Final Report

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www.railstaffer.eu

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Foreword

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STAFFER Coordinator

STAFFER is the **Erasmus+ Sector Skills Alliance for Rail** gathering 31 full partners and 15 associated partners from 13 EU countries and from the different parts of the complex rail world: infrastructure managers and operators, industry suppliers, educational institutions, and other different associations and organisations. The project started on 1 November, 2020, upon approval by the EU Education, Audiovisual and Culture Executive Agency (EACEA) and is now close to its end, which will be on the 31st of October, 2024.

STAFFER was thought of as a framework for strategic cooperation among the different key stakeholders of the rail sector, and aims to develop a holistic Blueprint strategy to recognise present and new skill needs suitably and timely, and contribute to achieve the Single European Rail Area.

Upon the identification of current and future skills and competence needs for the whole complex rail system, suitable training and education paths and curricula were designed, developed, and validated for effectively increasing employability and career opportunities. STAFFER defined a long-term and sustainable strategy to fill the gap between supply of and demand for suitably skilled workforce. Finally, a long-term action plan was developed and endorsed to roll-out at the different territorial levels.

STAFFER was designed in three phases. The first phase was the **skills identification**, which, during the first year of the project, defined, under a unique methodological umbrella, the view of the future rail sector and the relevant skill needs identification.

The second phase was the **mobility and training programmes design and implementation**, which ran for the entire duration of the project, and had the crucial and articulated objective of developing and implementing suitable mobility and training programmes to cope with the diverse skill needs.

During this phase, suitable programmes were designed and assessed from the point of view of employability and careers opportunities, and selected pilots at different EQF levels were implemented and validated.

In parallel, the third phase, the **definition and implementation of a rail sector strategy** led to the definition of a long-term action plan and key policy recommendations.

This report describes the main results and the implemented pilots, showing the great effort of all the partnership and demonstrating how the complex European rail sector (operators, infrastructure managers, suppliers and all the other stakeholders) can respond as one to the immense challenge of rail career attractiveness and skills mismatches, adopting a new strategic approach to rail sectoral cooperation.

We hope that the lessons learned within STAFFER will help to best foster inclusivity and attractiveness and will pave the way towards a more unified European rail sector.

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About STAFFER

Context

In 2019, a European Commission Study on the Competitiveness of the Rail Supply Industry identified the "promotion of the development of skills and safeguard of access to skilled labour" as one of the main action fields for ensuring Europe's rail supply industry's leadership.

According to this study, "the supply of technical engineers may become a bottleneck in maintaining the competitive position of the EU rail supply industry". It even states that "combined with a decreasing workforce due to ageing, perception of an unattractive sector, and changing skill requirements due to the digital transformation, it is expected that this skills shortage could increase in the near future". These mounting challenges necessitate action without further delay.

Later that year, the Final Report of the EC Expert Group on the Competitiveness of the EU Rail Supply Industry confirmed that "in view of the ageing population, a significant cohort of employees is expected to retire within the coming years. At the same time, transformation related to digital and high-tech technologies creates mismatches between available and demanded skills. Already now, enterprises in many Member States are reporting difficulties to find railway engineers".

By the end of 2019, following these discussions held within the EC Expert Group on the Competitiveness of the EU Rail Supply Industry, it was clear that these weaknesses must be addressed immediately. In response, the Commission shortlisted the rail industry as 1 of 6 sectors eligible for the creation of an Erasmus+ Blueprint for Sectoral Cooperation on Skills.

What is STAFFER?

STAFFER was a four-year, European Commission-funded Blueprint project focused on the topic of skills in the rail sector. A large share of the sector's workforce is expected to retire in the next 10 years as it experiences both a severe skills shortage and a need for re/upskilling.

STAFFER delivered human capital solutions for all levels of the rail value chain, gaining the holistic view of the sector as a system of systems, unifying the European rail world. Coordinated by the University of Genoa, our alliance STAFFER officially started on 1 November 2020 and lasted for 4 years.

To ensure that rail is best prepared to meet the transport needs of tomorrow, the consortium has been composed of representative key businesses, trade unions, education and vocational training stakeholders and public authorities. Its objective was to help identify the main existing skill gaps and assess the future needs in our industry, Vocational & Education Training (VET) institutions and technical universities to propose adaptations to curricula, training and educational programmes so as to address new technological developments and trends.

Blueprint for skills

The Blueprint for sectoral cooperation on skills was first introduced by the **Skills Agenda for Europe 2016**. Since then the Commission has selected 21 projects under the Erasmus+ programme that are implementing the Blueprint.

They build on previous work by the European Commission and sectoral partners to address sector skills mismatches, in particular the European sector skills alliances.

The European Skills Agenda 2020 has confirmed the Blueprint as a key initiative to create new strategic approaches and cooperation for **concrete skills development** solutions in the industrial ecosystems as introduced by the updated EU industrial policy.

Under the new Erasmus+ programme (2021 – 2027) a new action, the Alliances for Innovation Lot 2: Alliances for sectoral cooperation on skills, is now the tool to implement the Blueprint.

