Rail training 2020

Training needs and offers in the European railway area the next 10 - 15 years

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1. Introduction

European railways are facing fundamental legal, technological, demographic and market changes that the railways need to deal with in the coming years. The main changes include:

- Introduction of *new European legislation* that, among others, promotes cross-border interoperability and common standards in the railway sector requiring training of staff in the new legislation.
- *Technological developments* affect the professional requirements related to the operation of trains and networks as well as the maintenance of rolling stock and infrastructures.
- The *demographic situation* in railway undertakings implies that a significant number of railway staff have to be replaced in the coming years creating a need to recruit a considerable number of staff for the railway sector.
- *New railway undertakings are emerging* as a result of the opening of rail markets. These undertakings require access to training facilities that provide the necessary professional training. However, new undertakings do not necessarily have access to their own training facilities and therefore need to buy training services on the market – either from other railway undertakings with their own training centres or from independent rail training centres.

Such changes create a 'skills gap' that European railways need to bridge in order to stay in business.

However, there is a lack of knowledge about future training needs, i.e., what types of professional skills will be needed in the coming years. Furthermore, the availability of training services that could help bridge the skills gap in the railway sector has not yet been investigated at a European level.

The lack of such vital knowledge forms the background for this study on training needs and offers in the European railway area. Accordingly, the purpose of the study is to produce:

- An analysis of existing rail specific training services
    - Inventory and analysis of existing offers of services related to training activity in the rail sector
    - Assessment of accessibility for new market entrants to rail training services

- An analysis of training needs until 2020 deriving from
    - Technological changes
    - Legal Changes
    - Market Changes (structural and demographic)

- An evaluation of current and expected future market for training services and assessment of the need for action

Figure 1.1: Rail training centres

This study addresses both vocational and academic training at European and at national level. The study is confined to professional skills and training related to the operation of railways. The geographical coverage is all EU Member States with a railway system as well as Bulgaria, Romania, Norway and Switzerland.

1.1. *Background*

For the past 30 years, the European railway sector has been in a state of decline: Rail's modal share of freight transport fell from 21 pct. in 1970 to 8 pct. in 2002. During the same period, the modal share of passenger transport dropped from 10.5 pct. to around 6 pct. In contrast, rail transport is currently flourishing in the US accounting for 40 pct. of total freight. The example from the US shows that the decline in the rail transport sector is not inevitable.[1] However, there is an urgent need for action in order to revitalise the European rail sector.

Changes in the regulatory framework

The European Union has taken several steps aimed at revitalising the European railway transport sector and making it a viable and attractive alternative to other modes of transport. The first step was taken with Directive 91/440/EEC regarding the development of European railways. It introduced the principle of decoupling network management from transport service activities. The 1996 White Paper on rail transport laid down several principles to guide policy actions and make the European railway sector more competitive and attractive. Furthermore, the issues of licensing, infrastructure management, and interoperability were addressed through Directives 95/18/EC, 95/19/EC and 96/48/EC (EIRO 2005).

A major step was taken in 2001 with the White Paper *European transport policy for 2010: time to decide*. The White Paper proposed three types of measures to revitalise the railways:[2]

[1] European Commission, *WHITE PAPER - European transport policy for 2010: time to decide*, 2001 http://ec.europa.eu/transport/white_paper/documents/doc/lb_texte_complet_en.pdf

[2] European Commission, *Towards an integrated European railway area* (COM(2002)18 final), 2002 http://eur-lex.europa.eu/LexUriServ/site/en/com/2002/com2002_0018en01.pdf

- Putting in place a fair system for charging for all modes of transport to reflect the full value of the most environmentally friendly modes
- Continued development of the trans-European transport network, giving strong priority to rail and concentrating on removing bottlenecks and adding new major railway projects to the list of priority projects
- Constructing a legally and technically integrated European railway area.

The 2001 White Paper was followed by the adoption of a legislative package consisting of three directives on rail interoperability and rail infrastructure. A second legislative rail package was adopted in 2004. This package provided for full open access to all kinds of rail freight services, a common approach to European rail safety, extending the scope of interoperability to cover the entire rail network and the setting up of a European Railway Agency (ERA) in Valenciennes (France) entrusted with the task of driving forward the technical implementation of the EU safety and interoperability approach.[3]

Third 3 railway package has just been adobted in 2007 and contains:[4]

- a further opening of the market for international passenger transport by rail
- a regulation on the rights and obligations for passengers in international rail traffic
- a regulation on rail freight quality
- a directive for train driver licences (common licensing regime).

Harmonisation of staff requirements

The creation of a European Railway Area through the integration of national rail systems is based on increased interoperability. However, interoperability is not only a technical issue, but also a question of ensuring that cross-border operations are not hampered by diverging national staff requirements and standards necessitating changing train drivers and crew every time a train crosses a border. The European train driver-licensing regime is thus an important step in facilitating cross-border operations.

In 2002, the training and staff requirements for different categories of railway staff involved in cross-border operations were analysed and assessed in a study commissioned by the European Commission (the Atkins study).[5] The study presented a range of recommendation. These recommendations point toward a need for harmonised minimum requirements for railway staff involved in cross-border operations and a common training approach in those cases where systems and rules are harmonised at the European level.

Current situation and future challenges

Full market integration has been achieved as yet and barriers to market entry have only been eliminated to some extent. The study Rail Liberalisation Index 2007 describes the status of

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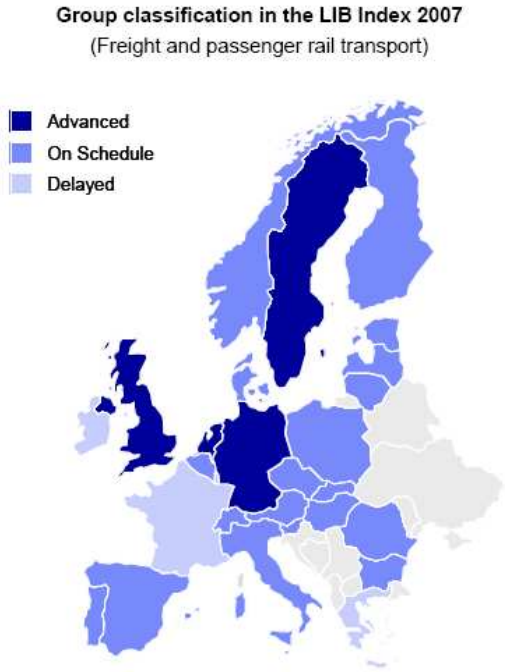
[3] Scherp, Jan, *Rail (de-)regulation in EU Member States and the Future of European Rail*, 2005, http://www.cesifo-group.de/pls/guestci/download/CESifo%20DICE%20Report%202005/CESifo%20DICE%20Report%204/2005/dicereport405-forum5.pdf

[4] European Commission, *Further integration of the European rail system: third railway package* (COM(2004)140 final), 2004, http://eur-lex.europa.eu/LexUriServ/site/en/com/2004/com2004_0140en01.pdf

[5] Atkins, *Training and Staff requirements for Railway Staff in Cross-border Operations*, 2002, http://ec.europa.eu/transport/rail/research/doc/atkins-final_report.pdf

market opening in the European rail markets of the enlarged EU, Norway, and Switzerland. The complete study can be found at www.db.de/liberalisation-index.



Source: IBM Business Consulting Services and Kirchner, Rail liberalisation index 2007

According to the study published 17 October 200, all the countries examined have continued to open their rail markets since 2004 and the gaps between them are now much smaller overall. But the access conditions vary between the countries – even between the countries most liberalised. The Index divides the countries into three groups:

- **The advanced group** of Great Britain, Germany, Sweden and the Netherlands, who have made considerable progress in terms of the degree of market opening compared to other European Countries. Worth noticing however is, that the four countries have chosen different approaches to liberalisation and as a result differ in particular in terms of the practical and legal access regime for public service contracts and purely commercial transport in passenger transport, infrastructure charging system, the powers of the regulatory authority and the organisational structure of the incumbents.
- **On Schedule** is a group of countries, which are currently going through a process of dynamic liberalisation.
- **Delayed** countries are countries where legal and practical market entry barriers are the highest on a Europe-wide comparison.

In general the Rail liberalisation index 2007 finds that

- **Freight transport**. Market access is possible for freight transport companies in all the countreis – but the access conditions can be very restrictive in some countries. In most countries foreign railway undertakings are licensed and involved in freight transport.

In spite of EU law which grants freight transport companies open access six countries still have restrictions.

- **Passenger transport.** The situation in passenger tranport are more varied: In some countries external passenger railway undertakings are refused access to markets in other countries several external passenger railway undertakings have operated successfully for a long time.
- **The practical process not well understood**. Rail regulation varies between countries and some have only adopted EU regulation on paper. The practical process is not as well understood as the legal requirements and often the regulatory authorities doesn't have the competences or capacity of granting network access to external railway undertakings. The advanced countries being the exception.

Consequently, the European Commission still faces important challenges that need to be dealt with in the coming years. Scherp (2005) point out the following major challenges:

- Ensuring open and competitive rail service markets
- Bringing down market entry barriers and systems costs
- Making swift progress towards a European network integration
- Successful delivery of a sustainable financial restructuring

The SERVRAIL study from 2006 has assessed the present and likely future conditions of providing rail-related services. The study looked into the current and likely future conditions of providing rail related services such as maintenance, traction, shunting, and terminal services and look at the legislation that has been put in place in Member States as well as Norway, Switzerland, Bulgaria and Romania. According to the report, open access to rail related services is far from being achieved in most Member States. The report was made on behalf of the European Commision.

1.2. *Overview of the report*

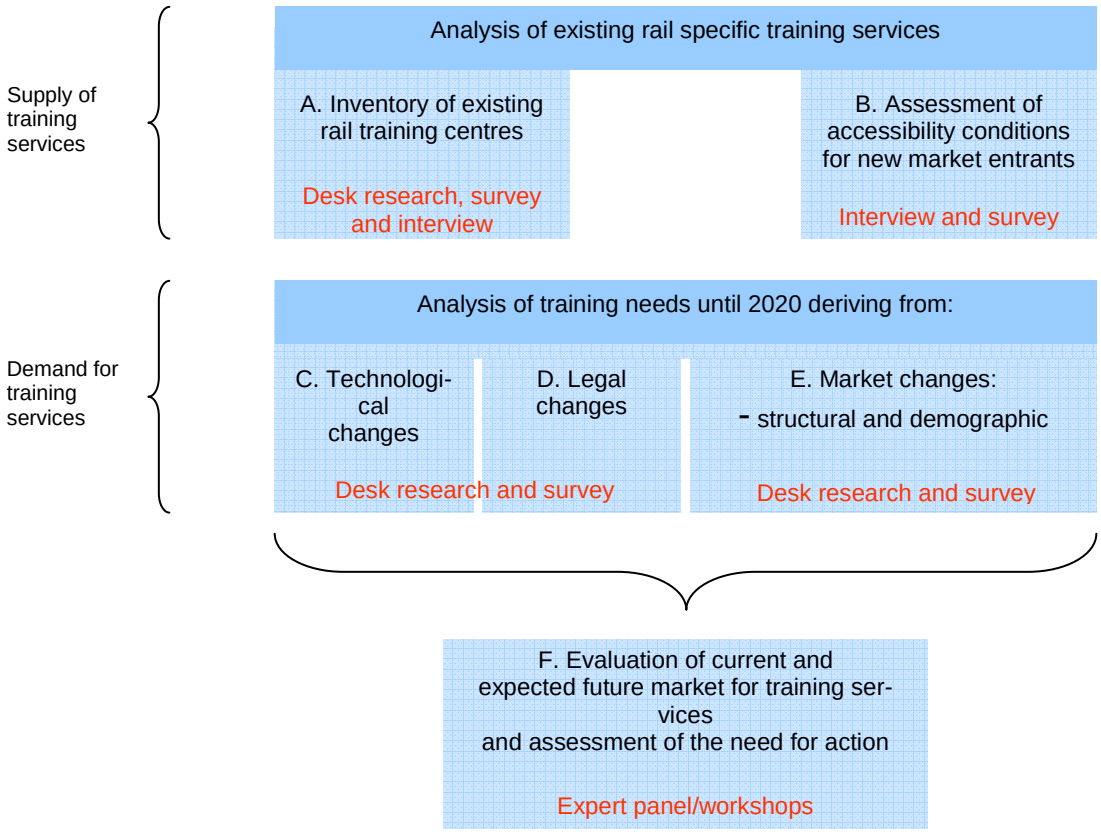
The report follows the workflow of the project.

Chapters 2 and 3 offers an analysis of existing rail training services. In chapter 2, we examine the existing rail training services through an inventory of rail training services across Europe. The inventory offers a snapshot of the status quo in European rail training. In chapter 3, we take a further look into the accessibility conditions for new market entrants.

Chapters 4, 5, 6, 7 looks into the technological (4), legal (5) and market forces (6) which can be expected to influence the demand for future training services. The chapters are based on desktop studies of existing reports and data and questionnaires among all known European rail operators and training centres. Chapter 7 supplements the findings with interviews with selected railway organisations.

The findings in chapters 2 – 7 were discussed and reflected upon in an expert workshop held in Brussels in June 2007. As a tool for discussions at the workshop a set of future scenarios were developed by the consultants. The scenario and the workshop s are presented in appendix 1- 11.

Figure 1.3: Overview of analysis, overall workflow



1.3. *Executive summary*

Demands for new skills and competencies in European railway towards 2020

The European railways are facing fundamental legal, technological, demographic and market challenges in the years to come. Often theses challenges will require that the railways' workforce acquire new competencies and skills.

The overall task of this study was to assess the availability of training services in the European railway industry and to identify future training needs and potential skills gaps towards 2020.

The study examines existing specific rail training services in the EU member states as well as those in Norway and Switzerland. The study maps more than 100 training facilities across Europe and looks into the training facilities and requirements for train drivers and other personnel related to railway operation. All known training centres and railway operators in Europe were contacted with questionnaires.

Currently the existing rail training centres in Europe train an estimated 11,000 train drivers and around 20,000 other rail related staff a year. In comparison, the European railway sector employs more than 900,000 people.

The training facilities has the overall capacity

The training facilities appear to meet the future with confidence with regard to their capacity for meeting the demand of materials and facilities. The challenge is to hire enough qualified trainers and, in the face of demographic changes, to recruit sufficient new staff. In a time with a shortage of train staff, potential trainers may be required to – or prefer to – operate trains rather than teach in a training facility. The survey cannot predict occasional or national bottlenecks in capacity, and bottlenecks may occur during periods of technology transition or opening of new markets.

Both training centres and rail operators expect an increase in the demand for training towards 2020

The main challenges

The study covers a large number of challenges with consequences for the future of rail training in Europe. These challenges can be summarised in the following headlines:

- **Liberalisation will change the demand for training** reflecting the changes in the number of operators in the market. The challenge to training centres will be to adapt to market change, and new independent training centres may turn up in the market as new competitors. Simultaneously, many facilities expect to open up to serving the needs of more operators. This process will be eased by a high degree of harmonisation and standardisation in the required competencies. New technologies, such as the use of training simulators, could increase the volume in some training centres.

- **Internationalisation requires different and new skills.** Historically the railways are national – but as standardisation and harmonisation of systems increase, the demand for competencies for cross-border operations also increases. The demand for foreign language proficiency will be one of the major challenges for rail training because different languages along a railway route are a serious obstacle to international railway operation. There is no consensus in the railway sector on how to deal with this obstacle.
- **Technical harmonisation and new technologies increase operability.** Many of the technical harmonisations needed for increased competition and cross-border operations are already being implemented in the political process. This means demand for retraining existing staff and teaching different skills in the transition period. One challenge in the period will be to offer training in several technical systems simultaneously. An obstacle may be lack of capacity to train new staff and update existing staff. Careful planning in the logistics area is needed if bottlenecks are to be avoided. At the same time, new technologies could reduce the demand for new staff and thus reduce the demand for training.
- **The demographic challenge and new thinking**. The changing age profile of the European population means that the workforce is shrinking in many countries and at the same time a job in the railway sector may no longer be as attractive. This creates challenges for operators as well as training centres. For training centres, the challenge is to adapt the training schemes to accommodate, i.e., new job profiles with a different mix of competencies, lifelong learning, or specialisation.

Summary of recommendations

These challenges can be met in number of ways, and the Commission's work to develop uniform criteria for vocational competencies and the adoption of a European qualifications standard is already a significant.

However, this study recommends a number of additional actions such as the creation of an international database on training requirements and national information points because railway operators report problems in accessing legal requirements concerning rail staff in foreign countries.

Another important recommendation to the Commission is the kick-start of a European network of training centres, which could take be based on the small network that the UIC has already created.

Finally, special attention must be paid to the language problem where almost any solution will have consequences for the training of railway staff.

2. Inventory of existing rail training centres

The existing rail training centres in Europe educate and train approx. 11,000 train drivers in 2007 and train approx 20,000 other rail related staff. Most training facilities are owned and run by rail operators. However, in general training centres are increasingly facing competition and opens up to other operators. Rail training is mostly a national business. Operators and training centres expect a rise in demand for training of rail staff.

Traditionally, train drivers working at the steam railway worked their way up through the railway hierarchy. They started as boys with engine cleaning or assisting the boiler-smiths. Working their way up from engine cleaner to fireman to train driver there was no formal training, but examinations had to be passed. The route to becoming a 'top link' express driver would take the better part of a career. With the advent of diesel and electric traction, formal training courses were introduced and with that a faster career path as a train driver. As observed on the railway register homepage: "It's strange that in the space of thirty years we went from a situation where new train drivers were highly experienced but had no formal training to one where we have formal (and often very good) training but the newbie can have almost no experience."[6]

Nowadays admittance to training includes both psychological and physical assessment, and the training involves knowledge of rules and regulations, safety procedures, knowledge of traction and train handling, as well as knowledge of routes.

This study looks into the training facilities and requirements for train drivers and other personnel related to railway operation.

For the questionnaire design and for the inventory we chose to use the personnel categories used in the Atkins study as they cover the relevant types of staff in a meaningful way:

- Train drivers
- Other onboard staff responsible for train and passengers safety
- Staff responsible for rolling stock inspection
- Staff responsible for assembling trains
- Staff responsible for dispatching and control-command

In the following, we will draw up an inventory of European rail training centres. The inventory is mainly based on the results of a questionnaire which has been sent to European rail training centres. It also includes a few case studies to illustrate innovation or different forms of organisation of the European train services.

In the text we will be considering rail training centres, activities or facilities, without differentiating between different types of organisations such as a rail operator with training facilities, an infra structure manager with trainees, and an independent rail training centre.

[6] www.railwayregister.care4free.net/becoming_a_train_driver.htm

The inventory covers the following issues:

1. The coverage of the survey
2. Ownership and organisation
3. Overall educations offered
4. Admittance to the training
5. Duration of the training
6. Content of the training
7. Training facilities
8. Graduation and estimating capacities
9. The price of education
10. Who pays?
11. Competition between centres
12. Internationalisation
13. Challenges ahead

2.1. *Inventory of existing rail training centres*

2.1.1. The survey cover 25.27% of the rail training market in Europe.

The railway sector in Europe employs roughly 900,000 people. In 2006 the *EU Energy and Transport in figures – statistical pocketbook*, DG TREN 2006 reported 911 848 people employed in the EU25.

This analysis looks into the training facilities for a large proportion of this staff. The analysis is build on questionnaires send to all identified rail training centres in Europe and to all European railway operators, who are in many cases responsible for training or part of the training of railway staff. For a complete list of identified and training centres contacted by us, please see chapter 11.

The analysis of the inventory is based on 32 completed or partly completed questionnaires from European railway operators and training centres. The 32 cases in the material mean that the survey data on rail training centres covers an estimated 25.17% of the European rail training market. Please refer to the chapter on methods in the end of this report to see the calculations and assumptions behind calculation of the market coverage.

The coverage is uneven across Europe. As is seen is table 2.1, we do not have questionnaires from all countries, we do not have all operators or training centres in the countries and we do not know the exact market share for all of those we have a received a filled questionnaire from.

On the other hand information have come in from old member states and new member states and from all training facilities and rail operators in passenger and freight markets as well as conventional and high-speed trains. Information has come in from small companies and national companies and from companies operating on very competitive markets and companies operating on not so competitive markets.

The representation of companies is very wide across the European railway sector and we have not been able to identify any patterns in the non-response to indicate a bias in the data. Had

we missed all large companies or all freight companies or all companies from the new member states we might have a suspicion like that towards the figures.

Thus, we feel confident that the 25,17% coverage of the market gives a realistic and plausible picture of European rail training and it allows us to give some estimations. In interpreting the figures and numbers on the following pages it is important to realize, that what we give is primarily a European overview. Only in a few tables do we provide data on specific nations since the data does not allow drilling down to a national level, i.e. in the UK we have only three responses from a population of more than 25.

Table 2.1: Number of answers and sum of estimated percentages of market shares

Country	No of organisations with filled questionnaire	Estimated percentage of market share				
		Train drivers	Other on-board staff	Staff rolling stock inspection	Staff assembling trains	Staff dispatching and control-command
Austria*	1					
Bulgaria	1	90				
Czech Republic*	1					
Denmark	3	91		1	1	1
Finland	2	100	100	100	100	100
Germany	9	5	1	7	0	30
Italy*	1					
Latvia	1	40	50		40	
Netherlands	2	100	95	100	80	90
Norway	3	100	11	50	51	100
Portugal	1	0	0	50	30	20
Slovenia	1	100	100	100	100	100
Spain	1	100	100	70	0	0
Sweden	1	35				100
Switzerland*	1					
United Kingdom*	3					

* Note: 17 of 15 organisations answered the questions on market share. * indicates that organisations from that country have not answered this question.

2.1.2. Ownership and organisation

We expected to find both training activities owned by Governments and privately owned training activities. Across Europe, we find about 50% government owned and 50% privately owned. However, the survey also shows that the mix varies from country to country.

In the Czech Republic and Slovenia, ownership is mixed. In Denmark, Norway and Germany both private and public training facilities exist. Even if the training centres are owned by different organisations, the education and training itself can still be shared – e.g. theoretical education at a government owned school and the practical part of with the rail operator.

Table 2.2: Ownership of training facilities

	Government or a public authority	Privately owned	Other	Total
Total	15	14	2	31

We asked the training centres about the primary objective of their organisation. Most training centres are placed in relation to an infra structure manager (13%) or a railway operator (41%). Only 16% have no other objectives than training rail staff.

Another observation from the survey is that the railway sector is a highly specialized (or isolated?) educational sector. Only 13% of the training facilities are found in institutions with a wider educational purpose. In Denmark, rail training is now placed within an independent government institution. This institution is related only to training railway staff and not to other types of education. See the case of establishing independent rail training centres in the box below.

Table 2.3: Rail training takes place in many different kinds of organisations. What is the primary objective of your organisation

	Rail training takes place in many different kinds of organisations. What is the primary objective of your organisation?					
Are the training activities at your centre	**General education with more than rail-related education offered**	**Specialised rail education only with no railway operation**	**Railway operation organisation**	**Rail infrastructure organisation**	**Other**	**Total**
Independent from any railway operators?	3	3	3	3	3	15
Owned by one railway operator?	1	2	8	0	1	12
Owned by two or more railway operators?	0	0	1	0	0	1
4. Other…	0	0	1	1	1	3
Total	4	5	13	4	5	31

Independent rail training centres

Traditionally, the railway sector in Denmark was dominated by one state-run company (DSB), which was responsible for all parts of the production with no competition. Ten years ago, a major restructuring of the railway sector was initiated with the aim of creating a more effective railway sector by introducing competition in as many areas as possible. Following a number of successive measures over the last ten years the market has opened up ensuring the possibility of competition for both passenger and freight rail transport.

As a consequence, the training of train drivers has also changed in the last ten years. Previously, DSB decided the content of the curriculum and was involved in training all the train drivers for rail transport in Denmark. When the market opened up for other operators for passenger transport in 2002 DSB was still training all the train drivers. This became a problem in 2003 when Arriva took over the passenger transport in parts of the country.

"DSB was training and investing money in train drivers who might then choose to take up an offer of employment with a competing company," says Frank Skadhauge, Head of Education and Training, CPH West

Consequently the responsibility for training train drivers changed as of 1 April 2005 from being DSB's responsibility to being under the full responsibility of the Ministry of Education in cooperation with the Ministry of Transport, which determine the course content and structure.

"The fact that two ministries are involved in decision making processes for the education of train drivers can cause a conflict of interest. But this is probably just because we are in the initial stages. In the long run, it seems like the best solution," says Frank Skadhauge

The Ministry of Education also determines what the student intake should be every year, taking into consideration the projected needs of the rail operators. Furthermore, the Danish Railway Association is involved in the decision making process. In Denmark the current annual intake is about 200-240 students, but this intake could change in the future due to the opening up of the market.

"It might be more difficult in future to predict rail training needs, as they become more specific according to who wins the tenders. If for example a German company wins the tender for Kystbanen, we will need to retrain German train drivers so they have knowledge of the Danish safety systems, infrastructure, not to mention that they need to know the language.", says Frank Skadhauge.

The theoretical part of the education takes place at one of the two rail training centres in Denmark, whereas the practical part of the training takes place at the different operators. The education and training is conducted exclusively in Danish, which means that there are implicit barriers for educational mobility, since anyone wanting to learn to drive a train in Denmark must master the Danish language.

Sources

Interview with Frank Skadhauge, Head of Education and Training, CPH West.
Source: Homepage of the Danish Ministry of Transport: http://www.trm.dk/sw60657.asp
Source: Danish Ministry of Education: http://www.retsinfo.dk/DELFIN/HTML/B2005/0019105.htm

2.1.3. Overall education offered

The training centres have a wide variety of educational offers. More than half of the centres and facilities offer the complete education necessary to become a train driver. If we only look at the centres which offer the complete education necessary to become qualified, then 44% of the rail training centres offer courses for only one kind of staff

Table 2.4: Education offered for different types of staff (Percent)

	Full education and training	Parts of the education and training	Supplementary courses	No theoretical or practical education, training or courses
Train drivers	57%	47%	43%	7%
Other on—board staff	47%	10%	33%	3%
Staff responsible for rolling stock inspection	40%	24%	30%	7%
Staff responsible for assembling trains	43%	13%	17%	10%
Staff responsible for dispatching and control – command	40%	17%	17%	7%

Note: Calculated in percent of total. More answers possible - no summing to 100 percent.

Most training centres have some form of cooperation with external organisations concerning education and training of staff. Cooperation is a rather encompassing term, which could mean everything from development of curricula to cooperation on training i.e. trainee periods with a railway operator. The big clients are not surprisingly the operators with the most volume in trains, i.e. freight and passenger rail operators.

Table 2.5: Do you cooperate with an external organisation concerning the education and training of rail staff

	Frequency	Percent
We cooperate with external training centres	6	20.0%
We cooperate with external rail operators	16	53.3%
No	7	23.3%
Don’t know	1	3.5%
Total	30	100.0%

Table 2.6: What are the types of clients served (more answers possible)

Clients	Count	Percent
Freight trains, line haul operators	24	80.0%
Freight trains, shunting operators	23	76.7%
Conventional passenger train operators	24	80.0%
Infrastructure managers	16	53.3%
Maintenance trains companies	14	46.7%
Light rail, metro or tram operators	8	26.7%
High-speed trains operators	11	36.7%

2.1.4. Admittance to the training

The admittance to rail training seems to be rather unhindered – but only few respondents have answered the question.

About one out of four rail training centres are exclusively for train drivers of one specific rail related company. Control-command staff are mostly (60%) trained in relation to one operator.

Another important observation is that only a few rail training centres do not require applicants to be employed by a rail company. Compared to the rest of the education and training market it is rather unusual that the applicant must already be employed by a company before he can be admitted to training and education. The combination of theoretical training and practical training implies close coordination between operators and training facilities – but not a close link between employment and training.

The close link between employment and training is probably explained by in part as a tradition in the railway sector and in part as a function of different national vocational training systems. The benefit of the close link is that schools and training facilities can have better knowledge of the demand and need for training of new staff. And the students have a job once they graduate.

Table 2.7: Who is admitted to attend the training (Percentage per staff category)

	Only employees of one rail related company	Employees of *any* rail related company	Employment at a rail company not required	Not relevant
Train drivers	26,9%	46,2%	23,1%	3,8%
Other on—board staff	33,3%	38,9%	111%	16,7%
Staff responsible for rolling stock inspection	38,9%	38,9%	16,7%	5,6%
Staff responsible for assembling trains	33,3%	44,4%	11,1%	11,1%
Staff responsible for dispatching and control – command	60,0%	33,3%	6,7%	

Note: Only valid answers counted. Six were left uncompleted for train drivers – 17 or more than half for control- and command. Most probably because the category of was not relevant to them – even though "not relevant" could be ticked in the questionnaire.

We have asked the training centres how many different railway operators they have served in the past and how many they estimate they will be serving in about 10 years. The clear picture is that for all categories of staff many more operators will be served in the future than in the past. This clearly indicates that the centres are expecting a change towards serving a wider audience in the future. This is especially true in Germany. Because of the low response rate, the numbers are relatively sensitive to fluctuations or outliers representing unique circumstances, such as the high number of rail operators supplied with train drivers in 2006.

Table 2.8: How many different railway operators have received or will receive graduates from your training facilities (*adjusted sum of all answers)**

Categories of staff	No. of rail operators		
	1996	2006	2016
Train drivers*	21	84	112
Other on—board staff	22	98	72
Staff responsible for rolling stock inspection*	42	54	49
Staff responsible for assembling trains*	14	47	76
Staff responsible for dispatching and control – command*	16	52	170

Note: The figures have been adjusted to exclude outliers. The adjusted figures illustrate the tendency. However, the fluctuations for individual training centres and countries can be quite high:

Train drivers. The figures that have been removed are one German facility serving 150 operators in 2006 – and none in 1996 and 2016, and another one serving 80 in 2006 and 1 in 1996 and 3 in 2016.
Rolling stock inspection: In Portugal none were served in 1996, 102 in 2006, and 150 were expected in 2016.
Assembling. In Portugal the figures were 0 in 1996, 57 in 2006 and expected to be 100 in 2016.
Control – command. In Portugal the figures were 0 in 1996, 232 in 2006 and expected to be 300 in 2016

Training future railway leaders

The NR Graduate Scheme is aimed at graduates interested in becoming the future leaders of NR. The GS is designed to progress people to middle management positions quickly and is therefore primarily intended for those looking for their first job after graduation. Six schemes are available: civil engineering, mechanical engineering, electrical engineering, commercial property, finance and general management.

The NR Graduate Scheme for the engineering stream is a training programme allowing students to become professionally qualified as engineers. NR aims to recruit approx. 60 graduates for the scheme. The engineering programme takes 18 months to complete and includes personal skills training, technical training and work-based placements. Applications for the engineering stream of the GS are accepted from students studying any engineering degree (2:2 or above) which is accredited by the IET, the IMechE or the ICE regardless whether there is little subject correlation with the railway industry.

The 2-year general management programme starts with a 6-week intensive induction programme, followed by work placement for 9 months. At the end of the work placement, the graduate starts his first position, which must be held for at least 1 year before a career move is agreed. A graduate with a business or management degree is preferred for this programme, although anyone with a degree can apply (2:2 or above). NR recruits applicants for the Graduate Scheme at Careers Fairs held at select universities throughout the country.

NR Graduate Scheme; enquiry@networkrailgraduates.co.uk

Source

Source: http://www.networkrail.co.uk/aspx/1092.aspx and Network Rail FAQs on the same page

2.1.5. Duration of training

The duration of training for railway staff varies considerably. We have examples of courses for train drivers lasting 160 weeks – or in excess of three years. Typically, the training offered by the training centres for train drivers lasts up to a year and training for other categories of staff up to half a year. Nevertheless, depending on the trains, the complexity of the safety measures, signalling, command, etc., there is bound to be great variation in the duration of the education and training programmes. Finally, the different national vocational training systems and practices probably explain a large part of the variation in the duration of the training. There will of cause be differences in short term modules compared to a full vocational education.

Table 2.9*:* Duration of the typical rail training measured in weeks (mean of all answers)

	Average number of weeks		
	Minimum	Maximum	**Longest**
Train drivers	23	41	160
Other on—board staff	5	15	160
Staff responsible for rolling stock inspection	4	17	150
Staff responsible for assembling trains	4	17	160
Staff responsible for dispatching and control – command	10	18	58

2.1.6. Content of the training

Some of the offered training is highly specialised and is only valid for one operator. This is true for 20-30 percent of the training centres. A relatively high percentage – especially among train drivers – receives an education that can be used with more than one operator at a national level. General training at an international level for cross-border operations is relatively rare. Most of the training offered – regardless of the type of staff - has a large percentage dedicated to practical training, i.e., 40% - 60%. In most cases, practical training takes place in cooperation with a rail operator. On average, the train driver undergoes the most training, lasting nearly a year, with a combination of theoretical and practical training.

Table 2.10: Which description describes the training best (column percentage calculated)

	Train drivers	**Other on-board staff**	**Staff rolling stock inspection**	**Staff assembling trains**	**Staff dispatching and control-command**
High specialisation – education/training is only valid for one specific operator	16.7%	21.7%	33.3%	21.7%	30.4%
General on a national level for more than one operator	60.0%	39.1%	25.0%	43.5%	39.1%
General on an international level for operators across borders	13.3%	8.7%	25.0%	4.3%	4.3%
No education offered	10.0%	26.1%	12.5%	21.7%	26.1%
Don't know		4.3%	4.2%	8.7%	
Total	100,0	100,0	100,0	100,0	100,0

Table 2.11: Division between theoretical and practical training measured in hours of training
(mean of answers)

	Theoretical training in hours (mean)	Practical training in hours (mean)	Practice in%
Train drivers	584	589	50%
Other on—board staff	337	324	49%
Staff responsible for rolling stock inspection	144	97	40%
Staff responsible for assembling trains	317	370	54%
Staff responsible for dispatching and control – command	238	331	58%

Bridging the skills gap – Partnerships between universities and private enterprises

Maintaining and improving Britain's rail infrastructure requires over 600 new engineers and technicians every year. With fewer students enrolling in engineering courses every year, what is needed to fill this skills gap is knowledge which is specifically targeted towards the railway sector.
To fulfil this demand, Network Rail and other organisations in the rail industry with responsibility for track renewals and maintenance joined forces with Sheffield Hallam University in September 2004 to offer several unique training and development initiatives, with the purpose of delivering industry focused courses at a high level. One of these is the Foundation Degree in Railway Engineering, which is suitable for people already employed within the rail industry and for those who wish to enter a career within rail engineering.

"The Foundation Degree course was developed by organisations in the rail industry who realized that they needed to build up a centre of excellence in railway engineering," says Sarah Bardell, Foundation Degree Manager, Network Rail.

The course offers a valuable combination of academic learning and workplace experience. Each year, the student spends the first seven months at the University. During the following five months spent in the workplace, the student rotates around the different engineering functions of the sponsor organisation, e.g. Signal Maintenance Engineering, Track Maintenance Engineering, Civil Engineering and Electrification & Plant Engineering.

"The course is specifically targeted towards training engineers for the railway industry. For example, signal engineering (electrical and electronic engineering) is taught from day one and where possible, the practical examples used in teaching, are taken from the railway engineering industry," says Sarah Bardell.

After successfully completing the Foundation Degree, students are often employed by their sponsoring organisations.

"Although we cannot guarantee these graduates a job, as we need to monitor their performance, from the first cohort, all except one were employed in the railway industry after finishing the course," says Sarah Bardell.

Another partnership between the Network Rail and Sheffield Hallam University is the conversion engineering programme which enables engineers from a non-railway background to make a transition to the railway industry. The programme is applicable for HNC/HND-qualified engineering managers who are used to applying engineering principles every day and who have at least 5 years engineering experience. The seven-month programme equips the engineer with a solid bank of railway-specific engineering experience, as well as leading to a highly regarded industry qualifica-

tion. The programme culminates in the achievement of a Postgraduate Diploma in Railway Infrastructure Engineering. The Engineering Conversion has three separate routes: Signal Engineering, Track Engineering and Electrification & Plant Engineering. Thus, civil or mechanical engineers become part of Network Rail's track maintenance and engineering teams, whereas Electronic or electrical engineers become part of Network Rail's signalling or electrification & plant teams.

Sources
http://www.networkrail.co.uk/aspx/1088.aspx
http://www.shu.ac.uk/courses/rail/
http://www.networkrail.co.uk/aspx/1096.aspx
Interview with Foundation Degree Manager Sarah Bardell, Network Rail, UK

2.1.7. Training facilities

The fact that a large variety of training facilities are offered during the training and that many training courses do not even require a classroom indicate that the levels of theoretical requirements are relatively low in some cases. The variety of the use of simulators, laboratories, training facilities in real life also suggest some rather advanced training setups. Nevertheless, it may be rather surprising to know that less than half of the respondents use rail simulation to train the train drivers. One of the users is Deutsche Bahn (DB) who reports on the advantages of using simulators for both training and re-training.

Table 2.12: What kind of training facilities are offered (Percentage of total answers)

	Classroom	Rail or train simulators on computers	Laboratories or models	Apprenticeships, on-the-job training	Closed, real life size training facilities	E-learning or self-study
Train drivers	78%	44%	19%	63%	22%	38%
Other onboard staff	47%	0%	13%	34%	6%	22%
Staff rolling stock inspection	50%	9%	3%	38%	6%	25%
Staff assembling trains	53%	6%	9%	38%	13%	31%
Staff dispatching and control-command	47%	25%	16%	34%	9%	28%

Use of advanced ICT in training in DB

Today's education and training of train drivers is increasingly carried out using advanced ICT, such as train-driving simulators. Simulators provide an ideal learning opportunity for prospective train drivers by exposing them to an array of possible situations in surroundings that emulate their future workplace.

The set up is a cabin equipped with a display, showing the view from a train cockpit, and a control panel equivalent to that of a given train model. Where some simulators are simply a control panel and a monitor set up in an office, more advanced models are closed cabins placed on hydraulic extenders, so the driver experiences all the physical sensations associated with a given manoeuvre, e.g. accelerating and braking or going round corners.

With new technology, entire journeys from one destination to another can be reconstructed, and situations can be presented which would be impossible to recreate with traditional video recordings. For example, some models can emulate driving in adverse conditions as well as day and night conditions with various degrees of visibility and track conditions. In others, the instructor can manipulate with the situation, introducing signal changes, vehicles crossing the line ahead, etc. at any point during the simulation, to prepare the future train driver for unexpected occurrences. Some of the modern train simulators are able to generate appropriate sounds, images, and movements in response to any action a trainee might perform. Here all instruments are controlled by computer to produce realistic real-time responses to the driver's actions.

Furthermore simulators can be used in training to handle malfunctions/incidents and operating sequences in hazardous situations. Other advantages of using train simulators in training rail staff are that they relieve the load of railroad traffic and reduce the need for operating driving school trains. By using simulators the quality of driver training can be enhanced while at the same time reducing training time and guaranteeing a constant high level of proficiency over the long term.

The German railways Deutsche Bahn (DB) has been using train simulators since 1996. Today, 17 full-mission simulators are situated on ten different training locations in different parts of the country, where the simulators are fully booked every working day of the week. At DB, the simulators are used for training and educating train drivers operating both S-Bahn BR 423/426, BR 101, ICE/ICT and IC3 trains, as well as freight trains BR 145, 152, 185 and 189. Some of the simulators are capable of being adjusted to represent several different types of trains and are used for conversion training (especially for the license to drive ICE trains).

