New skills required for the future, skills gap per staff category in the railway sector

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Summary

The main aim of this report is to provide an analysis of the view-points offered by 27 participants during the foresight workshop on employment and skills situation in the European railway sector. The participants, mainly experts, policy specialists and social partners, were invited to react to the conclusions of the study on changes in employment and skills in the railway sector (Dhondt et al., 2018). This study looks at studies and statistical data (representing trends from the past; and foresight/forecast studies). To keep the discussions manageable, the participants were asked to formulate their expectations about four typical railway occupations: management, professional railway engineers, sales personnel (ticketing agents; clerical staff), and train drivers.

Employment in the future

The research results (analysis of statistical data) collected by the project team show a continuing decline of employment in the railway sectors and in all job categories. The participants in the foresight session do not follow this conclusion and have formulated another view on developments up to 2025. They estimate a relative stability in the number of managers, a slight growth in engineers, and a decline in the two other occupational groups in focus in the meeting. The main explanation for this other view is that the market situation will be different in the coming years, and the main drivers for change will allow other employment developments: technology will require new skills and will influence productivity in occupations; occupation specific developments will change the composition of the workforce in the future (more managers and engineers; less train drivers); railway specific factors will play a role.

Skills in the future

The research shows mixed results for skill demands. For each of the railway occupations, participants could judge if demands for technical, social, communicative and organisational skills would change. The composition of these skills are skill profiles. Participants reacted to these results by insisting on a general rise in requirements for all skill categories (technical, social, communicative and organisational) for all occupational groups. The occupational groups will have distinct skill profiles (research suggests more homogenization of these profiles), with engineers moving more towards technical skills, and, surprisingly enough, train drivers would need more communicative skills in the future. Train drivers will need to provide better information to the passengers in order to increase satisfaction and quality of service.

Foresight/forecast studies

The foresight/forecasts studies that were consulted, foresee future growth of employment, mainly in management and engineering jobs. Also, the foresight/forecasts point out shifts in skills needed. Participants in the workshop support these results of the foresight/forecast studies, which are not in line with the statistical data analysed by the project team. The explanation given by participants is that the current development are caused by the economic crisis in the past years. This crisis has disappeared and we may expect other developments that statistics cannot show. Next, the foresight/forecasts expect future changes in operational skills/activities. Possibly, this points to a reduced need for these skills, whatever the reason. However, statistics only show little change in the overall labour force composition. This seems to hint that not much adaptation of railway organisations has taken place. It could also mean that no (planned) changes have been implemented, so no major innovations were implemented. This could be explained by the specificity of the sector (public, heavy decision making structures, etc.) that make it difficult for the sector to react to the changing customer demands. Future

growth depends on the sector being able to improve its performance in comparison to other transport sectors.

Factors driving change

The workshop group rated technology as the most influential factor for future work changes. Changes in market changes are rated as the second important change factor for work. Other factors have less influence on employment and skills in the sector.

New topics for research

At the end of the workshop, participants were asked if they thought some aspects of employment and skilling were overlooked. Six topics were suggested. Three topics point towards attention to educational courses supporting the workers. Implementing these courses leads to a lower need for education and makes the gap between skills and tasks smaller. They can also support cross border employment. Other topics to look at are automation and decarbonisation in railways. International changes in China and other countries should be considered. A last topic is the image of the sector on the labour market and in the public perception.

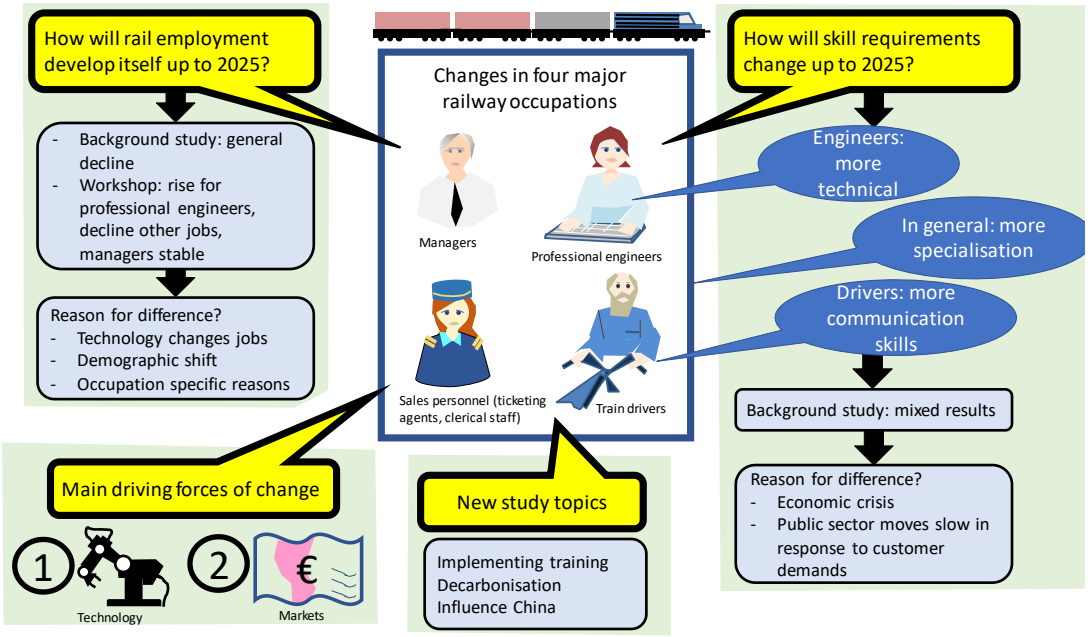

Figure 1. A graphical summary of results

Contents

Summary i

1 Introduction 1
1.1 Aim of the report 1
1.2 Goal and organisation of the workshop 1
1.3 Participants 1

2 Employment trends in four major occupational groups 3
2.1 Conclusions of report D1a 3
2.2 What are employment estimates of the participants for the period up to 2025? 3
2.2.1 Question: How would you forecast the employment trend for occupational groups in railways in 2025? 3
2.2.2 Questions: Explain in short your forecast (3 sentences) 3
2.3 Summary employment trends 5

3 Skill changes 6
3.1 Conclusions of report D1a 6
3.2 How will skill profiles change in the period to 2025? 8
3.2.1 Question: How will skill profile managers change? 8
3.2.2 Question: How will skill profile professionals/engineers change? 8
3.2.3 Question: How will skill profile clerical support workers change? 8
3.2.4 Question: How will skill profile train drivers change? 8
3.3 Summary is changes in skill profiles 9