The purpose of the Blueprint is to:

- Gather skills intelligence and feed this into CEDEFOP's Skills Intelligence tool
- Develop a sector skills strategy
- Design concrete education & training solutions for quick take-up at regional and local level, and for new occupations that are emerging
- Set up a long term action plan
- Make use of EU tools e.g. EQF, ESCO, Europass, EQAVET
- Address skills shortages and unemployment

Blueprint Alliances gathers key stakeholders from industrial ecosystems. These stakeholders can include for example:

- business
- trade unions
- research institutions
- education and training institutions
- public authorities

IMPLEMENT EUROPEAN SECTORAL SKILLS PROJECTS

The Commission selects **Blueprint Alliances** through the annual Erasmus+ call for proposals and supports their work with grants. Winning proposals are selected on the basis of the eligibility, award, exclusion and selection criteria.

Each Alliance will develop a **sectoral skills strategy** to support the overall growth strategy for the industrial ecosystem and skills needs.

Partners in Blueprint Alliances look into how the digital and green transitions are likely to affect jobs and skills needs.

Partners then **identify priorities and milestones for action** and develop concrete solutions, such as creating and updating curricula and qualifications based on changing or new occupational profiles.

The deliverables of Alliances for Sectoral Cooperation on Skills, i.e. sectoral skills intelligence, skills strategies, occupational profiles, training programmes, and long-term planning, will be an important contribution to the work of the sectoral partnerships that have joined the Pact for Skills.

ROLL-OUT AT NATIONAL AND REGIONAL LEVEL

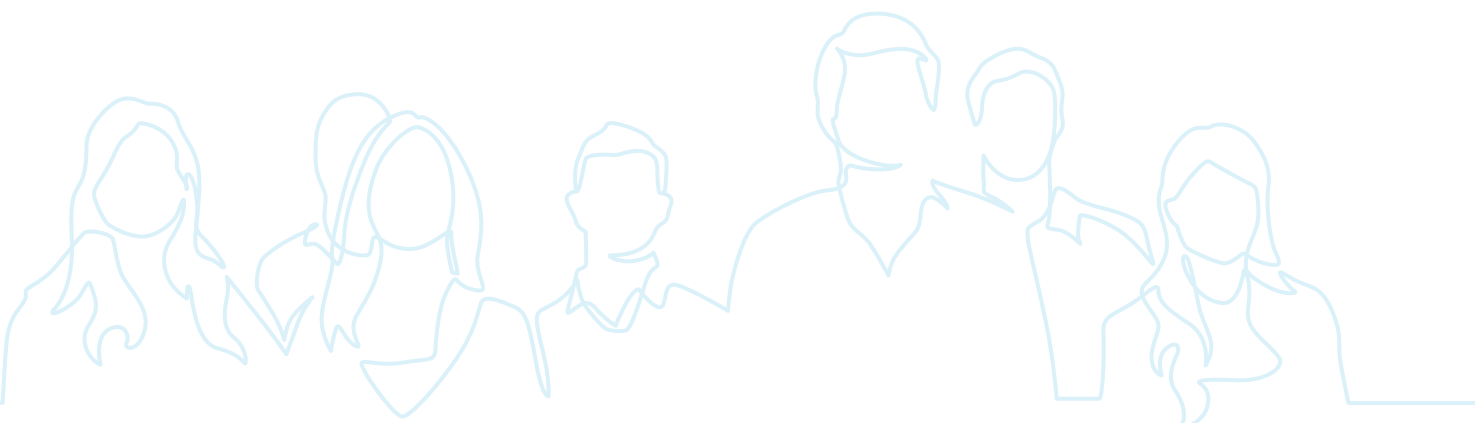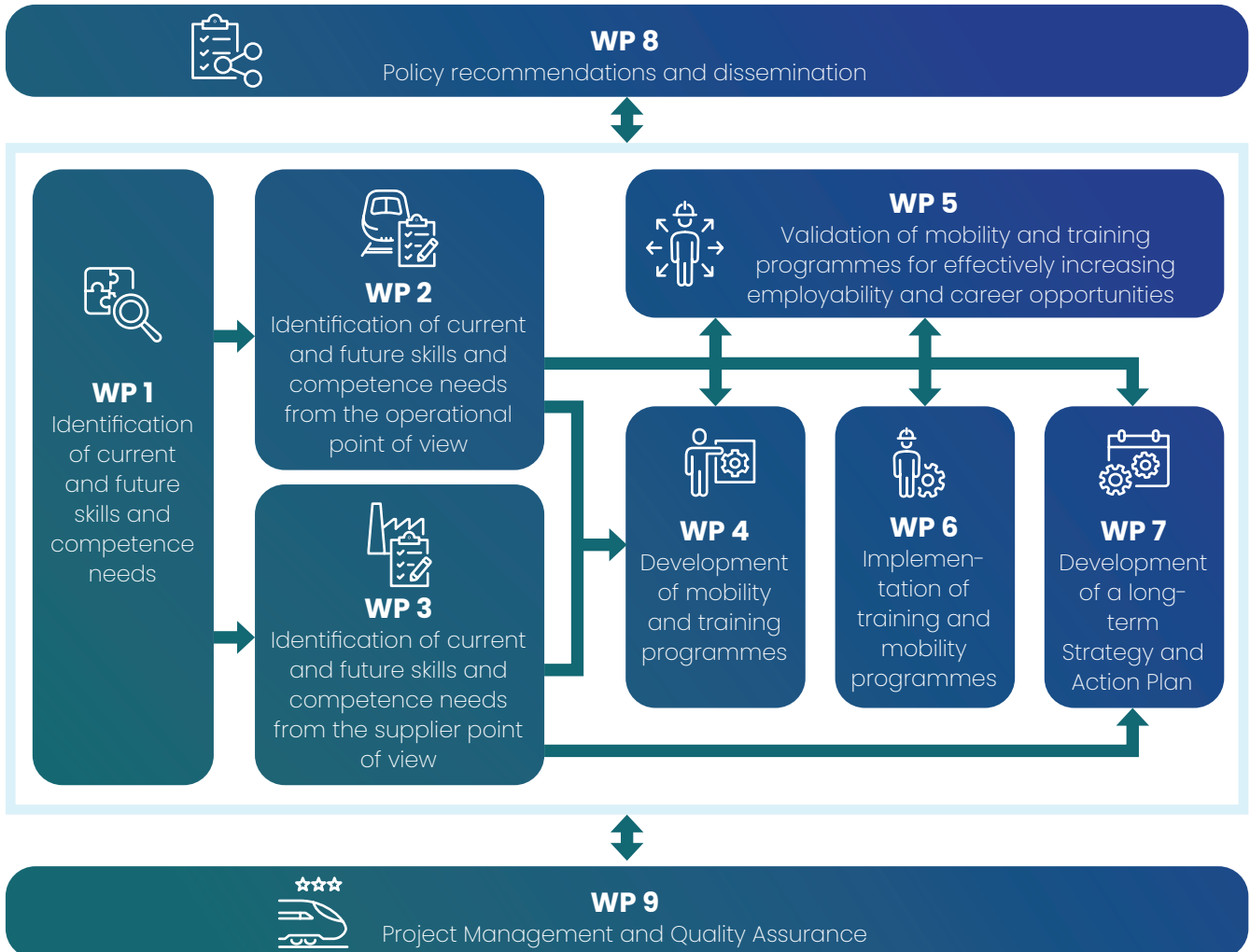Following an implementation plan, which the partnership has to develop, the results of Blueprint Alliances will be **rolled out at national and regional level**, for example through large-scale skills partnerships under the Pact for Skills.