The simulators are used for exam situations, for certifying train drivers and for training daily tasks. Every driver employed at DB must pass a one-hour assessment run on the simulator every year.

"Our experience with the simulators has been really good. It gives us the ability to simulate real events and tasks which are not possible to incorporate in a real-life test rail situation," says Mr. Siebler, Technical Adviser at Deutsche Bahn AG/DB Training.

These events could be the simulation of snowfall, mist, heavy rain, driving at night-time or responding to a car stopped on the opposite track. All of which are situations that the train driver needs to be trained to respond appropriately to, in order to be able to manage the situations, if they should occur in real life. Mr. Siebler also mentions the benefit of the simulations of the real train stations in the various German and other European cities allowing the train drivers to practice daily tasks, such as entering a given train station.

Sources

http://www.railway-technology.com/contractors/professional/dornier/
http://www.inrets.fr/ur/sara/oth_sim_e.html
Interview with Mr. Hermann Siebler, Technical Adviser at Deutsche Bahn AG/DB Training
Correspondence with Dr. Gotthif Walz, DB Training, Senior Sales Manager International Business

2.1.8. Graduation and estimating capacities

When comparing the five categories of staff, train drivers not surprisingly face the highest requirements to their skills and knowledge before they are able to qualify.

Table 2.13: What completion requirements do you use for graduation of students – more than one answer possible (Percentage of total answers)

	Specified number of practical hours completed	Specified number of theoretical hours completed	Series of examinations during programme	Final examination	No requirements
Train drivers	66%	59%	56%	66%	3%
Other onboard staff	28%	31%	34%	31%	6%
Staff rolling stock inspection	34%	34%	72%	38%	6%
Staff assembling trains	38%	34%	69%	38%	6%
Staff dispatching and control-command	38%	38%	25%	34%	3%

Table 2.14: The number of students graduated in 2006 – and expected to graduate in 2007- from training facilities (sum of answers)

	2006	2007 - estimate
Train drivers	3981	4644
Other on—board staff	521	705
Staff responsible for rolling stock inspection	2229	2343
Staff responsible for assembling trains	277	381
Staff responsible for dispatching and control – command	529	744

Note: Spain alone accounts for 3.000 and 3.500 train drivers in 2006 and 2007. About 2.000 of staff for rolling stock inspection.

In table 14 the ratio for graduates are calculated. I 2004, 52,484 locomotives and railcars were counted in Europe.[7] The number of locomotives and railcars is used as an indication of the relative size of the railway system pr. country. Table 14 indicates the stock of railcar and locomotives and the EU market share per country.

[7] The number of locomotives and railcars is taken from table 3.6.15 in The DG TREN, EU Energy and Transport in figures – statistical pocketbook, 2006.

Table 2.15: Calculating the market share and average ratio on the number of graduated train drivers in 2006.

	Graduated		Stock of locomotives and railcars		
	2006	**Adjusted number of graduates**	**Market share**	**Stock**	**Ratio**
Spain	*3000*	*3000*	3.674%	*1928*	*1.82*
Denmark	51	56	0.873%	458	0.12
Bulgaria	36	40	1,252%	657	0.06
Norway	78	78	0.396%	208	0.38
Holland	122	122	3.955%	2076	0.06
Finland	160	160	1.404%	737	0.22
Slovenia	78	78	0.520%	273	0.29
Latvia	30	75	0.716%	376	0.20
Sweden	53	151	1.185%	622	0.24
Market share (excl. Spain)			**10,30%**		
Average ratio (excl. Spain)					**0,20**

Not all training centres gave the number of graduating students for 2006, thus only countries with full information of number of graduating students and the market share are shown. A few countries gave a high percentage and these figures are adjusted to an estimated 100% level. Germany and Italy are left out since the market share of the training centres is not very high.

The ratio "Adj. number of graduates"/"Number of railcar and locomotives" is calculated. Most countries have a ratio around 0.20 – but Spain weighs in with a ratio of 1.82. It could be that the ratio in Spain is very different from other countries – or assumptions or the way of counting graduated students is very different. Thus in calculating a European ratio the figures from Spain is considered an outlier and left out of the calculation. This leaves us with a market share of 10% calculated on the share of railcars and locomotives. The average ratio is 0.20.[8]

The answers covers an estimated 10.30% market share of the training centres in Europe and a crude estimation of the European numbers can be calculated.

[8] The ratios are calculated on estimated 10% of the market share. The study covers 25.17% of training centres in Europe as calculated in the methods section. But for calculating the ratio we chose to use only the cases with the full information, because the numbers contains a higher reliability even on the 10% market share.. Using the 25.17% as the crudest possible number returns a ratio of 0.35. Also we are not calculating ratios for all categories of staff or with other estimations. It would of cause leave us with more ratios – but it would also postulate a level of precision in the calculation, which would be without solid foundation in the questionnaire. In interpreting the results it is important to be aware, that this is rules of thumb, only.

Table 2.15a: The estimated number of students who graduates in 2007 from European training facilities

	Estimated number of graduated students in 2007
Train drivers	11,104
Other on—board staff	5,873
Staff responsible for rolling stock inspection	3,329
Staff responsible for assembling trains	3,698
Staff responsible for dispatching and control – command	7,222

The estimated number of graduate students provides a rule of thumb of the number of railway graduates needed every year for running a certain number of locomotives and railcars on a railway in Europe. Table 2.15a shows a capacity and rule of thumb calculation for each category of students.

We have asked the training centres about the maximum capacity for training students in 2007 and in 2020 in their training centres, see table 2.16 Overall, the training centres expect a 13% - 25% increase in the number they can handle – at any one-time.[9] Most estimate that their capacity will increase, fewer that their capacity will decrease a little. The important conclusion is that an overall increase in the capacity of training centres is expected in the future.

We have also asked the *rail operators* how many employees they expect to need to train in the future. Half of the rail operators expect an increased need for rail training services. This is true for all categories of staff – except staff for rolling stock inspection.

This indicates a future increase in demand for training services.

More than 40% expect to handle the increased training needs in-house. 22% of the rail operators expect to have the training delivered by independent training centres. Only 3% answers "don't know" when asked how to meet the need for more capacity.

Table 2.16: What is the maximum capacity for students in your training facilities in 2007 and expected in 2020 (sum of answers)

	2007	2020	% Increase
Train drivers	1239	1556	26%
Other on—board staff	666	750	13%
Staff responsible for rolling stock inspection	728	826	13%
Staff responsible for assembling trains	485	575	19%
Staff responsible for dispatching and control – command	919	1071	17%

[9] The question "What is the maximum capacity for students in your training facilities? In 2007 and 2020" does not explicitly state – "at any one time". But based on an assessment of the answers most training centres have interpreted the question in this way.

Table 2.16a: Railway operators: In your opinion, will your company experience a lack of training capacity in the future

	Frequency	Percent
No, all training needs will be met	26	43
Yes, there is a need for increased capacity	30	49
Don't know	5	8
Total	61	100.0

Table 2.16b: Rail operators: If there is a need for increased capacity – where would this need to be met

	Frequency	Percent
Irrelevant. No increased capacity needed	13	22
In-house. We make our own training facilities	26	43
External. Training of staff is delivered by other rail-operator	6	10
External. Training of staff is delivered by independent training facilities	13	22
Don't know	2	3
Total	60	100.0

2.1.9. Who pays?

Many rail training facilities charge an equal price for their courses regardless of the rail operator served. Not all, however, as more than one out of four rail training centres has different prices for different rail operators.

The number of answers does not allow further analysis, but one plausible explanation of price differentiation could be that prices are based on quantity of courses, i.e. the more training education needed, the cheaper the price per graduate.

Table 2.17: Do different operators pay different prices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1. Yes	6	18.8	28.6	28.6
	2. No	15	46.9	71.4	100.0
	Total	21	65.6	100.0	
Missing	System	11	34.4		
Total		18	32	100.0	

Table 2.18: How are the training facilities financed (sum of answers)

	Paid by government	Paid by rail operators	Paid by students (tuition)	Not relevant/ missing
Train drivers	7	14	6	4
Other on—board staff	1	10	1	5
Staff responsible for rolling stock inspection	1	13	2	4
Staff responsible for assembling trains	2	12	-	5
Staff responsible for dispatching and control – command	2	12	-	2

Rail operators pay for most of the training and education, though some government payment and student tuition fees are seen. These factors are probably historically founded, where training was done on the job and only later formal training was applied.

2.1.10. Competition between centres

With the exception of Finland, Italy, Portugal and Slovenia almost all the training centres answered that they face competition to some degree.

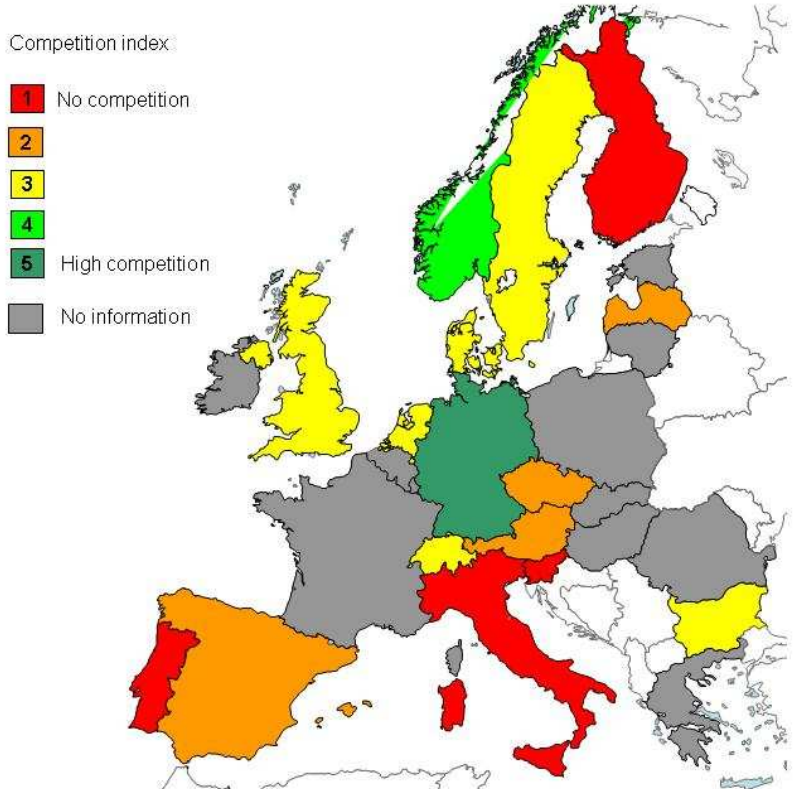
Table 2.19: Do you have competing training centres in your country

	Frequency	Percent	Valid Percent	Cumulative Percent
No, competitors – we are the only national training facility	4	12.5	14.8	14.8
Yes, just 1 other training centre	8	25.0	29.6	44.4
Yes, between 2 and 4 other training centres	6	18.8	22.2	66.7
Yes, between 5 and 10 other training centres	5	15.6	18.5	85.2
Yes, between 11 and 25 other training centres	2	6.3	7.4	92.6
Don’t know	2	6.3	7.4	100.0
Total	27	84.4	100.0	
Missing	5	15.6		
Total	32	100.0		

Recoding the “don’t know” and missing answers as “No, competitors” leaves us with an indicative competition index ranging from 1 = no competition to 5 = high competition. Schools within countries have reported varied levels of competion and in the index the highst reported number for each country has been applied.

Applying the calculated, indicative competition index on each country reveals rather large differences in competition levels in each country. It is important the the national figures are intrepreted with some caution because of the low response rates when the figures are split per country and small countries might appear as less competetive simply because they have fewer training centres than larger countries.

Figure 2.1: Indicative competition index for training centres per country
Indication of the competition from other national traning centres as percieved by the training centres



2.1.11. Internationalisation

Goods and passengers cross the European borders every day – by sea, air, road, and rail. Despite the huge international activity, the training centres appear to be very nationally oriented.

Many rail training centres are involved in some form of international cooperation – even though the activity seems to be rather limited. Compared to the 3,981 train drivers who are reported as graduated in 2006, the 78 foreign train driver students are not a very impressive as a measure for internationalization at the training centres. Scaled to a European level this means an estimation of approx. 310 foreign train drivers. We compared the answers from the training centres with the answers from the rail operators. The operators report that 1,223 employees attended training in a foreign country - or 1,936 when scaled to an estimated European level – better, but still not an impressive number considering that more than one million people are employed in the European railway industry.

Seven of the training centres offer education in a foreign language, twelve include cross-border operation in their training, and nine include rail operation in foreign countries.

A fair conclusion seems to be that more than half of the training facilities have some form of internationalisation – but none of the training centres who answered the questionnaire can be classified as an international training facility.

A few of training centres have engaged in international competition. However, most find it irrelevant and the main challenges are seen as problems recruiting qualified personnel, entering already established markets and handling foreign legislation.

Table 2.20: What kind of international cooperation on training of rail staff did you have in 2006 (sum of answers)

	Exchange of students	Exchange of teachers	Cooperation on educational programme	Contacts at managerial level	None
Train drivers	4	1	3	10	7
Other onboard staff	0	0	2	2	7
Staff rolling stock inspection	2	1	2	3	4
Staff assembling trains	0	0	2	2	6
Staff dispatching and control-command	0	0	2	2	6

Table 2.21: How many students from operators in foreign countries attended training at you facilities in 2006

	Total number of graduated students in 2006	Number of exchange of students	Percentage of exchange students
Train drivers	3981	78	2,0%
Other onboard staff	521	30	5,8%
Staff rolling stock inspection	2229	15	0,7%
Staff assembling trains	277	0	0,0%
Staff dispatching and control-command	529	20	3,8%

Table 2.21a: Rail operators: How many of your staff attended training in other countries in 2006

	Total number of staff
Train drivers	1223
Other onboard staff responsible for train and passengers safety	374
Staff responsible for rolling stock inspection	61
Staff responsible for assembling trains	13
Staff responsible for dispatching and control-command	32

Table 2.22: Degree of internationalisation (number of answers)

	Yes	No
Does your training include training in foreign languages?	7	20
Does your training include training in cross-border operations?	12	15
Does your training include training in rail operation in foreign countries?	9	18
No – to all of the above		12
Yes – at least one of the above	6	
Yes – in all of the above	4	

Table 2.23: Are you considering offering training in other countries

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes – we already provide training services in other countries	2	6.3	7.7	7.7
Yes – we are considering providing training services in other countries	2	6.3	7.7	15.4
No	16	50.0	61.5	76.9
Don't know	6	18.8	23.1	100.0
Total	26	81.3	100.0	
Missing	6	18.8		
Total	18	32	100.0	

Table 2.24: In your opinion, what would be the main barriers to providing training services in other countries? (sorted according to relevance)

	Very relevant	Relevant	Some relevance	Limited relevance	Not relevant	Don't know
It is difficult to find and hire qualified teachers	9	8	3	2	1	3
Railway operators want to use their own facilities	6	10	4	2	1	3
It is difficult to enter markets due to national regulation	8	7	4	2	2	3
Railway operators want to use companies they know well	5	8	7	2	1	3
It is difficult to se the market opportunities	2	11	8	1	3	1
It is difficult to find and rent relevant facilities	2	9	2	8	1	5
It is difficult to find get the good educational materials from industries	2	6	9	2	4	1

2.1.12. Challenges ahead

Even though international activities are limited at the rail training centres, many of the training centres are aware of the challenges ahead.

The respondents have evaluated a set of statements of the main challenges, and the main impression is that it is hard to identify strong agreement on what tomorrow's agenda will be.

That said, new regulation, environmental requirements, and internationalisation are seen as very relevant challenges by many training centres. Improving basic qualifications and standardising training to improve job mobility is on the agenda as well.

Table 2.25: What, in your opinion, will be the main challenges for your training centre in the coming years? Challenges sorted according to relevance to the centres.

	Very relevant	Relevant	Some relevance	Limited relevance	Not relevant	Don't know
We must improve basic qualifications of staff	7	9	7		3	1
We must offer new trainings due to increased internationalisation technical systems, languages, culture	8	8	4	5	1	1
We must adapt increased legislative requirements safety	7	9	5	3	1	2
In the longer run we must train staff according to international standards i.e. TSI	6	10	2	4	2	2
We must cooperate on international level to offer a full-package for the EU-market	3	11	5	1	3	6
We must train staff to meet environmental requirements	4	9	2	9	1	1
We must improve job mobility of staff between railway operators through standardised training	2	10	3	3	7	1
We must offer support for companies entering the national rail market	6	4	4	2	8	2
We must train more non-nationals due to increase in cross-border operations	2	7	7		8	2
We must adapt education to needs of ethnic minorities		3	7	8	7	1
We will be entering rail training markets in other countries		3	3	2	12	6

2.2. *Inventory of capacities at a glance*

- **Rail training is specialised.** The training of rail staff is usually handled within the railway sector itself. We have only one answer from the training facilities, i.e. from an institution with a general education purpose and not owned by a rail operator.

- **Rail training might be specialised – but it is not isolated.** Most training centres cooperate with external organisations
- **Rail training centres opening up**. Most rail training facilities seem to be admitting employees from several different rail companies. However, only a few have answered this question. One out of five rail training centres trains train drivers from one rail operator only. Other categories of staff are to largely trained exclusively for one operator.
- **Rail training centres will open more.** The training centres indicate that they expect to be serving a wider audience of rail operators in the coming years. This means that their training capacity might be utilised more effectively. This is especially true in Germany.
- **Most staff gets a general education.** 20-30% of the staff trained receives highly specialised training, which is only valid for a specific operator. Most of the training – especially for train drivers – is generally valid at a national level.
- **Training is both theoretical and practical.** All types of staff receive both theoretical training and practical training.
- **Train drivers receive the longest education** with an average of about 1000 hours of theoretical and practical training. Staff for rolling stock inspections receives the shortest education.
- **Rail simulators are not widely used in training.** Less than 50% of the training facilities have introduced the use of rail simulators in the training.
- **An estimated 11.000 train drivers were trained in 2006.** Based on the market share of each training centre, the number of graduated students at each training centre and the size of the market the number of graduated train drivers in Europe in 2006 can be estimated to 11.100 – other categories of staff can be estimated to about 20.100
- **Rail training centres expect a slight increase in capacity** and the operators expect an increase in demand towards 2020.
- **Training is paid by the rail operator.** Most training facilities are financed by the rail operator. Only in three instances are rail facilities paid by government.
- **Training centres engage in competition.** As illstrated by the competition index the picture is varied across the countriess. 4 centres reports to be the only national centres – but among those who reported back the majority are engaging in competion.
- **Training centres are national.** Many rail training centres report to be part of some form of international cooperation – and some have even trained foreign staff. Nevertheless, it seems fair to conclude, that training centres in general are nationally oriented.
- **Training centres disagree on future challenges**. When confronted with a set of challenges there is no clear agreement among centres upon which is the most important challenge – but more training centres see staff qualifications, internationalisation, legal and technical developments as challenges in the future.

3. Assessment of accessibility conditions for new market entrants

This chapter analyses the accessibility conditions for new operators entering the market: How often does rail operators tender for new markets? What prevents rail operators from tendering? How do rail operators access training facilities in new markets? The chapter explores the barriers to receiving or accessing training in the new markets and explains the underlying causes. It also examines and explains the challenges that both rail operators and training organisations perceive as important to their business in the next 10 -15 years.

The analysis concludes with some analyses of realistic hypotheses taken from the questionnaire replies and current literature concerning issues that will increase or decrease the need for rail training across Europe. A number of situations have been explored, some of which are more likely than others to happen, although all will have some affect on the development of a pan-European training market. All the situations are related to and predicated by a number of underpinning key forces:

- Liberalisation of the rail way (in the short term, 5-10 years)
- Extent and speed of internationalisation
- Following liberalisation, in the long term (15 years), a number of railway operating companies may rationalise to become one monopoly
- Extent to which rail operators use subcontractors
-

3.1. *Rail operators – demand for rail training*

3.1.1. Tendering for new markets

The questionnaire responses indicate that the majority of rail operators tenders for new railway operators on a regular basis. The respondents showed that, in 2007, 26% of the operators participated regularly in tenders for a railway operation. 22% of operators had tendered a ‘few times’ and only 10% of operators had tendered ‘only once’.

Figure 3.1: Percentage of railway operators participating in tenders for railway operations

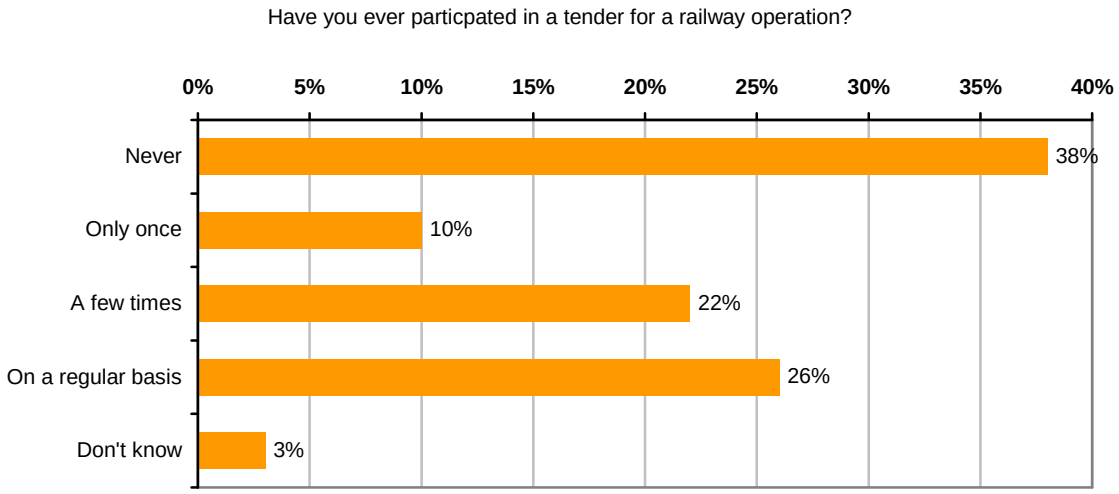


Figure 3.1 indicates that there is a certain amount of active tendering across Europe for new business currently. This means that there is a healthy amount of invitations to tender being put forward and bid for, although it does not address how many of these tenders are successful.

3.1.2. Increased number of competitors

The number of tenders is intrinsically linked to the number of rail operators in the market place. There are two possibilities about the nature of the causal relationship:

1. If there is a developed market place, it is likely that there will be national legislation insisting that individual rail operations have to be tendered. In this case, increased numbers of rail operators will increase the number of tenders.
2. If governments put forward competitive tenders (perhaps following liberalisation of the railway network in a country), then rail operators will see the opportunities and bid for new pieces of work. In this case, increased numbers of tenders will increase the number of competitive rail operator bidding for the work.

In several countries in Europe, there has been a process of reforms in the railway sector. In the UK, there has been radical liberalisation of the whole railway sector and a division of its functions and business areas into a large number of separate competing firms. In other countries (Denmark, Germany, Netherlands, Portugal, Sweden), a more cautious approach has been taken, with a step-by-step introduction of competition for the tracks, while the national railway has been kept more or less intact.

The questionnaire responses show that an overwhelming 66% of rail operators predict that they will have more competitors in the coming 10-15 years. It is not surprising that this increase in competition will lead to tenders that are more formal.

In order to overcome the financial and business difficulties of losing tenders, it appears that a greater number of operators are considering changing their operational area to tender for railway projects abroad. Other options include altering their mode of operation and switching into road transport. 62% of the operators responded that they expect to change their operational area (either geographically or mode of transport) in the next 10-15 years. This change is a result of increased internationalisation of the railway industry and would need to be supported by the reduction in legal restraints.

The expansion into foreign markets could happen in a number of ways:

1. Direct expansion into another country
2. A subsidiary company or sister company
3. Forming a coalition of smaller railway operators to jointly bid for a tender overseas

At the moment, approximately half of the respondents (48%) replied that they operate in other European countries (directly, through subsidiaries or sister companies). If liberalisation occurs in currently nationalised countries, then in the short term (10 years) there is likely to be an increase in the number of smaller privatised rail operating companies bidding for new pieces of work. Following this fragmentation of the industry, there may be a number of small, separate operators joining together to bid for large tenders, which may be in foreign markets. In

other words, it could be expected that in 20 years time many more than half the respondents operate in other European countries.

There are already examples of how groups of small companies can bid successfully for major contracts (either within their current countries or with foreign companies in new markets). Swedish firms have gone into alliances with foreign companies. In 1993, having lost the second tender for the traffic in the counties of Jonkoping and Halland, BK Tag started cooperating with the French company Via GTI, and added the UK Go Ahead Group in 1998.

3.1.3. Barriers concerned with rail operators expanding into new markets

One barrier to expansion into new markets noted in the literature review is that of contractual barriers.[10] Several train operators in the UK have noted that contracts should be, and are generally, awarded in small chunks. This makes it easier for the new entrant to win new contracts and to grow incrementally with one contract at a time. In some countries, however, there are national preferences for one single provider of rail operation services. This may act as a significant barrier to entering into new, foreign markets for two reasons:

1. New entrants may not be able to meet all the requirements of a large company
2. The existence of a large incumbent with a long-term contract prevents a new entrant from bidding to provide services.

The present study explored the barriers to expansion in foreign markets further.

Table 3.1 below shows the percentage of rail operators who rated barriers in terms of importance. The table shows that there are clear difficulties, which most of the rail operators cite as being important or very important. When rail operators use their own staff in foreign markets, 73% claim that national regulations make it difficult to obtain certificates/licences as a very important or important barrier. In addition, almost half the rail operators responded that limited access to rail training centres makes it difficult to ensure that their staff receive the required training.

Table 3.1: Rail operator ratings of importance of barriers to using own staff in foreign countries and hiring new staff in foreign countries

	Very important barrier	Important barrier	Not an important barrier	Not a barrier at all	Don't know
Barriers to using your staff in foreign countries					
National regulations make it difficult to obtain certificates/permissions/licences	44%	29%	3%	3%	20%
Limited access to national training facilities makes it difficult to obtain national certificates/permissions/licences	21%	33%	16%	5%	26%

[10] Acceptability Barriers of Pricing Strategies for Rail, Air and Water Transport. Athens University of Economics and Business.

Barriers to hiring new staff in foreign countries					
Staff certificates/permissions/licences from other railways are difficult to transfer when hiring staff	25%	34%	9%	4%	29%
Difficult to recruit new staff due to low unemployment	9%	21%	21%	16%	33%
Difficult to recruit qualified staff due to lack of basic qualifications (maths, knowledge of languages)	7%	27%	27%	13%	27%
Difficult to recruit qualified staff due to low attractiveness of jobs	9%	25%	21%	18%	27%
Difficult to recruit qualified staff due to limited access to training facilities	11%	21%	25%	16%	28%
Training services are very expensive in the country	8%	23%	19%	17%	33%
Other	2%	0%	0%	0%	0%

Rail operators were then asked to rate the importance of expansion barriers from another perspective, i.e. that of hiring new staff in foreign markets. The barrier most frequently rated as being very important or important (59%) concern the transfer of staff certificates/licences from one rail operating company to another

These barriers to expansion are centred round one core issue: a lack of technical and physical standardisation between countries and the resulting administration problems (such as different licensing requirements) arising because of this.

The lack of technical and physical standardisation across Europe is because the development of separate national rail networks in the nineteenth century led to differences in the technical specifications of the infrastructure. Gauge width differs between countries (Spain, Portugal, Finland and the Baltic States); electrification standards (more than five different types of electrification are in use throughout Europe) or safety and signalling systems (almost every country has its own system and some have several).

These technical differences result in different requirements for training and the subsequent certification and licensing of safety critical staff. Currently, the approval process in licensing is cumbersome and expensive[11] and there are huge difficulties involved when a train driver has to transfer their licence from one country to another.

Previous research[12] has argued that administration costs and difficulties would be greatly reduced if there were one multilateral European Railway licence; the drivers would only have to learn specific routes rather than go through the competence-testing process in each network. It was suggested that the lack of such a licence increases the cost of training drivers and limits their availability in respect of cross-border traffic, which increases the upfront costs faced by new entrants. This problem should slowly disappear with the introduction of the European Drivers' Licence provisions included in the Third Railway Package.

One challenge for the Commission and individual countries is to provide the prerequisites for a borderless and competitive market. A European railway market must entail harmonised rules of various kinds of order to contribute to borderless rail services, free of national re-

[11] Memorandum by Reseau ferre de France

[12] Sevrail, Draft final report, October 2006

straints and practices. Additional legislation, particularly safety legislation, may be needed to achieve this.

3.1.4. Access to training facilities

Regulatory requirements

Directive 2001/14/EC looks at many of the key aspects of track access including capacity allocation and the establishment of regulatory bodies, and deals with rail related services and the charging principles for those services. This means that Member States must ensure that railway undertakings applying for a safety certificate have fair and non-discriminatory access to training facilities for train drivers and staff accompanying the trains, whenever such training is necessary for the fulfilment of requirements to obtain the safety certificate. The services offered must include training on necessary route knowledge, operating rules and procedures, the signalling and control command system and emergency procedures applied on the routes operated. Member States must also ensure that infrastructure managers and their staff performing vital safety tasks have fair and non-discriminatory access to training facilities. If the training services do not include examinations and granting of certificates, Member States must ensure that railway undertakings have access to such certification if it is a requirement of the safety certificate. The safety authority must ensure that the provision of training services or, where appropriate, the granting of certificates meets the safety requirements laid down in TSIs or national safety rules described in Article 8 and Annex II of the safety directive.

If the training facilities are available only through the services of one single railway undertaking or the infrastructure manager, Member States must ensure that they are made available to other railway undertakings at a reasonable and non-discriminatory price, which is cost-related and may include a profit margin.

When recruiting new train drivers, staff onboard trains and staff performing vital safety tasks, railway undertakings must be able to take into account any training, qualifications and experience acquired previously from other railway undertakings. For this purpose, such members of staff shall be entitled to have access to, obtain copies of, and communicate all documents attesting to their training, qualifications, and experience.

In every case, each railway undertaking and each infrastructure manager must be responsible for the level of training and qualifications of its staff carrying out safety-related work as set out in Article 9 and Annex III of TSI CR OPE.

Article 13 of Directive 2004/49/EC requires Member States to liberalise access to training facilities for railway undertakings, infrastructure managers and appropriate staff.
The aim of this directive is to make sure that there will be non-discriminatory access to training facilities for train drivers and other onboard train staff. This includes training on necessary route knowledge, operating rules and procedures, the signalling and control command system and emergency procedures applied on the routes operated. However, until Directive 2004/49/EC is fully and successfully implemented into individual member state's national laws, rail operators will suffer from limited access to training facilities.

How do rail operators ensure their staff has received adequate training?

There are a number of ways used by rail operators to ensure that their staff are competent when breaking into new national and foreign markets. The majority (70%) attempted to use their own existing staff in the new market. This is clearly a failsafe thing to do when branch-

ing out into similar contracts (such as within the same country and/or working on the same piece of equipment). This is because a rail operator will have already assured itself, its stakeholders, and the regulatory bodies that its staff has received adequate training and are competent to carry out their tasks.

However, in those instances when rail operators have tendered for work in foreign countries that solution is more risky. In these instances, the majority of rail operators tried to recruit staff from other rail companies (62%) or trained staff for the new market internally/itself (67%). It is surprising that such a large percentage of rail operators train staff internally rather than using existing foreign training centres. There are two core reasons for this (each of which has a number of implications):

1. The rail operator is reluctant to employ foreign/new training centres.
2. The training centres are reluctant to engage staff from 'new' rail operators.

Previous research[13] has implied that the reason why so few rail operators train their staff in foreign training centres is reason 2. The Sevrail report noted that the problem of not being granted access to incumbent training facilities was raised by stakeholders in Italy and France. In these countries, individual operators felt that they had no option but to open their own training facilities at considerable expense, thus introducing an important entry barrier into the market and increasing the costs of the operations (need to meet not only the costs of training the staff, but also the costs associated with a training centre).

Barriers to using training services in new markets

This study examined the difference between 1 and 2 in more depth and asked

- Rail operators about their perceived barriers to using training services in other countries
- Training facilities about their perceived barriers to providing training services in other countries

Table 3.2 below shows the percentage of rail operators who rated the importance of the barriers to using training services in other countries.

Table 3.2: Rail operator ratings of importance of barriers to using training services in other countries

	Very important barrier	Important barrier	Not an important barrier	Not a barrier at all	Don't know
All training is conducted in-house in competing rail companies	13%	27%	24%	9%	27%
We are not sure about the quality of the external training providers	9%	22%	22%	20%	27%

[13] Sevrail, Final report, 2007

Language and cultural barriers	20%	44%	13%	5%	18%
It is difficult to get information about the training centres (location, cost, timing)	7%	17%	41%	15%	20%
It is difficult to get information about legal requirements concerning training	4%	35%	31%	7%	22%
It is difficult to meet the legal requirements covering training	2%	35%	31%	7%	24%
Foreign training centres do not provide training for our specific rolling stock	11%	27%	24%	15%	24%
Our staff does not want to travel to other countries to receive training	7%	11%	22%	39%	20%
National training providers are too expensive	7%	26%	19%	17%	31%
The training providers do not have the capacity for training our staff as well	2%	20%	26%	11%	41%
The training providers do not allow from foreign companies	4%	15%	17%	19%	44%
Other	0%	0%	0%	0%	0%

Table 3.2 shows that there are a number of barriers to using training centres which rail operators have cited as being very important or important:

- Language and cultural barriers
- Difficulty in getting information about legal requirements concerning training
- Difficulty in meeting the legal requirements covering training
- All training is conducted in-house in competing rail companies

Similar to the barriers noted in the section on barriers to rail operators expanding into new markets above, there is one clear issue here, i.e. that rail operators are encountering problems when expanding into other countries concerning lack of standardisation between countries and the resulting administrative problems (such as licensing and training requirements).

Another barrier concerns real or perceived language and cultural differences. This barrier is actually related to the lack of standardisation between countries and the lack of an international perspective in the European rail industry.

Both of these barriers to using foreign training centres could be reduced somewhat if the European rail industry adopted a more standardised approach (such as the provisions included in the Third Railway Package).

It is interesting to see that 39% of rail operators state that training being carried out in-house in competing rail companies is a ‘very important’ or ‘important’ barrier. This has also been rated by the rail training centres as the most relevant barrier to providing training services in other countries. 62% of the training centres said that it was ‘very relevant’ or ‘relevant’ that railway operators wanted to use their own facilities (i.e. not employ the services of a rail training centre) (see Table 3.3). A separate 50% also rated it as ‘very relevant’ or ‘relevant’ that rail operators only used the training companies that they knew well. These responses indicate that the rail training industry in Europe is relatively closed to new operators or training ser-

vices. If and when the European rail industry opens up (perhaps through liberalisation) and becomes more fragmented with more business competition, many of these barriers should be removed.

Table 3.3: Training centre ratings of barriers to providing training services in other countries

	Very relevant	Relevant	Some relevance	Limited relevance	Not relevant
Railway operators want to use the companies they know well	19%	31%	27%	8%	4%
Railway operators want to use their own facilities	23%	39%	15%	8%	4%
It is difficult to see the market opportunities	8%	42%	30%	4%	12%
It is difficult to enter markets due to national regulation	31%	27%	15%	8%	7%
It is difficult to find and hire qualified teachers	35%	31%	11%	8%	4%
It is difficult to find and rent relevant facilities	7%	33%	7%	27%	4%
It is difficult to find and get the good educational materials form industries	8%	25%	37%	8%	17%

However, perhaps the most interesting thing to note from Tables 3.2 and 3.3 is the high level of disagreement among respondents about what they rate as the most important barrier. The differences in the ratings of Tables 3.2 and 3.33 could be put down to how far the separate countries have progressed in the implementation of EU Directive 2001/14/EC (as mentioned in Introduction, section 1.1). Northern countries, such as the Scandinavian ones, may have rated the barriers as more important than the central or southern countries. This is not because the barriers are any less or more significant to these countries, rather it is because countries are at different maturity levels. Those countries who have progressed further to ensure that there is non-discriminatory access to rail-related services, may be rating the barriers as more important. Those countries who have little experience at branching out into new markets may have rated the barriers as less important.

3.1.5. Challenges to rail operators and training centres

The study also asked both rail operators and training centres what they believed to be the biggest challenges their companies would face in the next 10 – 15 years. Tables 3.4 and 3.5 show how important the rail operators and training companies have rated the challenges.

Table 3.4: Rail operator ratings of importance of challenges

	Very important	Important	Some importance	Limited impor-tance	Not important	Don't know
Liberalisation of markets leading to increased competition	53%	37%	7%	2%	0%	2%
Entering rail markets in other countries	32%	37%	8%	10%	8%	3%
Recruiting new and well-qualified staff	42%	43%	12%	2%	0%	2%
Integration of ethnic minorities in the organisation	0%	15%	27%	25%	27%	7%
Measures to improve gender balance in the organisation	3%	18%	30%	22%	20%	7%
Improving job mobility of staff between railway operators	5%	40%	18%	18%	10%	8%
Increased legislation requirements on safety	15%	57%	17%	7%	3%	2%
Young people find jobs in the railway sector less attractive than before	18%	27%	22%	17%	8%	8%
Environmental requirements	8%	45%	30%	10%	2%	5%
New skills needed due to increased internationalisation (knowledge of foreign technical systems, languages, culture)	14%	53%	22%	8%	2%	2%
New technologies will diminish the content of the role of different train staff	5%	28%	38%	14%	5%	10%

Table 3.5: Rail training centre ratings of importance of challenges

	Very relevant	Relevant	Some relevance	Limited relevance	Not relevant
We must offer support for companies entering the national rail market	23%	15%	15%	8%	31%
We will be entering rail training markets in other countries	0%	12%	12%	8%	46%
We must improve basic qualifications of staff	26%	33%	26%	0%	11%
We must train more non-nationals due to increase in cross-border operations	8%	27%	27%	0%	31%
We must adapt education to needs of ethnic minorities	0%	12%	27%	31%	27%
We must improve job mobility of staff between railway operators through standardised training	8%	39%	12%	12%	27%
We must adapt increased legislative requirements (safety)	26%	33%	19%	11%	4%
We must train staff to meet environmental requirements	15%	35%	8%	35%	4%

In the longer run we must train staff according to international standards, e.g. TSIs	23%	39%	8%	15%	7%
We must offer new trainings due to increased internationalisation (technical systems, languages, culture)	30%	30%	15%	19%	4%
We must cooperate on international level to offer a full-package for the EU market	12%	44%	20%	4%	12%

The questionnaire responses shown in Tables 3.4 and 3.5 indicate that there are a number of perceived key challenges to the rail industry:

- Liberalisation/fragmentations/liberalisation. Covers challenges relating to more competitors
- Extent and speed of internationalisation/standardisation. Covers challenges relating to technical systems, languages, culture, safety requirements, TSIs
- Attractiveness of rail industry to employees. Covers aging workforce, improving job mobility across countries, recruiting new and qualified staff, ethnic minorities

Challenges relating to more competitors

A large percentage of rail operators (90%) rate liberalisation/liberalisation of the market as being a 'very important' or 'important' challenge for them in the next 10 -15 years. 56% of rail training centres also stated that they will find it a 'very relevant' or 'relevant' challenge to offer support to the full and increased range of companies entering national rail markets.