4 Confronting research results and forecasts 10
4.1 Conclusions of report D1a 10
4.2 Evaluating the forecasts 10
4.2.1 Question: “Results: employment declines. Forecasts: growth”. What do YOU expect and why? 10
4.2.2 Question: “Results: skill upgrading in all jobs. Forecast: mainly upskilling in higher ranked jobs”. What do YOU expect and why? 11
4.2.3 Question: “Results evenly distributed requirement for skills between occupations; Forecasts: more differences in profiles”. What is YOUR expectation, why? 12
4.3 Summary of disparity between results and forecasts 13

5 Factors driving change in skill profiles 14
5.1 Conclusions of report D1a 14
5.2 Which changes will be visible in 4 major occupational groups? 14
5.2.1 Question: Which changes in four major jobs? JOB DEMANDS 15
5.2.2 Question: Which changes in four major jobs? DECISION LATITUDE 15
5.2.3 Question: Which changes in four major jobs? SKILL DEMANDS 15
5.2.4 Summary of driving factors 15
5.3 Factors influencing work in the railway sector 15
5.3.1 Documenting the driving factors 15
5.3.2 Prioritizing factors influencing work in the railway sector 17

6 Any topics the study needs to reconsider in the current work? 19

7 Conclusion, next steps 20
7.1 Conclusions 20

7.1.1 Employment in the future 20
7.1.2 Skills in the future 20
7.1.3 Difference between statistics and foresight/forecast studies 20
7.1.4 Factors driving change 20
7.1.5 New topics for research 21
7.2 Next steps 21

Reference 22

1 Introduction

1.1 Aim of the report

TNO and NewRail are conducting an analysis of the human capital changes in the railway sector, related to the investments by the sector, done in the Shift2Rail-research and innovation programme. For this study, a preliminary socio-economic study was conducted. A first report (Deliverable 1a; D1a) was published with an analysis of statistical data (representing trends from the past; and foresight/forecast studies (Dhondt et al., 2018).
The main aim of this new report Deliverable 1b (D1b) is to provide an analysis of the viewpoints offered by 27 participants during the foresight workshop on employment and skills situation in the European railway sector. The workshop was aimed to discuss the results from the analysis of employment and skills situation in the European railway sector. To keep the discussions manageable, the participants were asked to formulate their expectations about four typical railway occupations: management, professional railway engineers, sales personnel (ticketing agents; clerical staff), and train drivers. During the workshop, the conclusions of report D1a (Dhondt et al., 2018) were presented. In this report D1b, the workshop results are contrasted to this presentation of the D1a outcomes. In this way, the results from Deliverable D1a (the socio-economic study) are evaluated by the workshop participants. The report has also been reviewed by the participants. Their additional comments have been included in the report.

1.2 Goal and organisation of the workshop

The main aim of the workshop was to assess the skills for the long-term needs of the railway sector. This was done by bringing together stakeholders from the railway sector all over the EU. The procedure that was followed, was to use the research results collected in Deliverable 1a and to seek opinions from the participants to identify to what degree the future (horizon = 2025) would be markedly different from the current trends. Participants were asked to vote during the workshop and to document their opinions. Starting at 1.30pm on 14/05/2018, the workshop lasted for about 3.5 hours.

1.3 Participants

The foresight session was aimed at experts from employers' associations, trade unions, from research communities and other stakeholders (maximum 30). Next to the organisers and S2R, eventually there were 27 persons who indicated to participate in the workshop. 13 persons were physically present in the workshop in Brussels whereas at least 13 were connected via the webinar to the session.

The following stakeholder groups were present: employer association; trade unions; railway organisations; manufacturers, stakeholder group representatives; policy makers; research. Figure 1.1 shows the distribution according to stakeholder group. All organisations where represented by one person, except for two organisations.

Figure 1.1 Stakeholder groups participating in workshop

Figure 1.2 shows from which countries the participants came. The Belgian participants are all from EU-agencies or EU-stakeholder organisations. There were no Belgian participants.

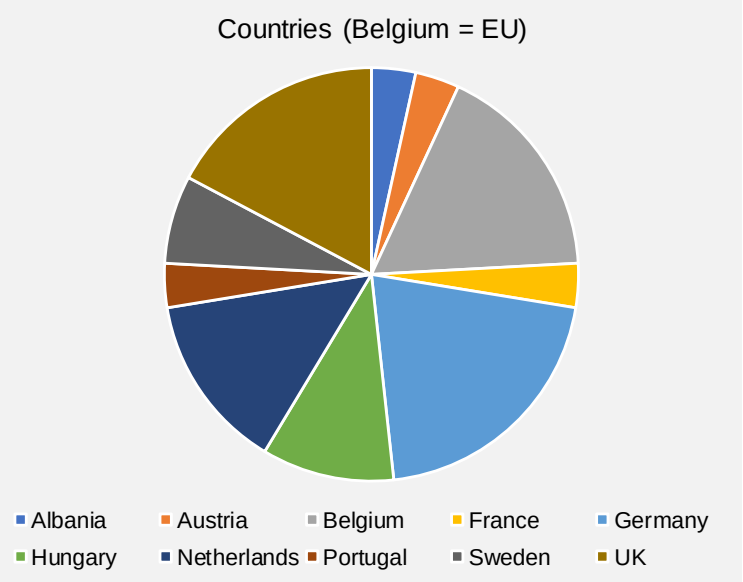

Figure 1.2 Countries participants

2 Employment trends in four major occupational groups[1]

2.1 Conclusions of report D1a

Table 2.1 shows the main development in number of people working in the major occupational groups railway sectors in 2016 and the trend over the period 2012-16. Figures are from the Labour Force Survey (LFS).

Table 2.1 Eurostat (LFs): general trend in employment according to occupational groups over period 2012-2016

Major occupations	2012-2016	2016
Senior managers	0%	6%
Professional engineers	+1%	10%
Technicians and associate professionals	0%	15%
Clerical support workers	+1%	11%
Service workers and sales workers	-1%	5%
Craft and related trades workers (service personnel)	0%	19%
Plant, machine operators and train drivers (train drivers)	-1%	25%
Elementary occupations	0%	10%
Total	**100%**	**100%**
Overall change in employment level/N=	-7%	817,752

In the discussion, the participants were asked to formulate their expectations about four typical railway occupations: management, professional railway engineers, sales personnel (ticketing agents; clerical staff), and train drivers.

2.2 What are employment estimates of the participants for the period up to 2025?

2.2.1 Question: How would you forecast the employment trend for occupational groups in railways in 2025?

The current statistics analysed in D1a predict a further decline in number of senior managers, professionals (engineers), administrative workers (clerical support; back office workers in the sector) and operational workers (train drivers). The participants in the foresight session predict a relative stability in the number of managers, a slight growth in engineers, and a decline in the two other occupational groups.

2.2.2 Questions: Explain in short your forecast (3 sentences)

The participants offered several explanations for the trends described. The answers stress several key influential factors for the trends. Below, a list of these factors is shown. The explanations are arranged according to several categories of explanations: the particular situation of the railway sector, assumptions about change in the railways and non-railways, potential barriers for change, job category specific developments and technology as a driving force for change. The main statements of participants are included below.