There will also be synergies with other policy frameworks, such as regional smart specialisation strategies, industrial clusters or Centres of Vocational Excellence.
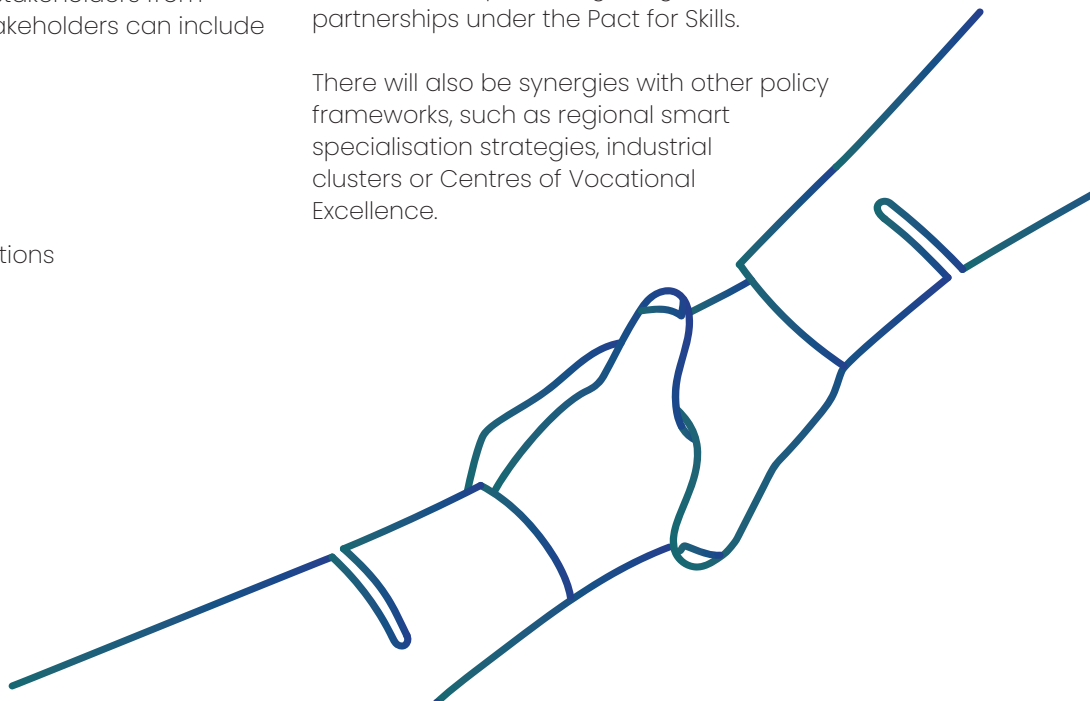
Project Structure

The STAFFER project consisted of 9 Work Packages and a total of more than 30 tasks that were implemented under the co-lead of railway suppliers and academic, rail and research partners as well as vocational education and training (VET) institutions.