These results show that there is a common misconception in the European rail industry where the majority of rail operators perceive increased competition as a challenge, when in fact it should be viewed as a business opportunity. Réseau de Ferré de France[14] (France's Railway Infrastructure Manager) claims that the best way to go forward is to follow the essence of the EU Directives encouraging liberalisation strictly. This belief is based on the fact that separation brings:

- *Efficiency* - because it allows each company to concentrate on its core activity
- *Transparency* - as it sets out our 'wares' in a manner that is clear and obvious to all users
- *Neutrality* - as we do not operate trains in competition with existing or potential users of our tracks – indeed, we encourage the arrival of properly accredited newcomers.

These provide the conditions under which increased competition can bring its new '*dynamism to the market'* (Minutes from 'Select Committee on European Union' UK parliament – Memorandum by Réseau de Ferré de France). Separation allows for the true internationalisation of rail services in Europe and offers clearer division of responsibilities leading to greater productivity and increased quality of services.

[14] Minutes from 'Select Committee on European Union' UK parliament – Memorandum by Reseau ferre de France. http://www.publications.parliament.uk

There are other examples where rail operators have embraced the increase of competitors as an opportunity rather than a challenge. The Swedish State Railways (SJ) has changed its view on competition over time. For many years, SJ claimed that competition from other modes of transport was quite enough, but recently increased competition from other train operators has even been encouraged by SJ's top management. One reason for this is that more entrants would give SJ higher credibility when claiming that the company is facing tough competition.

The step-by-step approach to liberalisation and reforms in the Swedish railway sector, initiated in 1988 with the division of the state's railway assets and the decentralisation of responsibility to regional transport authorities, is now beginning to reveal its long-term effects. 'The appearance of new operators acting on an international scene, sometimes through the formation of international alliances, seems to be what will eventually tear the barrier of the national border, by tradition of such importance in the European Railway sector' (Alexandersson & Hulten, 1999).

Another way that rail operators have overcome the 'challenge' of increased competitors is by using Public/Private Partnerships (PPP). In these situations, the public company has long-term and overall responsibility for delivering services to the customer and has responsibility for overall safety. Each private company enters into a service contract with the public company for the provision of infrastructure services. There are a number of examples where this PPP relationship has had very good results: London Underground has employed the privatised companies Metronet Rail BCV, Metronet Rail SSL and Tube Lines. In 2007, The Netherlands will get a connection to the European network of High-speed lines (HSL). Ultra-fast trains with a maximum speed of 300 kilometres an hour will take travellers directly from Amsterdam to Schiphol, Rotterdam, Antwerp, Brussels, and Paris. The operator of this HSL is a predominately public funded High Speed Alliance (joint venture between KLM and NS – Dutch Railways) and the infrastructure managers are the private companies ProRail and Infraspeed.

3.2. *Issues which enhance the development of a pan-European Rail training market*

The following sections present some realistic hypotheses (taken from the questionnaire replies and current literature) concerning issues which will increase the need for rail training across Europe. The issues have been divided into:

- Situations which will increase the demand for training from rail operators.
- Situations which will increase the supply of training from training centres.

3.2.1. Demand for rail training from rail operators

Increasing internationalisation of systems

The Second and Third railway packages aim to accelerate the liberalisation of rail freight and passenger services. The second Railway package necessitated the creation of a 'European Railway Agency' in France which provides technical support to the development of cross-border interoperability. This legislation will have a knock-on effect for training. The new pan-European requirements will affect, and in the short term (5-10 years) increase, the need for training.

Higher number of cross-border train services

In the short term, across most of Europe, it is possible that there will be a higher number of cross-border train services (both freight and passenger services both state and privatised). As

in the hypothesis above, existing rail operators will need to train their staff in cross-border operations.

State run company becomes privatised - fragmentation

The majority of EU has state owned companies who deliver internal training. Literature reviewed[15] suggests that liberalisation of the rail industry in some Member States is likely to happen in the next 10 years. If there happens there will be a huge increase in the number of rail operators tendering for work. The increased numbers of rail operators will need to ensure that their staff are trained and so increase the demand for training.

Growing problem of recruiting staff through traditional routes

The number of young people pursuing a trade qualification is reducing dramatically (e.g. Germany). The questionnaire also highlighted that rail operators believed that their ageing workforce would be a challenge. The rail industry needs to adapt to mitigate the consequences of having an ageing workforce. The rail operators may have to employ young, unskilled staff and train them itself, rather than relying on recruiting staff who have received training previously. This will increase the need for training.

Company acquisitions and mergers

The more that the rail industry moves towards working in a competitive business environment, where privately owned companies join together to bid for larger pieces of work, the more an individual working in the rail industry will have job mobility. Rail operators rated this as an important challenge in the next 15 years. If staff are able (and possibly required) to travel across countries in Europe while working for the same company, then there will be a serious need for staff training.

Increasing health, safety and environmental regulations (scope, requirements, and penalties).

Rail operators believed that increased safety legislation and regulations will be an important challenge to them in the next 10-15 years. If there is an increase in the number of regulations across Europe, then there will be a subsequent increase in demand for training to help individuals and rail operators meet the requirements of the new regulations.

3.2.2. Supply of rail training from training centres

Growth in the number of national and cross-border rail operators

The current situation in the European rail industry is that there are state owned rail operators who either deliver their own training or have an exclusive agreement with one training centre to deliver all their training needs. However, if there is a growth in the number of private companies that offer cross-border services (either on its own, or through joint bids with other companies) then there will an increase in need for external training centres.

Less railway operators do their own training

The situation may arise that rail companies become more streamlined and look outside for their railway training services. It is likely that, following liberalisation, operators will regard training not as a core operator capability. In this instance, operators will require the services of rail training centres to deliver training. (This is not to say that rail operators do less train-

[15] Sevrail Report, October 2006

ing, but make decision not to do own training). If liberalisation occurs in a European country, then an increase in the demand for training centres is likely to happen very soon after (2 years).

Training providers are more 'international' than their customers

As the Second and Third Railway packages become more commonplace and cross-border freight and passenger services become the norm, training providers will need to keep up with rail operators. If training providers were more international than their customers (i.e. had affiliations with other training centres in other countries) then those training providers would be seen as more attractive to those operators who want to deliver cross-border operations. Training providers can be 'international' in both technical and cultural issues.

Reduced dependency on a small number of customers

If the market becomes more fragmented following liberalisation of the rail industry, there will be an increase in rail operators. It is likely that each of the rail operators will have an approved suppliers list and the more of these that there are, then the higher the chance that training providers will be on one of them.

3.3. *Issues that impede the development of a pan-European Rail training market*

The following sections present some realistic hypotheses (taken from the questionnaire replies and current literature) concerning issues that will decrease the need for rail training across Europe. The issues have been divided into:

- Situations which will decrease the demand for training from rail operators
- Situations which will decrease the supply of training from training centres

3.3.1. Demand for rail training from rail operators

Reduced numbers of staff arising from technological advancement

The rail industry, as with all industry, is subject to technological advancement. It is likely that there will be a number of technological changes in the next 10 years. These changes may reduce the number of staff rail operators need to employ or will deskill this staff. In this situation, there is likely to be a decrease in demand for training services.

Company acquisitions and mergers reduce number of operating companies

If liberalisation happens, then in the short term (5-10 years), there is likely to be an increase in the number of competing rail operators. However, following this increase, it is then likely that small companies will begin to merge to offer joint tenders for pieces of work. If large operators begin to take over minor operators, in the long term (10-15 years) there will be a decrease in the number of rail operators who need training services. As in the UK, the privatised large companies, which hold a monopoly on the rail industry, may take some of their services (such as training) in house. This will have an increased knock-on effect of reducing the demand for rail training services.

Staff poaching is used to overcome language and cultural issues

Operators may decide not to train existing staff to work abroad; rather they will poach existing staff from the previous operator.

Regulations reduce the number of operators competing for cross-border work and services

As the market moves towards a small number of operators (or even just one) holding the monopoly for cross-border work, the need for training will go down.

Number of applicants for rail industry jobs decline further

If there are fewer applicants for jobs then the amount of training needed will be reduced.

Local/National industry standards retained

In spite of EU directives, local standards could be retained, thereby inhibiting operators from branching into new markets and the inhibiting ability of non-national trainers to deliver training to local standards.

3.3.2. Supply of rail training from training centres

More railway operators do their own training

As in the UK, the privatised large rail operating companies, who hold a monopoly on the rail industry, may take some of their services (such as operational training) in-house (although they may still outsource management or specialised safety training). In the UK, train operating companies have spent over £30million on investment in new training centres and simulators since 2000. This will have an increased knock-on effect of reducing the demand for rail training services, expect for specialised safety training, for example.

Small number of cross-border service operators and contractors

The fewer operators, the less chance any one training provider will have to get business

Perceived or real problems relating to language and cross cultural skills and regulatory know how

If training providers are perceived as not being able to adapt to meet the needs of international rail services, then it is likely that rail operators will not actively choose to buy in training services. Rail operators may believe that in order to overcome language and cultural barriers that have been rated as challenges, the training given to staff should cover these issues. If training providers do not seem to have adequate international credentials, the rail operators might take training in house.

Lack of delivery capacity

If training providers do not have the delivery capacity, then they will lose business – or at least fail to compete if the number of operators drops.

Lack of agreed equivalence in international certification/qualifications

Both rail operators and training companies have rated increased internationalisation as an important challenge. If there is no agreed common requirement for training providers to meet or to work to, then it is difficult for them to adapt to the needs of an international audience.

3.4. *Key forces*

The statements listed in sections 3.2.1 and 3.2.2 have been taken from the results of the questionnaire and are in fact a list of possible situations that the European rail training market

might find itself in. All the situation statements are related to and predicated by a number of underpinning key forces:

3.4.1. Liberalisation of the railway (in the short term: 5-10 yrs).

This has a number of important effects on the training market. The fragmentation of operations (passenger and freight train operation, infrastructure maintenance and renewal services, equipment manufacture, supply, etc) that tends to be a short-term consequence of liberalisation in the rail industry creates new demands for training and increases the number of potential customers for training providers. However, it also leads to large numbers of small customers who find it difficult to release staff for off-the-job training because of the lack of suitable cover, which in turn increases demand for on-the-job training support and innovative training methods. Training organisations that offer flexible delivery options understand how to tailor training courses to meet individual client needs (to save time off-the-job) are able to keep development and delivery costs under control and are likely to do better than those which are slower to respond in these areas.

3.4.2. Extent and speed of internationalisation

There are two main causes of internationalisation in European rail markets, i.e. regulations and competition.

High-speed and conventional interoperability regulations have recently been adopted by governments across the EU. They require inspection and certification of vehicles, systems, and infrastructure against common technical specifications. These regulations are designed to drive convergence of technical and safety standards and can be expected to lead to increased demand for similar types of training across the EU. Training providers who are more up-to-date with these developments and can advise customers on their implications for the competence and training of their staff and contractors are most likely to benefit from these changes.

Competition in certain sectors of the rail industry - particularly vehicle manufacture, remote asset condition monitoring, trackside systems and equipment and control centres - is also pushing internationalisation of supply. Manufacturers like GE Rail, Bombardier, Siemens and Alstom are developing common products for a global market. The opportunity for training providers is to form exclusive alliances or partnerships with companies' rail manufacturers to support their customers. Training providers who understand technical developments in the rail industry can forge effective commercial relationships with major businesses and have suitable technical skills in their training staffs are more likely to succeed in this area.

3.4.3. Following liberalisation, in the long term (15 years), a number of railway operating companies may rationalise to become one monopoly.

Short-term fragmentation tends to be followed in the long term by rationalisation (organisational restructuring, mergers and acquisitions) as suppliers and customers seek to drive down operational costs and gain from economies of scale. Reducing the number of interfaces in the supply chain is a key objective in this regard. In this situation, training providers are likely to face a reduction in the number of customer they deal with and increased sophistication in client requirements as organisations seek to integrate services across national, cultural and linguistic boundaries. Training providers who can accommodate high- and low-volume training delivery requirements demonstrate abilities in dealing with cross-cultural issues and offer training across a wide range of rail disciplines are likely to do better than those who are slow

to adapt their traditional offerings. As the process of rationalisation matures, the number of clients will reduce further, in which case training providers themselves need to look at mergers and acquisitions as strategies for retaining a competitive advantage.

3.4.4. Extent to which rail operators use sub-contractors

The degree to which operators rely on subcontract labour has a direct effect on the demand for training.

Where the reliance is low, variation in training requirements will be lower and levels of demand tend to be more predictable as well as higher because fewer organisations are involved.

Where the reliance is high, training requirements will be more varied and levels of demand will be less predictable and usually lower. This is because more organisations are involved in the supply chain, many of which are typically quite small. Rail industry regulators and safety agencies tend to mandate procedures and practices in this situation, which brings a degree of regularity to the types of training demanded and can also make levels of demand more predictable. However, where training is required for the sake of compliance there is a tendency for its value to decrease as the number of providers grows.

Training providers who understand the market structure and commercial dynamics of the sectors of the rail industry that they serve are likely to be better equipped to anticipate and respond to changes in supply chains than those that do not.

4. Training needs deriving from technological changes

All of the surveyed training centres and operators agree that new technologies will create additional training needs in the near future. Until 2020 several technological changes will exert an influence on the content of the train staff's tasks (in terms of complexity and variety) and on the diversity of the tasks in Europe. Thus, chapter 4 section investigates the technological changes that will create additional training.

The need for implementation of these technological changes is caused by technological changes such as information, communication and sensor technology. Changes in market or regulations such as liberalisation, operation and infrastructure management, competitive international operation, standardisation, and sustainability can also create a need for implementing new technologies in the rail sector.

The next main technological changes with impact on the training needs in the period until 2020 can be identified:

- ETCS (as part of ERTMS)
- GSM-R
- Galileo, the European position system
- Energy-efficient driving
- Electronic ticketing
- Modularisation and standardisation of trains
- Information systems
- Operational information on computer medium

Most operators expect that GSM-R and different IT-applications will be introduced in the coming years in their company (Table 4.1).

Table 4.1: Percentage of Rail operators, who foresee that the introduction of this new technology in their company

New technology	
ETCS	52%
GSM-R	74%
IT-applications	69%
Other, like	12%

Source: Survey of rail operators

The technical changes will be implemented in the EU Member States in different phases and at a different pace in each country. These changes will remove the technical barriers to market opening.

RAILIMPLEMENT mentions the relevant topics gauges, traction, signalling and RS-homologation.

In the following sections, the technological changes will be described and the implementation will be explained.

4.1. *ERTMS*

The European Rail Traffic Management System (ERTMS) is the European substitute for all national control-command systems and communication systems. ETCS is the new control-command system and GSM-R is the new radio system for voice and data communication. Together with the traffic management system, they form ERTMS. ERTMS is intended to be the new signalling and management system for Europe, enabling interoperability throughout the European rail networks. Decision 2001/260/EC on the characteristics of ERTMS stressed the importance of developing a common standard for command-control, signalling subsystem and railway operations in order to assure interoperability. This issue deals with both infra-structures and fixed installations with logistic equipment as well as rolling stock. It takes into account the requirements from operators, industries, and governments for safety, reliability, human health, environmental protection, technical compatibility and operations.

The ERTMS system aims at two major functional aspects:

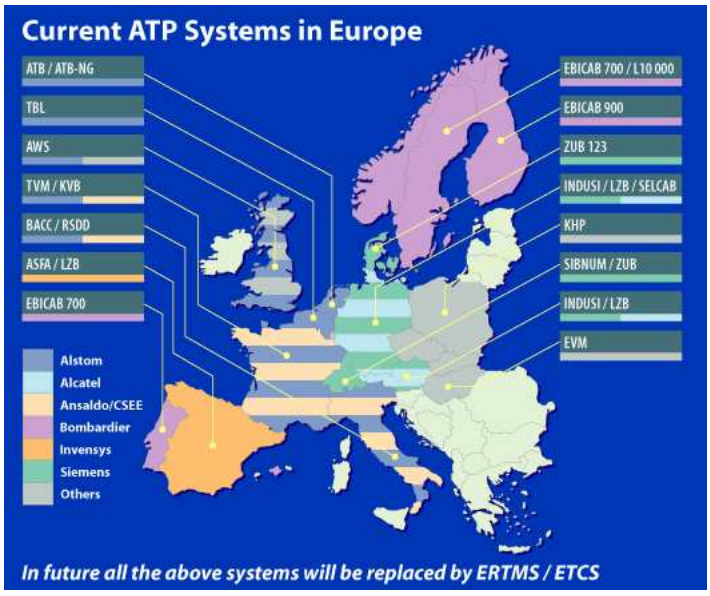
- **Train Control Command.** Ensures safe operation of the trains in the network
- **Traffic Management.** Deals with the traffic and infrastructure management issues to enable the optimisation of the capacity of the lines and the utilisation of the fleet

ERTMS features

- Interoperability
- Highest speeds up to 500 km/hr
- Automatic Train Protection (ATP)
- Smaller headways
- Moving Block Operation (Level 3)

ERTMS benefits

- Major equipment reduction
- Better assets utilization
- Highest level of safety
- Possibility of more trains per line
- Less trackside equipment
- Higher operational throughput & lower cost
- Interoperability or railway networks
- Open market for signalling systems



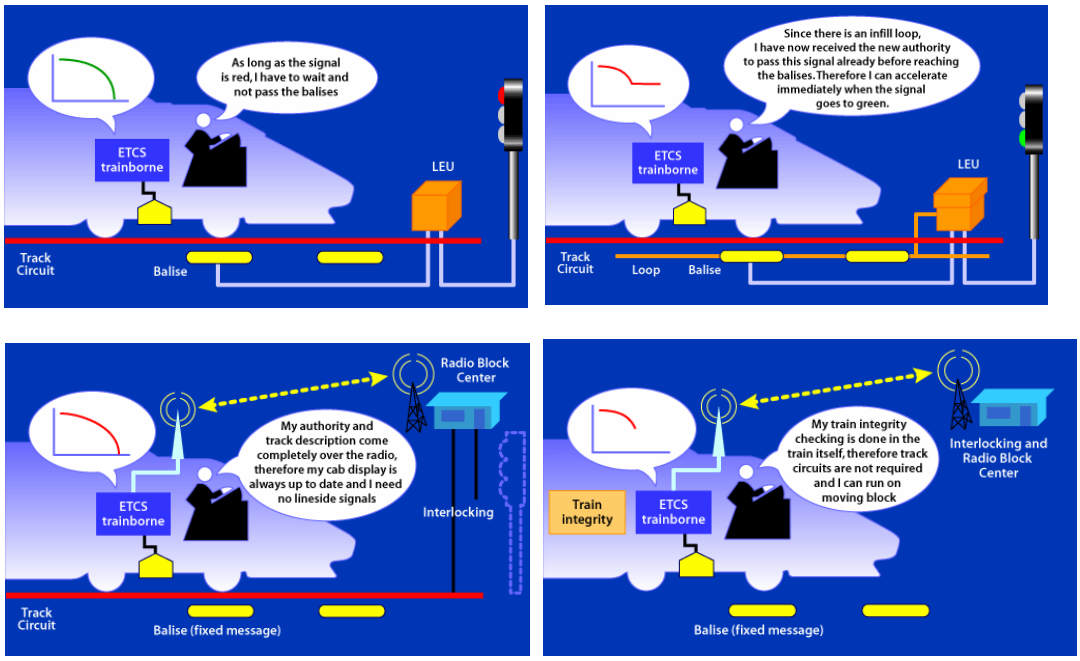
4.2. *ETCS*

Currently trains are equipped with up to six different navigational systems. Each is extremely costly and takes up space onboard. A train crossing from one European country to another must switch the operating standards as it crosses the border. All this adds to travel time and operational and maintenance costs.

The development of ETCS started at the end of 1990 at the ERRI, the former research centre of UIC. The project framework included new onboard equipment based on open computer architecture (EUROCAB), a new discontinuous system for data transmission, (EUROBALISE) and a new continuous transmission system (EURORADIO). In April 2000, the class 1 ERTMS specification, Class 1, was ready.

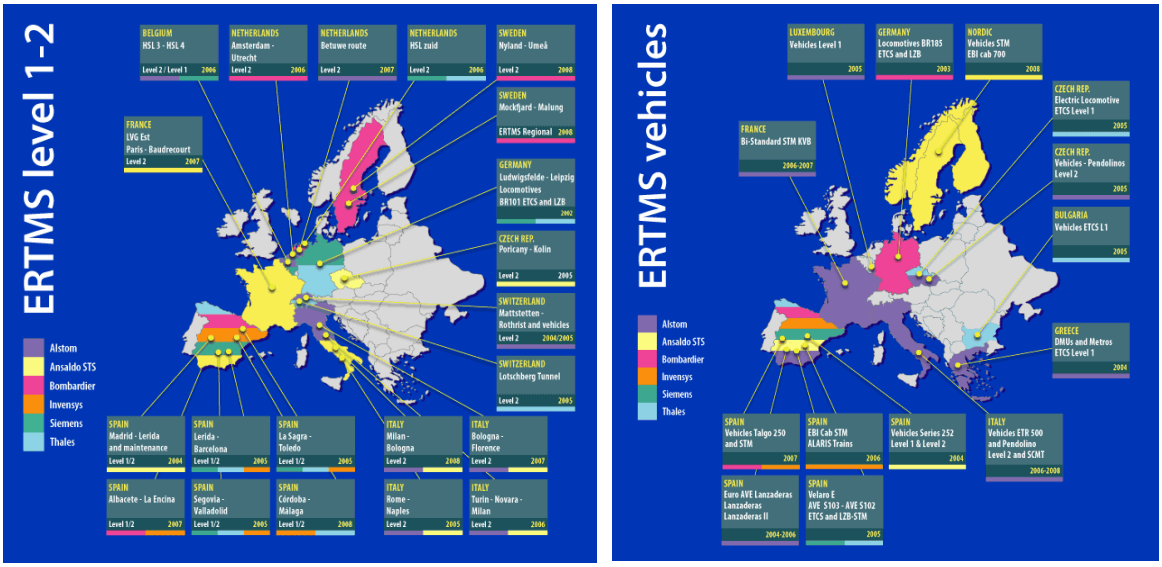
Great success has already been achieved with testing the interoperability approved in February 2002 and is on the way to be introduced in the Technical Specifications for Interoperability. A number of commercial projects at varying stages, such as the West Coast Main Line, the HSL-Zuid, Rome-Naples, Switzerland, Berlin-Halle-Leipzig, Athens and Madrid - Lleida, have been initiated and are partially financed by the EU.

The ETCS-system will be implemented in different levels/stages1, 2 and 3.



4.2.1. Implementation in 2020

All EU-Member States have to come up with an implementation strategy for ETCS by 28 September 2007. The implementation started several years ago in several states,. The next charts show the different projects related to ETCS. Based on this schedule, the expectation is that in 2020 level 2 will be in operation on almost all international lines. Moreover, the national systems and level 1 will be in operation as well. Possible regional versions of ETCS will be replace the national system on low dense, regional connections.



The Mid-term Review of the European Commission's White Paper (2006) also foresees the implementation of ERTMS in certain corridors in 2009.

4.2.2. Effects on training needs

The implementation of ETCS affects mainly the jobs of the train drivers, staff responsible for rolling stock inspection and staff responsible for dispatching and control-command.

- **Train drivers**: Existing train drivers will need updated knowledge on this new train control system. Especially the differences in train performance and the Man-Machine interface between the ETCS and the national system. Because the transition period will be long, the training center will need to offer training on both systems. This will demand a lot of extra training capacity and trainers and a responsibility to focus on the differences of the systems.
- **Staff responsible for rolling stock inspection**: Existing staff wil need updated knowledge of the different modules (interacting between old systems and ETCS) and related software. Because of the complex harmonisation process, in the first 5 years a lot of attention should be paid to the knowledge of the different versions.
- **Staff responsible for dispatching & Control-command staff**: The impact of ETCS for this staff is much smaller than for the drivers and the inspection staff. The influence is of the same kind.

Overall the challenge tot the training centres will be to enrol teachers with additional competences on ETCS and to find the capacity to upgrade existing staff while at the same time supplying new staff with competence in new systems and the old system in the transition period.

In 2020, the amount of ETCS level 1 and level 2 training will be larger. The exact speed can be determined when the implementation plan is ready. It is plausible to expect that the implementation period will be close to 10-15 years. The member-state specific training will become less, because of the increase of ETCS-use. Training will take longer, because of the higher complexity of the ETCS in comparison with the national system.

4.3. *GSM-R*

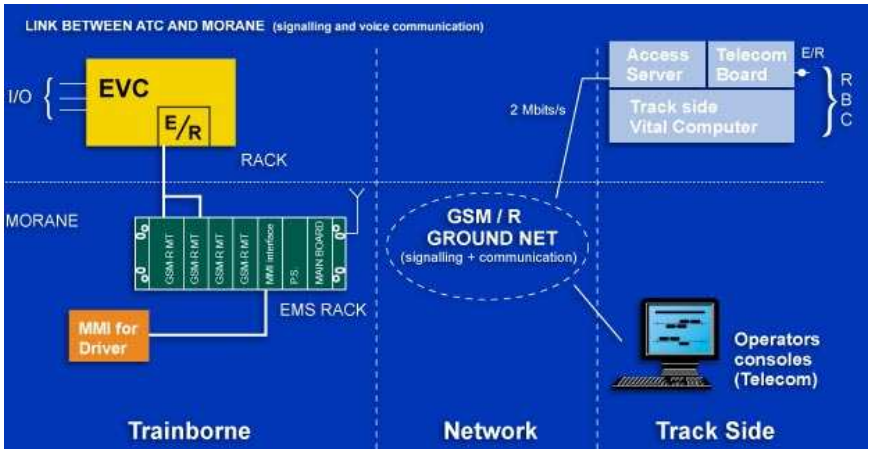
4.3.1. Description technical system

GSM for Railways (GSM-R) is an international mobile communication standard for railways and was developed by order of the UIC. An international standard, GSM-R, for mobile communication has been for national and international train operation for the communication applications for the railways. It provides interoperability between railway networks, higher efficiency, lower operating costs and high availability.

GSM-R is based on GSM technology, and benefits from the economies of scale of its GSM technology heritage, aiming at being a cost efficient digital replacement for existing incompatible in-track cable and analogue railway radio networks. Over 35 different systems are reported to exist in Europe alone.

GSM-R is a secure platform for voice and data communication between railway operational staff, including drivers, dispatchers, shunting team members, train engineers, and station controllers. It delivers features such as group calls (VGCS), voice broadcast (VBS), location-based connections, and call pre-emption in case of an emergency. This will support applications such as cargo tracking, video surveillance in trains and at stations, and passenger information services.

GSM-R, the communication standard network for rail applications



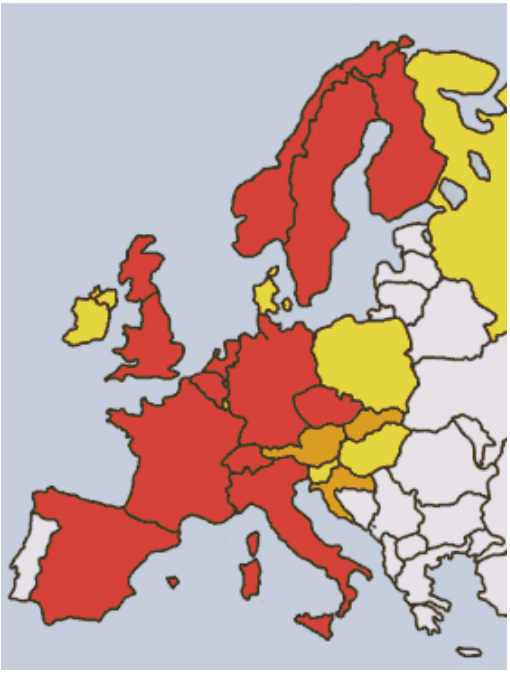
The standard is the result of more than ten years of collaboration between the various European railway companies, achieving interoperability using a single communication platform.

As part of the ERTMS- standard, it carries the signalling information directly to the train driver, enabling higher train speeds and traffic density with a high level of safety.

The benefits to the railway operators include interoperability, increased operational efficiency and reduced operational costs.

4.3.2. Implementation in 2020

The progress of GSM-R implementation can be followed in the reports of the meetings of the European Radio Implementation Group (ERIG) below.



Contract Awarded /Currently Implementing

Belgium, Czech Republic, Finland, France, Germany, Great Britain, Italy, Netherlands, Norway, Spain, Sweden, Switzerland and India (not shown)

Planning phase/Contracting

Austria, Croatia and Slovakia (pilot site)

Feasibility phase

Denmark, Hungary, Luxembourg, N. Ireland, Poland, Republic of Ireland, Russia, Slovenia, China and USA (not shown)

4.3.3. Effects on training needs

This implementation schedule shows that in several years the whole EU will be on one communication standard: GSM-R. Besides the language topic, this means that the GSM-R training will be standardised. Because of general communication technological changes (also the new GSM in private life), it is obvious that the training content and duration are small.

This technology will affect all the train staff.

One standard will mean that the training centres have to transfer their training just to the GSM-R system. The availability of training on the old systems can be diminished in 5 years. The volume of training on this system won't increase, so the training centres should upgrade their trainers to this GSM-R standard.

4.4. *GALILEO*

4.4.1. Description technical system

Galileo is the satellite navigation system built under authority of the EU. This system is expected to be in use from 2010 onwards. However, latest news shows that a delay is inevitable. GALILEO system should be the most accurate system.

GALILEO will offer numerous rail transport applications, ranging from traffic, wagon and cargo control and monitoring to train signalling, track survey and passenger information services. In particular, GALILEO will make it possible to reduce distances between trains and therefore increase train frequency. In addition, it will make it easier to locate the entire rail fleet.

By integrating GALILEO with other technologies, the rail sector can benefit from:

- increased performance of transport by rail and facilitated shift of transport from road to rail;
- reducing or even avoiding some trackside equipment and having a more economical solution for Train Control;
- high positioning accuracy for efficient track survey;
- A unique tool that contributes to many different functions.

4.4.2. Effects on training needs

The system should be available and used for applications in the railways of EU-member states in 2020. These applications will be standardised systems. Training the staff in using these applications can/will be based on one standard. This technological development will harmonise on long term the content of the training.

At this moment the detailed implications on the content of the task of the staff are not clear. It is clear that Galileo will make new features possible. There is a drive from UIC to harmonise the functions of these features within the railways. This will mean not many differences on international level. The training centres have to be aware of these new technological developments.

In 2020 the system should be available and used for applications in the railways of the EU-Member States. These applications will be standardized systems. Training the staff in using these applications can/will be based on one standard.

4.5. *Energy-efficient driving*

4.5.1. Description of technical system

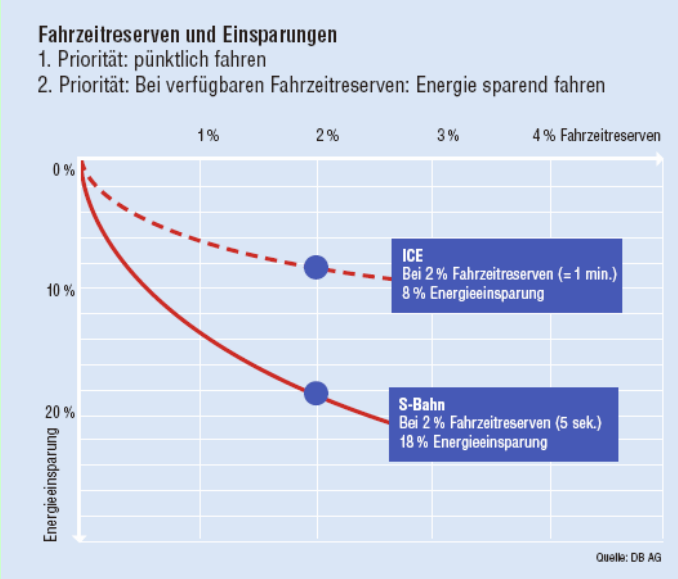
Environment as part of sustainability is becoming more and more important. Besides technical improvements for energy efficiency, focus will be on the energy-efficient driving.

DB-Project ENERGIESPAREN

In Germany, the DB AG has finished the project ENERGIESPAREN in 2004. In this project DB AG, department for passenger transport, has trained 14,000 train drivers. Using theoretical classes, driving on simulators and at training in trains in daily operation, the sense for energy-efficient driving is being improved.

The energy-efficient driving has enabled DB AG to reduce CO_2 emissions by 140,000 tons.

In 2005, the project was expanded to DB Railion AG. Other rail operators in Germany (EVU), for example the Metronom Eisenbahngesellschaft and the Verkehrsbetriebe Peine-Salzgitter, are also training their train drivers also in energy-efficient driving



After initiatives at the local and national level, a project TRAINER started at European level in 2006. This will be the starting point for the establishment of international training programmes and facilities to initiate and optimise energy efficiency improving measures by railway operators.

Within TRAINER, the adjusted and newly developed training programmes will be tested by railway operators in Slovenia, Slovakia, the Netherlands and Italy, supported by railway operators in Germany and Denmark and by the UIC. The results will subsequently be made available for railway operators in all EU countries through specific dissemination and the development of universal manuals.

The TRAINER training programmes for train drivers and railway operators will be implemented in at least five EU countries, including Eastern European countries. That way, at least five railway operators and 25,000 train drivers will be directly or indirectly involved in energy efficiency boosting training programmes. Train drivers will be stimulated to drive trains more energy-efficiently, safer and more comfortably. Additionally railway operators will be stimulated to initiate and implement measures aimed at optimising energy efficiency in the areas of technology (rolling stock and infrastructure) and organisation.

4.5.2. Effects on training needs

The training programmes for energy efficient driving will be a common part of the driver training.

It is expected that in about 3 years the Driver-Machine Interface (mainly the data) for energy efficient driving will be standardised. From the authorities there will some pressure as well to improve the driving style of the train driver.

This will just have impact on the training of the driver and not on the other train staff. This can be seen as an additional module in the training. So the training will be longer and more

trainer capacity is needed. The teachers should need additional competences to teach this new module.

4.6. *Electronic ticketing*

4.6.1. Description technical system

Caused by new technological developments in the ICT area, commercial needs and accelerated by the increased danger of terrorism, electronic ticketing systems will be introduced at many stations in Europe in combination with entrance gates. It starts with national, regional or even local initiatives. The implementation of these systems is increasing and London and the Netherlands are involved in ticketing projects. It is to be expected that there will be a need for standardisation to improve the interoperability of the networks.

London

The introduction of Oyster technology started in 2006 at gated stations and once worked through with train operators, Oyster pay-as-you-go could be available at National Rail stations in London during 2008. Currently, there are only 60 London National Rail stations where passengers can use pay-as-you-go. The total number of stations in London Zones 1-6 is 310. Transport for London introduced the Oyster card in 2003 to speed up passage through underground gates and boarding buses. Oyster allows 40 people per minute to pass through gates, 15 more than those with magnetic stripe tickets.

The Netherlands

The chip card for public transportation (OV-chipkaart) in the Netherlands is almost ready. There will an electronic system with one form of payment for travel by bus, tram, rail, and metro throughout the Netherlands. The card will replace all existing tickets. Until 2006 the card has been tested on the connection Rotterdam Centraal - Hoek van Holland Strand. Mid 2007 all other Dutch stations will be rebuilt to for the chip card-application. In the second half of 2007 travelling over the whole rail-network in the Netherlands will be possible via the OV-chipkaart.

4.6.2. Effects on training needs in EU in 2020

The different cases show that a European- wide introduction of one standard system will last many years.

The increasing call for personal safety pushes the need for ticketing systems. They will have mainly an impact on the work of the onboard staff responsible for the train and passenger safety. Cross border travelling will be an interesting topic for further harmonisation. At this moment the training is dedicated for operation on networks with these electronic systems.

The challenge to the training centers will be to to develop the necessary competences of the trainers. It is not expected that this will affect the volume of the training.

4.7. *Modularisation and standardisation of trains*

With the introduction of the TSIs, it is easier for a train to operate in different countries, without modifications. The next step is to standardise the relevant modules in a train. The 6th framework project MODTRAIN (Innovative Modular Vehicle Concepts for an Integrated European Railway System) will set out the basis for this standard.

Please note that MODTRAIN is not a technological change as such. It is an attempt to develop a common awareness that the appearance of trains influences the need for training and the diversity in maintenance and operation. This awareness can and should result in development of more modular train concepts.

The concept of modularity aims at economic advantages for both railway suppliers and operators, such as reduced manufacturing cost and economies of scale, increased productivity of new rolling stock as well as increased reliability based on a rise in proportion of service-proven components in new rolling stock designs. The project's economic advantages together with the technical solutions fulfil the objectives of increased railway competitiveness and interoperability defined in the agenda for the European Rail Research Advisory Council (ERRAC) and in the First, Second and Third Railway Packages enacted by European Union legislation.

For the staff relevant parts in this project are:

MODLINK - Modular man-machine and train-to-train interfaces. The objective of MODLINK is to develop and test modular and harmonised improved technical solutions as an essential contribution to a competitive European rail system in three major working areas:

- **Driver Interface (the Driver-cab)**: integration of a working train cab and man machine interface (working area EUCAB),
- **Passenger/crew interface**: development of an interoperable passenger and crew MMI concept (working area EUPAX),
- **Train-to-train high capacity data interface**: development of an inter-train data transmission link from different operators (working area EUCOUPLER).

MODCONTROL - standardising the Train Control and Monitoring System (TCMS) functions and the interfaces between the TCMS and the train subsystems.

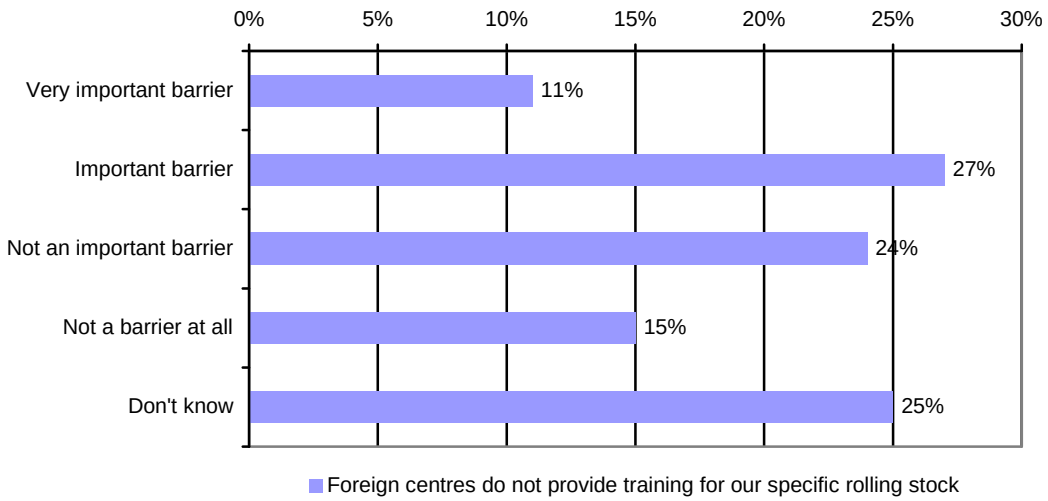
4.7.1. Effects on training needs

It will last at least until 2015 before the MODULAR trains as a whole will start to run on the European network.

The main relevant parts for training are the standardisation of the man-machine interfaces, such as the driver desk of the opening of the doors. The rolling-stock specific part of the training will be less. The generic part will increase. The challenge for the training centres is to develop the necessary competences of the trainers and to adjust the necessary documentation.

At this moment the specific rolling stock types in the EU-countries aren’t a main barrier for the operators (figure 4.1).

Figure 4.1: The importance of this barrier for operators.