[1] The data were presented in absolute numbers of staff in the different categories and % of change. The different categories allow to have a view of rail workers in comparison to a dominant group such as the train drivers.

Particular situation of railway sector

“There will be a strong shift in which skills are required and a slight decline in employment level”.

Scenario assumptions on railways and non-railways

- “Attractive work a must for a new generation of railway employees. This assumes that this is imposed on the sector”.
- “Uptake of innovation in rail is slower than in other sectors due to its current complexity (institutional rigidities and engineering interdependencies, low profitability, long asset life, often not clear links between investments and pay offs)”.
- “Economic recovery in some market segments will lead to need of more train drivers”; “For train drivers we see a growth for a short time because of the ageing theme”. [assumption non-rail]

Potential barriers

“Protest from labour unions may be a serious issue in such changes, but development cannot be overlooked”. [this is also a scenario assumption]

Job category specific developments

- “More autonomous teams with own responsibilities so less managers”; “No, managers decline; Streamlining of senior management and processes”.
- “Managers are needed for strategy develop and steering”; “Managers stable”; “Railway Undertakings seem to have a tendency to blow up management jobs”
- “Needs of Engineers will rise”; “Rise in professionals due to most job roles (not just engineering) now requires at least a degree level of qualification to be competitive”.
- “Railway Undertakings seem to have a tendency to blow up administrative jobs while operational jobs are declining”.
- “For the administrative jobs a strong decline”.

Technological as driving force for change

- “Automation will be everywhere”; “Impact of automation and digitization”
- “More technology, hence more professionals”; “Need for high-skilled engineers to deal with increasingly digitalised railways”; “Automation ->new skills are required → technicians needed to keep systems running”; “Moving towards more technical management and analysis of data”.
- “Technology also increases productivity of professionals so, less too”.
- “Digital and automation technologies strongest force, next to replacement demand (people reaching 60-70 years of age)”.
- “Due to the new technologies some of the operations will decrease”; “The data skills as an emerging area, it can impact administrative staff”; “Automation of clerical”.

Assessment

Participants had the possibility to mention three explanations. This means that it is possible they could offer more reasons for the other opinion on change. It is important to notice that a lot of participants stressed the importance of ‘assumptions’.

2.3 Summary employment trends

The current research results have shown a continuing decline of employment in the railway sectors. The participants in the foresight session estimate a relative stability in the number of managers, a slight growth in engineers, and a decline in the two other occupational groups in focus in the meeting. The trend is explained in several ways. Technology development will require new skills and will influence productivity in occupations. Each of the job categories will show specific developments. A separate explanation is the particular situation of the railway undertakings. There is also insistence on assumptions for the change in the future or on barriers for this change.

3 Skill changes

3.1 Conclusions of report D1a

In the report D1a, several overviews of skill changes and skill profiles have been shown. During the workshop, the discussion was focused on the general skill changes and on the specific skill changes within four occupational groups. These core results are shown in Table 3.1 and Figure 3.1 to 3.4. For each of the four groups, a summary was made of the current skill requirements for four types of skills: technical (STEM), communicative, social and organisational. The combination of these skills are called profiles.

Table 3.1 Trend 2012-2016: development over time of skill distribution within the professional groups (LFS)

2012-2016: trend	ISCED 0-2	ISCED 3-4	ISCED 5-6
Senior managers	-10%	+5%	+5%
Professional engineers	0%	-1%	+2%
Technicians and associate professionals	-1%	-3%	+4%
Clerical support workers	-1%	-4%	+5%
Service workers and sales workers	-5%	+5%	-3%
Craft and related trades workers	-4%	+2%	+2%
Plant, machine operators and train drivers	-3%	+1%	+1%
Elementary occupations	-3%	-4%	+6%

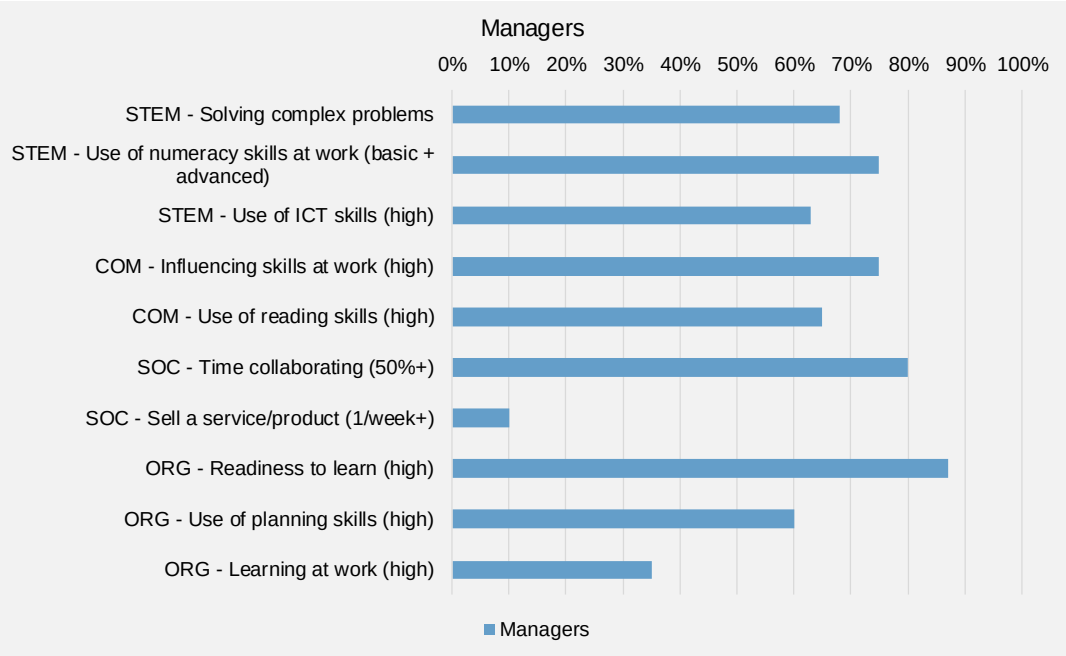

Figure 3.1 Profile 'senior managers': % of managers reporting such skill (PIAAC, 2012)