WP 8
Policy recommendations and dissemination

WP 1
Identification of current and future skills and competence needs

WP 2
Identification of current and future skills and competence needs from the operational point of view

WP 3
Identification of current and future skills and competence needs from the supplier point of view

WP 5
Validation of mobility and training programmes for effectively increasing employability and career opportunities

WP 4
Development of mobility and training programmes

WP 6
Implementation of training and mobility programmes

WP 7
Development of a long-term Strategy and Action Plan

WP 9
Project Management and Quality Assurance

Executive Summary

The STAFFER project was established to foster cooperation among key stakeholders in the rail industry, with as primary objective the creation of a Blueprint strategy to identify and address both current and future skill needs within the sector, thereby contributing to the development of a Single European Rail Area (SERA). It has now succesfully concluded after a an active and productive four-year life-cycle.

The project was implemented in three phases — first, the identification of skills; then, the mobility and training programmes design and implementation; and finally, the definition and implementation of a rail sector strategy — and was structured around nine Work Packages (WPs), each focusing on different aspects of skills development, training, and strategy.

- **WP 1:** Focused on identifying future trends impacting railway staff skills and developing a continuous skill assessment methodology. This groundwork was crucial for subsequent work packages, ensuring the railway workforce is well-equipped for future challenges.

- **WP 2:** First time comprehensive identification of current and future skills and competence needs for 30 occupational profiles in railway operations and infrastructure management. Addressing skill gaps by analysing technological, social, economic, and policy trends impacting railways, with particular focus on cross border efficiency and communication and language.

- **WP 3:** Provided an overview of macro-trends impacting rail industry suppliers, identifying necessary skill shifts and analysing current and future skill needs, with a significant emphasis on digitalisation.

- **WP 4:** Defined programme contents for selected occupational profiles compliant with European standards to promote mobility across different European countries.

- **WP 5:** Developed a framework to analyse employability in the rail sector, validating training and mobility programmes in terms of career opportunities and providing an evaluation tool for continuous analysis.

- **WP 6:** Developed and implemented cross-European student, apprentice, staff mobility programs and cross-border usable training concepts and learning media..

- **WP 7:** Devised a long term strategy and action plan to ensure European rail's continued success and growth as a quality employer, sustainable transporter and world leader in transport technologies.

- **WP 8:** Developed a comprehensive communication strategy & dissemination plan to share the projects work, results and recommendations both within the consortium and to relevant stakeholders and decision makers.

- **WP 9:** Managed the work of the consortium to ensure correct, cohesive and timely delivery of high-quality results.

OUTCOMES

STAFFER successfully delivered a range of human capital solutions across the rail value chain, offering a holistic perspective of the sector as an interconnected system. The project's major outcomes include:

1. **Skills and Competence Identification:** STAFFER effectively mapped out the existing and future skills requirements for the rail industry, providing a foundation for tailored training and education paths.

2. **Development and Validation of Training Programmes:** The project designed, developed, and validated specific training curricula to enhance employability and career prospects within the rail sector. These programmes are expected to address the skill gaps identified and support the sector's evolving needs.

3. **Long-term Strategy and Action Plan:** STAFFER defined a sustainable, long-term strategy to balance the supply and demand for skilled labour in the rail sector. This strategy includes an action plan endorsed for implementation at various territorial level and in relation to key thematic fields.

RECOMMENDATIONS

The STAFFER final report includes comprehensive policy recommendations aimed at addressing the skills shortage and enhancing workforce development within the European rail sector. These recommendations focus on three primary areas:

1. **Enhancing Employability, Attractiveness, and Diversity:** Policies at the European level aim to make the rail sector more appealing and inclusive, with initiatives like the Rail Ambassador Programme and mentoring programmes for underrepresented groups. National and sector-specific strategies focus on local engagement, visibility, and creating inclusive workplace cultures.

2. **Advancing Education and Training:** Recommendations include developing EU-wide education strategies, introducing the "Railway Erasmus" programme, and establishing a portal for rail-related educational programmes. At the national level, partnerships with educational institutions are encouraged to develop relevant curricula and training programmes, supported by targeted funding.

3. **Fostering a Single European Railway Area of Skills:** Policies to promote a cohesive and integrated railway workforce include transnational education programmes, standardising skills and qualifications to build European mindsets and enhancing workforce mobility and adaptability through language and soft skills training.