Source: Survey of rail operators

4.8. *Information systems (real-time monitoring of freight and trains)*

The TSI for telematic applications subsystems for freight services defines the necessary information that has to be exchanged between the different partners involved in a transport chain and permits a standard mandatory data exchange process to be installed.

The information must contain all transport critical technical data such as:

- Identification of rolling stock
- Technical/design data
- Assessment of compatibility with the infrastructure
- Assessment of relevant loading characteristics
- Brake relevant characteristics
- Maintenance data
- Environmental characteristics.

No interoperability constituents have been determined as far as the subsystem Telematic Applications for Freight is concerned. For the fulfilment of the requirements of this TSI only standard, IT equipment is needed without any specific aspects for interoperability in the railway environment. This is valid for hardware components and for the standard software used like operating system and databases. The application software is individual on each user's side and can be adapted and improved according the individual actual functionality and needs. The proposed ‘application integration architecture’ assumes that applications may not have the same internal information model.

4.8.1. Effects on training needs

The IT-equipment for Telematic Applications will undergo a continuous technical development. Migration strategies have to be devised in order to cater for the transition period between the current framework of differentiated information systems and the fulfilment of this TSI as commanded by the SEDP.

For this purpose the information handling concepts embodied in this TSI where developed in order to facilitate such a migration. They do allow for an incremental build-up of the target TAF TSI pan-European system, notably through facilities such as peer-to-peer communication based e.g. on the concept of aggregate data repositories (namely including message metadata, data directory and certification authority).

The migration-phase will have an impact on the task of the train staff. In Europe no harmonised migration strategy over all the Member States has been defined. This means different phases on the networks. This will affect the training needs. Less harmonisation: less standardisation on training needs.

4.9. *Operational information on computer medium*

4.9.1. Effect on training needs

As defined the TSI OPE relevant operational documentation will be increasingly available as a computer medium (either located on the train, or as a personal device of the train staff). Examples include: the Driver's Rule Book, the 'Route Book' and the train schedule information.

Data recording

Caused by the implementation of the TSI's, more data will be recorded. Data pertaining to the running of a train must be recorded and retained for the purpose of for example supporting systematic safety monitoring as a means of preventing incidents and accidents.

Requirements with regard to storage, periodic evaluation of and access to this data are specified in relevant national legislation of the Member State.

Recording of supervision data outside the train

As a minimum, the infrastructure manager must record the following data: failure of line-side equipment associated with the movement of trains, detection of an overheating axle bearing and communication between the train driver and infrastructure manager's staff authorising train movements.

Recording of data on board of trains

The railway undertaking must record the data, such as passing of signals at danger or 'end of movement authority' without authority of the application of the emergency brake.

4.9.2. Effect on training needs

The transition from paper to screen will results in some additional training. However, in after-work hours, people are using IT applications more and more. The complexity of the in- work applications will not be that high that a lot of additional training should be expected.

The extra training will be a result of the different methods of using rule books etcetera.

It will be a challenge for the training centres to develop the necessary competences of the trainers and relevant documentation on these topic.

4.10. Training needs caused by technological changes

Training centres and operators foresee a significant impact of technological changes on training need. The training centres have estimated the number of training weeks per year that will be required. Table 4.1 below shows the results of the investigation under training centres. Besides ETCS, GSM-R, IT-applications, they foresee also other new technologies which have impact on the training needs. These new technologies are not specified by them. Train drivers and rolling stock inspectors will need the most training.

Table 4.1: Training need in weeks/year

	ETCS	GSM-R	IT-applications	Other
Train drivers	3952	1099	990	2060
Other onboard staff	0	65	640	10
Staff rolling stock inspection	1050	1010	1110	1500
Staff assembling trains	300	310	30	35
Staff dispatching an control-command	500	0	20	0
All other staff	25	205	240	9

The amount of staff training needed the coming years because of the introduction of new technologies. Note: The table shows the sum of the answers and thus gives an indication of the relative need for additional training

The staff training needs are no longer an issue without obligations. In order to increase reliability and safety, there are guidelines for determining the exact need. These are part of the TSI Operations (development and updating of the analysis of training needs and the specific elements for train crew and auxiliary staff). In the chapter 5 'Training needs deriving from legal changes' examined the effects of legal changes on the training needs.

4.11. *Key forces*

Below is a selection of the key forces with a challenge to the training sector. The selection is based on technological change with the greatest impact on the task of the relevant train staff. Some technological changes are not specific for the rail sector, so it won't have a large impact on the training of the train staff, e.g. energy efficient driving.

4.11.1. Migration towards ERTMS

Migration towards ERTMS has an important effect on the training market. Within the next 10 years, national safety and control systems will disappear more and more. This not only puts an end to costly implementation of national systems in trains, it will also put an end to the diversity in rail training. Training organisations will be able to synchronise training. This will last for a long time. Harmonisation of training can be seen as a result from the technical harmonisation, where of ETCS is today the one with the most impact. The rail training market will open further due to this driver.

4.11.2. Standardisation of the driver's cab

Within the process of standardisation of trains, the most important driver that influences the need for rail training is the design of the cab (mainly the man-machine interface). Unification of operation will simplify the interoperability of personnel and will reduce the need for train-

ing. It will also be easier for maintenance and assembly staff to do their work. This can be expected somewhere around 2015.

4.11.3. E-ticketing

As a security measure, E- ticketing in combination with improved entrance systems, will influence train operations within the next five years. The training needs for the onboard staff will change and new training needs will emerge. It will take a very long time before all European countries have a similar system. Consequently, no harmonisation is to be expected in this area before 2020.

Other IT-solutions as enabler of functionality will also influence the training needs dramatically.

5. Training needs deriving from legal changes

The main topics in the area of legal changes in the rail transport area of the European Union until 2020 will be:

- interoperability
- safety
- working conditions
- certification of train crews
- environment

5.1. *Interoperability*

5.1.1. Directives 1996/48, 2001/16 and 2004/50

In achieving fully open and integrated rail markets, the EU established Directives 1996/48 (conventional), 2001/16 (high-speed) and amendment 2004/50 on rail interoperability. Through these directives, technical specifications for interoperability have been drawn up and will start up a process of technical harmonisation of the European railways.

The aim of these directives is to establish the conditions to be met to achieve the interoperability within the Community territory of the trans-European high-speed rail system as described in the directives. These conditions concern the design, construction, placing in service, upgrading, renewal, operation and maintenance of the parts of this system placed in service after the referred date in the TSI, as well as the qualifications and health and safety conditions of the staff who contribute to its operation.

The rail system is broken down in the following subsystems:

- **Structural areas**: infrastructure, energy, control and command, and signalling, traffic operation and management, rolling stock
- **Operational areas**: maintenance, telematics application for passenger and freight services

The following TSIs contain specifications influencing the training need of train staff:

- **Infrastructure**: associated station infrastructure (platforms, zones of access, including the needs of persons with reduced mobility, etc.), safety, and protective equipment.
- **Control and command and signalling**: all the equipment necessary to ensure safety and to command and control movements of trains authorised to travel on the network.
- **Traffic operation and management**: the procedures and related equipment enabling a coherent operation of the different structural subsystems, both during normal and degraded operation, including in particular train driving, traffic planning and management. The professional qualifications which may be required for carrying out cross-border services.
- **Telematics applications** comprises two elements:

(a) *applications for passenger services*, including systems providing passengers with information before and during the journey, reservation and payment systems, luggage management and management of connections between trains and with other modes of transport;

(b) *applications for freight services*, including information systems (real-time monitoring of freight and trains),marshalling and allocation systems, reservation, payment and invoicing systems, management of connections with other modes of transport and production of electronic accompanying documents.

- **Rolling stock:** structure, command and control system for all train equipment, traction and energy conversion units, braking, coupling and running gear (bogies, axles, etc.) and suspension, doors, man/machine interfaces (driver, onboard staff and passengers, including the needs of persons with reduced mobility), passive or active safety devices and requisites for the health of passengers and onboard staff.

5.1.2. Harmonisation

The directives and the TSIs have forced several technical harmonisations. An important example is ERTMS (cf. section 4.2). This harmonisation process started in the early nineties. In the other areas, the harmonisation process begins with the effectuation of the TSIs. The ongoing TSI change process could disturb the efficiency of this process. Eventually, harmonisation will lead to less specific cases around the European rail network and thus reduced need for training of train staff in specific, national cases.

The next changes in training needs forced by the implementation of the TSIs can be investigated:

- Rolling stock: modularization and standardisation (section 4.7)
- Control and command and signalling: ERTMS (ETCS and GSM-R) (sections 4.2 and 4.3)
- Telematics applications: information systems (section 4.8)
- Traffic operation and management:
    - Requirement for analysis of training needs and a process for reviewing and updating individual training needs, taking into account issues such as previous audits, system feedback and known changes to rules and procedures, infrastructure and technology
    - Transparency in qualification of the different tasks of train staff
    - Transparency in the differences in operating practices between infrastructure managers and the risks associated with changing between these; the differences between tasks, operating procedures and communication protocols; any difference in the ‘operating’ language used by the infrastructure manager’s personnel; local operating instructions, which may include special procedures or particular equipment to be applied in certain cases, for example a specific tunnel. (professional knowledge, knowledge of rolling stock: route knowledge: less difference by harmonisation of infrastructure end CCS, knowledge of operational procedures and safety systems: by harmonisation OPE, ability to put knowledge into practise)

Each TSI has included an indication of the strategy for implementing the TSI. In particular, it is necessary to specify the stages to be completed in order to make a gradual transition from the existing situation to the final situation in which compliance with the TSIs must be the norm;

5.1.3. Effects on training needs in 2020

No specific goals about the harmonisation speed have been described in the TSIs. On the other hand, new developments will influence the harmonisation speed. One important development is the entrance of new members to the EU or new insight into the cost-benefit of the implementation. The ERA will have an important role in this process.

5.2. *Safety (2004/49)*

5.2.1. Harmonisation of safety rules:

The purpose of the Safety Directive 2004/49 is to ensure the development and improvement of safety on the Community's railways and improved access to the market for rail transport services by developing common safety targets and common safety methods with a view to greater harmonisation of national rules. National safety rules, which are often based on national technical standards, should gradually be replaced by rules based on common standards established by TSIs. The introduction of new specific national rules that are not based on such common standards should be kept to a minimum. The current situation, in which national safety rules continue to play a role, should be regarded as a transitional stage, leading ultimately to a situation in which European rules apply.

5.2.2. Safety management system

In carrying out their duties and fulfilling their responsibilities, infrastructure managers and railway undertakings should implement a safety management system, fulfilling Community requirements and containing common elements. The safety management system should take into account the fact that Council Directive 89/391/EC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (2) and its relevant individual directives are fully applicable to the protection of the health and safety of workers engaged in railway transport.

5.2.3. Safety certification

To be granted access to the railway infrastructure, a railway undertaking must hold a safety certificate. The safety certificate may cover the whole railway network of a Member State or only a defined part thereof. The purpose of the safety certificate is to provide evidence that the railway undertaking has established its safety management system and can meet requirements laid down in TSIs and other relevant Community legislation and in national safety rules in order to control risks and operate safely on the network

5.2.4. Access to training facilities

Member States must ensure that railway undertakings applying for a safety certificate have fair and non-discriminatory access to training facilities for train drivers and staff accompanying the trains, whenever such training is necessary for the fulfilment of requirements to obtain the safety certificate. The services offered must include training in necessary route knowledge, operating rules and procedures, the signalling and control command system and emergency procedures applied in connection with the routes operated.

Member States must also ensure that infrastructure managers and their staff performing vital safety tasks have fair and non-discriminatory access to training facilities.

If the training services do not include examinations and granting of certificates, Member States must ensure that railway undertakings have access to such certification if it is a requirement of the safety certificate.

The safety authority must ensure that the provision of training services or, where appropriate, the granting of certificates meets the safety requirements laid down in TSIs or national safety rules described in Article 8 and Annex II of the 2004/49.

If the training facilities are available only through the services of one single railway undertaking or the infrastructure manager, Member States must ensure that they are made available to other railway undertakings at a reasonable and non-discriminatory price, which is cost-related and may include a profit margin.

When recruiting new train drivers, staff on board trains and staff performing vital safety tasks, railway undertakings must be able to take into account any training, qualifications and experience acquired previously from other railway undertakings. For this purpose, such members of staff will be entitled to have access to, obtain copies and communicate all documents attesting to their training, qualifications and experience.

In every case, each railway undertaking and each infrastructure manager will be responsible for the level of training and qualifications of its staff carrying out safety-related work as set out in Article 9 and Annex III.

5.2.5. Harmonisation of safety certificates

Before 30 April 2009 decisions on common harmonised requirements in accordance with Article 10(2)(b) and Annex IV and a common format for application guidance documents must be adopted in accordance with the procedure referred to in Article 27(2).

The Agency must recommend common harmonised requirements and a common format for application guidance documents under a mandate which must be adopted in accordance with the procedure referred to in Article 27(2).

5.2.6. Licenses for staff performing safety tasks

The development of a safe Community railway system requires the establishment of harmonised conditions for delivering the appropriate licenses to train drivers and onboard accompanying staff performing safety tasks, for which the Commission has announced its intention to propose further legislation in the near future. As far as other staff charged with safety-critical tasks is concerned, their qualifications are already specified under Directives 96/48/EC and 2001/16/EC.

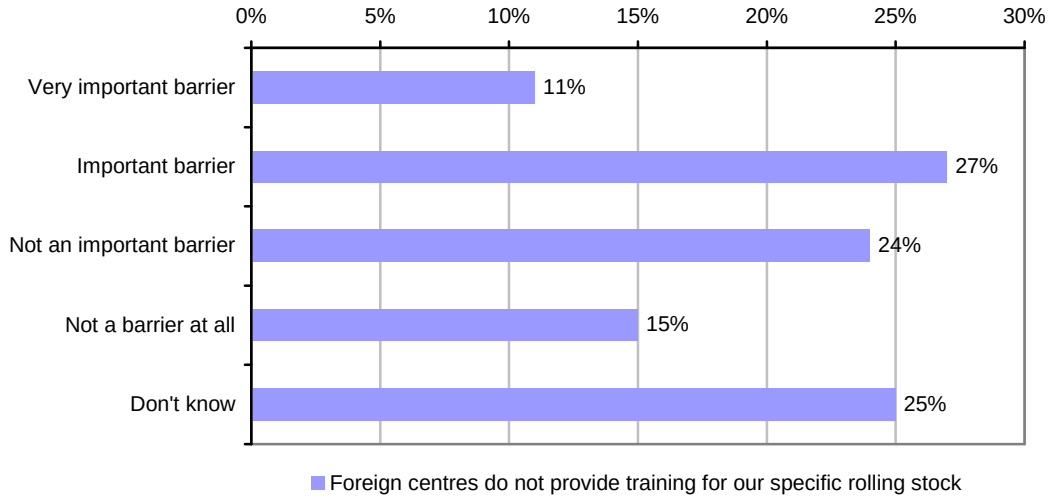
5.2.7. Impact on training need in 2020

The answers to the questionnaires show that the operators currently have the opinion that the legislative requirements on safety are an important challenge for their future business (figure 2). Furthermore, the training centres have foreseen that the safety related legislation become more important for them.

Relevant topics of these safety legislation related to training needs are: safety management system, accessible training facilities and licenses for staff with safety related tasks.

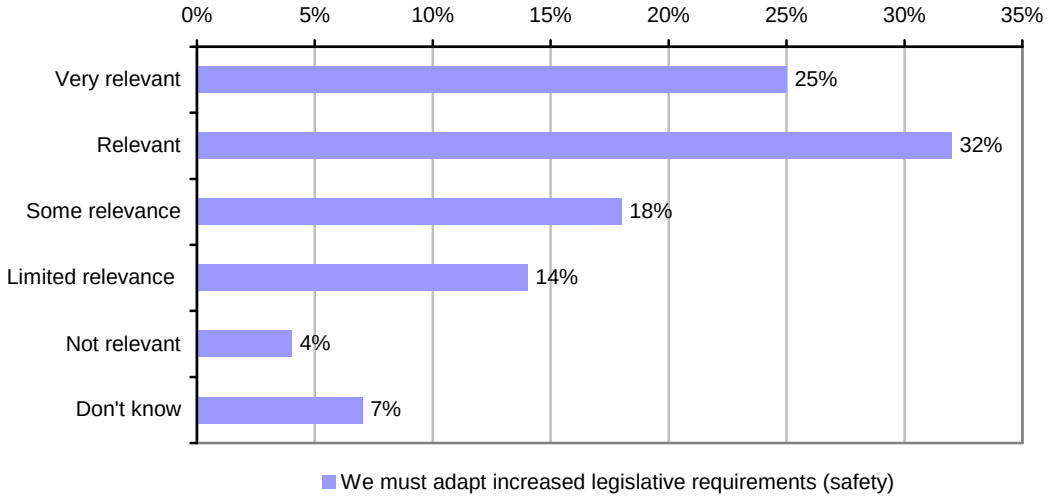
In 2020, there will be harmonised conditions for delivering the appropriate licenses to train drivers and onboard accompanying staff performing safety tasks. This is a relevant part of the safety certificate, needed for accessing the rail infrastructure.

Figure 5.1: Importance of challenge for operators related to safety



Source: Survey of rail operators

Figure 5.2: Training centres have the opinion that they must adapt increased legislative requirements (safety)



Source: Survey of rail training centres

5.2.8. European Railway Agency activities

In the area of training of railway staff, the European Railway Agency has the following responsibilities:

- The Agency must draw up recommendations concerning the determination of common uniform criteria for the vocational skills and the assessment of the staff involved in the operation and maintenance of the railway system. In doing so, it must give priority to drivers and trainers. The Agency must consult the representatives of the social partners in accordance with the arrangements laid down in Article 4 of Regulation 881/2004.
- The Agency must draw up recommendations with a view to putting in place a system for accreditation of training centres.
- The Agency must promote and support exchanges of drivers and trainers between railway companies from different Member States.

5.2.9. Impact on training need in 2020

Based on its mandate the Agency must improve the harmonisation of the requirements for staff and the quality of training centres and the exchange of staff between railway companies.

The consequence is a lesser training need for staff acting in different companies and different countries.

5.3. *Working conditions*

The purpose of the Directive 2005/47/EC is to implement the Agreement concluded on 27 January 2004 between the Community of European Railways (CER) and the European Transport Workers' Federation (ETF) on certain aspects of the working conditions of mobile workers engaged in interoperable cross-border services.

This agreement describes the topics daily rest at home, daily rest away from home, breaks, weekly rest period, driving time, checks.

Apart from this agreement there are general requirements dealing with health and safety national and at EU-level. We have not taken this into account in our this research.

5.3.1. Impact on training need in 2020

Directive 2005/47/EC is not relevant for the examination of the training needs, but its general health and safety requirements are.

5.4. *Certification on train crews (2004/0048)*

In 2007 The Third Railway Package was adopted. The package comprises four legislative proposals, including a proposal for a directive on the certification of train crews operating locomotives and trains on the Community's rail network.

Drawn up in consultation with the industry and the social partners, this text provides for a mechanism to define more clearly powers and responsibilities as regards the training of train drivers and crews who perform safety-related tasks, and the assessment and recognition of their qualifications.

Train drivers will have to hold a license certifying their general skills; this license will be their property and will be valid throughout the Community. The license must be supplemented by a certificate issued by a railway undertaking confirming that specific training has been followed for the line concerned, the rolling stock used and the operational and safety procedures that are specific to that undertaking.

5.4.1. Impact on training need in 2020

In 2007, the operators find that the different national regulations and the differences in certificates and licenses make it difficult to obtain certified staff. Much additional training is needed.

When Directive 2004/0048 comes into effect, the differences in the certificates/permissions/-licenses will become more transparent and a process of harmonisation will start. The expected situation in 2020 is a harmonised system of staff certificates/permissions/licenses with more cross-acceptance of national documents.

Table 5.1: Barriers related to certificates/licenses for operating in a country from operators view (status 2007)

	Very important	Important	Not important	Not at all	Don't know
National regulations make it difficult to obtain certificates/permissions/licenses.	44%	29%	3%	3%	20%
Staff certificates/permissions/-licenses from other railways are difficult to transfer when hiring staff	25%	34%	9%	4%	29%

Source: Survey of rail operators

5.5. *Environmental policy challenges*

5.5.1. General

The mid-term Review of the European Commission's White Paper (2006) envisages a number of concrete actions for the period up to 2009 to meet the new transport challenges and to complement its existing policies in order to boost current action in the field. In the area of protection/energy the following actions are mentioned:

- urban transport green paper (published in September 2007)
- action plan for energy efficiency and road map for renewables (2006),
- strategic technology plan for energy (2007),
- launch of major programme for green propulsion (2009).

On 27 February 2007, the European Commission opened a public consultation on the preparation of a Green Paper on Urban Transport (published in the september 2007). The consultation provides an opportunity for stakeholders to express their views on how the EU best may contribute to improving transport and mobility in urban areas. The closing date for the consultation was 30 April 2007.

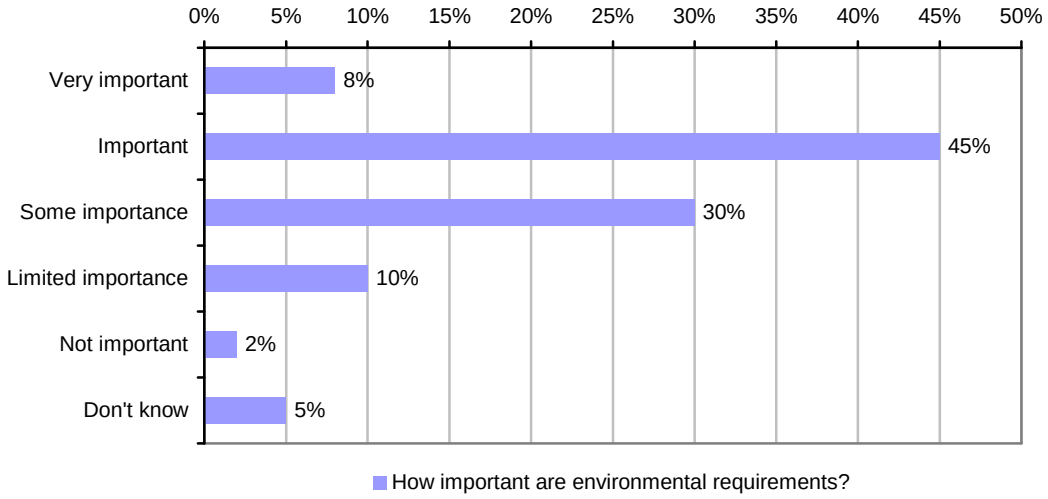
This green paper is a consultation paper of the EC in the specific field of energy (according to the reference: *'Mid-term Review of the European Commission's White Paper (2006)'*) . Consequently, besides the individual and national energy saving plans, there will be increased influence at the EU-level on the environment topic in the next years.

5.5.2. Impact on training need in 2020

Will this lead to additional activities on energy-saving measures on rolling stock and infrastructure, but also on energy-efficient operation in the period until 2020? The train driver will have an important role in this area. This is described in chapter 4.

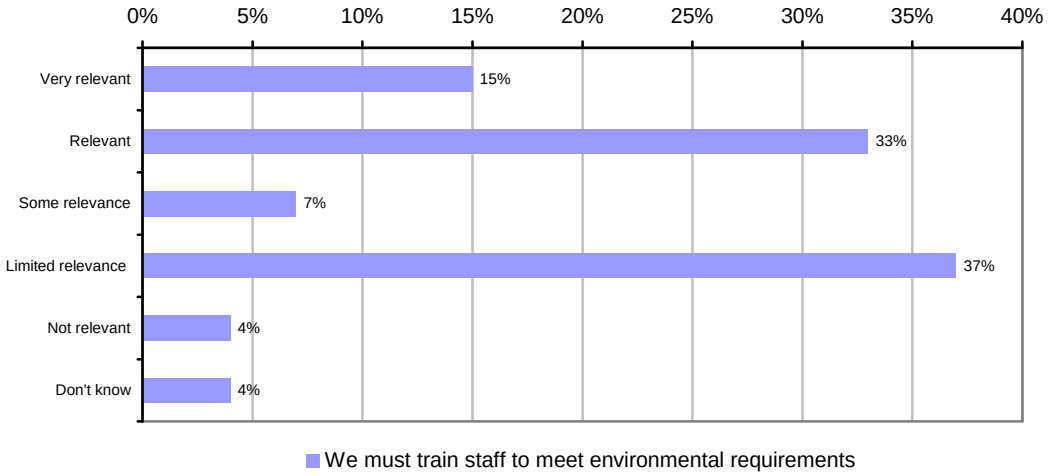
Operators have foreseen the heavy impact of environmental requirements on their business (figure 4). The training centres do not foresee such an impact on the training programmes (yet) (figure 5).

Figure 5.3: Importance of challenge for operators, related to environment



Source: Survey of rail operators

Figure 5.4: Importance of environmental requirements in training programmes, foreseen by the training centres



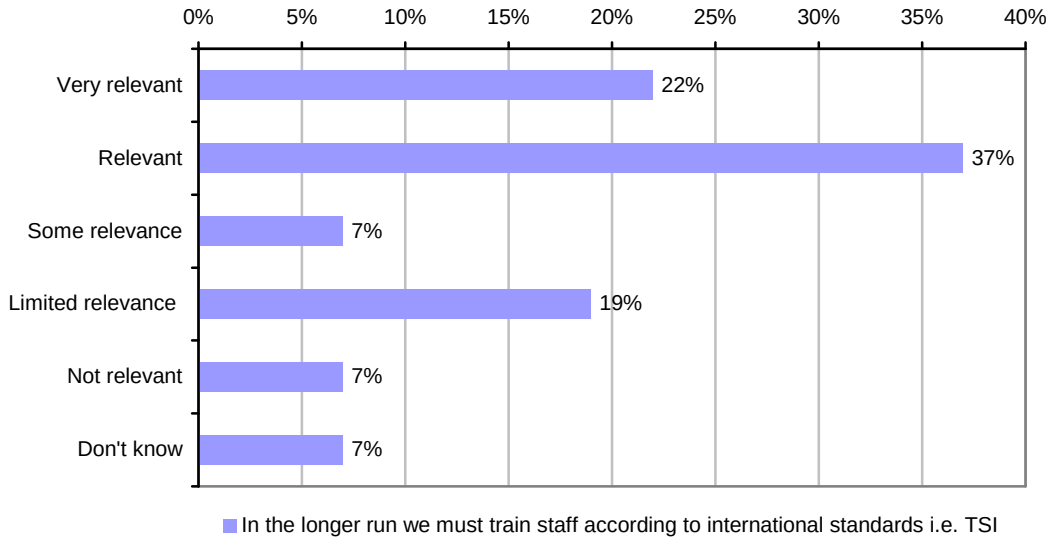
Source: Survey of rail training centres

5.6. *Key forces*

5.6.1. Technical harmonisation and interoperability

The recent and ongoing introduction of the TSIs has enforced/enforces technological changes as described in the previous section. Only because of the compelling character of the TSI such technological changes will really happen. The influence on rail training may therefore be significant.

Figure 5.5: The impact of the TSIs on the training is also foreseen by the training centres



Source: Survey of rail training centres

5.6.2. Safety procedures and train crew

The effect of Directive 2004/0048 will be that the training facilities will be open to everybody. All generic training is then open as well, which reduces barriers. All the member states have implemented this Directive 2004/0048 before May 2006.

6. Training needs deriving from market changes and social changes

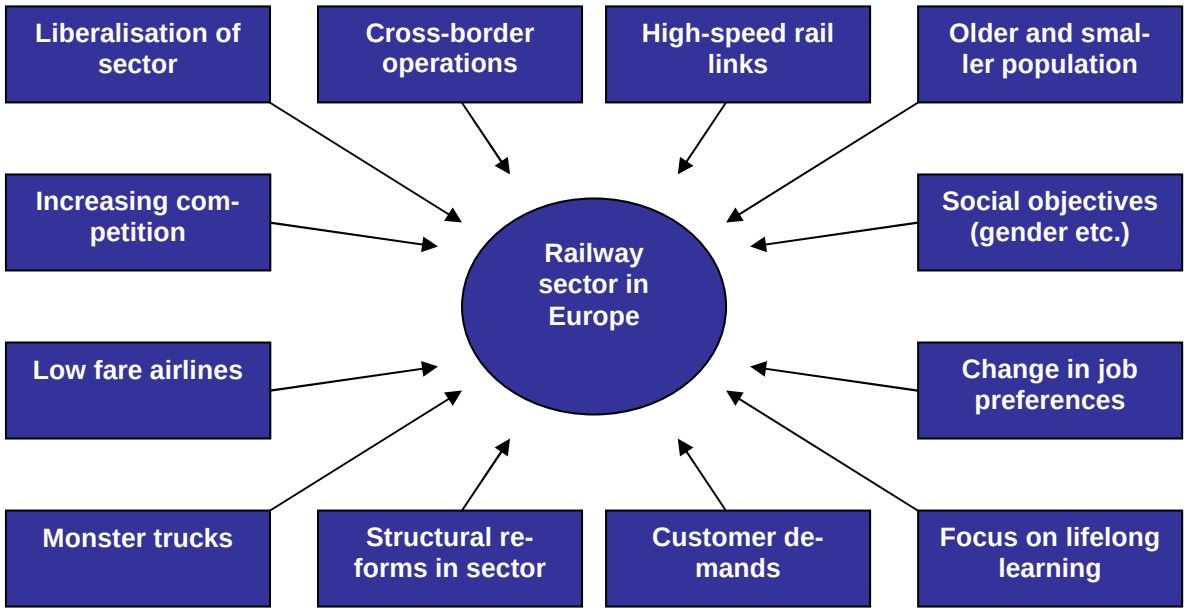
6.1. *Introduction*

This chapter aims at identifying and analysing new training needs resulting from key market changes. The term 'market changes' covers structural changes of European railways, in particular the liberalisation of national rail markets as well as the increasing importance of cross-border rail services. In addition, the developments affecting the potential and current labour force of the European railway undertakings will be taken into account. This includes the development of the future needs as the result of expected retirements and the 'demographical' situation of the railway undertakings.

The section on market changes is based on desk research and the results from the survey of operators and training centres. The focus in this chapter is on issues that have implications for skills and training needs for the five selected staff categories. Thus, certain structural changes such as the separation of railway undertakings and infrastructure managers or issues such as access charging are not discussed, even though these issues might be high on the sector's current agenda.

A range of forces is affecting the railway sector in Europe. A brief overview of some of the most important forces in terms of market and social changes is presented in figure 6.1 below:

Figure 6.1. Key forces affecting the railway sector in Europe



In the following section, the specific forces and their implications for future skills and training needs in the rail sector will be analysed.

6.2. Market changes

6.2.1. Continued liberalisation of national rail markets

The first step in the liberalisation of the European rail sector was Directive 91/440/EC. The directive focused on ensuring greater transparency in the finance, structure and accessibility of the national railways of EU Member States and also created limited rights of access for railway operating companies to enter into international groupings to run cross-border services. The directive was followed by a range of other directives, including Directive 96/48/EC on the interoperability of the trans-European high-speed rail system, Directive 95/18/EC on the licensing of railway undertakings; and Directive 95/19/EC on the allocation of railway infrastructure capacity and the charging of infrastructure fees.

The Commission White Paper: "A strategy for revitalising the Community's railways" (1996) pointed out a number of shortcomings in these directives. Since then the Commission has adopted two legislative railway packages and a third package is currently being considered.

The first railway package was adopted in 2000. The directives in the package enable any railway undertaking that has been licensed within the European Union to have access to the national rail networks of Member States on an equal and non-discriminatory basis for the transport of cross-border freight on the Trans European Rail Freight Network. The directive also imposed a range of obligations on the industry, including the separation of railway undertakings and capacity allocation bodies.

The second railway package was proposed by the Commission in January 2002 and adopted in April 2004. This package aimed at accelerating the liberalisation of rail freight services by opening the international rail freight market across all national networks by 2006 and allowing cabotage by 2007. Furthermore, the package created a "European Railway Agency", which has now been set up in Valenciennes, France, to provide technical support to the development of cross-border interoperability. The package also introduced rules on accident investigation including a requirement for independent investigators in each Member State.

The Commission has proposed a third package, and the proposal is currently being considered. The main provision that put forward by the Commission focuses on the liberalisation of international rail passenger transport by 2010, but the package also includes provisions for EU wide certification of train crews and the creation of international rail passengers' rights and obligations.[16]

Assessment

The opening of rail markets has had a profound effect on the sector by paving the way for the entry of new operators in markets that were previously monopolies. However, it also required efforts by regulators aimed at ensuring free and non-discriminatory access to infrastructure, rolling stock and different types of rail services including rail training services.

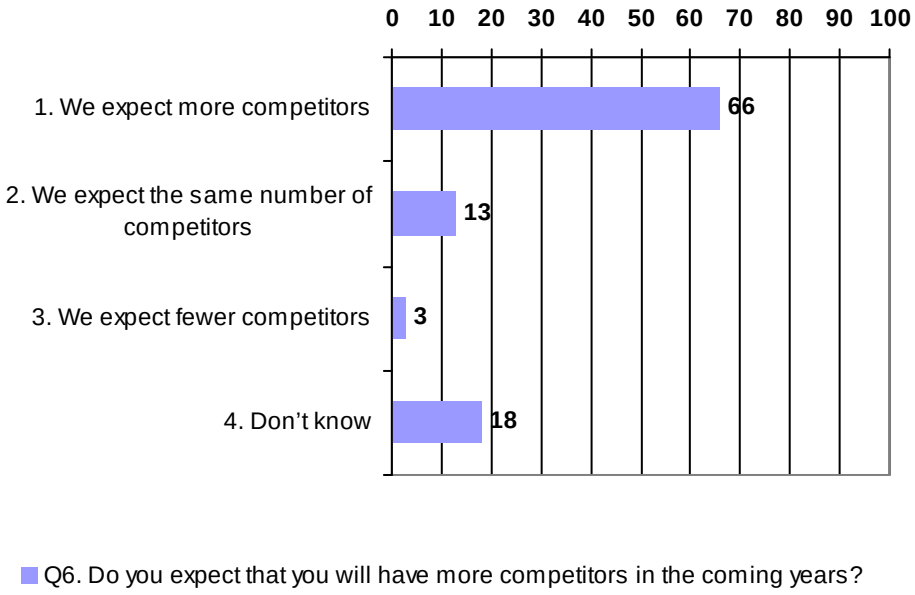
6.2.2. Increased competition in the rail sector

The opening of national rail markets and the subsequent entry of new rail operators have increased the competitive pressure on national incumbents, and this pressure is likely to in-

[16] SERVRAIL

crease. According to the survey, 66% of rail operators predict that they will have more competitors in the coming 10 -15 years.[17]

Figure 6.2. Assessment of the future competitive situation, rail operators (Percentage, N = 68)



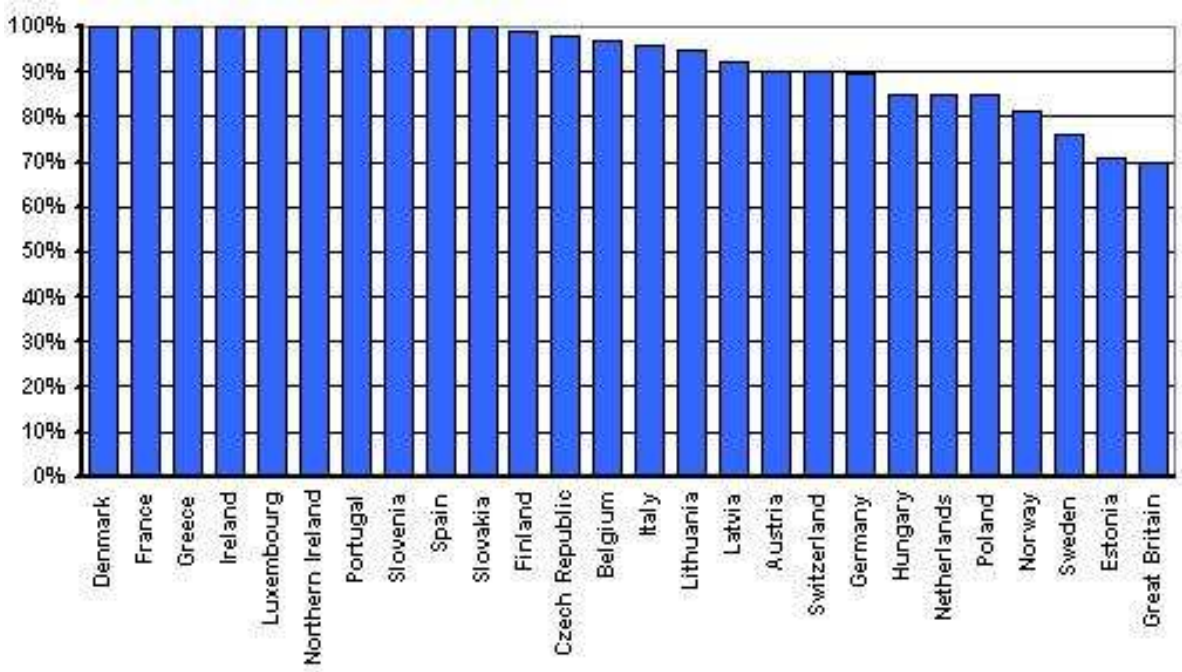
Source: Survey of rail operators

However, the objective of creating a competitive European rail market is yet to be realised due to different types of market barriers. According to the study 'Rail liberalisation index 2004', many of the Member States have granted documented, non-discriminatory access to the market, but in practice the functioning of the market is hampered by expensive and complex licensing and approval processes. In particular, the approval of rolling stock still represents a considerable market access barrier. [18] As a result, the market shares of new railway undertakings in national rail markets remain only marginal.[19]

One example is the European rail freight market. In spite of new entries on the rail freight markets, in particular in Sweden, the UK, the Netherlands, Germany, Italy, Poland and the Czech Republic, the rail freight market share of the largest operators remains high.

[17] Based on question 6 in the survey of rail operators
[18] IBM, *Summary of the Study Rail Liberalisation Index 2004*, http://ec.europa.eu/transport/rail/market/doc/lib2004-en-sum.pdf
[19] *Summary of the Study Rail Liberalisation Index 2004*, http://ec.europa.eu/transport/rail/market/doc/lib2004-en-sum.pdf

Figure 6.3. Rail freight market share of largest operators (in terms of tkm)



Source: European Commissions website, http://ec.europa.eu/transport/rail/market/freight_en.htm

In spite of market access barriers, new railway undertakings are increasingly trying to get access to regional or national rail markets. This has led to railway undertakings entering into new types of co-operations/alliances for providing international rail freight services.[20] In fact, some rail freight operators have developed a European business strategy and are now present in several national markets, for example the Railion Group (in Germany, Netherlands, Denmark and Italy), Trenitalia in Italy and Germany (through acquiring a majority share in the private German undertakings TX Logistik), the Swiss SBB Cargo by setting up subsidiaries in Germany and Italy, and the 'European Bulls' alliance set up by five new market entrants in January 2005.

By entering into new alliances, new entrants are in a position to provide competitive international services and to compete with national incumbents for such services. However, faced with the high market share and relatively strong capital base of the national incumbents, new entrants in many cases find it difficult to establish a significant position on the market.[21]

The framework conditions for actors in the national rail markets have to ensure fair and non-discriminatory access to infrastructure and rail related services such as rail training services. The survey of rail operators gives an indication of the type of skills and training-related barriers that constitute the largest obstacles in foreign markets for new market entrants.