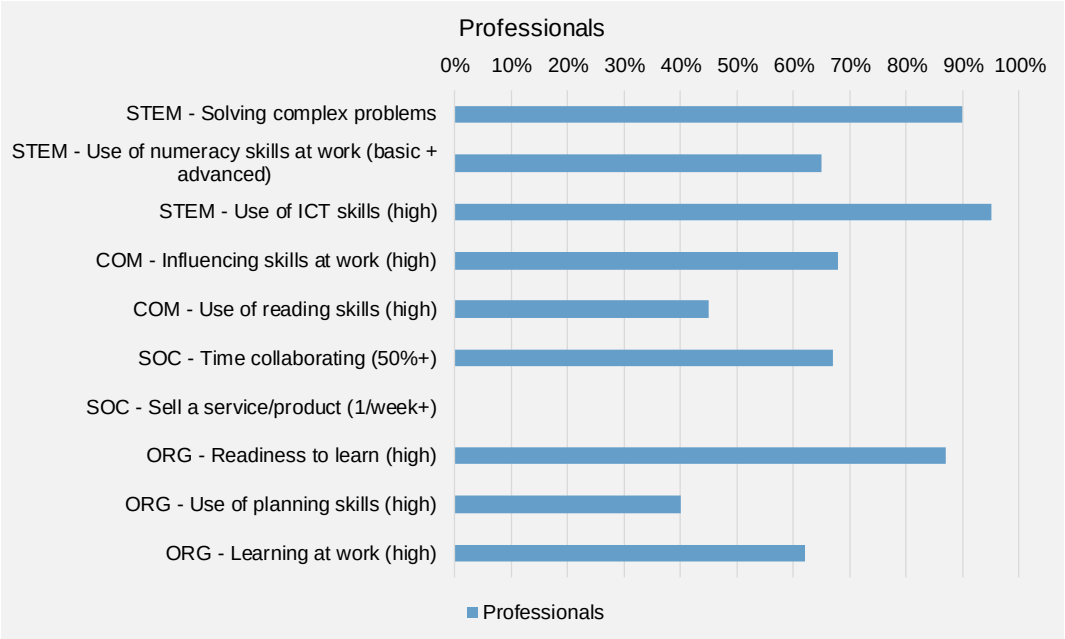

Figure 3.2 Profile 'professionals/engineers' (PIAAC, 2012)

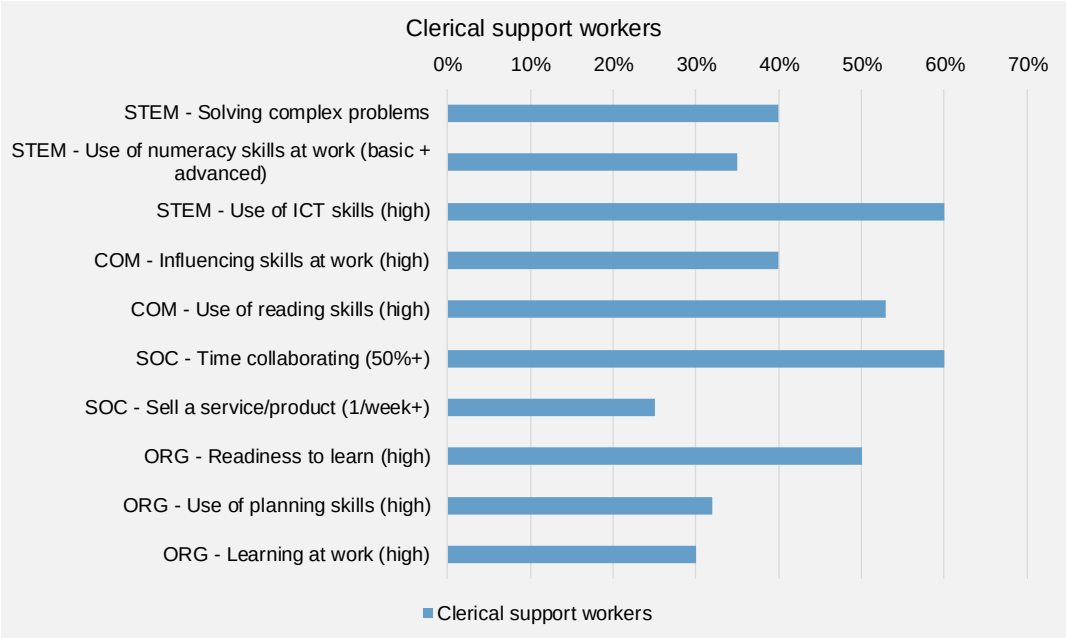

Figure 3.3 Profile 'clerical support workers' (PIAAC, 2012)

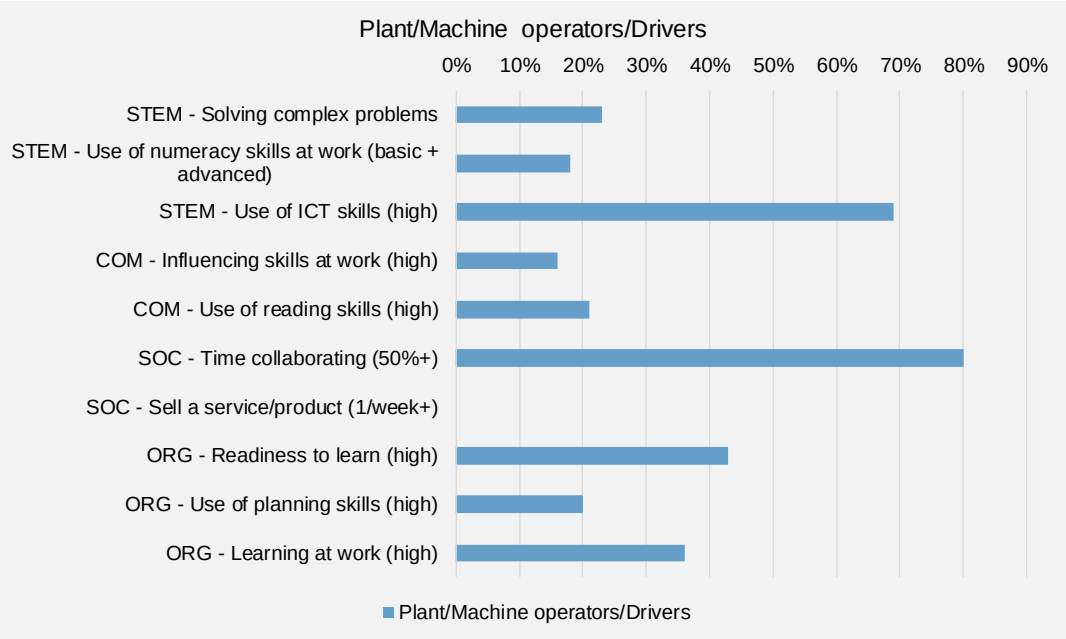

Figure 3.4 Profile 'machine operators/train drivers' (PIAAC, 2012)

3.2 How will skill profiles change in the period to 2025?

3.2.1 Question: How will skill profile managers change?

The D1a analysis shows that more managers need to rely on technical and communication skills. Social and organisational skills are less present. In the foresight session, the prediction is that all skills will be needed for managers. Looking more closely at the responses of the participants, they show that their opinions are less uniform about the importance of social and organisational skills. We think this signifies no consensus on the need for these skills. It requires in further research more attention to barriers and drivers for change in these skill sets.