CONCLUSION

The STAFFER project has significantly contributed to addressing the skills and workforce challenges in the European rail sector. The implementation of the project's policy recommendations will improve employability, advance education and training, and integrate skills across the Single European Railway Area. A coordinated effort from the EU, national governments, and the rail sector, supported by adequate funding and collaboration, is essential to build a skilled workforce capable of supporting Europe's green transition and meeting future demands.
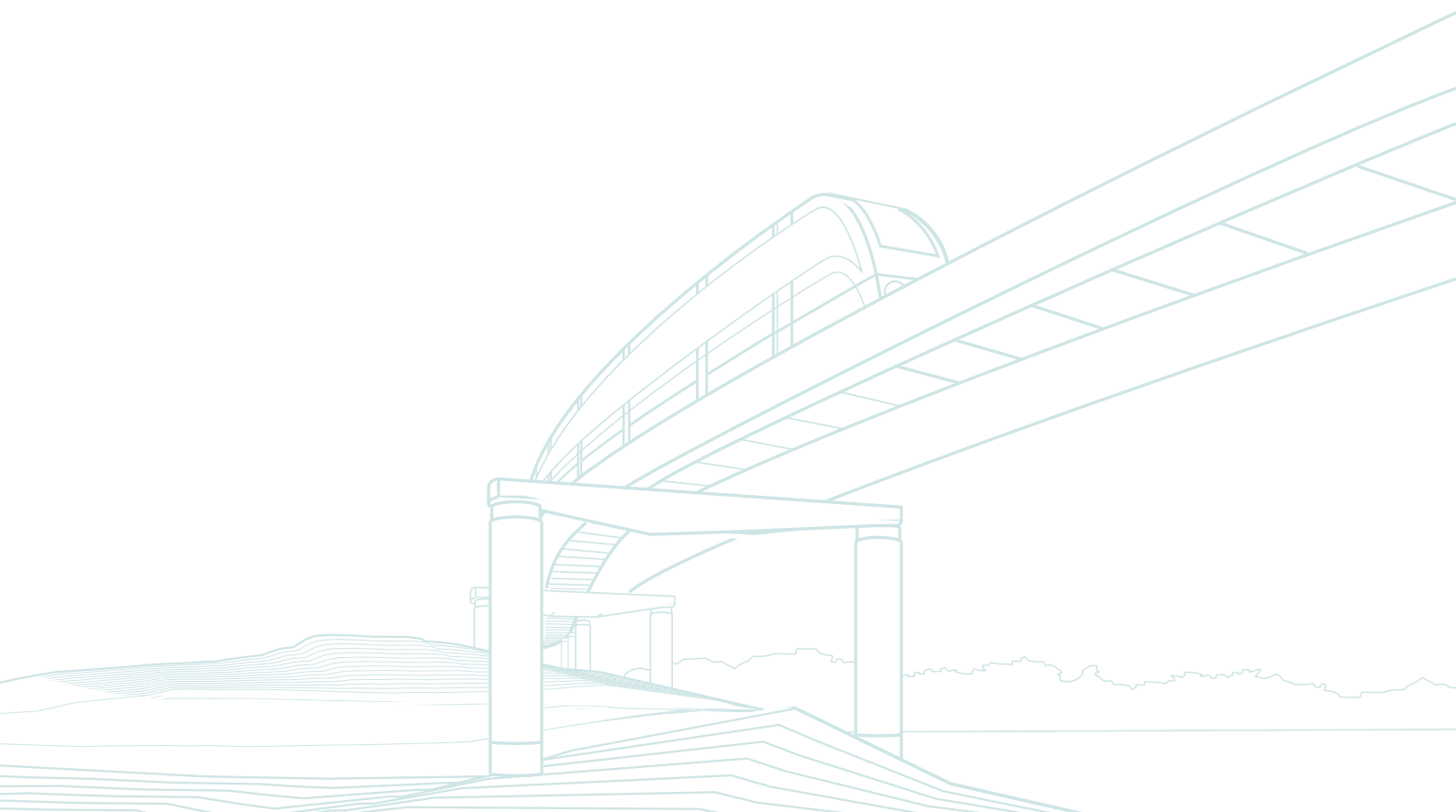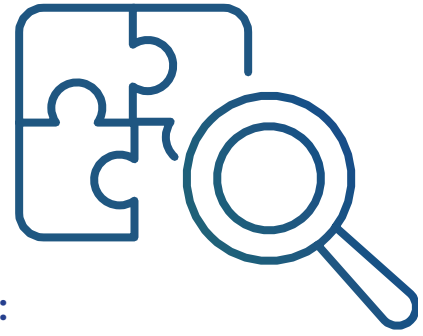
The Work Packages

Work Package 1
Identifying skills needs

ABOUT

Work Package (WP) 1 identified the current and future skills and competence needs throughout the rail sector. It served as a methodological umbrella for the skills identification performed by WPs 2 and 3, where the specific views of operators/ infrastructure managers and suppliers were further developed.

The focus was therefore on providing an overview and an introduction of the competence model featuring the four categories of social, technological, domain knowhow, and personal competences. The analysis of skills and jobs focused on technical skills that go hand in hand with the technical innovations and adaptions in the rail industry on both the suppliers' and operators' sides.

The work was based on the analysis of existing studies and more in-depth interviews to help assess the skill maturity level of the current workforce and identify skill gaps.

Work Package 1 (WP 1) aimed to support the rail transport sector's competitiveness by identifying emerging trends and developing methodologies for assessing and monitoring the skills required by railway employees. This work package set the foundation for subsequent work packages by focusing on two primary tasks: analyzing the state of the art and developing an assessment methodology.