Assessment

There is a need to ensure access to training facilities and increasing job mobility (cross-border; between companies). In addition, new market players are often weak in the area of

[20] Jan Scherp, *Creating an integrated rail freight market in the EU*, 2005 http://ec.europa.eu/transport/rail/market/doc/Amsterdam-21Nov05.pdf
[21] European Commission website, http://ec.europa.eu/transport/rail/market/freight_en.htm

training.[22] In order to facilitate market entry, national regulators could assist new market entrants with advice on national training requirements and provide an overview of potential training suppliers, etc.

See also chapter 3 on accessibility conditions for new market entrants.

6.2.3. Increasing importance of cross-border operations

Cross-border operations are becoming increasingly important in the European railway sector – not least in relation to cross-border region building (e.g. the Danish-Swedish Øresund region) and the establishment of European rail corridors.

In 2002, the Commission commissioned a study on training and staff requirements for railway staff in cross-border operations.[23] The final report highlighted the wide diversity of national legislation on certification conditions for train drivers, administrative complications resulting from this for the granting of various safety certificates to railway undertakings wishing to operate on the networks of the Member States, and associated operational difficulties in organising cross-border services.

Moreover, the report confirmed that train crews involved in cross-border operations and personnel responsible for inspecting rolling stock from other Member States or from outside the EU and for dispatching trains with foreign train crews need additional knowledge and training. The skills required vary substantially from one country to another because of the language used, the rules governing operations and signals, knowledge of infrastructure, use of different types of rolling stock and emergency procedures.

Three general recommendations were made in the study:

- The need to specify and implement common minimum requirements for train drivers at European Union (or Member State) level, in particular to replace certification systems based on the practices of former railway operators.
- The need for extending interoperability to a "multi-border" approach going beyond the traditional bilateral approach.
- A recommendation to take advantage of the implementation of harmonised systems such as ERTMS/ETCS in order to simplify the training of train drivers and despatching and control-command staff.

Assessment

Cross-border operations are an integral part of the creation of a European Railway Area and in realising the ambition of making European rail a competitive alternative to other modes of transport. Effective cross-border operations require full technical interoperability and cross acceptance/harmonisation of national staff requirements.

6.2.4. Regional differences

In 2004, 10 European countries joined the European Union followed by Bulgaria and Romania in 2007. These new Member States have been doing well in terms of liberalisation of the

[22] European Foundation for the Improvement of Living and Working Conditions, *Employment, industrial relations and working conditions in the European rail transport sector*, 2006
[23] Atkins, *Training and staff requirements for railway staff in cross border operations - Final Report*, 2002

rail sector.[24] However, there is a considerable backlog when it comes to rolling stock and infrastructure. The modernisation of the infrastructure, the introduction of new technical equipment and new communication systems in combination with e-ticketing systems and other technological innovations pose a significant challenge for railway undertakings in the new Member States.

Assessment

The modernisation of equipment or systems constitutes a challenge – especially for operators in the new Member States that face a considerable backlog. Operators will have to ensure that staff receives proper training when new equipment or systems are introduced. Meeting this demand requires access to training facilities that can provide the necessary training.

6.2.5. Structural reforms in the industry (restructuring)

The liberalisation efforts in the rail sector have triggered extensive structural changes in the sector, which will continue or even accelerate in the future.[25] As a part of the liberalisation process, rail operation has been separated from infrastructure management. In addition, non-core activities have been outsourced to state owned enterprises or private companies in some countries. One example is that rolling stock and related services in the UK are largely provided by private companies such as Angel Trains (http://www.angeltrains.co.uk/) through leasing agreements. The structural reforms in combination with increasing market pressure resulting from the entry of new market players has led to extensive restructuring activities in the rail sector aimed at adjusting to the new rules of the game and not least reducing costs. The restructuring activities have led to a significant decrease in the employment level in the sector. At the same time, the increasing number of market players has led to greater competition for skilled workers and specialists.[26]

Reorganisation and restructuring has occasionally led to conflict in the rail sector.[27] For instance, unions in Hungary recently (April 2007) protested over plans to cut employee benefits in the national railway sector. The Hungarian government's reform of the entire healthcare system has been heading towards the abolishment of a separate healthcare plan for railway employees, and the unions have threatened with strike action in response to this development.[28]

Assessment

Restructuring activities and increasing market pressure have had a substantial impact on employment levels and working conditions, as operators to an increasing extent focus on cost reductions and achieving higher degrees of flexibility with regard to working time and work organisation.[29]A potential impact of these activities is that the need for improving the job mobility of employees within a specific organisation increases (cf. below).

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[24] IBM, *Summary of the Study Rail Liberalisation Index 2004*, 2004 http://ec.europa.eu/transport/rail/market/doc/lib2004-en-sum.pdf

[25] European Foundation for the Improvement of Living and Working Conditions, *Employment, industrial relations and working conditions in the European rail transport sector*, 2006

[26] European Foundation for the Improvement of Living and Working Conditions, *Employment, industrial relations and working conditions in the European rail transport sector*, 2006

[27] European Foundation for the Improvement of Living and Working Conditions, *EIRO thematic feature - Industrial relations in the railway sector*, 2005

[28] European Industrial Relations Observatory website, http://www.eurofound.europa.eu/eiro/2007/02/articles/hu0702029i.html

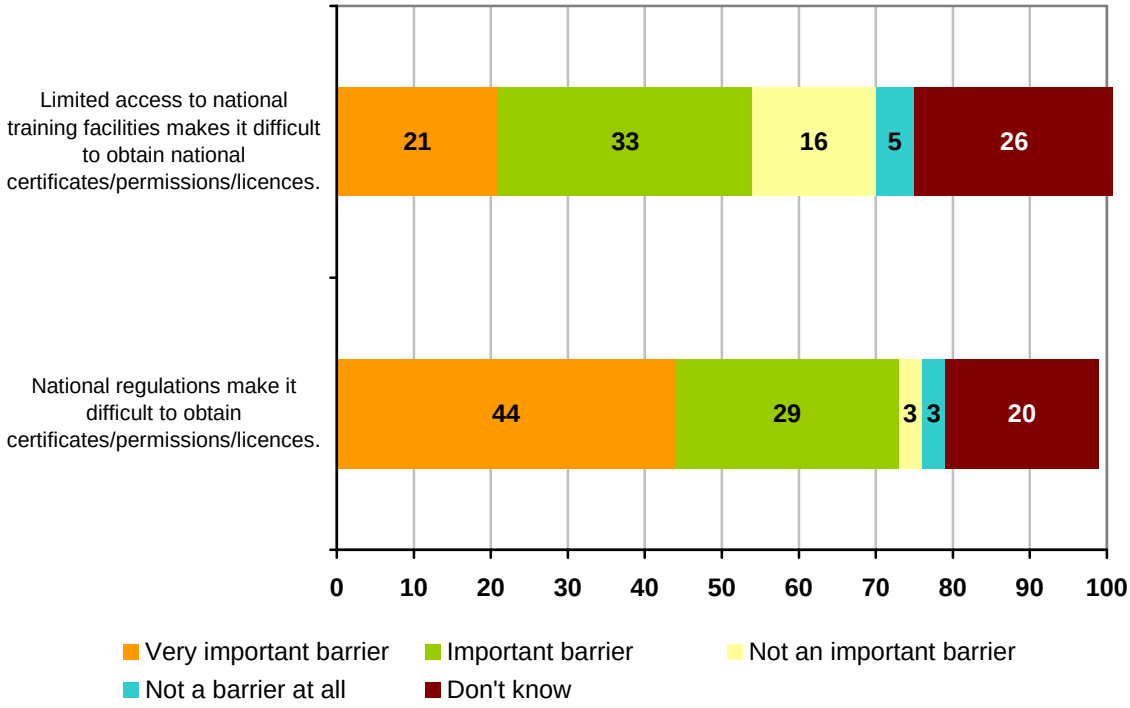
[29] European Foundation for the Improvement of Living and Working Conditions, *Employment, industrial relations and working conditions in the European rail transport sector*, 2006

6.2.6. Need for increased job mobility

Two factors (A) industry reforms (including restructuring activities) and (B) new rail operators entering national rail markets increase the need for increased job mobility in the rail sector. In relation to restructuring activities, there is a general need to focus on retraining staff so that they are able to take care of functions that they have not previously been taking care of in the company. This is also influenced by the reduced pool of potential employees due to demographic changes in Europe.

In addition, there is a need to improve the process of transferring staff from one country to another or from one rail company to another. Job mobility is also important for European citizens wanting to work in other countries or transferring to another company due to changes in life situation, preferences or the prospect of a change in working conditions/salary. Considering the cross-border mobility of rail staff, 73% of the operators consider national regulation a "very important" or "important" barrier to obtaining certificates/permissions/licenses for their own staff when entering new markets in other countries.

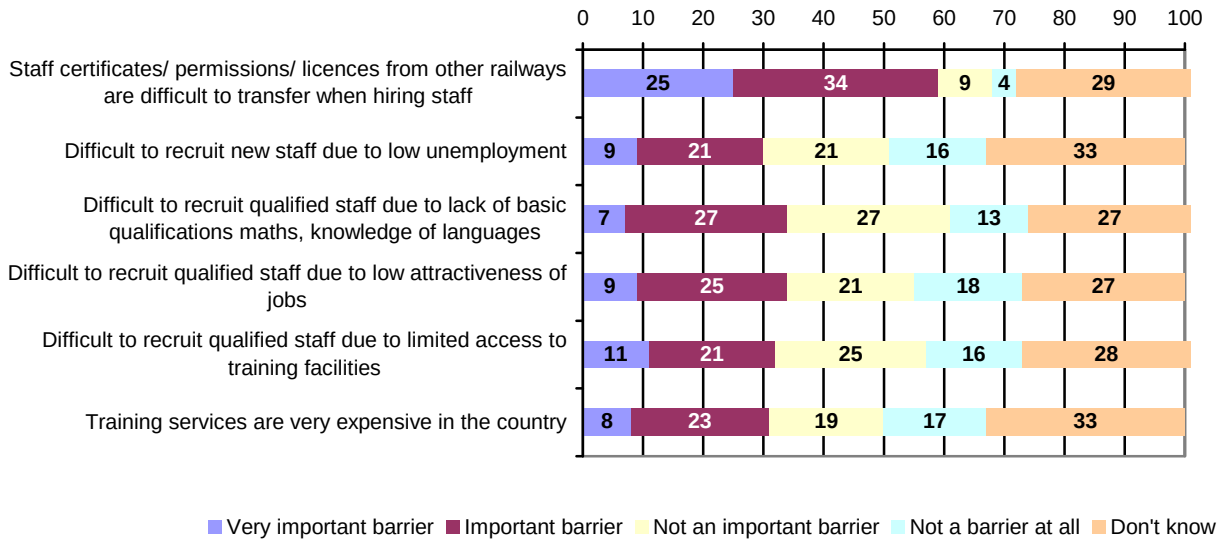
Figure 6.4. Assessment of barriers to using existing staff in foreign countries (cross-border mobility), rail operators



Source: Survey, question 18a. "Barriers to using your existing staff in foreign countries"

Moreover, in terms of mobility between rail companies, 59% of the operators consider difficulties in transferring staff certificates/permissions/licences from other railways a "very important" or "important" barrier to hiring staff in rail markets in other countries, cf. figure 6.5 below:

Figure 6.5. Assessment of barriers to hiring new staff in foreign countries, rail operators



Source: Survey, question 18B. "Barriers to hiring new staff in foreign countries"

In the survey one rail operator considers the lack of standardised job descriptions for railway staff in Europe as one of the important barriers to hiring new staff in other countries.

Assessment

The survey indicates that there is a need to promote cross-border mobility and mobility between companies in a specific market.

6.2.7. Increasing competition from other modes of transport

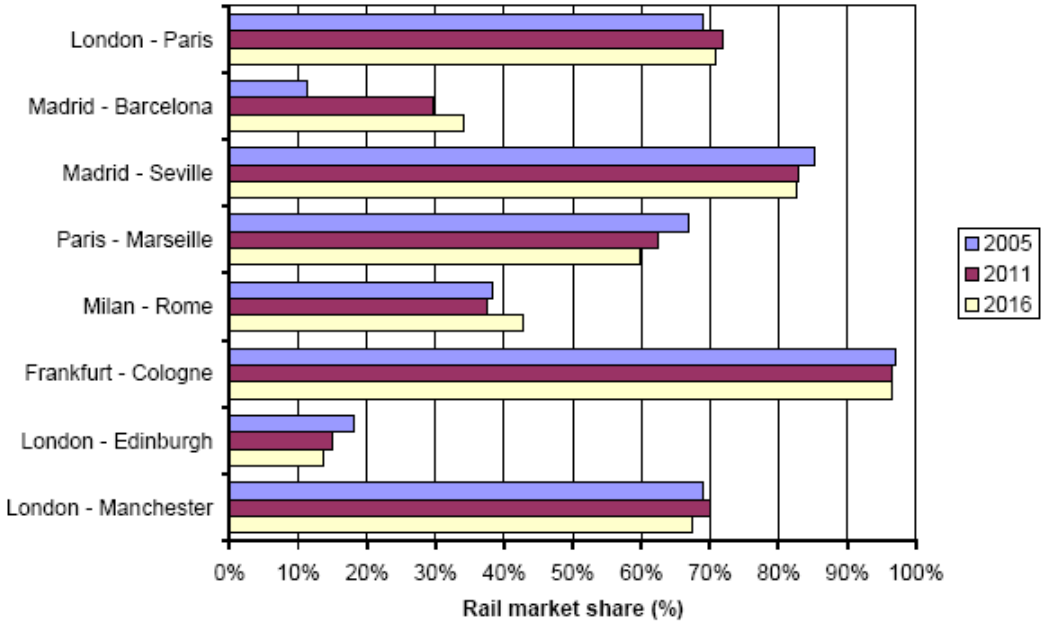
The European rail sector is competing against other modes of transport – in freight as well as passenger transport - and when competing modes of transport introduce new products on the transport market, it could very well affect the rail sector's market share. For instance, the possible introduction of so-called 'monster trucks' in the European freight transport markets will probably have a negative impact on the rail sector's market share.[30]

The expansion of low cost airlines means that on some routes, particularly in Germany and the UK, prices for air transport are now similar to or below prices for rail transport. This development constitutes a threat to rail services covering the same routes.

In a recent Steer Davies Gleave study of eight selected rail markets, the possible change in market share following from estimated changes in operating costs has been analysed.

[30] CER website, http://www.cer.be/files/070321%20trucks%20-160331A.pdf

Figure 6.6: Projected changes in rail market share in selected rail markets



Source: Steer Davies Gleave, Air and rail competition and complementarity - Final Report, 2006
http://ec.europa.eu/transport/rail/studies/doc/2006_08_study_air_rail_competition_en.pdf

The most significant changes in market share are expected to be on the Madrid-Barcelona and Milan-Rome routes, where the opening of high-speed lines will significantly reduce rail journey times. However, on both routes it is likely that low cost air services will be significantly expanded, leading to large reductions in air fares, and this will offset part of the increase in rail market shares. The share of rail transport will decline on most of the other routes due to lower airfares.

In a projection for 2016, it is estimated that operating costs per passenger will be higher for rail than classic airlines on three of the eight routes examined, approximately equivalent on three, and lower on two. Low cost airline operating costs will be below rail operating costs on all routes apart from Frankfurt-Cologne.

Until recently, it was cheaper (although slower) to make relatively long trans-European journeys, such as Paris-Berlin or Amsterdam-Munich by rail rather than air. Now, rail fares often exceed airfares for these types of journeys.[31]

Assessment

Increased competition – from railways and from other transport modes (especially low cost airlines) – requires that rail operators reconsider their strategies and adopt new measures to increase their competitiveness and profitability. In face of the growing competition, many European rail operators have focused efforts on increasing labour productivity. According to the CER, labour productivity in rail companies increased 39% in the EU15 and 34% in the New Member States between 1995 – 2004 (CER 2006).

[31] Steer Davies Gleave, *Air and rail competition and complementarity - Final Report*, 2006
http://ec.europa.eu/transport/rail/studies/doc/2006_08_study_air_rail_competition_en.pdf

Productivity gains are often made through the introduction and innovative use of ICT or through reorganisation and it is reasonable to expect that such initiatives will be on the sector's strategic agenda in the future. As a result, staff will be required to quickly adopt new technologies and adapt to new routines and working practices.

6.2.8. The establishment of high-speed lines

In order to compete with air and road, railway undertakings are establishing high-speed lines between the main destinations in Europe. The opening of high-speed lines has enabled rail transport to obtain significant market shares on routes where time-sensitive passengers would previously have travelled by air, such as Paris-Lyon and Madrid-Seville.[32]

Among the most recent initiatives is the TGV Est high-speed line between Paris and Bratislava. The first phase linking Paris and Strasbourg was completed in March 2007, opening the way for high-speed travel between France, Germany, Switzerland and Luxembourg. The new line will reduce the journey time from Frankfurt to Paris to 3 h 45 m instead of the current 6 h 15 m. The line between Paris and Strasbourg will eventually become the French section of a 1500-kilometre rail link between Paris and Bratislava.[33]

Assessment

High-speed lines are an opportunity for railway undertakings to improve competitiveness vis-à-vis other modes of transport. The establishment of high-speed lines accentuates the need to facilitate cross-border operations between Member States, thus ensuring that technical as well as staff related issues are addressed appropriately (see section on cross-border operations). Furthermore, railway undertakings have to ensure that their staff is sufficiently qualified for high-speed operations (e.g. additional courses in safety requirements, special technical equipment, etc.).

6.2.9. Integration in global logistics chain

Rail needs to be integrated in the global logistics chain and this, among other things, requires the building up of a European intermodal transport system. However, the strategic necessity of integrating the railways in the global logistics chain implies that shifts from one mode of transport to another need to be optimised. Hours spent waiting is money lost. Such integration requires a strong transport infrastructure, introduction of new technologies and improved communication between actors in the logistics chain.

Among the European initiatives in this area is the PROMIT project that aims to contribute to a faster improvement and implementation of intermodal transport technologies and procedures and to help promote intermodal logistics and mode shift by creating awareness of innovative solutions, best practices and intermodal transport opportunities.[34]

Increased collaboration among actors in the transport sector is also vital, leading to for strategic partnerships for instance between rail operators and shipping companies or the establish-

[32] Steer Davies Gleave, *Air and rail competition and complementarity - Final Report*, 2006 http://ec.europa.eu/transport/rail/studies/doc/2006_08_study_air_rail_competition_en.pdf

[33] European Commission website, http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/329&format=HTML&aged=0&language=EN&guiLanguage=en

[34] Promit website, http://209.85.129.104/search?q=cache:-IGT_sDcG1UJ:ec.europa.eu/transport/logistics/rdn/networking_en.htm+best+practice+intermodal+shift&hl=da&ct=clnk&cd=9&gl=dk

ment of networks providing integrated multimodal services to costumers. One example is the Antwerp Intermodal Network set up by the Antwerp Port Authority in collaboration with barge and rail operators in Belgium and other countries. The network aims at expanding and promoting the short-to very short-distance multimodal transport network.[35]

Intermodality is also relevant in relation to passenger transport – e.g. when passengers change from aeroplanes to rail and vice versa. At two European airports, Frankfurt and Paris CDG, there are high-speed rail stations at the airport and there is the potential for rail and air services to complement each other rather than compete. Instead of taking a short-distance flight to the airport in order to connect to a long-distance flight, passengers can travel by high-speed rail to/from the airport, and on certain routes they can purchase tickets which include both the journey by train and by airplane. However, the attractiveness of such offers is limited if air passengers cannot check in their luggage at the train station and obtain a single electronic ticket for the combined journey.[36]

Assessment

In relation to the optimisation of intermodal shifts, communication between the different actors in the logistics chain is vital. The introduction of new communication devices and procedures will require training of staff.

6.3. Social changes

6.3.1. Social objectives: The effect of gender on training needs

Changes in working conditions and work organisation affect the training needs of employees in the sector i.e. requiring more flexible training offers. In addition, a range of social objectives need to be taken into consideration when discussing training needs. For instance, 'equal opportunities' are among the main social objectives in the political discourse, and this implies that the special training needs of women, disabled, and/or people from other ethnical groups need to be approached proactively.

In terms of gender, the project 'Representation and better integration of women in the different professions of the railway sector' launched in 2005 aimed at providing an overview of the sector from the perspective of female employees and to facilitate exchange of good practice in the area of equal opportunity and integration of women in the railway sector. Trade unions and employers from 11 EU Member States participated in the project and in the survey.

The study concluded that:

- Women are seriously under-represented in the workforce of the European railway enterprises, and employment trends show a further drop in their number due to the accelerated pace of restructuring. Women account for only 18.8% of the total number of employees in the 11 railway companies subject to survey.
- The rail sector is deeply marked by horizontal and vertical segregation. Thus, female workers prevail in clerical jobs while technical occupations are by far male-

[35] Antwerp Intermodal Network website, http://www.portofantwerp.com/html/05_PORTBROCHURES/AGHApdfNEW/PoA_intermodal.pdf
[36] Steer Davies Gleave, *Air and rail competition and complementarity - Final Report*, 2006 http://ec.europa.eu/transport/rail/studies/doc/2006_08_study_air_rail_competition_en.pdf

dominated. While managerial posts are equally shared between men and women, only 1% of the executive posts are taken up by women.

- The pay gap (in average wage) in the sector varies from country to country varying from 10% to 30%!
- Regarding work-life balance, female railway workers share a strong view that maternity leave has a negative impact on career progress and pay.
- Cultural stereotypes feeding into segregation and discrimination, pay inequity affecting job satisfaction, and difficulties in reconciling work and family life are among the most critical aspects social partners need to address in order to encourage more women to join the railway professions and to keep their jobs within the sector.

With the view to the above, the study makes recommendations in three areas, namely communication/language to overcome the male-oriented stereotype, training/updating to allow workers equal conditions and career prospects as well as improving the culture of equal opportunities, better representation of women's needs and interests at the level of collective bargaining.[37]

Assessment

Promoting training activities in relation to female employees requires training offers that meet the needs of female employees for flexibility, giving female employees the possibility of participating in training activities that could otherwise be in conflict with their job or family life.

6.3.2. The European workforce is getting smaller and older

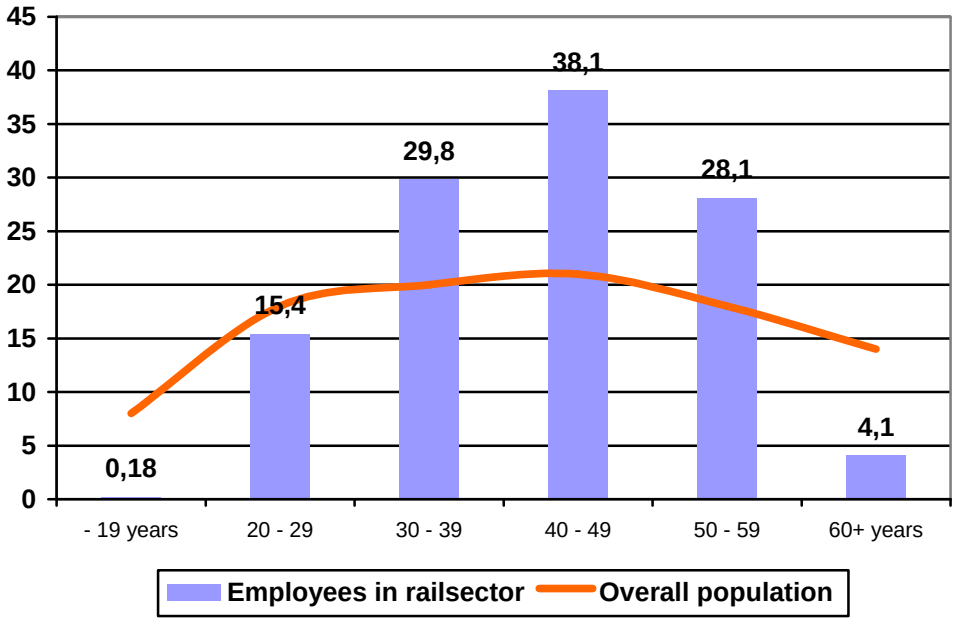
Demographic developments in Europe are posing a major challenge to European railway operators. The workforce in Europe is getting smaller and older - mainly due to better life expectancy and low birth rates. This results in a smaller pool of potential employees and increasing competition for human resources – both from other railway operators and other sectors.

At the same time, many countries in Europe are experiencing a reduction in unemployment. Rail companies operating in these countries will face even more competition for potential employees (especially the skilled workers) in the labour markets.

In the survey, the train operators were asked to indicate the age profile of their employees. The average distribution is shown in figure 6.7 below:

[37] CER and ETF, *The representation and better integration of women in the different professions of the railway sector*, 2005 http://www.itfglobal.org/files/seealsodocs/1502/Rail%20Women%20Project%20Final%20Report%20EN.pdf

Figure 6.7: Age profile of employees, average (pct)

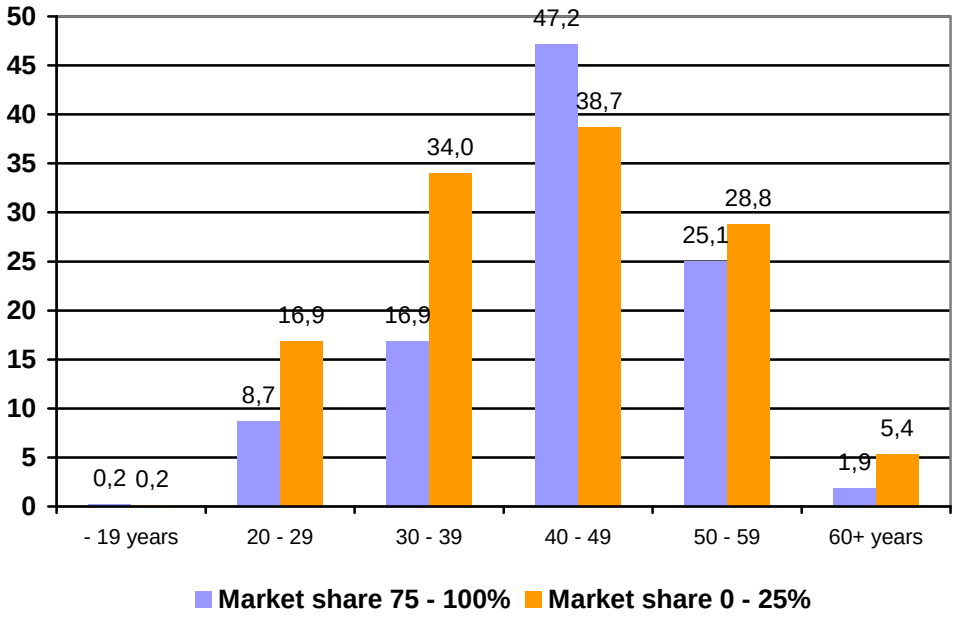


Source: Survey, question 28 and http://www.census.gov/
Note: The age-distribution is a calculated average of the reported share within each age group across Europe – thus the figures doesn't sum to 100. The figures for the overall population is a calculation of the relative share of the total populations within each agegroup: 15-19,20-29,30-39,40-49, 50- 59, 60-65 years old. Thus the number is larger than the actual available work force within a given year. The figures must be interpreted with caution – however they indicate that the age distribution within railwayoperators differs from the demographic profile of the population.

Considering the overall composition of the European workforce, the share of 'old' employees in the rail sector is relatively large. This composition of the workforce presents a significant human resource challenge in the years to come and a considerable shortage of employees in the sector is to be expected. This emphasises the need to focus on recruiting more employees and retaining employees that are currently employed in the sector e.g. age management strategies etc.

Operators with a relatively small market share (0 - 25%) – typically this group includes new market entrants – has a slightly different age profile than operators with a relatively large market share, cf. figure 6.8 below.

Figure 6.8: Age profile by size of company (market share)



Source: Survey of rail operators

According to the survey, the share of young employees (aged 20-29 and 30-39) is significantly larger for small operators compared to large operators. At the same time, the workforce of small companies is also characterised by a relatively large share of 'old' employees (aged 50-59 and 60+). Even though all operators are facing an 'age problem', the more even age distribution of employees indicates that small operators could be in a better position to handle this problem than large operators[38].

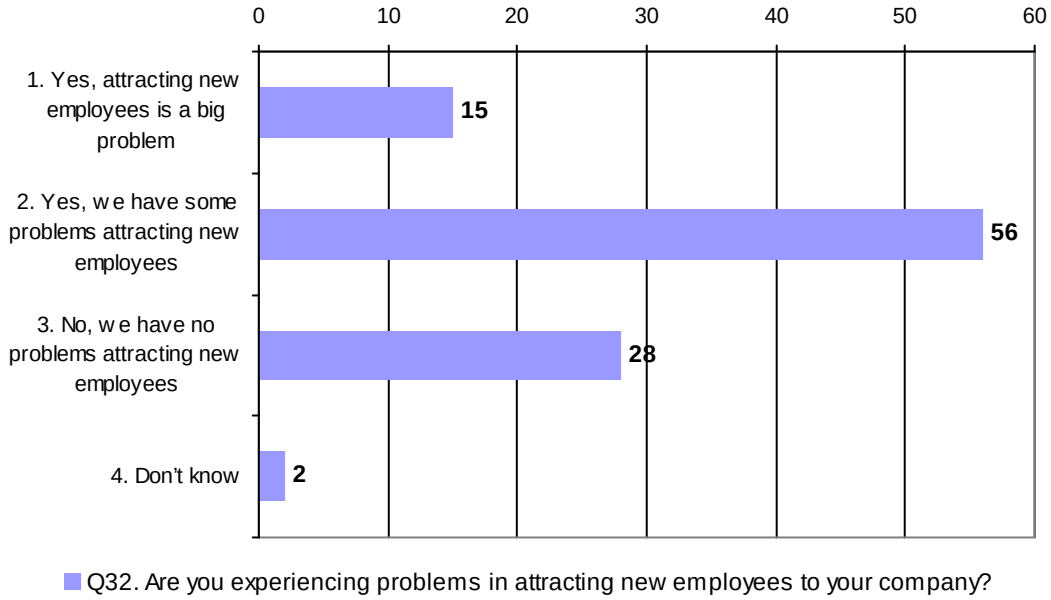
The concerns about the demographic developments in Europe are reflected in the survey of rail operators. In fact, the recruitment of new and well-qualified staff is the second most important future challenge for rail operators, based on the importance assigned to this issue in the survey by the rail operators (out of a list of 11 potential challenges): 85% of the rail operators consider this challenge "very important" or "important", while 90% of the operators consider the liberalisation of markets leading to more competition as a "very important" or "important" challenge.[39]

In fact, many rail operators state that they currently find it difficult to attract new employees as shown in figure 6.8 below.

[38] The difference may illustrate structural differences between big and small operators, but it is outside the scope of this survey and the data available to analyse the explanation for this observation. Among plausible hypotheses could be differences regional differences, differences in national regulation, differences in pensionschemes, differences in the nature of the operations and others explanations may apply as well.

[39] Based on survey, question 34. "The rail industry is facing a number of challenges in the years to come. We would like your view on the importance of the challenges. Please indicate how important you think each of the challenges are to your company"

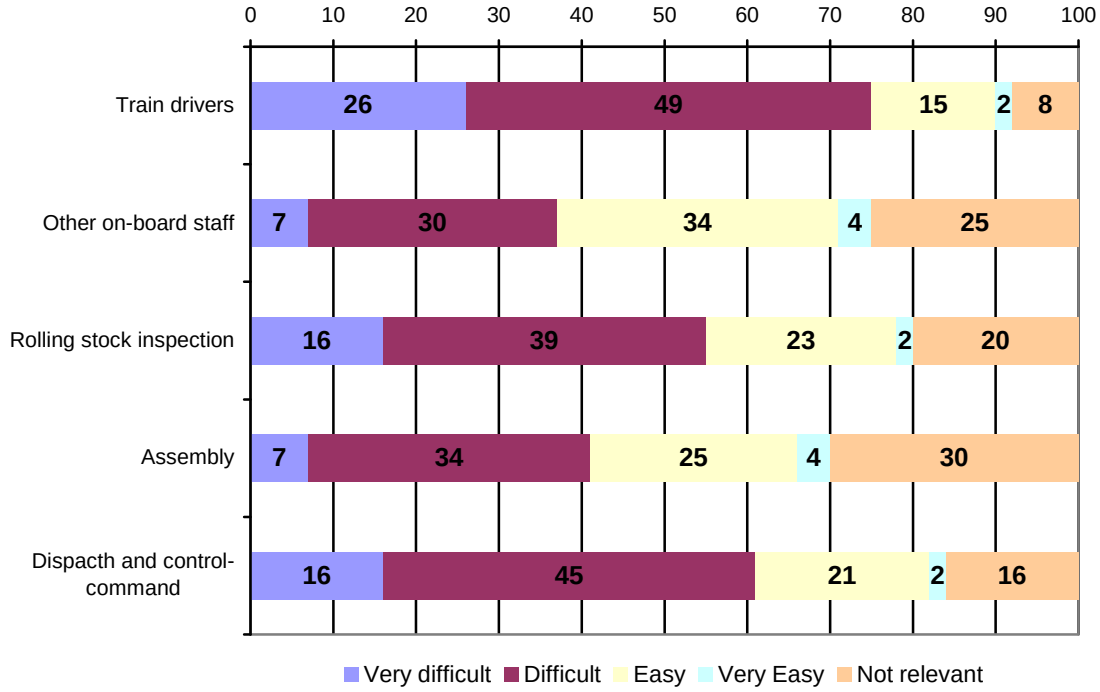
Figure 6.8: Assessment of recruitment situation, rail operators (percentage)



Source: Survey of rail operators

However, it is important to note that the recruitment situation differs depending on the specific staff category:

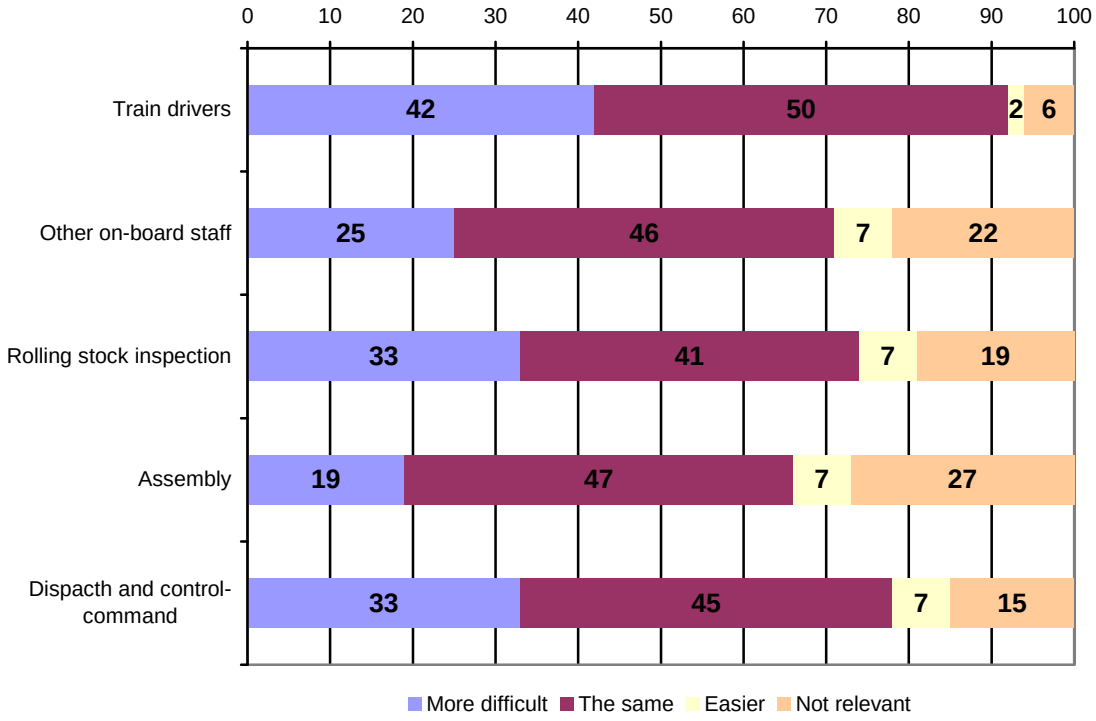
Figure 6.9: Assessment of current recruitment situation by staff category, rail operators



Source: Survey of rail operators. "For each of the categories of staff – would you say that it was very difficult, difficult, easy or very easy to recruit the required new staff in 2006?"

The current recruitment situation is especially difficult in relation to train drivers, dispatch and control-command staff, and staff working with rolling stock inspection. Moreover, a large share of the rail operators indicates that the recruitment situation will worsen in the coming years – at least for some staff categories:

Figure 6.10: Assessment of future recruitment situation by staff category, rail operators

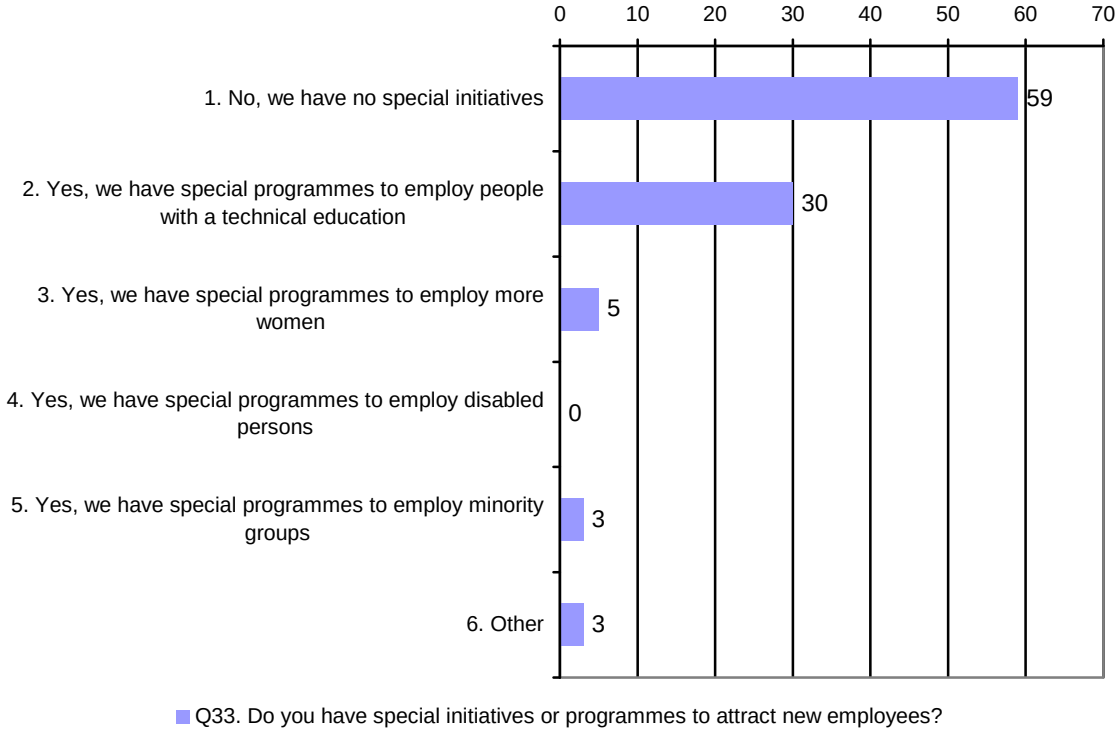


Source: Survey of rail operators. "For each of the categories – compared to 2006 – would you expect that it will be more difficult, the same or easier to recruit new staff in 2010?"