3.2.2 Question: How will skill profile professionals/engineers change?

Figure 3.2 shows that most professionals/engineers need high technical skills, less engineers report other skills. In the foresight session, the prediction is that having those technical skills will become even more important. Communication skills should also be at a very high levels; social and organisational skill requirements will also be needed for many engineers, even though the consensus about this need is less clear in the group.

3.2.3 Question: How will skill profile clerical support workers change?

Figure 3.3 shows that less clerical support workers are required to have any of the different skill categories. In the foresight session, the prediction is that technical skills will be less prevalent among this group of workers. Communication and social skills should be more prevalent in the future; organisational skill to a lesser degree. The consensus is the least for the need for communication and social skills.

3.2.4 Question: How will skill profile train drivers change?

Figure 3.4 suggests that most train drivers will require ICT- and collaboration skills. Communication and organisational skills are less prevalent. In the foresight session, the prediction is all skill levels will rise to the medium level. The strongest change is foreseen for communication skills. One comment was that for drivers and other safety critical roles, there is an increas-

ing emphasis on non-technical skills, and broader competence management, rather than just the old rule learning approaches. The opinions are most divided about technical skills.

3.3 Summary is changes in skill profiles

In general, participants see a rise in the need for all skill categories (technical, social, communicative and organisational) for all occupational groups. The expectation is that the occupational groups will show distinct skill profiles, with engineers more towards technical skills, and, surprisingly enough, train drivers more towards communicative skills. Train drivers will need to provide better information to the passengers in order to increase satisfaction and quality of service.

4 Confronting research results and forecasts

4.1 Conclusions of report D1a

Report D1a contains an overview of the main forecasts and predictions for employment and skills for the railway sector in the future. The following table shows the main outcomes of this analysis for five studies.

Table 4.1 Overview of five forecasts for shifts in employment (E:) and skills (S:) for four major occupational groups

Occupational groups	Davydenko et al., 2008	Christidis et al., 2014	Panteia, 2015	Skillful, 2018	IMPACT-2 2018
Horizon	2020	2030	2020	2020, 2030, 2050	
Managerial	E: Stability S: eSkills; broad skills sets		E: Stability S: [?]	E: Emerging S: [?]	
Professionals				E: Emerging S: eSkills; data skills	E: [?] S: Shifting skills
Administrative	E: Strong decline S: [?]	E: Strong decline S: Other skills		E: Decline S: [?]	
Train drivers	E: Increase S: eSkills, broad skills sets, interdisciplinary abilities	E: Steady growth S: [?]	E: Steady growth S: [?]	E: Decline S: [?]	E: [?] S: Service skills

4.2 Evaluating the forecasts

The participants were asked to comment on three major forecasts made in these studies:

- Development of employment;
- Development of skills;
- Changes in skill profiles.

4.2.1 Question: "Results: employment declines. Forecasts: growth". What do YOU expect and why?

Four categories of expectation are formulated by participants for this conflicting result. Two expectations are about future growth of the railway sector: one expectation is that growth depends on the competitive position of rail in comparison to other transport modes; a second is that growth of employment will surely rise because of demographic shifts, but also by less constraints on public budgets.

Statements:

- "It must be a balance between growth discussions connected to number of Jobs". "It is important to have the right competitiveness in the business. Key question is: are railway services able to attract more passengers and freight, given huge cost competition from road (buses and trucks) and air; It will depend on the market share of rail". "Recruitment likely to increase (impact of demographic change), but without changing employment

rates"; "Will depend on the performance of rail vis-à-vis other modes of transport"; "No change but significant change in the current staff composition/skill requirements"

- "I expect a high demand because of demographic change. At the same time less demand because of automation -> situation will level out"; "Grow". "A dip because of budget cuts, project delays, self-employment and contracting. But will pick up again". "Growth, but unskilled job will disappear + highly skilled job will rise". "Complex systems need higher educated employees for maintenance, trouble- shooting"; "Based on the EU Plan and National Plan of Employment and training as well as growth, there are involved all the strategic relevance assessed".

A third expectation is somewhat more careful, stressing that change depends on how technology and other impacts will play out.

Statements:

- "2020 level EURO4 Engine vehicles are on the highways. By 2025 maybe level 5. So the operational costs of buses and trucks go down. Rail will have keep up the pace". "Growth in rail is not sure yet. Combination of automation, and reduction in operational costs = decline in jobs. BUT there will be hidden growth in outsourcing and extended supply chain".

A fourth expectation is that decline of employment will continue, mainly because of technology and productivity rise.

Statements:

- "At first a growth but in the end a decline"; "A decline due to automation and technology facilitating higher productivity and efficiency". "Employment continues to decline". "To improve productivity; Will decline due to automation and competition".

4.2.2 *Question: "Results: skill upgrading in all jobs. Forecast: mainly upskilling in higher ranked jobs". What do YOU expect and why?*

Five expectations can be identified for the upskilling observation. A first expectation is that upskilling will depend on the degree of outsourcing applied in the sectors, even though overall complexity in work will rise.

Statements:

- "Technical and organisational complexity will further increase. Yet it might be that some of these skills can be hired externally (outsourcing)"

A second expectation is that upskilling will depend on the national employment situation: we may expect differences between countries.

Statements:

- "General upskilling. It depends on the country as well: if high unemployment rate, highly-skilled candidates turn to any type of profession".

A third expectation is that mainly communication skills will rise in all main jobs.

Statements:

- "Mainly communication skills should be upgraded especially in Management, Train drivers and technician area".

The fourth and fifth expectations are that skill upgrading will be a broad phenomenon, in the first case mainly by general market changes, in the second case mainly because technology will make low skilled activities obsolete.

Statements:

- "Not only in higher rank jobs, in all jobs the upskilling will happen; All jobs". "Customer/end client demand is changing". "Technology change". "Everything is now a service, a brand. Rail usage is now an experience. General upskilling: not just higher ranked jobs"; "Upgrading skills we will see in all kind of ranked jobs. More technical, social, communicate skills; Almost all jobs need upskilling. Even in less technical roles, people will have increasing technical interactions and, more self-management"
- "Supporting tools for workers can augment skills to a higher level. So higher requirements may be expected but with the same education levels". "Routine tasks will be automated so tasks that remain will require higher (cognitive, social & technical) skills"; "New technologies could bring simplifications for the jobs but requires new skills to understand and to react to the new requirements"; "The skill upgrading will appear in every job. The low skilled jobs will disappear". "In the Connectivity Agenda, the skills profile upgrading will continue for all ranked jobs, incl. higher rankings".