WP 1 had two main goals: identifying future trends impacting railway employee skills and establishing a continuous skill assessment methodology. The work was divided into two tasks.

Task 1.1 involved a thorough analysis of existing projects, studies, and initiatives to understand railway trends and their impact on skills. We reviewed 34 documents and conducted a survey among railway companies to gather insights on current skill levels and future needs.

KEY TRENDS:

Social Changes: Addressing staff shortages due to retirements and evolving qualification requirements. Recommendations included targeted training, recruitment of talented employees, and improving job perception.

Technical Changes: Integration of digital technologies such as IoT, AI, big data, 5G, BIM, and autonomous vehicles to enhance system monitoring, safety, and capacity. The report emphasized the importance of predictive maintenance and real-time monitoring.

Environmental and Political Factors: Emission reduction and climate neutrality goals, along with the need for sustainable infrastructure and integration into comprehensive mobility systems.

Economic and Market Dynamics: Harmonizing train control systems, enhancing logistics management, and addressing international rail corridors' challenges. The report highlighted the potential for increased trade between Europe and Asia.

Furthermore, a detailed report was submitted containing the results of the survey conducted among railway operators and suppliers. Key findings included:

- High importance placed on sustainability, new work models, urbanization, and addressing talent shortages.
- Emphasis on the need for digital skills, leadership, communication, and adaptability.
- Identification of a lack of training in future competencies, such as digital training for production and sales staff, managerial skills, and green economy skills.

Moreover, task 1.2 focused on creating a comprehensive framework for assessing and monitoring the skill needs of railway employees. Various assessment methods were examined, including self-evaluation, company evaluation, interviews, tests, peer evaluations, and audits. Data from the 34 studies analyzed in Task 1.1 informed the development of effective assessment methodologies.

The analysis and survey revealed several interesting findings crucial for understanding the future skill needs of the railway sector. The sector faces significant

challenges, including a shortage of qualified staff, compounded by upcoming retirements and evolving qualification requirements. Increasing system complexity demands higher skill levels, while working conditions and wages remain unchanged. Strategies to address these challenges include targeted training, recruitment of talented employees, and improving job perception to reduce the skills shortage.

The integration of digital technologies such as IoT, AI, big data, 5G, BIM, and autonomous vehicles is transforming the railway sector. These technologies enhance system monitoring, safety, and capacity. For example, the use of big data analytics improves operations and customer experience, while IoT and AI enable real-time monitoring and predictive maintenance. The potential for automated shunting, brake control, and wagon control, as well as the need for an automatic coupler specific to rail freight transport, were highlighted.

Environmental considerations are becoming increasingly important, with emission reduction and climate neutrality being key goals. The rail sector must develop sustainable infrastructure, reduce noise

and vibration, and integrate into comprehensive mobility systems to meet changing end-user needs. The harmonization and standardization of railway standards and regulations within Europe are essential for creating an interoperable trans-European rail system.

The survey results indicated a high importance placed on sustainability, new work models, urbanization, and talent shortages. There was a strong emphasis on the need for digital skills, leadership, communication, and adaptability. The survey also identified a lack of training in future competencies, including digital training for production and sales staff, managerial skills, and green

WP 1 successfully laid the groundwork for understanding the future skill needs of the railway sector. By identifying key trends and developing a robust assessment framework, WP 1 provided essential support for the development of targeted training and education programs. These efforts ensure that the railway workforce is well-equipped to meet future challenges, contributing to the sector's competitiveness and sustainability