Over 40% of the rail operators expect that it will be more difficult to recruit train drivers in the future, while more than 30% of the operators expect more difficulties in recruiting staff working with rolling stock inspection and in recruiting dispatch and control-command staff.

However, in spite of the current recruitment situation and outlook, most of the rail operators in the survey are not engaged in specific recruiting initiatives targeted at women or groups of people who often hold a marginal position in labour markets (ethnic minorities, disabled people).

Figure 6.11: Initiatives or programmes aimed at attracting new employees, rail operators



Source: Survey of rail operators

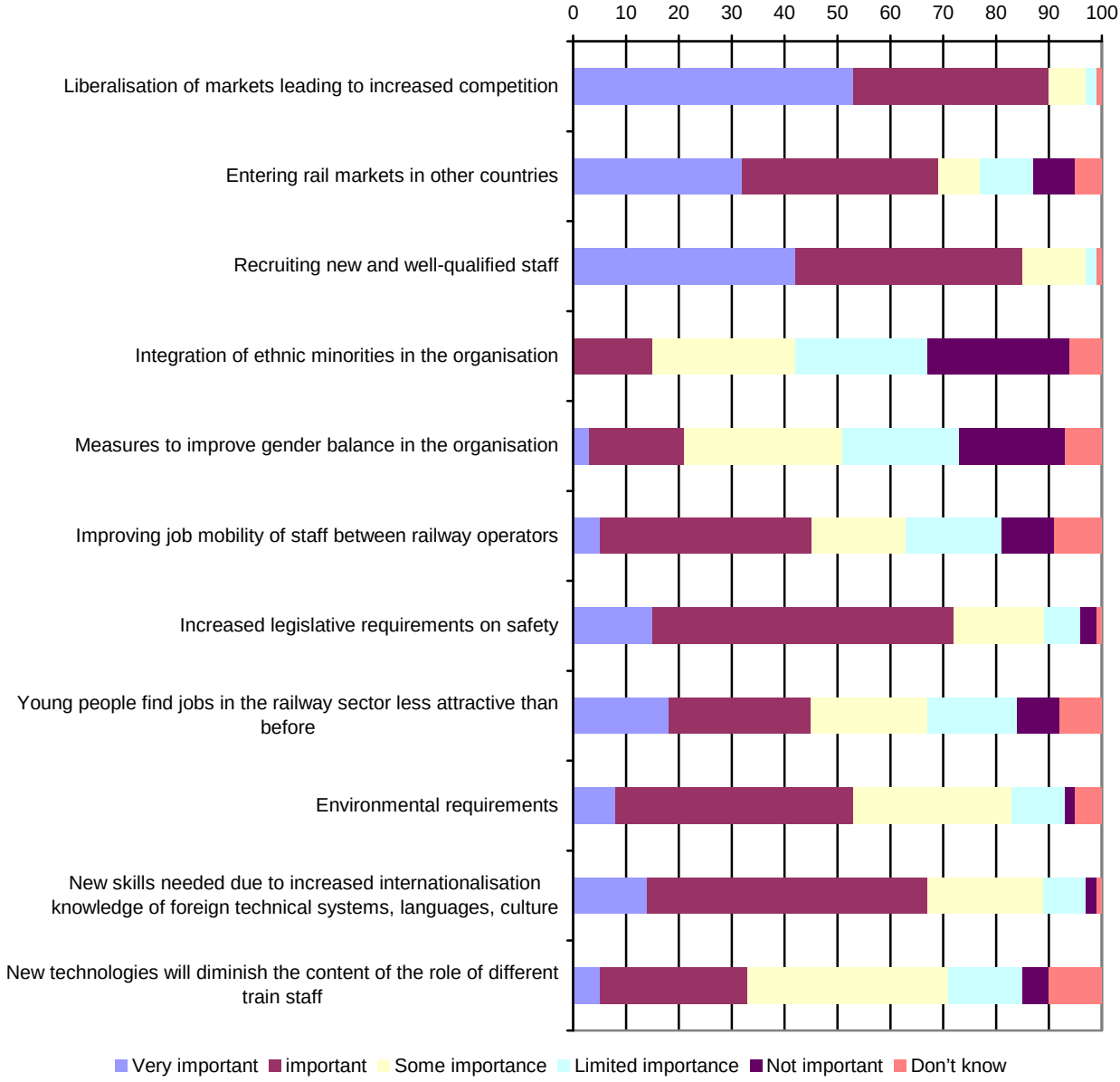
Assessment

The demographic situation of companies in the rail sector and difficulties in the recruitment of new employees constitute a major challenge for rail operators. This development requires that rail operators are proactive in their recruitment and human resource policies, focusing efforts on recruitment of women and groups that often hold a marginal position on the labour market (disabled persons, immigrants, ethnic minorities), offering competitive salaries and working conditions etc. Increasing the focus on groups that hold a marginal position on the labour market on the other hand will require additional training (for instance language training for immigrants).

6.3.3. Low attractiveness of jobs in the railway sector

One of the reasons for the recruitment problems in the rail sector could be a change in the preferences of young people. In recent years, jobs and education which are considered 'technical' have been deemed unattractive to an increasing extent by young people. Instead, the young generations tend to focus on jobs and education that are considered to 'creative' or within the media industry [Interview with Rosemary Way, Network Rail]. However, in their assessment of potential future challenges, less than half of the rail operators consider the risk that young people view jobs in the rail sector to be less attractive than other jobs a "very important" or "important" challenge, cf. figure 6.12 below:

Figure 6.12: Assessment of potential future challenges, rail operators



Source: Survey of rail operators. "The rail industry is facing a number of challenges in the years to come. We would like your view on the importance of the challenges. Please indicate how important you think each of the challenges are to your company"

There are several possible explanations for this:

- the operators do not think that young people find jobs in the rail sector unattractive
- even though young people might find jobs in the rail sector unattractive, the pool of potential employees is still considered to be sufficiently large to avoid serious recruitment problems

Assessment

Even though they might not be concerned about young people's interest in jobs in the rail sector, the demographic developments and the demographic situation of companies in the

sector suggests that rail companies need to focus on making young people aware of job opportunities in the rail sector. It is necessary for rail companies to ensure that jobs in the sector are attractive by providing attractive working conditions and ensuring that the education and career opportunities in the sector are interesting and meet young people's expectations (cf. case about Network Rail's Advanced Apprenticeship Scheme).

Re-establishing Industrial Apprenticeships – Pre-empting Future Staff Shortages

Network Rail – responsible for maintaining, improving and upgrading every aspect of the rail infrastructure in the UK – has responded to the future need for employees at all levels of the rail sector by creating several types of training schemes.

One of these is the Advanced Apprenticeship Scheme, a government subsidised modern apprenticeship scheme. Network Rail has set a target of training approx. 240 apprentices each year for 5 years to pre-empt future shortages in their workforce. More than 1600 applications were received in 2006, so there is no shortage of applicants, but there are some challenges in recruiting a sufficient number of apprentices from peripheral regions of the country and in those regions where competition from other employers is high. These challenges are overcome by using a variety of innovative recruitment procedures and targeting recruitment in certain geographical areas.

A joint venture between The Royal Navy, Flagship Training Ltd. and Network Rail this scheme is an exemplar approach to a modern apprenticeship scheme, where two large organisations with similar technical training requirement and facilities join resources for their mutual benefit.

"It was pure coincidence that someone at Network Rail had been trained in the Navy and knew that they had plenty of training facilities available at Gosport, since the Navy had been scaling down their recruitment," says Rosemary Way, Resourcing Manager, Advanced Apprenticeship Scheme.

This fortunate incident was the beginning of a rewarding partnership: The tailored first year training programme is delivered by Flagship Training Ltd. to meet the specific requirements of Network Rail and is delivered at the Royal Navy's engineering base HMS Sultan in Gosport, Europe's largest specialist engineering training centre. This ensures consistency of training across the entire apprentice workforce, contrasted with the disparate apprenticeship schemes which used to be offered by the various maintenance contractors before Network Rail set up the Scheme.

The apprentices spend the first year of the course at The Royal Navy's engineering base the HMS Sultan living nearby on the HMS Collingwood. In subsequent years, the apprentices return to the HMS Sultan on a part-time basis for additional rail specific training delivered by Network Rail's team of experienced engineers.

After three years of training – classroom, work-based and practical – the apprentices qualify as maintenance engineering technicians within one of three areas of engineering of their choice, i.e. track, signalling and electrification & plant. The apprentices will have studied a range of engineering subjects, received further education in mathematics, science, and either electrical & electronic principles or mechanical engineering principles, to attain nationally recognised qualifications (NVQs and BTEC) and a NVQ Level 3 in railway engineering. Once they have completed their education, the engineering technicians are guaranteed a job in Network Rail.

"Network Rail's advanced apprenticeship scheme is not just an apprenticeship with no further employment opportunities. Network Rail's apprentices are employees from day one, and after three years of training they will join a team of experienced co-workers, where they can develop their skills further and if they have the potential and ability, go on to study further and qualify as track or signalling engineers." Rosemary Way, Resourcing Manager, Advanced Apprenticeship Scheme.

Sources

http://www.flagshiptraining.co.uk/content/default.asp?PageId=367

http://www.everydaybrilliance.co.uk

Interview with Rosemary Way, Resourcing Manager, Advanced Apprenticeship Scheme.

Possible actions aimed at recruiting young people could involve a reform of education and training in the sector (form and content), and/or a joint recruitment campaign specifically targeted at young people.

The Blue Denmark - Recruiting young people for a career in the maritime sector

Un 2007, a wide range of Danish shipping companies, shipyards, offshore companies, educational institutions, public authorities, and companies in supplying sectors joined forces and launched a campaign aimed at recruiting young people for a career in the maritime sector.

Source

http://www.worldcareers.dk/Det_Blaa_Danmark/Kort_og_blaat.aspx

6.3.4. Lifelong learning

Lifelong learning is a key word in the realisation of the objectives of the Lisbon Strategy. There are several initiatives in the sector, including the establishment of two new training centres in Glasgow in 2006.

Promoting Lifelong learning – new training centres in Glasgow

In 2006, the Rail Learning Centre at Stow College and First ScotRail's dedicated Training Academy in Glasgow opened, making Glasgow a centre of lifelong learning for rail staff. These centres make it possible for staff to deliver high service standards and ensure that rail staff has the opportunity to improve their education and skills throughout their career.

The Rail Learning Centre will offer courses ranging from IT to languages and features full technical support services and opportunities for on-line learning. It is considered an excellent example of effective partnership between businesses, unions and the College.

The First ScotRail's Training Academy offers courses ranging from core training for new entrants to personal and management development programmes. The Training Academy provides the opportunities for First ScotRail employees to learn throughout their careers in terms of vocational and non-vocational skills.

Source

Scotrail website,
http://www.firstgroup.com/scotrail/content/news/view-scotrail-press-release.php?id=00000000166

Another example is the lifelong training initiative taken by the London Underground in 2002 in an effort to promote vocational training in the company:

Boosting vocational training – London Underground

London Underground initiated its national vocational qualifications (NVQ) programme in 2002 following guidance from the railway inspectorate on the importance of proving the skills of its workforce. The programme covers 10,000 frontline operational staff.

In 2004, London Underground stepped up its training effort by committing to vocational education for the next decade aiming to expand the range of qualifications for staff. The same year, London Underground established a Centre of Vocational Excellence (CoVE) in partnership with Four Counties Training (http://www.fct.uk.com/). Delivering NVQs on a large scale has been an extensive task, and entering a strategic partnership has been critical in making the programme work, particularly in securing government funding for all NVQ candidates.

London Underground's NVQ programme has ensured that thousands of employees have gained nationally recognised qualifications in one of the UK's largest skills development programmes. London Underground also plans to roll out an apprenticeship scheme in rail operations and has made the marketing of NVQ opportunities a priority with new recruits.

Source

Personnel Today Website, http://www.personneltoday.com/Articles/2004/09/01/27708/london-underground-set-to-boost-vocational-training.html; Transport for London website, http://www.tfl.gov.uk/corporate/media/newscentre/4292.aspx

Assessment

In order to meet the objective of ensuring lifelong learning, dedicated training initiatives have to be implemented and rail operators need to build a strong learning culture in the company promoting training activities such as vocational training.

6.3.5. Customer demands

Costumers expect to receive information about the traffic situation - especially when rail operations are delayed. Communication concerning the traffic situation has to reach train drivers and onboard staff, and train staff has to be able to communicate back to traffic managers about situations that could result in delays or even affect the traffic situation for other trains (technical malfunctions, break down, etc.). Moreover, staff increasingly has to deal with customers that are verbally or physically abusive. Such developments require additional training making it possible for staff to handle conflict situations.

Assessment

Rail operators have to focus on the development of a service culture that focuses on providing information to customers. This requires effective communication between staff. There is also an increasing need for courses focusing on conflict management.

6.4. Key forces: market changes

6.4.1. Implications of continued liberalisation of national rail markets

The opening of rail markets has a profound effect on the sector by paving the way for the entry of new operators in markets that used to be monopolies. The liberalisation process requires efforts by regulators aimed at ensuring free and non-discriminatory access to rail training services.

6.4.2. Implications of increased competition in the rail sector

Increased competition requires non-discriminatory access to training facilities, sufficient training capacity and/or job mobility (cross-border; between companies). In addition, new market players are often weak in the training area.[40] In order to facilitate market entry national regulators could assist new market entrants with advice on national training requirements and provide an overview of potential training suppliers.

6.4.3. Implications of increasing importance of cross-border operations

Cross-border operations are an integral part of the creation of a European railway area and in realising the ambition of making European rail a competitive alternative to other modes of transport. Effective cross-border operations require full technical interoperability and harmonisation of national staff requirements, cross-border acceptance of national certificates or even European certificates for train staff. Staff needs to be trained in language and improve their cultural skills.

6.4.4. Implications of regional differences

Special needs for training of staff in the new member states will require access to training facilities, sufficient capacity and ensuring proper certification of training.

6.4.5. Implications of structural reforms in the industry (restructuring)

Restructuring activities and increasing market pressure have had a substantial impact on employment levels and working conditions as operators to an increasing extent focus on cost reductions and achieving higher degrees of flexibility with regard to working time and work organisation.[41]

6.4.6. Implication of need for increased job mobility

The survey of rail operators indicates that there is a need to promote cross-border mobility and mobility between companies in a specific market. Possible actions could include increasing job mobility within the company and between companies. In order to promote job mobility, a range of initiatives could be implemented: national or even European skills profiles for each staff category (European Qualification Key), national or even European certificates, identification of transferable skills across staff categories and specialist skills, identification of training needs in relation to functional changes, re-training plans for staff categories in relation to restructuring etc.

6.4.7. Implication of increasing competition from other modes of transport

Increased competition – from railways and from other transport modes (especially low cost airlines) – requires that staff productivity in the rail sector be at a competitive level. Productivity gains are often made through the introduction and innovative use of ICT or through reorganisation, and it is reasonable to expect that such initiatives will be on the sector's strategic agenda in the future. As a result, staff will be required to quickly adopt new technologies and adapt to new routines and working practices.

[40] European Foundation for the Improvement of Living and Working Conditions, *Employment, industrial relations and working conditions in the European rail transport sector*, 2006

[41] European Foundation for the Improvement of Living and Working Conditions, *Employment, industrial relations and working conditions in the European rail transport sector*, 2006

6.4.8. Implication of the establishment of high-speed lines

The establishment of high-speed lines accentuates the need to facilitate cross-border operations between member states, thus ensuring that technical as well as staff related issues are addressed appropriately (see section on cross-border operations). Railway undertakings also have to ensure that their staff is sufficiently qualified for high-speed operations (safety requirements, special technical equipment, etc.).

6.4.9. Implication of integration in global logistics chain

In relation to the optimisation of intermodal shifts, communication between the different actors in the logistics chain is vital. The introduction of new communication devices and procedures will require training of staff.

6.5. Key forces: social changes

6.5.1. Implications of social objectives: The effect of gender on training needs

Promoting training activities in relation to female employees requires training offers that meet the needs of female employees for flexibility, giving female employees the possibility of participating in training activities that would otherwise be in conflict with their job or family life.

6.5.2. Implications of the ageing and reduction of the European workforce

Demographic developments in Europe pose a major challenge to European railway operators. The workforce in Europe is getting smaller and older. The demographic situation of companies in the rail sector and difficulties in recruiting new employees constitute a major challenge for rail operators.

This development requires that rail operators are proactive in their recruitment and human resource policies. Possible actions could include initiatives aimed at recruiting women and groups that often hold a marginal position on the labour market (disabled persons, ethnic minorities), offering competitive salaries and working conditions, etc. Increasing the focus on groups that hold a marginal position on the labour market will require additional training (basic skills such as language).

6.5.3. Implications of low attractiveness of jobs in the railway sector

Rail operators find it difficult to recruit new staff. This is probably due to demographic developments (reduced pool of potential employees) and increased competition in the rail sector for skilled staff. In addition, the recruitment situation could be influenced by a change in young peoples' preferences. Young people are more interested in jobs and education that are considered 'creative' rather than 'technical'. They also look for jobs that provide them with attractive career opportunities.

The rail operators have to ensure that a job in the sector is attractive by providing attractive working conditions and ensuring that education and career opportunities in the sector are interesting. This requires transparency – not least in relation to future career opportunities, e.g. starting as a train driver could lead to a degree in engineering. Thus, the training system has to be orientated towards higher education and ensure a high degree of educational mobility (e.g. certification of skills making it possible to have these skills recognised when applying for entering higher-level education and training programmes).

6.5.4. Implications of lifelong learning objective

Lifelong learning is a key objective in the Lisbon Strategy. In order to promote lifelong learning, rail operators have to ensure that their staff has access to relevant vocational training programmes. In addition, rail operators need to build a strong learning-oriented culture in the company.

6.5.5. Implications of changing customer demands

Costumer's expectations regarding to the quality of the service provided by companies in the transport sector are rising as new technologies become an integrated part of daily life. Part of the quality dimension is information, e.g. that costumers receive information about the traffic situation - especially when rail operations are delayed. Flexibility is another dimension of quality, e.g. buying tickets onboard via mobile devices.

Rail operators have to focus on the development of a service culture that ensures high quality standards in terms of providing information to customers and assisting costumers with ICT based services. Providing the best possible information requires effective communication channels between staff and will increase the need for training in the use of advanced ICT devices and adjusting to changing communication procedures.

Furthermore, a change of attitude among customers increases the need for courses focusing on conflict management.

7. Training needs foreseen by railway organisations

In order to supplement the questionnaires to rail operators and training centres we have conducted a number of interviews with people from rail organisations, i.e. employers and employees organisations. Employers were identified through contacts of CER, Community of European Railway and Infrastructure Companies and EIM, the European Rail Infrastructure Managers. The interviewees from the workers unions were identified with the help of EFF, European Transport Workers' Federation. The interviews were conducted as semi-structured questionnaires.

The main theme behind the questions to the organisations has been challenges to railway training – on issues such as cross-border activities, internationalisation, language, interoperability, distance, ECTS, and complexity of tasks.

Employee's organisations

Henrik Horup, Vice-president, Danish Railway Association, Denmark
Andy Reed, National Organiser, ASLEF, UK
Harald Schmid, TRANSNET-Zentrale Frankfurt, Betriebsverfassung und Berufsbildung, Germany
Harald Voitl, VIDA, Austria

Employer

Victor Esquinas, Director of Training and Recruting, RENFE-Operadora, Spain
Dušan Pouzar, České Dráhy, a.s., General Management, Department Personnel, Czech Republic
Walter Moser, SBB Consulting, Bollwerk 10, 3000 Bern 65.Switzerland

7.1. *Cross-border* activities

Increasing cross-border activities in the railways could be expected. We asked the interviewees what challenges to training of railways staff for cross-border activities they see. Do they see a difference in the challenges for train drivers vs. infrastructure staff or control-command staff?

It is safe to say that all interviewees points to the variety of security systems across Europe and language issues as the main challenges for training railway staff for cross-border activities.

Andy REED from ASLEF, UK points to language as the biggest challenge and secondly applying and understanding relevant rules and regulations. Andy REED on the language challenge:

> "*The challenges are the means and methods of communication of all these people, i.e. language and being able to understand each other clearly for instance on safety-issues. For example, if a signal is not working it is important that the implicated staff understand the issues and fully understand what they are supposed to do.*"

Henrik HORUP from the Danish Railway Association has no objections to cross-border activities, but he foresees a number of challenges. One challenge is different security systems and language, since there is no general accepted "train-language" comparable to the situation in air-traffic. Henrik HORUP sees language as one of the main challenges to train drivers and control-command staff. For other categories of staff languages problems is not so much a matter of security as a problem of service levels for the operators.

Harald SCHMID, Germany also points to language, and he calls for minimum security standards within the EU area in order to secure the quality – and he calls for a greater attention to foreign language training.

Harald VOITL, Austria is straightforward on the 2020 situation, and he also points to culture as one important barrier:

> "*I believe that if we look into the year 2020 there will still not be full interoperability. However, through increased cross-border activities we expect that the distance of driving will also increase. This means, that there is a broad range of further training needs.*
>
> *There is a need for route knowledge (including special knowledge of big railway stations and shunting yards. Route knowledge is what the train driver needs to know about the route, signalling, stations, language, cultural customs, safety procedures (normal and abnormal situations) ,in case of break down, and so on. All of the things that the train driver needs to know to be confident. In 2020, we do not expect that there will be full interoperability. For instance, there are differences as to how old the stations are and what kind of equipment they use. For instance, the signalling infrastructure varies, some stations use Siemens systems and others use Alcatel, and these different systems bring with them different procedures and customs.*
>
> *Also, as distances will increase the cultural issues such as the company culture, organisation, etc,. of the different companies varies, and the systems and procedures are not easily changed. Therefore, things and procedures are done differently across the different nations, and the longer the distance, the bigger this complexity gets.*
>
> *There are some differences in challenges between the different types of staff, but in general, it is an integrated system as a whole. In aviation it is easier to pinpoint differences in staff requirement (mostly focus on air traffic managers and pilots), where as in the railway sector there is a need for co-operability, throughout the whole system because all the staff together is permanently integrated in the safety system (chain).*"

On the employer side Victor ESQUINAS from Renfe, Spain, also points out, that security of traffic must be secured as well as the quality of the service and training of the relevant personnel is necessary. Dušan POUZAR from České Dráhy agrees:

> "*Nowadays, we have a few employees which operate in cross-border service. According to this service, we have already put in operation a new strategy of training which is focused on engine drivers and train crews. All mentioned employees*

must graduate in language training, road recognition training (of the road, where the exact driver will operate) and signalling system training. In the future, we expect that training will be unified together with neighbouring countries, which can also bring easier transport in cross-border systems. The difference between engine drivers and other employees we found in language knowledge, because it is expected that engine drivers will have to have a higher level of knowledge."

Walter MOSER acknowledges this challenge and foresees increasing training needs – especially around security and route knowledge – as well as language skills. Switzerland already has a number of cross-border activities.

7.2. *Internationalisation*

Internationalisation could mean that the infrastructure of railways across Europe will be harmonised, but before there will be a transition period. What challenges to training of railways staff do they foresee in the transition period?

Again, everyone agrees that language and security are huge challenges. The discussion moved more into the realism of harmonisation and length of the transition period. No one thinks the transition period will be short. Some think harmonisation is far out in the future – others that harmonisation is necessary, unavoidable and already started.

Henrik HORUP sees the challenge to what to do with staff that already has completed their training. Language is a bigger training challenge than technical issues. Henrik HORUP points to the example of cross-border traffic between Denmark and Sweden, where mostly young train drivers are allowed to drive. Andy REED from ASLEF, UK does not foresee harmonisation in the near future:

"Huge challenges! Is the infrastructure going to be a standard system throughout Europe? If signalling and everything else are to be harmonised, that will take years. This is really a question that is too big for a simple answer as it covers a whole debate that the different stakeholders could spend weeks discussing.
It involves rules and legislation training issues for everyone involved. For example, high-speed train signalling systems are standardised but for the non-high-speed trains procedures, etc., are different all across Europe. If you want to standardise this area, it is a massive area to try to clarify and debate."

Harald SCHMID shares the pessimism of Andy REED and points out that harmonisation will take many years and will be very expensive, and national issues might still play a huge role – such as TGV or ICE?

In contrast, Harald VOITL points out, that we are already in the transition period:

"We are already in this period. For us, it is important that there is only one safety procedure, not different procedures between operating an international train and a national train. The difference makes the risk of failure and accident to big. The international trains and the national trains use the same railway infrastructure, therefore there is a need to harmonise it all, so that there are not different procedures for the different trains. Imagine for example that the signal for stopping a national train is a flashing red light, while this signal has a different meaning for

international trains. Non-interoperable and interoperable trains have to be treated the same way, when it comes to safety procedures and signalling. It is important to avoid that the staff has to decide first, which kind of train it is and than set the emergency measures."

Victor ESQUINAS and Dušan POUZAR primarily point to language and knowledge of standards. Walter MOSER thinks that that ECTS will make the challenge of training easier because the technical issues are straightforward.

7.3. *Language*

Internationalisation means that railway staff needs to improve their foreign language skills – especially onboard personal and control and command. What challenges do they foresee for existing staff? Do they recommend a new education for the "international train driver"?

Language is a huge problem – but several things point to possibility of agreeing on regional languages, but it is possible? If existing staff is to be convinced, the effort must be worth their while in form of salary.

Henrik HORUP points to the experience of Danish train drivers in Sweden: the wage is better, they have the necessary training and education including a supplementary course in cross-border traffic. Henrik HORUP thinks this should be part of the ordinary education and to this end, harmonisation of security, infrastructure, etc., in Europe is required. Henrik HORUP thinks harmonisation of training is within reach before 2020. Andy REED is worried that picking up a new language will be a struggle for some and thinks recruitment of training capacity alone can be difficult. He calls for an audit system that insures the same language standards across Europe. Andy REED also points to the fact that language skills need to be refreshed constantly. Harald SCHMID is not as doubtful as Reed. He thinks that the largest part of the existing staff will adapt a foreign language if they get the opportunity in form of sufficient paid training and if their new qualification leads to a higher salary. Harald VOITL says:

"We agree with the Atkinson report that suggested focusing on regional languages instead of one single, common language. A regional language was used in the case of building the Øresund Bridge as we also use regional languages between the borders around Austria with Hungary. The railway system is not as simple as with aviation where communication between the command centre and the pilot is only two people, the railway system is a much more complex system, with many more people involved in the processes.

We do not recommend an ITD. An ITD also works nationally, so he will need the full training for driving both nationally and internationally. We fear that this will take focus away from either one of the areas and therefore will cut down the competence of either national or international driver abilities.

International drivers need to be fully trained for each national system they are asked to drive in. Through this, there is a certain limit as to how much an individual is able to learn and to integrate fully in his daily work (normal and abnormal situation, bad weather conditions, different language, etc.). "

Victor ESQUINAS points out the necessity to design specific training plans for the veteran drivers; and in the future, he is convinced, that a minimum of foreign language knowledge is required. In the Czech Republic the České Dráhy is already carrying out a few specific language courses for train drivers and onboard staff, says Dušan POUZAR. As a part of this training, dictionaries and communication manuals are developed to prepare further staff for training. Walter MOSER explains that in Switzerland there are already more languages and he does not endorse the introduction of English as the future railway language. It would be a very big challenge to training.

7.4. *Interoperability*

Investments in interoperability are especially in corridors. Standards for security, signalling or communication in the infrastructure vary across countries in Europe. What challenges must be overcome to certify that the rail staff has the competence to operate across systems?

Standardisation and harmonisation is fundamental to interoperability, and as long as this is not achieved train drivers should not pass through more than two or three countries.

Henrik HORUP points out that the policy of Danish Railway Association is to agree to drivers going through two countries in one day – but not three. According to Henrik HORUP this would jeopardise security. Harald SCHMID doubts that the same train driver can move through more countries as long as the systems is not harmonised. He points to a limit of maximum three countries – and only through regular testing and reassessment of the skills of the staff. Harald VOITL acknowledges that corridors might be interoperable, but safety has to be maintained also on the last mile of the stretch according to the national standards – and this is a huge challenge.

Victor ESQUINAS simply points out, that ERMTS/ECTS in all countries of Europe and the training of staff who participates in the international activities across this system are fundamental to get the interoperability.

7.5. *Distance*

Internationalisation means longer stretches of transport if the same staff stays onboard. What challenges to the training of railway staff do you foresee?

Distance includes a number of challenges knowledge of language, route, stations, culture arises. Moreover, the level of competence for people operating high-speed railways is rising. Finally, a number of working environment issues not directly associated to training issues arise such as working hours and accommodation.

Henrik HORUP points to the challenge of agreeing on rules on working periods. In Denmark a train driver is currently allowed a maximum of 10 hours, while operators argue for twelve hours. Henrik HORUP calls for a European standard in line with the Nordic standards being developed among Nordic railway workers associations.

Andy REED calls for an understanding of lifestyle and keeping fluid levels high to ensure high levels of concentration.

Harald SCHMID points out, that distance does not necessarily imply longer working hours because of the advent of high-speed trains. This increase in the required competence level does not only apply tor the people on board the train but also to the people maintaining the trains and railway system.

Harald VOITL points to a number of issues related to distance:

> *"For sure language, route, station knowledge. The longer the distance, the more knowledge is needed [referring to question 1], as the culture differences increase along with the increase in distance.*
>
> *Also, there are some work environment issues and personal/family/work issues. On the motorway/highway there is a trucker (e.g. sleeping in the driver cab), but we do not want to have this way of organising the work on the railways."*

Victor ESQUINAS finds that the challenge to training is to obtain knowledge of the procedures of communication and basic standards in several languages that the train runs through. Walter MOSER does not consider distance a challenge – but a way of making railways more effective.

7.6. *ECTS*

Does the implementation of ECTS mean increased or decreased demands for the competence of railway staff?

ECTS to most is just another security system and will not increase or decrease demand for skills – but the demand will change to something else.

Henrik HORUP points out that to the train driver it is not important which security system is chosen – it is only a matter of training and he expects a changed profile of drivers in the future. Andy REED clearly expects ECTS to demand more from the staff:

> *"The nature of the setup is that the companies expect more of the drivers, more training, competence levels are audited which puts pressure on the drivers as they have to go through more test etc."*

Harald SCHMID points out that while ECTS might make the technical side easier this would lead to new challenges that more than compensates for the gain: higher speed, introduction of new technologies, more efficient working, more tasks. The final challenge will be that if ECTS malfunctions then the staff has to be able to take over. Harald VOITL simply thinks the demand will not increase – but simply change.

Victor ESQUINAS thinks the implementation of ECTS implies more competent staff related to security. Dušan POUZAR points out that if ECTS is running alongside another security system, two systems will have to be learned and this is a challenge. MOSER agrees that it is a challenge getting to know the new system – but the work will not be more complicated because of ECTS.

7.7. *Complexity of tasks*

Railway staff might get new tasks on the trains besides the technical operation of the trains – including e.g. service, controlling, handling of conflicts, multiple languages. Do they think that the complexity of the job of the railways staff is increasing or decreasing? Please explain? What challenges do they see for training of staff?

There is a general agreement that the technical task of driving the trains will be easier in the future – and thus other tasks will be required of the staff.

Henrik HORUP in particular sees the challenges of new IT systems. The systems will mean different challenges, and training should provide the necessary skills. In the long term, IT will make the job easier for the driver. Andy REED agrees on the increased complexity and points to a freight train form France through the tunnel to the UK. This alone is three systems and cultures within one hour. Harald SCHMID believes that in the future the staff will be less occupied with technical tasks and more with service tasks – and this is a challenge to the training systems. Harald VOITL is concerned about this:

> *"We have reached the limit for what is expectable of the train drivers. In some new companies, train drivers are even doing couplings, declarations of hazardous goods and a number of other activities. In aviation, there are already some studies about the limit of the workload, the stress and the complexity of work in connection with competent behaviour and high safety standards. Such studies do not exist in the railway system. The multitasking that the train drivers are dealing with is adding to stress, and possibly taking the focus off their primary task."*

Victor ESQUINAS and Dušan POUZAR agree that the scope of skills needed are widening – to include commercial and service-oriented skills, and Walter MOSER foresees that sharp division of work between categories of staff might loosen somewhat in the future.

7.8. *Other Challenges*

Henrik HORUP points to the fact that admission criteria to training school it not harmonised across Europe.

Andy REED stresses that training standards should be the same across the network and that give sufficient training time must be given. He calls for a European standard to insure a high level of internationalisation and security allowing drivers to operate across borders
.
Harald SCHMEID also calls out for a stronger European context of qualifications and he suggests that it be mandatory for staff to have an apprenticeship period in a neighbouring country as a part of the training.

Harald VOITL says:

> "*An accident or a person who commits suicide by jumping out in front of a train is processed differently in the various European countries. In some countries, the train driver is arrested if there is an accident which has caused a death, and in other countries the situation is handled totally different. This is also something that the train driver needs to be aware of and deal with.*

It is hard to see how these rules could be harmonised throughout all of Europe with the huge differences in legislation that exist between the European countries. Therefore, even though there is full interoperability in the railway system, driving over boarders will always increase the complexity and the demands on the staff. "

Victor ESQUINAS points out that national training regulations must evolve in parallel to European Directives

8. The future of rail training in Europe – conclusions and recommendations

The European railways are facing fundamental legal, technological, demographic and market changes that the railway sector needs to deal with in the coming years. Liberalisation, internationalisation, and changes in the demographic composition of the European workforce create challenges to the skills needed within the European railways need to stay in business.

In this study, we have examined the existing rail specific training services in the EU member states as well as Norway and Switzerland. We have looked into the training facilities and requirements for train drivers and other personnel related to railway operation; other onboard staff responsible for train and passenger's safety, staff responsible for rolling stock inspection, staff responsible for assembling trains and staff responsible for dispatching and control-command. The focus in the study is rail training centres and their capacity for training rail staff.

We have identified more than 100 rail training facilities across Europe – most of them not previously mapped. In addition to the training facilities, the railway operators themselves have training facilities or are involved by providing apprenticeships. We estimate that existing rail training centres in Europe educate and train approx. 11,000 train drivers and approx. 20,000 other rail related staff a year. All together more than 900,000 people are employed in the European Railway Sector. The training facilities appear to meet the future with confidence in regards to their capacity for meeting the demand of materials and facilities – the challenge is rather to hire enough qualified trainers and in the face of demographic changes to recruit a sufficient number of new staff. In a period with a shortage of train staff, potential trainers might be required to – or prefer to – work with operation of trains rather than teaching in a training facility. The survey results are general at the European level and cannot predict occasional bottlenecks in capacity.

Most training facilities are financed, owned and run by rail operators. However, the market for rail training is increasingly liberated and, in general, the training centres are increasingly facing competition and expect to offer their facilities to other operators. The opening of facilities will make it easier for new market entrants to get access to training of staff. Rail training, however, is largely a national business.

Both training centres and rail operators are expecting an increase in the demand for training towards 2020 – but at the same time there is no clear agreement among the centres as to which is the most important challenge. However, the majority of training centres see staff qualifications, internationalisation, legal and technical development as challenges for the future.

Rail operators across Europe are expected to take more competition in the next 10-15 years. This competition will either come from increased numbers of new operators within their member state or existing, foreign operators crossing borders from other states. The effect of branching out into new, often foreign, markets will have consequences for how rail operators recruit, select, train, and develop new staff to ensure their competencies. Although some staff can be 'poached' from the incumbent operator, rail operators will need to provide training facilities for their newly recruited staff (as well as ensuring that existing staff receive re-

fresher training, for example). In general, rail operators find that there are barriers to accessing training in foreign countries because of language and cultural differences and difficulty in obtaining information about the new country's legal requirements.

European railways are facing fundamental legal, technological and market changes in the coming years. This study has mapped the forces and challenges facing the railways and the training centres in the next 10 – 15 years.

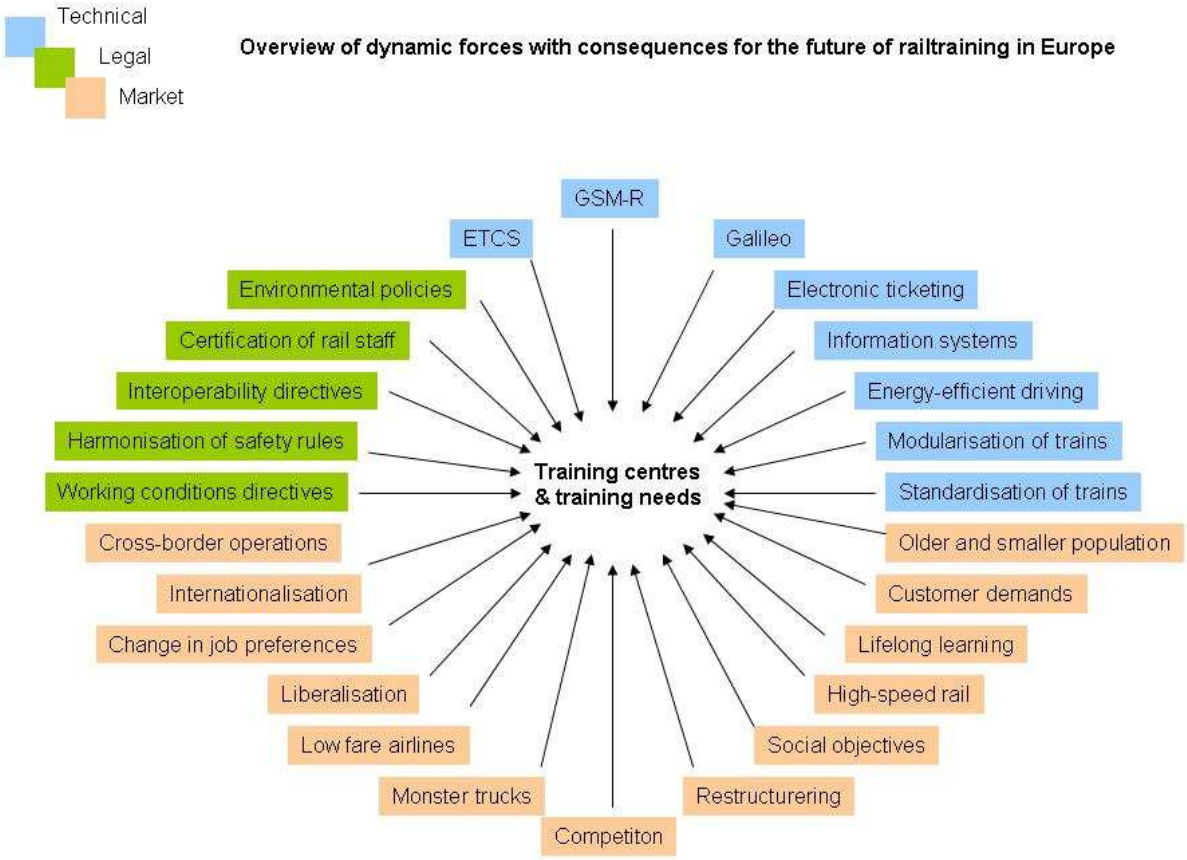
The forces that have consequences for the future need for training and how training is structured are identified and discussed in chapters 4-8. Some of the forces can be expected to have a bigger impact on the training needs and the training centres than others, and some developments are more certain than others.

What the future looks like for the railways and the rail training centres cannot be predicted with great precision. To illustrate various future paths we have set up three equally plausible scenarios of alternative futures based on different combinations of assumptions, facts, and forces. See appendix no.1 and 11 with the workshop report for the scenarios.