4.2.3 *Question: "Results evenly distributed requirement for skills between occupations; Forecasts: more differences in profiles". What is YOUR expectation, why?*

Three expectations are visible in the responses of the participants. A first is that we should also focus on new skills categories: migration to new technologies, implementation of innovation, benchmarking from other modes and better quality services.

Statements:

- "New category needed. Migration and implementation skills of innovation"

A second is that the skill requirements will rise for all occupations and all skill categories. The main underlying idea is that technical skill rises, but it also needs support of other skill categories.

Statements:

- "Digital and technical skill requirements will rise across the board. Other skills more differentiated between occupations"; "Will require combination of technical, communication, social and organisational skills at all levels, but with different degrees"; "Expect as in results. Maybe because companies tending towards providing end to end service/keep things in house. Young people becoming all rounded"; "Even - automation leads to specialisation and technical knowledge, but also need to interact with diverse roles (incl. public), self-organise, etc."; "The transition to automation is very technical at all levels, but once implemented this skill will be less needed. Focus on social and comm."; "Digital skills, detailed jobs and organizational profile, with higher expertise, which distinguishes by the capacities involved, education etc"; "A real transformation with digital and automation in most jobs. But other transformations in other jobs."

The third expectation is that there will be more differentiation between occupational skill profiles, with a stress on more technical skills for technicians, demographic change in employment and change of organisation.

Statements:

- "Technical professions will maintain distinct features. Increase of soft skills for more professional categories. Fewer technician-managers."; "Agree more differences and working together in multidisciplinary teams"; "specialised Job profiles and skills are needed. The different Jobs will be "connected" through common/standardised communication skills; We expect a gap between the Professionals and the technical jobs. High expertise against routine tasks"; "Agree, more specific job profiles/niche areas emerging. Benchmarking from other modes and integration to the rail system".

4.3 Summary of disparity between results and forecasts

Participants seemed to be more convinced to confirm the outcomes of previous foresight/forecast studies. These foresight/forecasts bank on growth of employment, mainly in management and engineering jobs. Also, the foresight/forecasts point out shifts in skills needed. One reason for this is that the current slow development in employment is seen as caused by the economic crisis in the past years. Currently, data only shows a change/reduction in operational skills/activities of major occupational groups. Possibly, this points to a reduced use of these skills, whatever the reason. The overall labour composition seems not to change over time. This seems to hint that not much has been adapted of all the past innovation plans. It could also mean that no (planned) changes have been implemented or no major innovations have been implemented. Second, the specificity of the sector (public, heavy structures etc) makes it difficult for the sector to react to the changing demands. Future growth depends on the capability of the sector to improve its relative performance in comparison to other transport sectors.

5 Factors driving change in skill profiles

5.1 Conclusions of report D1a

In the following Figure 5.1, the main drivers for changes in skill profiles are shown using data on railway employees in the Eurofound Working Conditions Survey (2015). The figure compares the results for railway employees (all occupational categories) with employees in other sectors. Those working conditions were selected that relate to the main skill categories discussed in previous sections of this report:

- Technical skills: substances, physical work, complex tasks, use of computers,
- Communication skills: noise,
- Social skills: direct demands: people,
- Organisational skills: jobs demands, autonomy, machine driven, skills to cope with more demands.

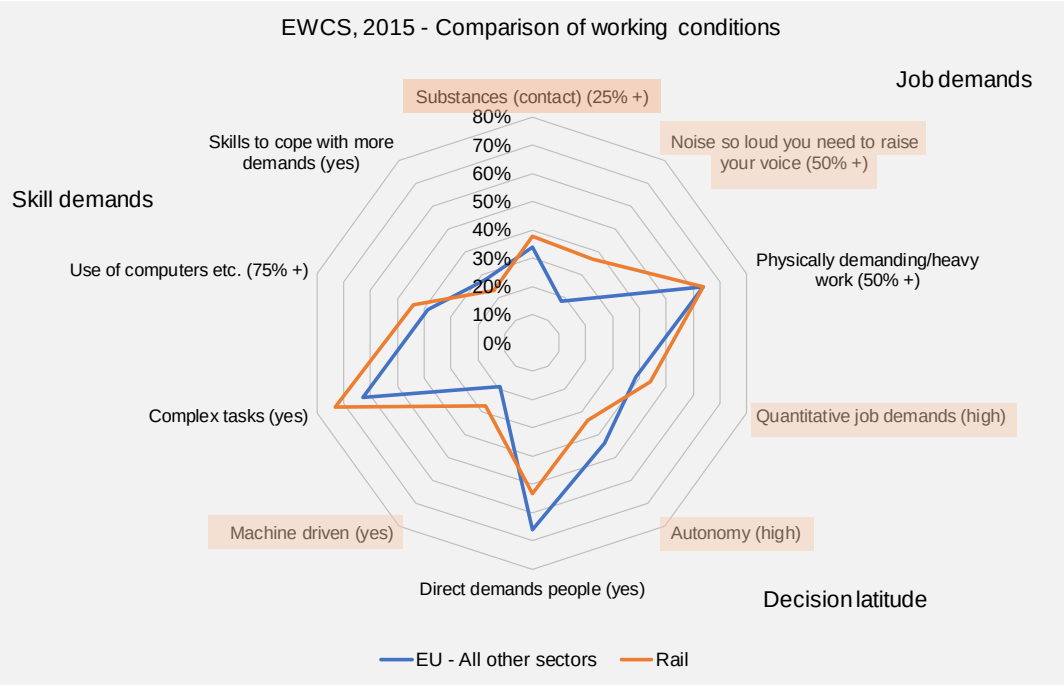

Figure 5.1 Comparison of main working conditions of rail employees (red = more at risk than employees from other sectors)

The railway workers compare as following:

- Better than other employees: contact with substances, noise, job demands, machine driven, complex tasks, use of computers;
- Comparable to other employees: physical demands;
- More risks than other employees: autonomy, direct demands from people, skills to cope with more demands.

5.2 Which changes will be visible in 4 major occupational groups?

The participants were asked to evaluate if the current working conditions will improve or deteriorate.

5.2.1 Question: Which changes in four major jobs? JOB DEMANDS

Job demands will be rising for managers, but mainly for professionals (engineers). Administrative and operational workers will see declining demands. One comment was that the railway sector has seen an increasing move to on-call working (i.e., where staff are called out at short notice). This is particularly the case for engineering work, but this can be more of an issue in the future for other roles (e.g., for train drivers that are providing cover). This change has implications for the nature of work, stress, workload, wellbeing, etc. The opinions for administrative and operational job categories are however very much divided.

5.2.2 Question: Which changes in four major jobs? DECISION LATITUDE

Managers and professionals will see rising decision latitude (more autonomy). Administrative and operational workers will see declining decision latitude.