FIG. 1 GREATEST NEED FOR SKILL ADAPTION
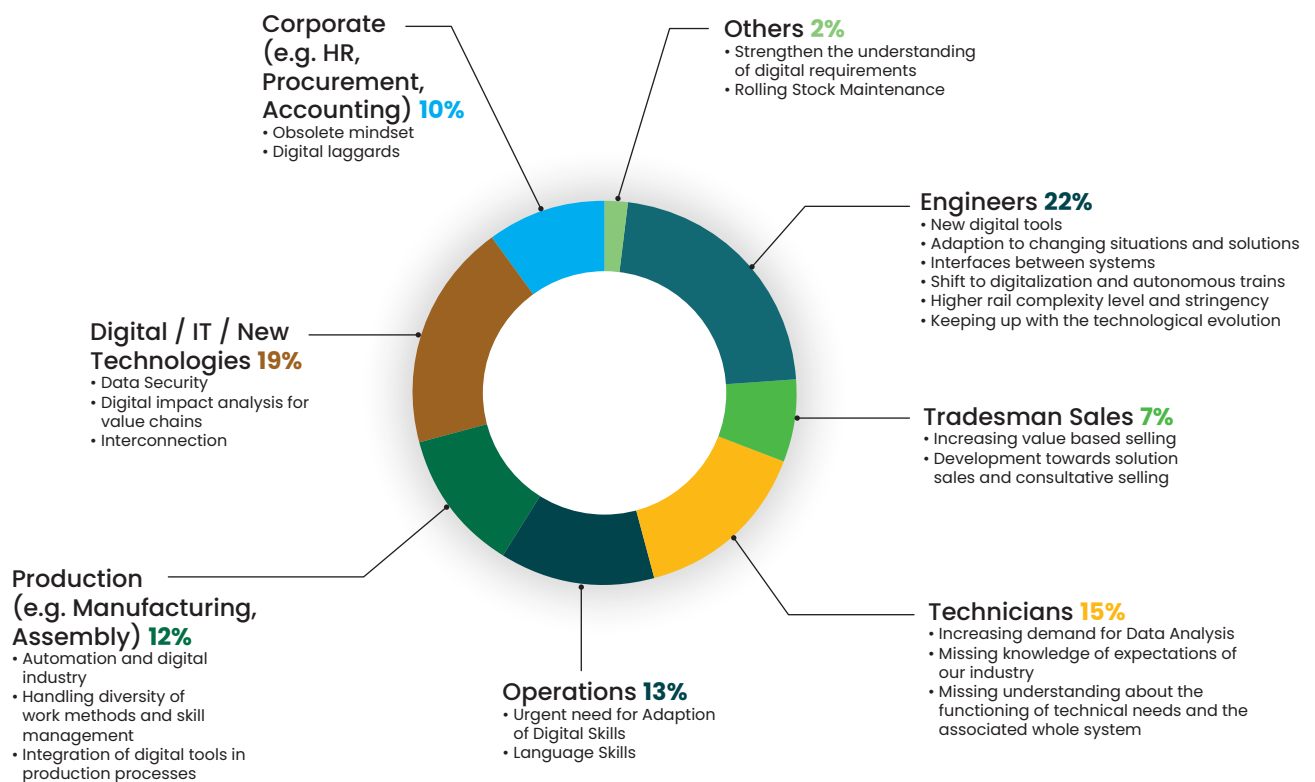
SURVEY RESULTS ON TECHNICAL AND SOCIAL CHANGES (SOCIETY, TECHNICAL CHANGES, ENVIRONMENT & POLITICS, ECONOMICS & MARKETS)[1]

The evaluation considers the following scale: 1 = extremely important 2 = very important 3 = quite important 4 = somewhat important 5 = unimportant