The identified forces have different characteristics. Some are uncertain while others are very certain. For instance, we already know much about the age distribution in the European population in 2020. Moreover, even if we think the age distribution is certain, the picture can change due to new medications or disasters such as war, hunger, or epidemics. Others are more uncertain, such as transport politics in 13 years' time, technological developments, or the speed of introduction of ECTS in the railways. Another characteristic is the influence the driving force has on training needs – some forces have an important influence whereas others have little influence.

On the next few pages, we will pinpoint the dynamic forces with the biggest potential for impacting the future of rail training in Europe. Based on our knowledge of training centres in Europe and the interviews and discussions we have had with European experts and organisations on the subject we have analysed the potential of training centres to cope with the future challenges – and assess the need for action.

The figure below gives an overview of the dynamic forces with consequences for the future of rail training in Europe. There are quite a number of dynamic forces, which could come into effect. Below we have summarized the main challenges under four headings. We outline the challenges to the training centres and assess the need for action.



8.1. *Liberalisation will change the demand for training*

Continued liberalisation of the rail markets can be expected, and this will lead to increased competition between, and an increased number of rail operators. An increased number of rail operators could also lead to a more competitive situation among training centres. Training centres and operators expect the opening of the markets. There will of course be national variations in the degree and speed – but the overall European picture points to liberalisation of railway markets.

The challenge to training centres is to adapt to market changes – even in the short term. There could be an increased demand for training when concessions are won and sharp drops when concessions are lost. Independent training centres may pop up in the market representing competition to existing centres. However, the training centres seem to be well prepared for this change. According to the survey data, existing centres can be expected to open up for new market entrants and many existing centres will adapt to the demands from new operators in the market.

In general, the result is more likely to be adaptation and possible expansion of existing training facilities than the establishment of many new centres. (chapters 3, 6 and 7). One reason for this is the close link between the centres and the railway operators and that the cost of establishing new centres is very high if a setup with close circuit training and simulators is needed.

Non-traditional training centres might become more widespread. In the UK, there are examples of manufacturers or suppliers who provide training. Very specialised skills that are too expensive to maintain at one centre will be offered by pan-European consultancies or online e-learning programs. One example is EADS, which provides simulators and training systems in Germany, France, Netherlands, Italy, UK, Turkey, and the Middle East.

The effect of liberalisation will depend on the degree of harmonisation and standardisation in the competencies demanded from old and new rail operators. Eventually, a number of railway operators might merge to form large groups of operators (chapter 3). This could give more volume to some training centres and thus make a better platform for investing in modern training equipment such as simulators.

8.2. *Internationalisation requires new skills*

Historically railways are national. Security systems, technical systems, trains, regulations, etc., are defined by national standards. This model is under pressure as railways become increasingly international due to foreign railway operators bidding for tenders in other countries and increases in cross-border operations. International high-speed trains and a political preference for rail transport rather than road transport might accelerate the need for international competencies among rail staff. Lack of standardisation, different signalling and communications systems, station layout, complexity of cultures, larger route networks, legal differences between countries are slowing down the process – but nevertheless the transition process has begun.

The harmonisation of infrastructure is a massive task – it is already happening on high-speed lines. However, in terms of the conventional lines, respondents in the sector are pessimistic about the prospects – and the question is: will the transition process be completed?

Harmonisation will lead to an increase in demand for international training facilities and perhaps foreign apprenticeships. Already today, operators report that all kinds of staff attend training in foreign countries with train drivers taking the lead. The exchange of students and teachers has begun. There are examples of cooperation concerning educational programmes and in terms of knowledge exchange at the managerial level. However, international cooperation is not the general picture allthough 50% of the tonnes-kilometres freight transport is international in the EU. The question is how far this development can go without a solution to one of the main obstacles, i.e. language.

Language training is one of the major challenges for training and admission criteria for rail training in the future (chapters 2, 3, 6 and 7). This is supported by the training centre and rail operators in the interviews with railway organisations. The consensus in the railway sector appears to be that different languages are a serious obstacle for international railway operation and different languages limit the benefits of common standards. However, we have not found any consensus on how to deal with this obstacle.

Air traffic has an international “flight language” which enables international flights. Without a common language, we would have to land before the border in every European country to change airline pilots, and airports would have to be placed at the border of the countries. This would be detrimental to the advantage of flying as a means of transportation. The airway sector in Europe employs almost 400,000 people.

One solution to the problem in the railway sector is suggested by the Atkins report, i.e. regional languages rather than developing one common language. We think that regional solutions could be solutions for primarily cross-border operations where only one or two borders are crossed. For long distance trains running from Denmark to the Czech Republic or from the Netherlands to Italy the advantage of regional languages quickly diminishes. Moreover, an operator sending trains in different directions from, e.g., the Netherlands to Italy and from the Netherlands to Estonia would still experience problems from crossing several language regions. It is worth noting that the language challenge applies to onboard staff as well as network staff.

The straightforward solution of choosing on language such as English, German, or French as a common rail language is in reality not so straightforward in an industry that is still mostly national oriented. Teaching a new language is expensive and time-consuming. There are more strategies for the training centres to follow here and experiences to be gained from, e.g., Eurostar or Denmark-Sweden handling cross border operations, the Czech Republic teaching languages and Switzerland with several official languages. The conclusion is that as long as the issue of language is not solved it will remain an obstacle to international railway operation – and whatever the solution it will be a challenge to training.

8.3. *Technical harmonisation and new technologies increase interoperability*

Many of the technical foundations for increased competition and cross border operations are already in the political process of being implemented. Implementation of ETCS, standardisation of drivers cab, e-ticketing will sooner or later help to standardise training across Europe. By 2020 or possibly later, many technical prerequisites can be expected to be in place in most of Europe and at that point the variety of technical and security system will have been reduced (chapters 4, 5 and 7).

The transition period is a challenge for rail training centres. In the transition period, it will be necessary to offer training in several technical systems – and cross border operations add to this complexity. In transition periods, the challenge can be both lack of capacity for training new staff and updating of existing staff. This could create bottlenecks in the training system.

The lack of capacity can be expressed in terms of access to required practical training or apprenticeships as well as access to a sufficient number of experienced instructors. Both capacity issues may prolong the period of transition. On the other hand, alternative training methods, such as the use of technology-supported learning or simulators in the provision of training, could ease the transition period somewhat and reduce the need for extra capacity.

Other outcomes could be that new technologies and automation reduce the demand for new staff. This will reduce the demand for training capacity for some groups of staff and perhaps redefine the functions of onboard staff, i.e. to be less occupied with technical tasks and more with service tasks.

8.4. *The demographic challenge and new thinking*

The European population is getting older as is the railway staff. In combination with low job attractiveness for the railways this creates difficulties with recruiting enough people to replace the retired staff – not to mention recruiting people to develop the railways. These challenges call for new thinking in recruitment and planning of the work.

New thinking could imply more flexible use of the existing workforce, if it can be achieved without jeopardizing security. Instruments could be retraining of existing staff, lifelong learning, new career opportunities, redefining tasks, changing the gender profile, introducing new technologies, etc. Alternatively, options could involve recruiting people with a non-traditional railway background by changing the image of railways through branding campaigns, better salaries or working conditions and better career opportunities. Rail operators need help to address these problems in cooperation with organisations, governments and the national vocational system.

There could be a number of challenges to the training centres:

- A reduction in the number of students might be a consequence and downsizing or reducing the number of facilities cannot be ruled out though it is not very likely. A reduction can happen if demand for railway operation drops or if the industry response to a lack of manpower is increased automation.
- Training people with non-traditional and non-technical skills is a more likely outcome of new thinking in recruitment. This could mean prolonged training and training staff for new sets of skills and/or different skills.
- Definition of new job profiles might lead to a redefinition of the mix of skills people are trained for, e.g., technical skills, language, co-operation, safety, routes, signalling, procedures, flexibility, analytical skills, and service.
- Making training attractive. High specialisation, long recruitment periods and student tuition during the training period might make a job in the railways less attractive. Thus, in recruitment and planning of the training theses issues should be taken into consideration. Interviewees have mentioned location of training facilities as an important parameter in attractiveness to start training, i.e. it is easier to recruit staff for training near densely populated areas than remote areas.
- Recruiting new teachers and qualified and experienced trainers is a separate but equally important issue. With rail operators as owners of training centres, there might be reluctance to let experienced staff move into training when it is difficult to hire replacement staff. Thus, the recruitment of trainers requires careful planning.

8.5. *How to meet the challenges*

Across Europe rail training centres face the same challenges, and below we have suggested a number of themes, which must be addressed by the EU Commission or by rail operators and training centres alike.

Minimum standards for competencies

Interoperability and safety directives will affect the technologies and the procedures in the rail sector – and thus affect the tasks of the railway staff and the necessary competencies. No doubt rail training requirements will be modified as a result of such directives being implemented. The vocational competencies can be reached in a number of ways, e.g., apprenticeships, classroom teaching, simulators, closed circuit training facilities. The survey of the training centres illustrates that training facilities, requirements and the length of training needed can vary across countries and still produce qualified railway staff. The training facilities and the training requirements chosen are a result of available technologies, culture, and economical resources.

We acknowledge that the European Commission allready focus on the outcome of the training with the adoption of the Third Railway Packackage

The Third Railway Package is largely based on a joint agreement between the European Transport Workers' Federation (ETF) and the Community of European Railways (CER). The Third Railway Package focus on competencies needed rather than training methods. General or common competencies should be identified and separated from specific operator, technical or route competencies to reduce the specific part to increase interoperability and to increase the flexibility of the workforce when moving between railway undertakings or even across borders.

Certification or recognition of trainers and trained rail staff

Agreeing on a common EU qualification standard and a common certificate for railway staff, trainers and examiners would is a great step on the way to increasing cross border rail operations and to create a more flexible workforce. We therefore recommend that the European Commission in cooperation with the sector finds a way to define a common EU qualification standard for rail staff and for trainers and we acknowledge progress made with the adoption of the Third Railway Package.

International database on training requirements

In general, we have not found a general lack of capacity for training. Nevertheless, foreign operators and new rail operators have identified barriers to accessing training in foreign countries because of language and cultural differences and difficulties in obtaining information about a new country's legal requirements. Consequently, to some operators it would be useful if information on legal requirements concerning train staff were more accessible.

We recommend that the European Commission take initiatives to make information on legal requirements more accessible. www.railneteurope.com with information on infrastructure companies across 23 countries could be a model. www.railtrainingnet.eu (fictitious) could be a website with country information on national rail training centres, description of facilities, schedules and capacities, types of staff trained, contact persons, prices, information on legal requirements and other national information. A website with updated information would make it possible to get an updated picture of capacities at any time.

The database could be created in connection with the network suggested below. The information should be given in at least three or four European languages, e.g., the national language, English, French, and German – with an option for more if necessary.

Finally, we recommend that the European Commission set up a system of national information points with contact persons or with information on the national rail training centres. A close nit network of contact persons would make communication with rail training centres a lot faster – and it could be a way to overcome the immediate language barrier in contacting national training centres and gathering of information.

Setting up a network

International networking activities among training centres are surprisingly sparse in spite of the fact that many of the challenges faced by training centres are international in character or common to most of them.

The UIC has already taken first important steps in creating such a network, but without doubt both the number of participants and the activities must be expanded considerably in order to establish the network of training centres as a central platform for discussing training issues across countries. More activities and more members than currently involved are needed in order to help the sector address a number of issues efficiently.

Thus, we recommend that the European Commission in cooperation with relevant organisations take initiatives to kick start a network among training centres. The network could be a platform for more concrete initiatives further on. One possible starting point could be the UIC network and we encourage a widening of the number of members to as many as possible, an expansion of the activities and a stronger profile of the network among European training centres. The introduction of the network could involve:

- Communication to all railway training facilities and operators
- An opening conference
- A web site
- A newsletter
- A moderator or secretariat

The network must be a place to meet – in person at conferences or online on a website. Many themes could be discussed in such a network. It is not meaningful to force people into networking, so a starting point could be an opening conference with an invitation to network.

Themes for a network

Themes for a network to collaborate on could be

- **Language**. One of the major challenges to the training of railway staff is languages – how can rail training facilities meet this challenge: one language or regional languages? Can rail training facilities handle language training as well? Is apprenticeship abroad a possibility?
- **Image and branding**. The competition for recruiting staff for railways will increase in intensity as the demographic picture changes – can training centres play a role in improving the image of a career in the railways?
- **Adapting to a new demographic challenge.** The demographic challenge implies that people with non-traditional competencies will need training in the training centres: new age groups, new professional backgrounds, people with a career in other sectors, more women. Some will need more and different training – some will need less. How should training centres adapt to this challenge? How can the training centres collaborate with each other and with the national vocational training system?
- **Attractive career paths**. Can rail training be better connected to national vocational training systems? Rail training might be less attractive if it is perceived to be a dead end career rather than a path to new opportunities. Rail training could be seen as one way of specialising existing competencies or it could be a road to become a railway engineer. This means that the training centres must be open to training new competencies. How to handle that challenge?
- **Attractive training**. Even if the image of a job in the railway sector is positive and the career path a promising prospective, students may seek other paths if the training cen-

tres are without modern facilities, expensive to attend, located far away or do not offer any pay during training. Thus, strategies to make railway training attractive in itself should be discussed.

- **Attractive trainer jobs**. Recruiting qualified instructors can be challenging. Rail training centres should develop strategies for making trainer jobs attractive and develop "early warning" systems making it possible to predict a lack of trainers well in advance.
- **E-learning**. The use of computers and simulators could be a road to reducing the need for capacity. Less than half of the current training centres use simulators. Developing common tools on the internet for e-learning and self-study or shared use of simulators may be relevant.
- **Setting up international training programs for international lines**. The demand for cross border operation is a challenge to the individual training centre. Partnerships or cooperation among training centres across borders on, e.g., mutual recognition of competencies, common training programmes, or development of add-on modules could help to meet the demand.
- **Exchange students**. Developing programmes for exchanging students and trainers across borders could be one way to meet the need for cross border personnel.
- **Strategic procurement and planning**. Simulators and closed circuit training are expensive training equipment, which could become more accessible if training facilities could cooperate on joint procurement or sharing of facilities.
- **Barriers to accessing existing training centres.** National forums could discuss shared problems concerning difficulty in accessing existing training facilitates. The network could encourage similar rail operating organisations to lobby incumbent training providers in a strategic and well-organised way.

The themes mentioned above are related to the challenges facing the training centres in the coming years. There may be other themes of common interest that could stimulate exchange and collaboration in the network. Each of the themes could be chaired by different training centres or organisations.

It is also clear that the training centres are not the main decision makers on some of the issues discussed above. Making attractive career paths or initiating branding campaigns for the railway sector is a task for rail operators more than the training centres. Nevertheless, the discussion points are still relevant for training centres because the training centres have to meet the resulting challenges and they might have valuable contributions to the solutions.

Language

Beyond doubt, the question of language has implications for the training requirements for railway staff. It is not within the scope of this study to recommend one solution or the other – but it is clear that different languages are a serious obstacle for international railway cooperation and different languages limit the benefits of common standards. Almost any solution will have consequences for the training of railway staff and for the resources needed for training. However, no solution will have consequences for the internationalisation of the railway sector as well.

Thus, we recommend that the European Commission and the sector organisations pay special attention to the language issue.

APPENDIX

I. Scenarios for 2020

a. Introduction to Scenarios

In this chapter, we have taken the long term view to the future, i.e. until 2020. We do that by setting up scenarios of alternative futures based on different combinations of assumptions, facts and trends. Scenarios are called scenarios because they are like "scenes" in the theatre – a series of differing views or presentations of alternative and plausible futures. We present below three short scenarios, which will allow the reader to better understand options or possibilities. These scenarios were used in the workshop in the project.

The set of scenarios might leave the reader wondering which is the more likely. This forces the reader to think more, and that is the whole point of a scenario - to learn more about alternative futures in order to make better choices today. Scenarios sharpen our ability to visualise a future.

The objective is not to present a correct future – even trained weathermen have trouble forecasting the next week, so forecasting 2020 is an impossible task. Scenarios are suggestions of alternative and plausible futures. The objective of scenarios is to create a platform for reflection and not to find consensus for the preferred future. To take a vote on the preferred future might make sense today – but it will not say much about the future. A good set of scenarios makes it difficult to select a more likely or preferred scenario and makes it easier to reflect on the future.

The scenarios are rather short in order to be a platform for reflection. We have developed the scenarios around the forces we have identified for the future. These forces have been derived from the questionnaire responses and interviews. The forces have different characteristics. Some are uncertain and some are very certain. For instance, already now we know much about the age distribution in the European population in 2020. Moreover, even if we think the age distribution is certain that picture can change due to new medicines or disasters such as war, hunger, or epidemics. Others are more uncertain such as politics in 13 years' time, technological developments or the speed of introduction of ECTS in the railways. Another characteristic is the influence the driver has on training needs – some forces have an important influence whereas others have little influence.

We have chosen to set up our scenarios around highly influential forces, which have some uncertainty. We have made three scenarios. ECTS and liberalisation is used as the starting point for the first two scenarios. The third scenario suggests a third – and perhaps more unexpected future. The three scenarios are:

- Ronkedors in trouble
- I'll rather fly
- Costa del Oslo

b. Ronkedors[42] in trouble

NERWS FINALLY ON RAILS

News Again Magazine, 1 June 2020

Today the European ministers of transport are gathered in Nice, France, for the opening of the Nice Corridor High-speed Train. The 4-hour drive from Amsterdam to Rome is the last milestone of NERWS.

"*I am very proud today*," says Dutch Minister of Transport, A. Van Hembirgen. "*Only ten years ago we decided to kick-start the NERWS New European Railway Structure all across the European Union. Back then, only a few countries were implementing ECTS and each time you wanted to cross a border the train had to stop and staff had to be changed. Operating a train system was a very complicated affair."*

In Odense the director for the Fine Alliance, S. Jensen strongly agrees. "*Back then we were all struggling with running small independent railways and only the former national railways – dating back more than 100 years – had the economy of scale to be run efficient, but with no real competition. In Fine Alliance we have copied the business model of the Airline Companies of the nineties and formed a business alliance with 15 railway companies across Europe – which means we can offer anything that runs on rails - everywhere. We've given the railway Ronkedors something to think about. Today my congratulations go to the politicians for deciding on a swift transition from national railways to the NERWS."*

On the Autobahn A7 in Germany, we find Mr. Olsson from Sweden driving his 24-meter truck to Italy – perhaps for the last time. He is not as excited about NERWS. "*This is a sad day to me. For 36 years I have gone to Italy to get fresh vegetables for the Swedish people twice every week. But consumers rule and I cannot drive my truck back non-stop from Milan to Malmö with 200 km/h with 26 trailers at one time. They say its fair competition, but I don't know. I might apply for a job at the DSR – DANESWEDE RAILWAYS. If I can pass the tests, I might be able to have a second career as a train driver. A train drivers licence open lots of job opportunities. I'm only 57 years old – and with 15 years to retirement I have to be creative. 200 km/h is fascinating for someone used to only 80 km/h," says Mr. Olsson* - perhaps with a hint of excitement after all?

At the Malmö Technical Academy the headmaster, Mrs. Persson, is looking forward to seeing Mr. Olsson in his school: "*Mr. Olsson is more than welcome at our school. He'll join a class of seniors for a start. This would have been unthinkable just 15 years ago, but experienced people are in high demand today. Mr. Olsson has a remarkable international background, so he will be in high demand. He will receive sufficient allowances and tuition from the government to allow him to study here the next 18 months."*

The Malmö Technical Academy was created as a private educational institution only 10 years ago. The Academy covers a range of professions – and railway training is just one of them. NERWS made standardised teaching and testing possible and computer simulators take care

[42] A "Ronkedor" is the danish word for an old male elephant.

of 90% of the practical training. 10% of the time the students works as apprentices with a rail operator in a foreign company. "*To work in the railways nowadays, solid language skills are required. Many people have the skills already when they are recruited – and the past 10 years language courses have been in great demand to. To the railways staff NERWS is aptly named – it has been huge challenge," says* Mrs. Persson

The biggest challenge to The Academy in the beginning was recruiting teachers with the right combination of railway experience, insight into new security systems and language skills. *"Without the massive use of computer simulations for both train driving and language skills we had never made it this far*," concludes Mrs. Persson.

2020 Facts

European railways are fully harmonised and standardised after huge efforts in 2010-2020. This was decided in the view of the global competition and the congested roads and airspace. It has been a massive investment – but it has also shortened the transition period, which could have been much longer. Ageing population implies that people work in at higher age than before – and the huge railway net also gives some attractive career opportunities. Training centres are mostly independent of operators since the training is standard. Most people are trained as railway staff without having a job with an operator first. Language skills are highly valued.

Main forces

- Fast introduction of a harmonised and standardised European Railway Infrastructure
- Fierce competition on routes. Competition is International.
- National operators are reorganised, allied, broken up and increasingly international
- New technologies are introduced quickly
- A flexible workforce combined with lifelong training – and retraining gives a more flexible workforce.
- Workforce trained at independent centres to independent and common standards opens a smooth market
- Massive use of computer simulators in training

c. I'll rather fly

THE EXPLODING AGE BOMB SECURED

News OnceAgain Magazine, 1 June 2020

Consumers are increasingly flying or driving rather than taking the train. Goods are transported by truck or ship. The loser seems to be the railways. To counteract this trend the German, Austrian and Benelux railways have decided today to develop standards for railway systems.

"*I only fear it is too late*," says German consumer activist Frida Jürgens. *"I travel all over the region every week, and to be straightforward I'm fed up with trying to remember which electronic tag to wear today. Every rail company has their own ticketing system and time and again we are waiting on the tracks for no apparent reason. I'll rather fly or drive."* The total stock of locomotives and railcars has declined more than 25% since 2000 – and replacements are not very frequent.

Director for Germanrail Systems ltd. Mrs. A. Kermel recognizes the problem. *"I agree with Frida Jürgens. We want to do better and with the new regional system, we will now start to develop a unified ticket system and new ways to make the trains run smoothly, quickly and on time. We would like to keep Frida Jürgens and everyone else as our customers."*

The railways all over Europe have been under pressure from the slow but relentless explosion of the age bomb. Many operators have realised that trains do not run by themselves. People are needed. However, people are in high demand everywhere and the technical jobs in the railway sector have not been attractive to young people. The existing employees still expect to retire early. In some countries, this has brought trains to a complete stop. In Germany and the neighbouring countries, trains are still running – but not as often as before. Next year the number of licensed Museum Railway Operators is expected to surpass the number of passenger railway operators for the first time.

"*Our regional initiative will break the vicious circle of low investment, old technologies, standards that don't fit each other. We have been in a transition period for many years; now is the time to find common standards, and time and again we fall behind because of new technologies*," Mrs. A. Kermel points out.

RFID, GPS and wireless technologies are producing new possibilities at an increasingly high pace and few rail operators keep up – most stick to the technology from the nineties. Nineties technologies is still frequently seen - mostly because no new skills are required. This creates a very uneven situation, which benefits no one.

17 year old Internetist Peter is not worried about his future. "*Railways might not be my first choice, but the computers look awesome. I'll wait and see. My mother tell me: If nothing else - you can always get a job in the railways*," he says. For most people "mother" is the most important career adviser. This is also true for Peter.

Rail training is a huge challenge for the training centre at the heart of the Germanrail Systems ltd., and the HR Manager Otto Braun is looking forward to the new times. *"Most staff is trained in handling more than one security system – but fortunately we have our own standards for the drivers cab. This makes it a little bit easier to keep our staff."*

2020 facts

The lack of political will, money, skills and capacity means that common standards and new technology have not been implemented as fast as hoped for in 2007. In many cases technologies and standards are the same as in 2007 or 1997 or 1987. There has been competition on some routes in Europe, but the majority is still operated by the large, national operators in each country. Demand for advanced training has dropped. The number of training centres is falling. To make matters worse staff is still retiring early from the railways and young people are not attracted to the technical professions at all. The railway sector in Europe is at a crossroads: make railway attractive and popular again – or resign to only the specialised tasks such as U-bahn and metro systems in metropolitan areas and high-speed trains between major European cities. Roads are hard competitors and learning from the rails with virtual coupling trucks to a train on the high-way. Are rails on their way to history books?

Main forces

- Slow introduction of ECTS
- Common standards and harmonisation not implemented
- Rail markets not completely open to competition
- Car and low-fare airplanes a serious competitor – except in crowded areas
- Early retirements and low attractiveness of jobs reinforces the effects of an older population
- National or operator specific standards ties training facilities to operators

d. Costa del Oslo

MORE TRAINS THAN CARS

More News Magazine, 1 June 2020

I 1920 the number of cars surpassed the number of trains. After a 100-year reign, the car is now being squeezed out and is once again leaving the stage to the trains. Airplanes are mostly for intercontinental travelling.

"This day is a joyous day," smiles car battler and environmentalist George Smith, 52. *"I have been fighting for this day since I was born. Cars have been congesting our cities; more than 100,000 people have lost their lives to the car since I was born. They also changed the climate and made Costa del Oslo an attractive place. This is a joyous day."*

The decline of the car is one of the visible results of the 2008 Climate Conference in Copenhagen. The Conference was held in the light of global warming – and transport was in focus. Instead of banning the car, it was decided to make railways the most attractive way of transport. This has come about with heavy investments in new rails, locomotives, technology, and security systems all across Europe. Much of it paid was with heavy taxation on cars and airplanes. Taxation on new cars is now reaching 1000% and driving in a city area is heavily taxed as well. Low energy use, service and new technologies are rated very high in tendering for operators on routes.

The use of railways has exploded, and driverless trains are operating at high-speeds across the new transport corridors of Europe. The Autobahn A7 between Hamburg and Munich was replaced with a four lanes of high-speed trains and the Channel Tunnel was extended to Gare de l'Est in Paris reducing travel time to 1 hour from Victoria Station in London. The heavy investment in new technologies and equipment also accelerated the process of a common European railway system and infrastructure. This has been in place since 2015.

HR Manager Otto Braun of the Germanrail Systems ltd. is very satisfied. *"We were fearing the much hyped age bomb, but we've just won 'Most Attractive Place To Work Awards' for the fifth year in a row. Young people are queuing up to be part of our international, clean and friendly atmosphere. And many have the opportunity of an international career. In the old days – just 15 years ago – it was common to have a train driver in front of the train. However, this is not possible at the speeds we are operating at – instead we spend our resources on giving our customers a pleasant and safe trip.*

"The job as train staff is varied from guiding people to their seats and to maintaining order on the train. Tickets control is done automatically with electronic tags and is not really a job for humans anymore. Security remains the most important part of our job. Before we had to keep people from falling off the train or getting hurt at stations – now the challenge is to safeguard the trains and its passengers – or goods – from terrorist attacks."

The independent training centre in Warsaw, SecurRails, has specialised in security. Mrs. Rose Kuczanski explains: *"We used to train rail staff in all aspects, but the competition grew very hard on this. Many newcomers offered good training, so we decided to specialise in security*

and half of the staff comes directly from jobs with the police or armed forces. It is important that railway staff can prevent terrorist attacks, and, if the worst should happen, be a good help to the anti-terror forces. We offer a 2-month course and several supplementary modules". Rail staff from all over Europe participates in courses at Warsaw SecurRails.

2020 facts

Massive investments in railways accelerate the process of harmonisation and standardisation across Europe. The process was started because of the concern for climate and energy use. Road and air transport have a hard time competing with the rails. The massive investment introduces a range of new technologies and driverless trains become common. The activity makes the railway a very attractive workplace. The staff has many new tasks – security and anti-terror is one important aspect.

Main forces

- Political decisions on transport
- Security and a clean environment are main forces
- Very fast introduction ECTS and new technologies
- Liberalisation as a driver in the railway sector
- Massive taxation on individual transport sector

II. Workshop – Future of rail training in Europe

On 14th June 2007 the European Commission hosted a workshop in Brussels as part of the project on future rail training in Europe.

The purpose of the workshop was to discuss the future of rail training in Europe and identify the main strengths and weaknesses of the rail training centres in Europe as well as the main opportunities and threats facing the training centres. The workshop participants contributed to the report by discussing the identified forces and training needs.

The 21 participants represented operators from several countries, training centres, operators and different European and national organisations. Participants were from both old and new member states. Commission officials and members of the project team were also present at the workshop.

All participants received a draft of report "Rail training 2020" 2 weeks before the workshop and the offspring of the discussions were the three future Scenarios: Ronkedors in trouble, I'll rather fly and Costa del Oslo.

The workshop consisted of two group sessions – one session dedicated to a thorough discussion of the scenarios, and one session focusing on the implications of the different scenarios for the future demand for skills and the training centres. After these two sessions, the participants identified the main strengths, weaknesses, opportunities and threats facing the rail training centres in Europe (SWOT analysis).

In this section the main issues and discussion points from the workshop are presented. While the 21 workshop participants on one hand do not necessarily constitute a representative selection of the many actors in the European rail sector, their expertise and experience on the other hand ensures that issues raised during the workshop were thoroughly discussed with the broadest possible perspective. Also, the broad selection of participants helped to ensure that the issues were relevant for the rail sector as a whole.

This section includes the viewpoints expressed on the workshop and may represent the viewpoint of only one or a few participants.

The workshop covered training of the 5 categories of staff as defined in the project – but in the discussions at the workshop there were a strong tendency to use the term "train drivers" rather than the term "train staff". A number of remarks clearly refer only to train drivers and others to train staff in a wider sense. This bias in speaking is reflected to some extend in the workshop report – but this fact must not overshadow the point, that the future challenges are relevant to training of all of the 5 categories of staff.

a. Session 1 – Scenarios for the rail sector

Age

The demographic development in Europe is reducing the pool of potential employees and at the same time reducing the tax base for national governments. In order to counter the demographic challenge, the national governments could increase the age of retirement and their focus on lifelong learning, so that in the coming years some people may stay on the labour market longer and need retraining for new job markets. It is noted though, that retirement age is a sensitive issue. However, medical conditions could be the problem, and operators will have to monitor and assess health conditions of senior personnel.

In addition, the overall European workforce is ageing so the rail industry will need to review its working practices and application of technology to overcome this. There is a reduction in numbers of younger workers entering the market and a loss of technical expertise and corporate memory as older workers retire.

Financing the training

Financing the rail training is among the important issues: Should operators finance the training or should people finance the training themselves? If people are requested to finance the training themselves, some people that would otherwise have chosen a career in the rail sector, could decide to look for education and jobs in other sectors.

Also, the cost of training can be very high. In Poland, it takes to years to become a train driver, and the education is very expensive. As a result, new and small companies are often not able to find the resources for financing the training of new staff.

Independence of training centres

A fundamental question is whether training centres should be independent or integrated in the rail companies (in-house)? One of the problems with independent training centres is the decoupling from rail operation. This will be a problem because over time practical knowledge will be lost. There is a need to ensure close contact of operator to the training centres, for example by exchanging personnel between operators and training centres or ensuring that trainers have to go back to operators after 5 years work as a trainer. Otherwise no relation or exchange between training centres and operators. There are examples of operators who are leasing out trainers to training centres in return for access to training facilities.

Keeping and attracting trainers

It is important for the rail sector to keep and recruit new trainers. How to do that?

Recruiting new staff

Recruiting new staff is currently a problem in the sector, and the demographic developments in Europe will increase the competition for the best qualified people. One problem for the sector is the image of the sector – railways are not considered to be attractive places to work (working conditions, other peoples view on the sector; bad news in the media etc.). In the past the image of working in a state owned railway was good - now railways have become commercial actors and this affects the image. Also, the work is not considered to be very interesting – in France it is only interesting to drive the TGV. There is thus a need for a campaign to improve the image of rail sector and jobs in the sector.

Another problem is that students have no clear picture of what it would be like to work in the rail sector. In contrast, they have a clear picture of what it would be like to work at Ericsson or Volvo. A challenge for the sector is to create such a picture in the minds of young people. In addition, the rail sector also has to deal with the fact that there might be people who are not interested in working in the same sector their whole life, or even interested in working for one operator their whole life.

A range of opportunities for the rail sector were identified:

- 'Sandwich training' – combining school and work in the railway - could make a career in the rail sector more attractive.
- The cross border/international dimension of railway sector is considered to be attractive for young people and could be used more actively to recruit young people. In Germany, DB works very hard to portray itself as an international company in the media: Working for DB is an opportunity for both managers and train drivers to get international jobs.
- Recruiting people from non-traditional routes.
- Recruiting people from overseas – for example, there has been a growing reliance in the UK industry for the recruitment of staff form overseas; much of this is associated around major rail construction projects or specific skills that are not available in the UK labour market. An example is the use of signal engineers from Indian Railways to maintain and renew semaphore signalling in 2001.
- Recruiting 'older' people from other sectors than the rail sector – as long as there are healthy (hearing, reflexes, seeing etc.) and motivated.

Recruitment system

The length of the recruitment system needs to be considered - in Belgium it is 6 months. As a result, the qualified candidates choose jobs in other sectors.

The format of the recruitment system also needs to be considered. There should be much more recognition of current individual competencies at the point of entry to the industry; training programmes can be tailored to meet individual requirements, especially through the application of e-learning techniques and web based assessment systems.

Working conditions

Working conditions in the rail sector are not attractive and wages are low compared to other sectors. This affects the recruitment of new staff – both drivers and operations. One example is that the rail sector is characterised by un-regular working hours, and young people prefer regular working hours. In addition, staff involved in freight operations often work night shifts, which is not compatible with family life.

For train drivers, the fact that train drivers work very much on their own is considered to lower the attractiveness of this job position. Rail operators also need to consider the risk of job fatigue – after short time, a job in the sector becomes a routine, and it is important that operators are able to offer interesting career paths – both to attract new staff, but also to keep the existing staff.

New entrants are in many regards in a very difficult position, since they are often not able to offer the same kind of working conditions (pension schemes etc.) as incumbents. Furthermore, the new entrants are often too small and specialised to offer interesting career opportunities. This makes it difficult to compete for employees.

In the UK, privatisation resulted in increased salaries for train drivers and improved working conditions, and now there is a surplus of train drivers. The social partners were actively engaged in ensuring these improvements.

Technological changes

Assumptions underpinning the scenarios (technology) are not realistic: There is a long time horizon on rail assets, so railways do not have a choice due to the large investments. At the same time, assets with shorter time span are not good for environment ('throw away trains'). Leasing could be a part of the solution, but it is very expensive and the leasing market is not innovative.

In general, there is a need for increased technological innovation in the rail sector, and this has implications for the education of engineers (university level) – the current education of rail engineers is not good enough.

Education and job requirements

One of the characteristics of the rail sector is that people get employed by rail operators and then attend training financed by the operator. In Germany however, the biggest part of the general non-university vocational training system works on this principle that the employees receive the practical training at the company with whom he has an apprenticeship contract or employment contract, while the theoretical part of their education is conducted by state owned training centres.

The basic educational requirements for applying for a job in the rail sector needs to be considered - sometimes the formal requirements are set too high. For instance, SNCF requires high school diploma which also gives access to university studies: Why would young people choose to work in the rail sector when they could study law instead? SNCF is currently running a pilot project on recruiting people with lower level of educational qualifications: 80% of these candidates pass compared to the normal 75%.

In terms of job requirements, another challenge is to recruit people that are able to pass the physical tests. The health standard of candidates has been falling, and at the moment around 50 % do not pass the physical test. A standardisation of health standards could be considered.

Mobility

In general, the rail staff is characterised by low geographical mobility. However, in the UK the high salaries in London have made it possible to attract Scottish drivers to London. When it comes to cross border mobility, language is among the main barriers for increased geographical mobility of rail staff. In addition, experiences suggest that foreign staff tend to move back to their home countries after a short while.

Language

It is easier to learn English than other languages – but not necessarily a good idea with a single language in the rail sector. Perhaps it is necessary to focus on a 'regional' standard language rather than a European common language? Eurostar was mentioned as an example of how operators integrate language in the training of staff. All though national differences be-

tween training programmes exist (for instance, in the UK knowledge of the specific route is a priority), all staff receive language training.

Access conditions

It can be difficult for new market entrants to get their employees trained by incumbents. On the other hand, even formally independent centres can be monopolised by an incumbent (e.g. Sweden).

Internationalisation of rail operation

The increasing co-operation across borders between different rail operators is pushing for a standardisation of training requirements at the European level. However, it is very difficult to agree on requirements for cross border drivers licenses. Another challenge is that the cross border (technical) interoperability lacks behind the internationalisation of rail operators. CER and ETF has signed an agreement on European Locomotive drivers' licence which defines the minimum requirements on physical and psychological "fitness" and on qualifications and competencies. The same requirements can be found in the EU Commission draft directive on the certification of train drivers.

b. Session 2a - Skills in demand

In general, new demands are not leaving out demands for existing competencies – but they add on to the existing training needs.

Specific needs

There is a shortage of train inspectors/staff involved in assembly. One of the explanations for this is the need for an operational background/extensive experience in relation to these job functions.

Languages

Train staff in cross-border operations needs to command at least two languages. One problem is that language-education takes a long period, so it is best if staff knows foreign languages before they start their career in the rail sector.

Technical and non-technical skills

There is an increasing demand for people with IT-skills due to the increased use of ICT. Staff also increasingly needs a range of non-technical skills (co-operation, flexibility, analytical skills).

Shortage of Engineers

There is a very high demand for technicians and railway engineers. In civil engineering educational institutions there is less attention to railway engineering. In general, there are fewer students interested in technical studies, and this will only worsen the current situation characterised by a serious shortage of engineers. In DB there is a shortage of engineers. There are currently many activities at schools aimed at increasing the attractiveness of rail related engineering. Also, efforts in terms of internal recruitment – the target group (25-40 yr) is offered a combination of study and work (50/50). This is not sufficient.

Internationalisation

Staff needs to be trained in different technical systems when engaging in cross-border operations. Cross border operations also require that the train staff knows national regulation in the specific countries. This requires further training. But who supplies staff with such training – is it training centres or the operators?

Specialisation
Specialisation of staff (freight, passenger, high-speed trains, etc.) could be a priority for operators rather than training staff focusing on their general qualifications. Specialisation is good for safety. However, the more specialisation the less attractive the job becomes, and specialisation also reduces the flexibility of the staff.

Multi-tasking
Some participants were not satisfied with the prospect of more multi-tasking for rail staff since this often implies adding extra tasks to the portfolio of the existing staff. Adding extra tasks to the staff could jeopardize safety and result in accidents.

c. Session 2b - Challenges to the training centres

Foreign languages
Trainers need to be able to conduct training in foreign languages.

Closer collaboration between training centres
Training centres should engage in closer collaboration on an international level in order to promote exchange of offers, documentation and coordinate investments in - and the use of simulators.

Modularity of training
An important trend is training tailored to meet specific needs. This increases the demand for modularity of training.

Changes in the recruitment pattern
In order to recruit new staff, the operators will need to look for potential employees in non-traditional segments that have special training needs. For instance, training centres could be involved in raising the employability of older people, and also the recruitment of ethnical groups and/or immigrants could affect the demand for training (e.g. language training).

Recruiting good quality trainers
There is a need to focus on how to recruit good quality trainers. Perhaps independent training centres are in a better position to pay higher salaries than operators?

In Sweden, new trainers are coming in and out the sector (providing 'fresh blood'). In Germany, a trainer needs a driver license, so the problem with recruiting drivers will lead to a shortage of trainers.

Access barriers
It is often costly and difficult to set up a training centre (accreditation and licensing issues).

Introduction of new technologies
New technologies result in need for new facilities.