5.2.3 Question: Which changes in four major jobs? SKILL DEMANDS

Skill demands will continue rise for managers and professionals. For operational workers, the results seem to indicate that demands will remain the same. For administrative workers, demands are declining.

5.2.4 Summary of driving factors

Managers and professional see all demands rise quite steeply in the coming years. Other job categories show declining demands.

5.3 Factors influencing work in the railway sector

The participants were asked to look at major factors that were cited in forecasting studies as driving changes in work and skills in the railway sector. First they needed to identify for each of the drivers, what core elements will influence in work. This overview helped them to make their knowledge about the subject more explicit. Using this information and the feedback, the participants were then asked to rate the importance of the main drivers for work and skills in the future.

5.3.1 Documenting the driving factors

Question: What elements in TECHNOLOGY will influence work in the railway sector?

Next to the known rail specific elements in technological change, the following topics were indicated in the word clouds (number times of citation indicated). These topics will influence work:

- Technologies related to digital revolution (14):
  - Automation (4x); AI (artificial intelligence) (2x); Digitalisation (2x); IoT (2x); Augmented intelligence; Blockchain; Datas; Communication tools;
- Market change (10):
  - Intermodality (2x); Cost (2x); Changing; Consumer_centric; Engagement; Everywhere; Flexibility; Frequently_change;
- Systems change (8):
  - Competition (2x); Centralisation (2x); Control; Capacity_management; Self_organising_systems; Security;
- Specific rail technologies (4):
  - ATO; ERTMS;
- Organisation & Persons (3):
  - Autonomy; Organisation; Talent.

The following comment was added later. An 'elephant in the room' is automated ULEV vehicles. If I can get a cheap, emission free car to take me where I want to go, will I still want to take the train? This is maybe more of a competitor than MaaS, which could include the train as part of a co-modal journey.

The technologies included in the above list provide tools for the workers to make work easier, requiring less knowledge/education in the job. It also includes new technologies that require more knowledge for its development, implementation and maintenance; so requiring higher education from workers.

Question: What elements in MARKET CHANGES will influence work in the railway sector?

These market changes will influence work:

- Competition characteristics (12):
  - Service-orientation, Consumer_Centric, Consumer_expectations, customer_focus (4); cost competition, Competition (3); Reliability (3); Quality; speed;
- Competition instruments (8):
  - MaaS (3); Modal_connectivity, multimodal_ticketing, multimodality (3); Branding_and_Image; Integrated_services;
- Technologies (6):
  - ATO (3); automation; IA; Intelligent_terminals;
- General trends (4):
  - New_trends; Capacity; New_networks; SMEs;
- Market conditions (4):
  - No_borders; open_of_the_rail_market; transparent-access fair-rail-market; open-not-single-market.

What elements in LABOUR MARKET RULES will influence work in the railway sector?

These labour market rules will influence work:

- Labour market conditions (10):
  - Liberalisation (3); Interoperability (2); Cost; Regulation_lagging_behind; Market_demands; Increased_outsourcing; internationalisation;
- Employee level (6):
  - Self-employment (3);Skills; Collaboration; employability;
- Management practices (5):
  - Safety (2); management; On_demand_management; quality;
- Sector specific conditions (4):
  - Reliable_railways; sector_bargaining; Standards; undertakings.

The change in labour market conditions means more on-demand labour management; this is part of the business model of the new economy. In most cases the implementation is quite harsh and unfavourable for the workers. For instance zero hour contracts, notification for work 1 day I advance, etc.

Question: What elements in ORGANISATION CONCEPTS will influence work in the railway sector?

These changes in organisational concepts will influence work:

- Organisational level (14):
  - MaaS (2); Customer_centric (2); intermodality; interoperability; mobility_for_demand; Modular; Seamless; Self_organising_logistics; Smaller_organization; transport_as_platform; Crossborder; International;

- Targeted at worker behaviour (12):
  - Interconnecting_jobs, interconnection (2) Agile_team; culture-on-safety; Education_possibilties; flexibility; Collaboration; Implementation; communication; Migration; Own_responsibility; workers_participation;
- Technological aspects (4):
  - Automatisation; digitisation.

The following remarks were added to the workshop results:

- Outsourcing. This is likely to be the case for track engineering and maintenance roles, as well as for infrastructure construction. Increasingly we will also see it for IT back office (important for future automation/IoT etc). For engineering type activities, this leads to increasing fragmentation of the railway sector and the need for central leadership in order to drive safety culture (e.g., in terms of senior management communication skills).
- But, also, for maintenance and monitoring roles, we are seeing an increasing role of the supply chain. In the UK, the railways developed their own equipment but increasingly this is now all procured. This is not new, but what is likely to be new is that these suppliers will move from a product-based business model, to a service-based business model, and therefore have an ongoing relationship with infrastructure managers and railway undertakings. This has implications for the need for boundary and organisation spanning knowledge and communication skills.

Question: What elements in DEMOGRAPHY, DIVERSITY will influence work in the railway sector?

These topics will influence work:

- Composition of workforce (17):
  - Ageing_workers, High_share_elderly (5); Women_in_rail (5); Becoming_less_segregated, culturally_div_workforce, multiculturality (3); Gender_balance (2); Impaired_staff;
- General trends (8):
  - Ageing_passengers, aging_population (2); End_to_end_journey; extent-new-project-areas; improve_prm; Intercontinental; Railwaycapacity; Urbanization; greening;
- Job contracts (4):
  - Self_employment; Availability; daily-or-mobile-workers; Education;
- Job content (4):
  - Physical requirements; jobprofiles; Workers-dependents_balance; work-life_balance.

5.3.2 Prioritizing factors influencing work in the railway sector

In the previous question, participants were asked to suggest which developments they found relevant for the railway sector. The question then is, which of the (general) factors is seen as the most important influencing work in the railway sector. Figure 5.2 shows the outcome of this assessment.

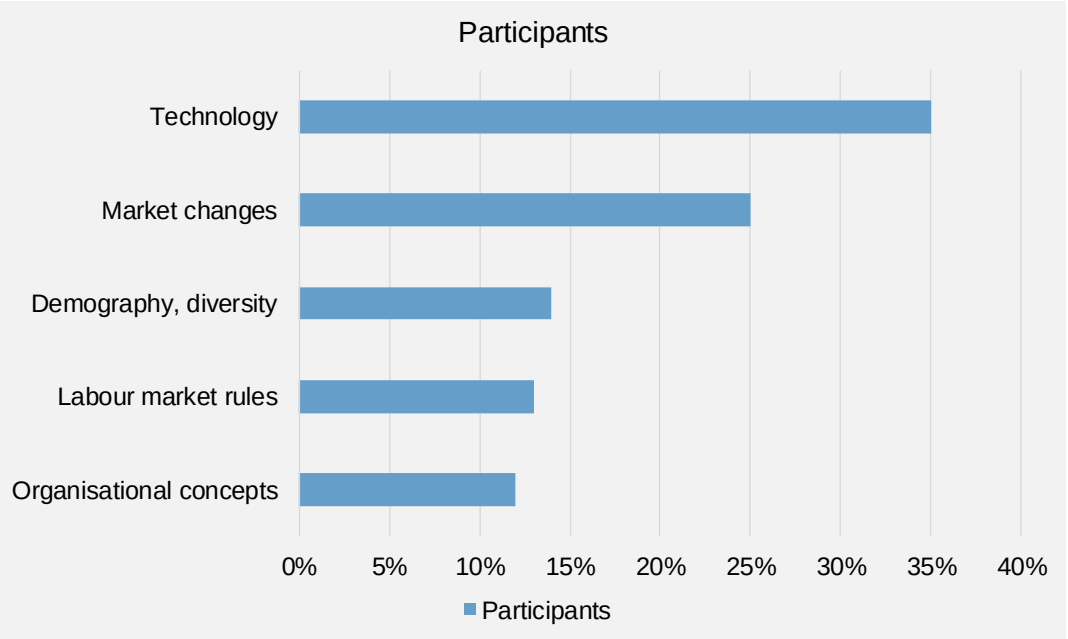

Figure 5.2 Results of the workshop: percentage of participants rating driving factors (n=14)

The group rated technology as the most influential factor for work changes. Changes in market changes is a second important change factor for work. The three other factors are seen as much less important influencing factors.

Afterwards, the following comment was added. It is possible that the participants put too much emphasis on technology as the driver of organisational and skills change. It could be that more stress should be placed on market and organisational aspects - in other words, what kind of railways do our customers want (market), and our staff want (organisational), and (from that) what skills, knowledge and technology, does this demand from our railways?

6 Any topics the study needs to reconsider in the current work?

At the end of the workshop, participants were asked if they thought some aspects of employment and skilling were overlooked in the current research. Six topics were suggested. Three of the six topics are connected to the educational system:

Statements:

- "If any change in skills is needed, how to accompany this change at company level? Alignment, partnerships education system/business"
- "Educational system"
- "University courses for Train operation"

These topics point towards courses supporting the workers. Implementing these courses leads to a lower need for education and makes the gap between skills and tasks smaller. They can also support cross border employment.

The following other aspects were suggested:

- "Aiming at automatisation and digitalisation, and decarbonisation in railways, our current work focus on short & mid-term goals is considered".
- "Look closely at developments in China & what to learn: 1) One Belt One Road - connecting to Europe, Africa; 2) 20.000 km highspeed network".
- "I think industry image and dynamics is also a key factor influencing future skills/human capital".

Comments that were added after the workshop:

- What about technology FOR training? This is not part of S2R, but remote learning, online competency management, and VR training are all areas of growth that the railways can benefit from.
- As an example of a group that was underrepresented, it was not clear where customer facing skills and staff come into this - we could imagine to see increasing numbers of passenger/customer experience type roles, as there is a shift away from low-grade technical roles (there is some evidence of this in the UK). We mentioned drivers talking more to passengers, but what about the number of staff that are likely to be working in station environments? This will be essential to present a high quality service in a potential highly competitive market place of the future.

These topics will be discussed with S2R JU.

7 Conclusion, next steps

7.1 Conclusions

The main aim of this report D1b is to provide an impression of the view-points offered by 27 participants during the foresight workshop. The workshop was aimed at discussing the results from the socio-economic analysis of employment and skills situation in the European railway sector. The participants, mainly experts, policy specialists and social partners, were invited to react to the conclusions of the study on changes in employment and skills in the railway sector.

7.1.1 Employment in the future

The research results collected by the project team have shown a continuing decline of employment in the railway sectors. The participants in the foresight session have another view on developments. They estimate a relative stability in the number of managers, a slight growth in engineers, and a decline in the two other occupational groups in focus in the meeting. The main explanation for this other view is that the market situation will be different, and the main drivers for change will allow other employment developments: technology will require new skills and will influence productivity in occupations; job specific developments will change the composition of the workforce in the future (more managers and engineers; less train drivers); railway specific factors will play a role.

7.1.2 Skills in the future

The research showed mixed results. Participants reacted to these results by insisting on a general rise in requirements for all skill categories (technical, social, communicative and organisational) for all occupational groups. The occupational groups will show in the future distinct skill profiles (other than the research suggests), with engineers moving more towards technical skills (rather than communicative skills), and, surprisingly enough, train drivers towards communicative skills. Train drivers will need to provide better information to the passengers in order to increase satisfaction and quality of service.

7.1.3 Difference between statistics and foresight/forecast studies

Participants seemed to be more convinced of the results of the foresight/forecast studies. These foresight/forecasts foresee growth of employment, mainly in management and engineering jobs. Also, foresight/the forecasts point out shifts in skills needed. One reason for this is that the current employment development is seen as caused by the economic crisis in the past years. The current development shows a change/reduction in operational skills/activities. Possibly, this points to a reduced use of these skills, whatever the reason. There is only little change visible in the overall labour force composition. This seems to hint that not much adaptation of rail companies has taken place over the past years. It could also mean that no (planned) changes have been implemented, so no major innovations implemented. Second, the specificity of the sector (public, heavy structures, etc.) makes it difficult for the sector to react to the changing demands. Future growth depends on the sector being able to improve its performance in comparison to other transport sectors.

7.1.4 Factors driving change

The group rated technology as the most influential factor for work changes. Changes in markets are a second important change factor for work. Other factors are deemed as much less important influencing factors.

7.1.5 *New topics for research*

At the end of the workshop, participants were asked if they thought some aspects of employment and skilling were overlooked. Six topics were suggested. Three topics point towards courses supporting the workers. Implementing these courses leads to a lower need for education and makes the gap between skills and tasks smaller. They can also support cross border employment. Other topics are to look at automation and decarbonisation in railways. International changes in China and other countries should be considered in the project. This does not mean that the study should consider transfer of knowledge, but mainly consider market changes (for example: new transport routes) caused by international developments. A last topic is the industry image factor of the sector.

7.2 Next steps

This report finalizes the research work on the socio-economic conditions of the current railway in Europe. The research has shown that several scenarios are available for conducting the next activities in the S2R-CCA project: the research results point towards a further decline of employment, a general upskilling of employment, and a relative stability in composition of the workforce and skills situation; the foresight workshop leads to a second scenario in which employment will grow, upskilling will take place but different in the major occupational groups, leading to future more reliance on managers and engineers. These two scenarios will be considered in the analysis of the technological changes induced by the S2R research and innovations projects. In estimating and explaining employment and skill changes, but also in identifying training and schooling measures, these scenarios will be used.

Reference

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