Change of training methodology
Some training centres are engaged in the production of products for self-training/e-learning (cf. European social partners' joint study on new technology for training). More importantly, the importance of self-learning/e-learning is increasing.

Increasing competition from manufacturers

Manufacturers or suppliers (e.g. leasing companies) of rolling stock are to an increasing extent providing the necessary technical training relating to their products (case: the UK).

Integration of rail training in the national educational systems

Training centres need close linkages to the national educational systems (e.g. vocational qualifications schemes).

'Licences independent of operators

Is there a need for a system of licenses that are independent of a specific operator, enabling people to use licenses wherever they want?

d. SWOT – Strengths, Weaknesses, Opportunities, Threats

The SWOT analysis concluded the workshop and it represents a brainstorm on the strengths, weaknesses, opportunities and threats of the rail training centres. Some issues appears in several categories, which in some cases can be attributed to national variations of legislation or use of technology.

Strengths

1. The dynamism of supply and demand will insure that rail training facilities will open if there is a demand. Training centres can be set up by privates if there is a demand in the market
2. Close relationship between training centres and the market exists. The deep knowledge of the railway and the needs in the railway insures high quality training..
3. Excellent training facilities already exist
4. Close relationship between training centres and the industry gives a high commitment to the industry and loyalty of staff.
5. Centres can offer training in more than one language and more than one system
6. Training is flexible in material requirements. Some training centres needs only a classroom and this makes it easy to expand capacity if you have the trainers. Others have higher demands for technology and simulators.
7. The market for training centres are well on the way and centres are already serving more operators – and they expect to open up to even more.
8. UIC sponsored network of European training centres means that some network formation is already taking place.
9. Systems of training and knowledge management are already formed.

Weaknesses

1. The cost of establishing centres is high
2. Independency rail training centres from rail operators runs the risk of loosing knowledge about rail operation and the feel for industry trends.
3. Operator's internal training centres not competitive to the market.
4. Language difficulties and cultural barriers when training foreign staff reduces cross border training.
5. Agreement system for training (?)
6. Training for wider geographical area is necessary with operators operating on more lines and in foreign countries. This makes training expensive – solution can be apprenticeships with foreign operators or simulators
7. At the moment rail training centres are not offering or are able to organise new international programmes. Internationalisation will start slow.
8. Restructuring of Training Centres (?)
9. Using or employing railway staff as trainers is difficult when railway staff is in high demand for driving the trains.

Opportunities

1. International co-operation, for instance by developing international training programme
2. New professions in the rail sector
3. Open training market
4. New training models can be developed. New training methodologies will increase the quality of training.
5. Bigger market due to more safety and security regulation
6. Need for a lot of train drivers and other staff in the future and thus a growing market for training centres.
7. Exchange between operators (secondment) – draws in expertise and facilitates cross fertilisation of ideas.
8. Rail staff needs to trained in multi-tasking
9. Centres can offer training package for train drivers involved in cross-border operations.
10. Climate change may trigger more business and thus more need for rail staff
11. Stabilisation of railway transport structures
12. Partnerships with commercial companies might give training centres new opportunities.
13. Centres can serve multiple operators
14. Training centres with a strong presence and profile in the market could attract better trainers

Threats

1. High demand for skills reduces the pool of potential employees. Skilled people have more opportunities and look for other educations
2. More competitors in the future. For instance, rolling stock manufacturers offer own training.
3. Transition period gives a safety problem and may also create bottlenecks in training capacity
4. Shortages of trainers in the short term reduce training centre capacity.
5. No international standardisation
6. Centres face the risk of not being attractive to the rail sector. Important that centres focus on market needs.
7. High investments required for training facilities
8. Slowly-changing mentality of workers and decision makers. It takes time to change strong cultures.
9. National legislation allowing only one training body in some countries
10. Individuals who pay for own training do not have as much money to spend as operators. This results in pressure for cutting costs and could lower the quality of the training.
11. Privatisation and strategic alliances within railway operators/railway undertakings
12. Operators-based training gets under pressure when concessions are lost. Surplus capacity and too little capacity elsewhere.
13. Changes to rail legislation at national or EU level

III. Methods

a. Gathering data and documentation

The data for this project has come from several sources:

1. Survey with written questionnaires
2. Personal interviews either face-to-face, written as well as comments from experts.
3. Written sources and the web

In the following, we make a brief presentation of the methods of data collection used in this project.

b. Survey with written questionnaires

One of the main sources of the project has been three surveys which were sent to rail operators, rail training organisations and rail organisations in all the EU Member States with a railway system as well as Bulgaria, Norway and Switzerland.

i. Survey for rail operators

Identifying the respondents in the first place has been one of the main challenges of the survey since we were not able to identify or get access to any single source or database with a complete overview of European railways operators with relevant contact information. It probably does not exist.

The main sources for identifying European railway operators were DG TREN and an address database we bought from a marketing company. The primary source was DG TREN. We received an Excel spreadsheet with the names and postal address of 561 rail operators from 17 different European countries. The advantage of the list was that all the companies on the list were actually railway companies – although not necessarily operating companies. The disadvantage was that it was not complete in terms of countries, there was a complete lack of e-mail addresses and contact persons and not all companies registered were operating railway operators.

The secondary source was a database bought from the marketing company Experian. The initial list from the marketing company consisted of 1538 companies registered in 28 different European Countries under the NACE code 60.1 (rev. 1.1).

The company structure and system of registration according to NACE codes vary between countries and companies. Of the 1538 companies, 885 rail operators were registered in the UK, 206 in Spain and 118 in Rumania according to the list. Since the DG TREN list gave us a good coverage in the UK and Spain, we left them out and included the 54 main operators from Rumania. The advantage of the second sources was more complete contact information from a much wider range of countries – though we still did not receive e-mail addresses for most of the companies. The disadvantage of the second list was that some of the companies registered under NACE 60.1 were misplaced or placed there even though they did not operate any rails.

The two sources were merged into one list of railway addresses – altogether a final list of 977 European railway operators. Some of the companies on the final list are not relevant, and the

list includes companies registered as rail operators in every European country with a railway system. Some of the smallest German museum railway operators were excluded from the list. Germany has more than 300 registered operators. However, Deutsche Bahn AG has a market share of 80% – 99% depending on the market, so leaving the smallest museum operators would not bias the picture (EMCC, 2005).

The questionnaires were posted to all 977 rail operators with the general director or his staff as the target. The questionnaire could be completed on paper or on the internet through a electronic survey system. All operators received the questionnaire, a letter of introduction with the project internet address and a letter of recommendation from DG TREN. Three weeks after the letters were posted, we used all known e-mail addresses to re-send the questionnaires. After two weeks we e-mailed again, and in April and May there was an e-mail every week.

The questionnaires were written in English. Language is a barrier in this type of survey. We have followed up by phone to the major rail operators in Europe to insure a satisfying percentage of answers – if not in numbers then in market coverage. One practical problem in contacting the major rail operators is to locate and catch the relevant English, German or French speaking person at the relevant decision level. In an organisation such as DB in Germany with 225,000 employees this is difficult. Moreover, we had to use personal contacts to contact the railway companies since the contact information on railway companies is targeted at people wanting to buy a ticket. With + 20 languages represented in the survey we have not always been able to locate the right respondents.

Table 10.1: Overview of survey of rail operators

Type of response	Number	%
Completed	121	12,4%
No Response	814	83,4%
Partly completed	19	1,9%
Refused to participate	23	2,3%
Total Questionnaire	977	100%

In some of the completed questionnaires the only response has been that the respondent was neither a rail operator nor an infrastructure manager. This leaves 80 completed or partly completed questionnaires. The table below illustrates their estimated market share. Seventeen countries are represented in the survey. Please note, that the operators in Poland and Austria have estimated more than a 100% percent market share. The explanation is that the results cover both the infrastructure manager and the large, national railway. They have different markets and can thus have almost 100% of the market each. The double estimation in Austria was easy to spot. Furthermore, similar double estimates can exist in the material, and there is therefore a slight risk of an overestimation of the markets.

Table 10.2

Country	Number of completed questionnaires	Percentage of completed questionnaire	Estimated market share
Austria	5	6.3	184
Belgium	5	6.3	40
Bulgaria	1	1,3	17
Czech Republic	1	1,3	27
Denmark	3	3,8	28
Finland	1	1,3	
Germany	17	21,3	18
Greece	1	1,3	
Hungary	3	3,8	23
Italy	2	2,5	80
Latvia	1	1,3	44
Lithuania	2	2,5	90
Netherlands	1	1,3	
Norway	3	3,8	6
Poland	4	5,0	125
Portugal	2	2,5	
Romania	8	10,0	39
Slovakia	2	2,5	
Slovenia	2	2,5	17
Spain	3	3,8	80
Sweden	4	5,0	10
Switzerland	4	5,0	
United Kingdom	5	6.3	5
Total	80	100,0	

Based on the market share estimated by the respondents, the questionnaire has an estimated 32.61% coverage of the market. Assuming the 29 organisation who did not answer the questions have an equally large market share on average, the coverage percentage can be multiplied by 1.95 – thus leaving us with a final estimate of 63.6% coverage.

This figure will be used to scale to a European level – although the figures must be interpreted with caution, since variations in organisation, technology, markets, education, etc., are not included. The number is estimated by:

A. Calculating the European share of locomotives and railcars for each country[43]
B. Multiplying the European share of locomotives and railcars with the market share in each country of train drivers
C. Estimating the total market share by multiplying the result B with a factor 1.95 calculated as (Number of organisations who completed or partly completed the questionnaire/Number of organisations who answered the question on the market share equal 80/41).

The calculation for each country is shown in the table below. Countries with a sum of market share above 100% is rounded off to 100%

Table 10.3: Calculating the coverage by operators participating in survey

Country	**BE**	**CZ**	**DK**	**DE**	**EE**	**EL**	**ES**	**FR**	**IE**	**Total**
Stock	3%	6%	1%	16%	0%	1%	4%	14%	1%	
Questionnaire	40%	27%	27%	18%			80%			
Coverage	1%	2%	0%	3%	0%	0%	3%	0%	0%	9%
Country	**IT**	**CY**	**LV**	**LT**	**LU**	**HU**	**MT**	**NL**	**AT**	
Stock	9%	0%	1%	1%	0%	3%	0%	4%	3%	
Questionnaire	80%		44%	90%		23%			100%	
Coverage	7%	0%	0%	1%	0%	1%	0%	0%	3%	12%
Country	**PL**	**PT**	**SI**	**SK**	**FI**	**SE**	**UK**	**BG**	**RO**	
Stock	9%	1%	1%	3%	1%	1%	7%	1%	4%	
Questionnaire	100%		17%			10%	5%	17%	39%	
Coverage	9%	0%	0%	0%	0%	0%	0%	0%	2%	12%
Country	**HR**	**MK**	**TR**	**NO**	**CH**	**LI**				
Stock	1%	0%	1%	0%	4%	0%				
Questionnaire					5%					
Coverage	0%	0%	0%	0%	0%	0%				0%
Total										32,61%

As a further indication of the validity of the results, the table below shows the names of the companies participating in the survey. The survey include answers from all types of railway operators: Huge national railways, small new comers, local railways, railways operationg in serveral countries, all types of railway operations, infra structure managers, passenger and freight.

[43] ENERGY & TRANSPORT IN FIGURES 2006, European Commission, Directorate-General for Energy and Transport. We have used the number of stock, since this is the most complete data. Another relevant figure would be the number of employees – but here the data is not complete for all relevant countries – 12 countries are missing in the statistics of the number of employees in railways.

Table 10.4: Names of companies participating in the survey

Ab Lietuvos Gelezinkeliai	Mittelweserbahn Gmbh
Administrador De Infraestructuras Ferroviarias	Neg Norddeutsche Eisenbahn Gesellschaft Mbh
Arriva Tåg Ab	Nordjyske Jernbaner A/S
Banverket Swedish National Rail Administration	Northern Rail Limited
Bulgarian State Railways (Bdz)	Ofotbanen As
Central European Railway Transport, Trading And Service Co.	Ortenau-S-Bahn Gmbh
	Pkp Przewozy Regionalne Sp. Z O.O.
Ceské Dráhy, A.S.	Polskie Koleje Panstwowe
Cobelfret Rail	Prva Slovenska Zeleznicna, A.S.
Comsa Rail Transport Sa	Public Agency For Rail Transport Of Rs
Connex Tog As	Rail Traction Company S.P.A.
Cp, Comboios De Portugal	Rede Ferroviária Nacional, E.P. (Refer)
Ctl Kolzap Sp. Z.O.O.	Reloc Sa
De Transport Gmbh	Renfe - Operadora
Dillen & Le Jeune Cargo	Rompetrol Logistics Sa
Dsb S-Tog A/S	Raab-Oedenburg-Ebenfurther Eisenbahn Ag/Györ-Sopron-Ebenfurti Vasut-Rt. (Raaberbahn/Gysev)
Eisenbahnunternehmen Steirmarkbahn Transport Und Logistik Gmbh	Sa Trainsport
Ers - European Rail Shuttle B.V.	Schweizerische Bundesbahnen Sbb
Ets East Traffic Service Fuvarozási És Szállítmányozási Korlátolt Felelõsségû Társaság	Servtrans Invest Sa
	Sncb - Nmbs
Eurotunnel - The Channel Tunnel Group Ltd	Stadtwerke Verkehrsgesellschaft Frankfurt Am Main Mbh (Vgf)
Fm Rail Limited	
Georg Verkehrsorganisation Gmbh (Gvg)	Stahlwerk Thüringen Gmbh
Graz -Köflacher Bahn Und Busbetrieb	Stock-Transport
Great North Eastern Railway Limited	Swiss Train Paths Ltd
Grup Feroviar Roman Sa	Talgo (Deutschland) Gmbh
H.F. Wiebe Gmbh & Co. Kg	Tim Rail Eisenbahnbetriebsgesellschaft Mbh
Hellenic Railways Organization S.A.	Total Bitumen Deutschland Gmbh
Holding Slovenske Zeleznice, D.O.O.	Transferoviar Grup Sa
Infrabel – Access To The Network	Trenitalia S.P.A.
Jernbaneverket (Jbv)	Tx Logistik Ag
Koleje Mazowieckie - Km Sp. Z O.O.	Unifertrans Sa
Latvijas Dzelzcels As	Veolia Transport Sverige Ab
Lietuvos Gelezinkeliai Joint Stock Company	Via Terra Spedition Srl
Logistic Services Danubius Srl	Vorbereitungsgesellschaft Transporttechnik Mbh (Vgt)
Lokalbanen A/S	Vr-Yhtymä Oy
Lokomotion Gesellschaft Für Schienentraktion Mbh	Westfälische Landes-Eisenbahn Gmbh
London & South Eastern Railway Limited	Württembergische Eisenbahn-Gesellschaft Mbh
Magyar Államvasutak Zártkörûen Mûködõ Részvénytársaság	Železnice Slovenskej Republiky (Žsr)
	Öbb Infrastruktur Betrieb Ag
Merresor I Sverige Ab	Öbb Traktion Gmbh
Métro Lausanne-Ouchy S.A.	Aare Seeland Mobil Ag

ii. Survey for the rail training centres

Identifying the European rail training centres turned out to be an even bigger challenge than identifying the rail operators. We started out by compiling a list of rail training centres from searches on the internet, a mail enquiry to all European rail authorities, infra structure managers, international organisations, interested persons and the research network EURNEX. The final data source is the questionnaire to the railway operators, where we ask what kind of training they demand of their employees.

We did not identify independent rail training facilities in every European country with a railway network – and one reasonable explanation is that in most cases they do not exist, since training is the responsibility of the railways operator. In other cases, there is a mixed situation.

Finally, we merged the list of rail training centres with our list of railway operators. This created a list of 1,075 potential respondents for our questionnaire of railway training centres. The advantage is that we reached perhaps 95% of the population this way. The disadvantage is that since we have not been able to identify the population, some x% of the respondents will be irrelevant for the questionnaire. We have included a filter question for this in the questionnaire, but since most organisations would not answer this kind of questionnaires, we are not able to calculate an exact measure of the x%.

The questionnaires were posted to all 1,075 rail training centres and rail operators with the leader of the training facilities or the HR director and his staff as the target. The questionnaire could be completed on paper or on the internet through an electronic survey system. All operators received the questionnaire, a letter of introduction with the project internet address and a letter of recommendation from DG TREN. Three weeks after the letters were posted we used all known e-mail addresses to re-send the questionnaires. After two weeks, we e-mailed again, and in April and May we sent an e-mail every week. We have been in contact with a number of training centres by phone and e-mail.

The questionnaires were written in English and language is a barrier in this type of survey. We followed up on phone to the major rail operators in Europe to insure a satisfying percentage of answers – if not in numbers then in market coverage.

Table 10.5: Overview of survey of rail training centres

Type of response	Number	%
Completed	106	9,9%
No Response	934	86,9%
Partly completed	20	1,9%
Refuse to participate	15	1,4%
Total	1075	100%

Of the 126 completed and partly completed surveys, 32 are organisations offering rail training. The table below gives an overview of the estimated market share in each country. Estimates are given by the training centres themselves and numbers are only indicated, where the training centres have answered the question.

Table 10.6: No. of answers and sum of estimated percentages of market shares

Country	No of organisations with filled questionnaire	Estimated percentage of market share				
		Train drivers	Other on-board staff	Staff rolling stock inspection	Staff assembling trains	Staff dispatching and control-command
Austria*	1					
Bulgaria	1	90				
Czech Republic*	1					
Denmark	3	91		1	1	1
Finland	2	100	100	100	100	100
Germany	9	5	1	7	0	30
Italy*	1					
Latvia	1	40	50		40	
Netherlands	2	100	95	100	80	90
Norway	3	100	11	50	51	100
Portugal	1	0	0	50	30	20
Slovenia	1	100	100	100	100	100
Spain	1	100	100	70	0	0
Sweden	1	35				100
Switzerland*	1					
United Kingdom*	3					

** Note: 17 of 15 organisations answered the questions on market share. * mark indicates that organisations from that country has not answered this question.*

Seventeen organisations answered the question on market share. Fifteen did not. Based on the market share for training train drivers the organisations that answered the question on market share have an estimated 13.37% coverage of the market. Assuming the 15 organisation that did not answer the questions have an equally large market share on average, the coverage percentage can be multiplied by 1.88 – thus leaving us with a final estimate of 25.17% coverage.

This figure was used to scale to a European level – although the figures must be interpreted with caution, since variations in organisation, technology, markets, education, etc., are not included.

The percentage in coverage for other categories of staff is somewhat smaller. The number is estimated by:

A. calculating the European share of locomotives and railcars for each country[44]

B. Multiplying the European share of locomotives and railcars with the market share in each country of train drivers

C. Estimating the total market share by multiplying the result B with the factor 1.88. The factor 1.88 is calculated as Number of organisations who completed or partly completed the questionnaire/Number of organisations who answered the question on the market share equal 32/17 or 1.88.

The calculation for each country is shown in the table below.

Table 10.7: Calculation for each country

Country	**BE**	**CZ**	**DK**	**DE**	**EE**	**EL**	**ES**	**FR**	**IE**	**Total**
Stock	3%	6%	1%	16%	0%	1%	4%	14%	1%	
Questionnaire	0%	0%	91%	5%	0%	0%	100%	0%	0%	
Coverage	0%	0%	1%	1%	0%	0%	4%	0%	0%	5%
Country	**IT**	**CY**	**LV**	**LT**	**LU**	**HU**	**MT**	**NL**	**AT**	
Stock	9%	0%	1%	1%	0%	3%	0%	4%	3%	
Questionnaire	0%	0%	40%	0%	0%	0%	0%	100%	0%	
Coverage	0%	0%	0%	0%	0%	0%	0%	4%	0%	4%
Country	**PL**	**PT**	**SI**	**SK**	**FI**	**SE**	**UK**	**BG**	**RO**	
Stock	9%	1%	1%	3%	1%	1%	7%	1%	4%	
Questionnaire	0%	0%	100%	0%	100%	35%	0%	90%	0%	
Coverage	0%	0%	1%	0%	1%	0%	0%	1%	0%	3%
Country	**HR**	**MK**	**TR**	**NO**	**CH**	**LI**				
Stock	1%	0%	1%	0%	4%	0%				
Questionnaire	0%	0%	0%	100%	0%	0%				
Coverage	0%	0%	0%	0%	0%	0%				0%
Total										13,37%

Compared to a normal sample survey with a draft of 1,000 people out of a population of perhaps 5-6 million people we have achieved a very high coverage. The data covers both new member states, old member states and non-member states.

[44] ENERGY & TRANSPORT IN FIGURES 2006, European Commission, Directorate-General for Energy and Transport. We have used the number of stock, since this is the most complete data. Another relevant figure would be the number of employees – but here the data is not complete for all relevant countries – 12 countries are missing in the statistics of the number of employees in railways.

IV. Overview of identified training centres

The following provides an overview of *the training centres* we have contacted in this survey. Operators are not included in the list. However, it should be noted that a large part of the railway training is internalised with the operators or infrastructure managers.

The list is sorted alphabetically after country, completed survey or not and the name of the training centre. The organisations with a completed survey have confirmed their training activities.

The addresses were found through the questionnaires to rail operators, contacts in the rail organisations, on the internet, information from DG TREN and through mails to more than 113 operators, all national infrastructure managers, international associations, experts and individuals in the field of railway training.

Denmark

Completed Survey
Cph West
Dalbergstrøget 1
Taastrup
Denmark

Euc Syd
Plantagevej 35
Tønder
Denmark

Estonia

Not Completed Survey
Tallinn College Of Engineering
Pärnu Road 62
Tallinn
Estonia

The School Of Transportation
Tehnika st 18
Tallinn
Estonia

Finland

Completed Survey
Vr Group
Vilhonkatu 13
Helsinki 10
Finland

France

Not Completed Survey
Réseau Ferré De France (Rff)
92, Avenue de France
Paris Cedex 13
France

Société Nationale Des Chemins De Fer Français (SNCF)
88 Rue St Lazare
Paris Cedex 09
France

Germany

Completed Survey

Eisenbahn-Technische Bildung Gmbh
Elbestraße 6
Bernau Bei Berlin
Germany

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Germany

Tu Berlin, Fachgebiet Schienenfahrwege Und Bahnbetrieb Sekretariat Sg 18
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Vorbereitungsgesellschaft Transporttechnik Mbh (Vgt)
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Awv Aus- Und Weiterbildungszentrum, Verkehrsgewerbe Leipzig Gmbh
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Germany

Db Training
Solmsstraße 18
Frankfurt Am Main
Germany

Mev Eisenbahnverkehrsgesellschaft
Rheinvorlandstraße 5
Mannheim
Germany

Rwth Aachen, Lehrstuhl Für Schienenbahnwesen Und Verkehrswirtschaft,Verkehrswissenschaftliches Institut
Mies-van-der-Rohe-Straße 1
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Schreck-Mieves Gmbh
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Frechen
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Postfach 33 27
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Transport academy of the BVG:
Berliner Verkehrsbetriebe AöR
Verkehrsakademie Omnibus
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13349 Berlin (Not included in survey)

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Karlsruhe
Germany

Verband Deutscher Eisenbahnfachschulen
Bahnhofplatz 1
Karlsruhe
Germany

Hungary

Mmv Plc.
Reached by Email
Te
Hungary

Latvia

Completed

Latvian Railway
Gogola 3
LV-1547 Riga

Not completed

Rīgas tehniskās universitātes Dzelzceļa transporta institūts (Riga Technical university Institute of Railway Transport)
state academic and professional higher education establishment
Indrika street 8
Riga, LV-1004
Latvia

Latgales transporta un sakaru tehniskā skola (Latgale Transport and Telecommunication Technical School)
state vocational secondary education establishment
Stradnieku street 16
Daugavpils, LV-5404
Latvia

Rīgas Dzelzceļnieku skola (Riga rail school)
state vocational education and training establishment
Abrenes street 2
Riga, LV-1534
Latvia

Tehniskais mācību centrs (Technical training centre)
LDZ technical training centre
Rigas street 78
Daugavpils, LV-5403
Latvia

State Joint Stock Company "Latvijas dzelzceļš" (LDZ)
infrastructure manager
Gogola street 3
Riga, LV1547

Latvia

Joint Stock Company "Pasažieru vilciens" (Passenger Train)
passenger service
Turgeneva street 14
Riga, LV1547
Latvia

Joint Stock Company "Vagonu remonta centrs "Zasulauks"" (Wagon)
rolling stock service
Kandavas street 42a,
Riga, LV-1083
Latvia

"LDZ Cargo" Ltd
rail operator
Gogola street 3
Riga, LV1547
Latvia

"LDZ Infrastruktūra" Ltd (LDZ infrastructure)
infrastructure repairing
Karklu street 4
Daugavpils, LV-5403
Latvia

"LDZ Ritošā sastāva serviss" Ltd (LDZ Rolling Stock Service")
rolling stock service
Otra Precu street 2
Daugavpils, LV-5403
Latvia

Joint Stock Company "Starptautirkie pasažieru pārvadājumi" (International Passenger Service)
passenger service
Turgeneva street 14,
Riga, LV1050
Latvia

Netherlands

Completed Survey
Ns Opleidingen
Postbus 1148
Amersfoort
Netherlands

Rdp Services Bv
Postbus 91054
Rotterdam
Netherlands

Not Completed Survey
Erasmus Academie Bv
Postbus 1738
Rotterdam
Netherlands

Master Of Business In Rail Systems
Mekelweg 2
Delft
Netherlands

Mev Independent Railway Services Benelux Bv
Gildenweg 16
Zwijndrecht
Netherlands

Prorail/Verkeersleiding, Opleidingencentrum.
HGB II, Moreelsepark 2, kamer 4.89a, Utrecht,
Postbus 2038
Utrecht
Netherlands

Norway

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Jernbaneverket, Norsk Jernbaneskole
Østre Aker vei 256 (Jernkroken)
Oslo
Norway

Poland

Not Completed Survey
Organisation For The Collaboration Of Railways (Osjd)
Ul. Hoza 63/67
Warsaw
Poland

Slovenia
Slovenske Zeleznice d.o.o
Kolodvorska 11
SL-1506 Ljublijana
Slovenia

Slovakia

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Železnice Slovenskej Republiky
Klemensova 8
Bratislava
Slovakia

Sweden

Not included in survey. Adresses recived 3 weeks after closure of survey.

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262 52 Ängelholm
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83130 Östersund

Nyköpings Järnvägskonsult

Brunnsgatan 46 d, 61132,
Nyköping

TCC Transport Competence Center AB
Centralplan 3
803 11 Gävle

TCC Transport Competence Center AB
Nytorgsgatan 20
69433 Hallsberg

Nordisk Spårsäkerhet AB
Kupolen 51
SE-781 70 Borlänge

Utbildningscentret för kollektivtrafik AB
Brännögatan 2
211 24 MALMÖ

TrainDrivers AB
Box 142
311 22 Falkenberg

Switzerland

Completed Survey
Login Berufsbildung, Region Deutschschweiz
Hohlstrasse 532
Zürich
Switzerland

Not Completed Survey
Login Berufsbildung
Tannwaldstr.2
Olten
Switzerland

Login Formation Professionelle
Avenue de la Gare 41
Lausanne
Switzerland

Login Formazione Professionale
Palazzo Stazion FFS (Taverne)
Bellinzona
Switzerland

Verband Öffentlicher Verkehr
Dählhölzliweg 12
Bern
Switzerland

United Kingdom

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Arriva Trains Wales
St. Mary's House, 47 Penarth Road
Cardiff
United Kingdom

Ews, English, Welsh & Scottish Railway
Lakeside Business Park, Carolina Way
Doncaster
United Kingdom

Not Completed Survey
Amec Spie Rail (Uk) Ltd
Purley Training Centre, Fairbairn Close, Off Beaumont Road
Purley
United Kingdom

Amey Infrastructure Services
Sherard Building, Edmund Halley Road, Oxford Science Park
Oxford
United Kingdom

Astrac (Safety And Training) Ltd
Unit 27, Shelton Enterprise Centre, Bedford Street, Shelton
Stoke-On-Trent
United Kingdom

Atkins Rail Limited - Rail Services
Brunel House, RTC Business Park, London Road
Derby
United Kingdom

Atkins Rail Limited - Rail Services
Vauxhall Training Centre, 80-84 Bondway
London
United Kingdom

Balfour Beatty Rail Projects Ltd
Room B203, Midland House, Nelson Street
Derby
United Kingdom

Bombardier Transportation Uk Ltd
Litchurch Lane
Derby
United Kingdom

Bridgen Enterprises Ltd
10-16 Byron Road
Harrow Wealdstone
United Kingdom

Bridgeway Consulting Ltd
Oban House, 8 Chilwell Road
Beeston
United Kingdom

Cannon training
Reached by e-mail
United Kingdom

Catalis Rail Training
London Road
Derby
United Kingdom

Chiltern Railways
2nd floor, Western House, Rickfords Hill
Aylesbury
United Kingdom

Crs Training Services Ltd
Station Rise, 46-49 West Offices
York
United Kingdom

Crs Training Services Ltd
The Maltings, East Tyndall Street
Cardiff
United Kingdom

Crs Training Services Ltd
66-68 College Road
Harrow
United Kingdom

Develop Rail
Ascot Drive
Derby
United Kingdom

Epps Training Development
Epps Building, Bridge Road
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First Great Western
Bristol Group Headquarters, Albert Road, St Philips
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Gb Rail Freight
15-25 Artillery Lane
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United Kingdom

Grant Rail Ltd
1 Carolina Court, Lakeside
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Grantrail Ltd
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Heathrow Express
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London
United Kingdom

London Underground Ltd
Acton Training Centre, 123 Gunnersbury Lane,
Acton Town
London
United Kingdom

Metronet
Templar House, 81 - 87 High Holborn
London
United Kingdom

Mtr Training Ltd
Hydrex House, Serbert Way, Portishead
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United Kingdom

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277 Stockport Road
277 Stockport Road
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One Railway
'one', Floor One, Oliver's Yard, 55 City Road
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Orion Training Services
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Rail Training International
35 Old Queen Street
London
United Kingdom

Southern Railways
Go-ahead house, 26-28 Addiscombe Road
Croydon
United Kingdom

Tes Training Ltd
TES House, Heath Business Park, Grange Way
Colchester
United Kingdom

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United Kingdom

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Sandall Lane, Kirk Sandall Industrial Estate
Doncaster
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Doncaster
United Kingdom

Translink Northern Ireland
Central Station Belfast
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United Kingdom

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15 Westferry Circus, Canary Wharf
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United Kingdom

Vital Skils Training
The Mill, Southall Street, Salford
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United Kingdom

Wa Developments Ltd
Station Road
Appleby-In-Westmorland
United Kingdom

West Sussex Training Ltd
Cherry Tree Sawmill, Faygate Lane, Faygate

Horsham
United Kingdom

V. Sources

a. Interviews

Bardell, Sarah, Foundation Degree Manager, Network Rail, UK

Esquinas, VictorDirector of Training and Recruting, RENFE-Operadora, Spain

Horup, Henrik, Vice-president, Danish Railway Association, DK

Moser, Walter SBB Consulting, Bollwerk 10, 3000 Bern 65.Switzerland

Pouzar, Dušan České dráhy, a.s., General management, Department Personel, Czech Republic

Reed, Andy, National Organiser, ASLEF, UK

Schmid, Harald TRANSNET-Zentrale Frankfurt, Betriebsverfassung und Berufsbildung, Germany

Siebler, Hermann, Technical Adviser at Deutsche Bahn AG/DB Training, DE

Skadhauge, Frank Head of Education and Training, CPH West, DK

Voitl, Harald VIDA, Austria

Walz, Gotthilf, Dr. DB Training, Senior Sales Manager International Business, DE

Way, Rosemary, Resourcing Manager, Advanced Apprenticeship Scheme, UK

b. Literature

2004/0048 (COD), COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, pursuant to the second subparagraph of Article 251 (2) of the EC Treaty, concerning the common position adopted by the Council with a view to the adoption of a directive of the European Parliament and of the Council on the certification of train drivers operating locomotives and trains on the Community's rail network

AGREEMENT, concluded by the European Transport Workers' Federation (ETF) and the Community of European Railways (CER) on certain aspects of the working conditions of mobile workers engaged in interoperable cross-border services

Alexandersson, G & Hulten S 'Competitive Tendering of Railway Services in Sweded - Extent and Effects 1989 – 1999. Stockholm School of Economics. http://www.its.usyd.edu.au/conferences/thredbo/thredbo6/alexandersson_hult%C3%A9n.pdf

Allianz pro Schiene e.V; Der „Erste Umweltvergleich Schienenverkehr" Ziele, Ergebnisse und weitere Aufgaben. Juni 2005

Athens University of Economics and Business – TRANSLOG. Acceptability Barriers of Pricing Strategies for Rail, Air and Water Transport. MC-ICAM, Task 5.5, Version 3.0. August 2002.

Atkins, Training *and staff requirements for railway staff in cross-border operations*, 2002

Brown, Michael, The ChemQuest Group, Inc. 'Achieving growth in a mature market and defining 'barriers to entry'. 2002. http://www.chemquest.com/PDF-

files/Growth%20in%20a%20Mature%20Market%20and%20Barriers%20to%20Entry.pdf

Cap Gemini, 'Internationalism in the Rail Traffic – A European market research conducted by Cap Gemini on the role of operator models for international market entry in rail traffic'. 2004.

CER and ETF, *Agreement concluded by the European Transport Workers' Federation (ETF) and the Community of European Railways (CER) on the European Licence for drivers carrying out a cross-border interoperability service*, 2004

CER, *The Railways in an Enlarged Europe*

COMMISSION DECISION of 11 August 2006 concerning the technical specification of interoperability relating to the subsystem 'Traffic Operation and Management' of the trans-European conventional rail system (notified under document number C(2006) 3593)

Commission of the European Communities, *Proposal for a directive of the European Parliament and the Council on the certification of train crews operating locomotives and trains on the Community's rail network*, 2004.

Commission of the European Communities, *Directive of the European Parliament and of the Council on the certification of train crews operation locomotives and trains on the Community's rail network*, Proposal from the Commission to the Council and the European Parliament, 2004

Commission of the European Communities, *Keep Europe moving – sustainable mobility for our continent*, Communication from the Commission to the Council and the European Parliament, 2006

Commission of the European Communities, *Towards an integrated European railway area*, Communication from the Commission to the Council and the European Parliament, 2002

COMMISSION REGULATION (EC) No 62/2006; of 23 December 2005; concerning the technical specification for interoperability relating to the telematic applications for freight subsystem of the trans-European conventional rail system

Conway, P., V. Janod, and G. Nicoletti 'Product Market Regulation in OECD Countries, 1998 to 2003', OECD Economics Department Working Paper, No 419. 2005

Council Directive 2005/47/EC of 18 July 2005 on the Agreement between the Community of European Railways (CER) and the European Transport Workers' Federation (ETF) on certain aspects of the working conditions of mobile workers engaged in interoperable cross-border services in the railway sector - Agreement concluded by the European Transport Workers' Federation (ETF) and the Community of European Railways (CER) on certain aspects of the working conditions of mobile workers engaged in interoperable cross-border service

DG TREN, *EU Energy and Transport in figures – statistical pocketbook*, 2006

DIRECTIVE 2001/16/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 March 2001 on the interoperability of the conventional rail system

DIRECTIVE 2004/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on safety on the Community's railways and amending Council

Directive 95/18/EC on the licensing of railway undertakings and Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification (Railway Safety Directive)

DIRECTIVE 2004/50/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system

Elsey, M. PPPs: A help or hindrance to the development of the European rail sector. Ashurst, Presentation slides.

European Commission, *Further integration of the European rail system: third railway package (COM(2004)140 final)*, 2004

European Foundation for the Improvement of Living and Working Conditions – EMCC, *Employment, industrial relations and working conditions in the European rail transport sector*, EMCC 2006

European Foundation for the Improvement of Living and Working Conditions – EMCC, *EIRO thematic feature – Industrial relations in the railway sector*, EMCC 2005

European Foundation for the Improvement of Living and Working Conditions – EMCC, *Profile of the rail transport sector in Germany*, EMCC 2005

European Foundation for the Improvement of Living and Working Conditions – EMCC, *Profile of the rail transport sector in Italy*, EMCC 2005

European Foundation for the Improvement of Living and Working Conditions – EMCC, *Profile of the rail transport sector in United Kingdom*, EMCC 2005

European Foundation for the Improvement of Living and Working Conditions – EMCC, *Profile of the rail transport sector in Netherlands*, EMCC 2005

European Foundation for the Improvement of Living and Working Conditions – EMCC, *Profile of the rail transport sector in Sweden*, EMCC 2005

European Foundation for the Improvement of Living and Working Conditions – EMCC, *Trends and drivers of change in the European railway equipment sector*, EMCC 2004

Hylén, Bertil, *Access to the rail network in some European Countries*, Swedish National Road and Transport Research Institute, 2001

IBM, Rail Liberalisation Index – Comparison of the Market Opening in the Rail Markets of the Member States of the European Union, Switzerland and Norway. 2004.

IBM, Rail Liberalisation Index – Comparison of the Market Opening in the Rail Markets of the Member States of the European Union, Switzerland and Norway. 2007. www.db.de/liberalisation-index

ICLEI – Local Governments for sustainability 'Better public transport for Europe through competitive tendering – A Good Practice Guide'. Funded by the European Commission Directorate General for Environement. http://www.eltis.org/docs/Good_practice_guide_final.pdf

Intelligent Energy – Europe (IEE), Project-description "TRAining programmes to INcrease Energy efficiency" by Railways, 30 August 2006

Keep Europe moving! Memo june 2006, Sustainable mobility for our continent – mid term review of the european commision's 2001 transport white paper, EU DG TREN.

Kirschner, Christian, prof.dr., *Rail Liberalisation Index 2004*, IBM, 2004

Minutes from 'Select Committee on European Union' UK parliament – Memorandum by Reseau ferre de France. http://www.publications.parliament.uk

Office of Rail Regulation, ORR's approach to reviewing markets, 2006

Organisation for Economic Co-operation and Development, Competition and Barriers to Entry, January 2007.

Railway Association of Canada,'Canadian Railway Industry – Human Resources Study 2002'. http://www.railcan.ca/documents/CanadianRailwayIndustry_HRStudy02.pdf

Railwayregister, *How to become a Train Driver*, 2006

REGULATION (EC) No 881/2004 OF THE EUROPEAN PARLIAMENT AND OF THE C COUNCIL of 29 April 2004 establishing a European Railway Agency (Agency Regulation).

Sevrail, Draft final report, October 2006

Steer Davies Gleave, RAILIMPLEMENT, implementation of EU-directives 2001/12 – 2001/14, Nov 2005.

Steer Davies Gleave, *SERVRAIL report*, DG TREN, 2006

Trafikministeriet, *Bekendtgørelse om uddannelse til fører af trækkraftenheder inden for* jernbanedrift (lokomotivfører), 2003

TRANSPORT SECRETARY AND MAYOR OF LONDON ANNOUNCE NEW OYSTER DEAL FOR RAIL PASSENGERS, 10 May 2006

c. Websites

- www.ertms.com
- http://www.census.gov
- www.gsm-r.nl
- www.modtrain.com
- http://www.btsa.es/intercept/electronticketing.htm
- www.ns.nl
- http://gsm-r.uic.asso.fr/implement_map.html
- http://ec.europa.eu/dgs/energy_transport/galileo/applications/rail_en.htm
- http://die.bahn.de/site/shared/de/dateianhaenge/publikationen__broschueren/holding/umwelt__db__mobil__12-05.pdf