FIG. 2

N= 33

(C1) Social Changes

FIG. 3

N= 33

(C2) Technical Changes

FIG. 4

N= 33

(C2) Technical Changes
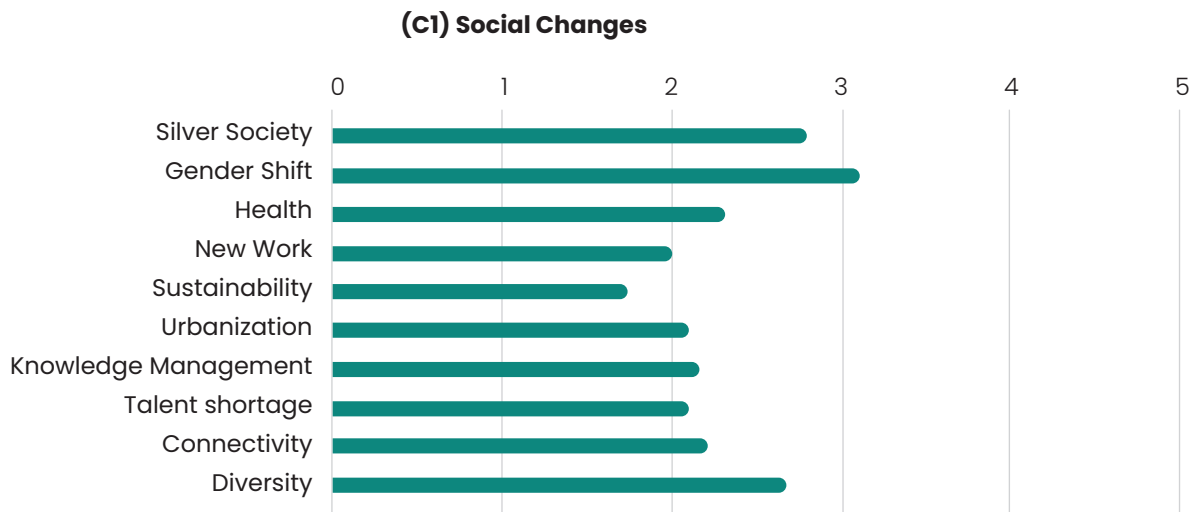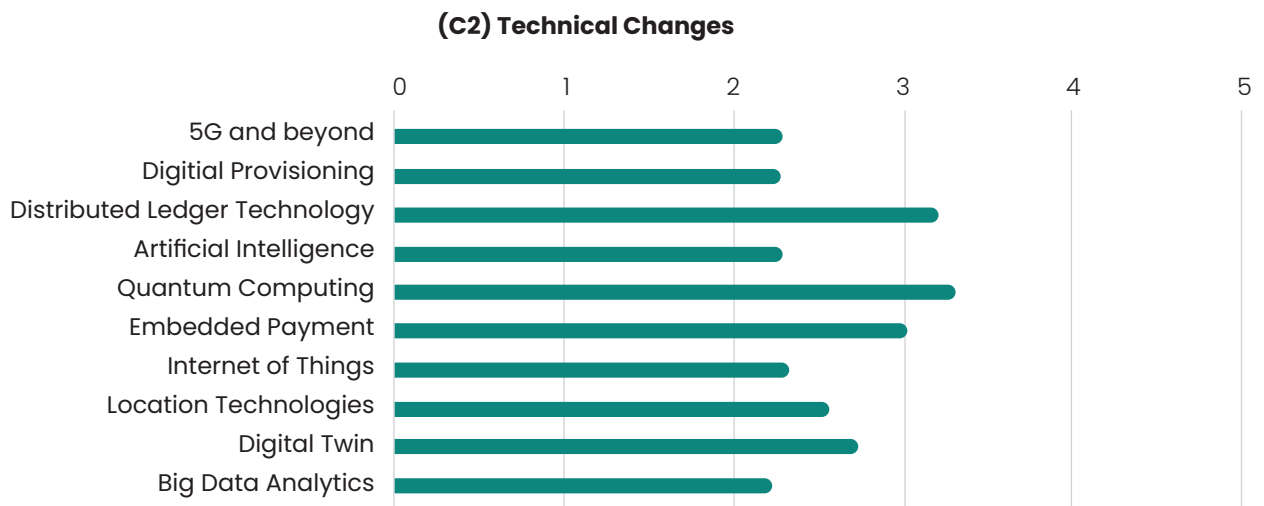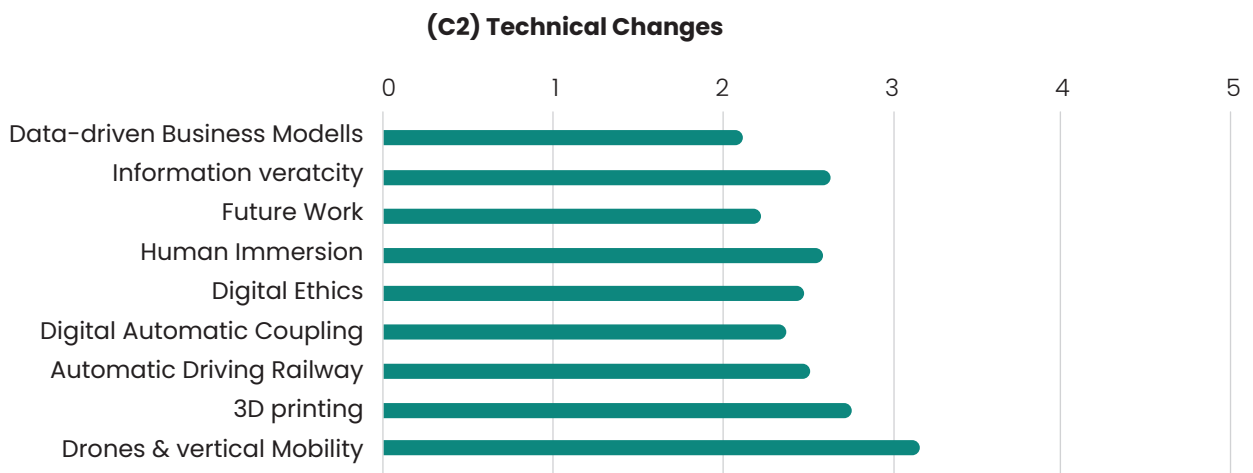
1 Source: WP1 deliverable Identification of current and future skills and competence needs.

FIG. 5

(C3) Environment and Politics

N= 33

Category	Value (0-5)
Politics	
Neo-ecology (e.g. general societal and economic shift towards resource efficiency and sustainability)	
Climatic-political regulation	
Security	
European Rail Area	
Smart and sustainable mobility strategy	

FIG. 6

(C4) Economy and Markets

N= 33

Category	Value (0-5)
Platforms of digital eco-systems	
Renewable Energy	
New Mobility	
Sustainable Management	
Globalization	
Transnational rail freight corridors	
Transnational rail passenger corridors	

Co-leaders names:
- Sabine S.Schneider
- Richard Kayser

Deliverables:
- Deliverables 1.1 and 1.2 Identification of current and future skills and competence needs[1]
- WP 1 Glossary[2]

SIEMENS   TECHNISCHE UNIVERSITÄT DRESDEN

1   https://www.railstaffer.eu/wp-content/uploads/2022/09/D1.1-and-D1.2_V2.0_PUBLICATION-VERSION-2.pdf
2   https://www.railstaffer.eu/wp-content/uploads/2022/09/WP1-Glossary_rev.pdf

Work Package 2
Assessing operational needs

ABOUT

Alongside the groundwork of WP 1, which covered the whole rail sector, WP 2 focused on main trends and challenges as well as their impact on qualification and skills requirements and changes in railway specific occupational profiles from the perspective of railway operators and infrastructure managers.

WP 2 notably looked at the definition of the future vision of rail considering the trends identified and their specific impact on railway operators and infrastructure managers. Besides taking a general view on railway occupational profiles, the WP paid specific attention to railway personnel involved in cross-border railway activities, including issues related to communication and language in operation and infrastructure management.
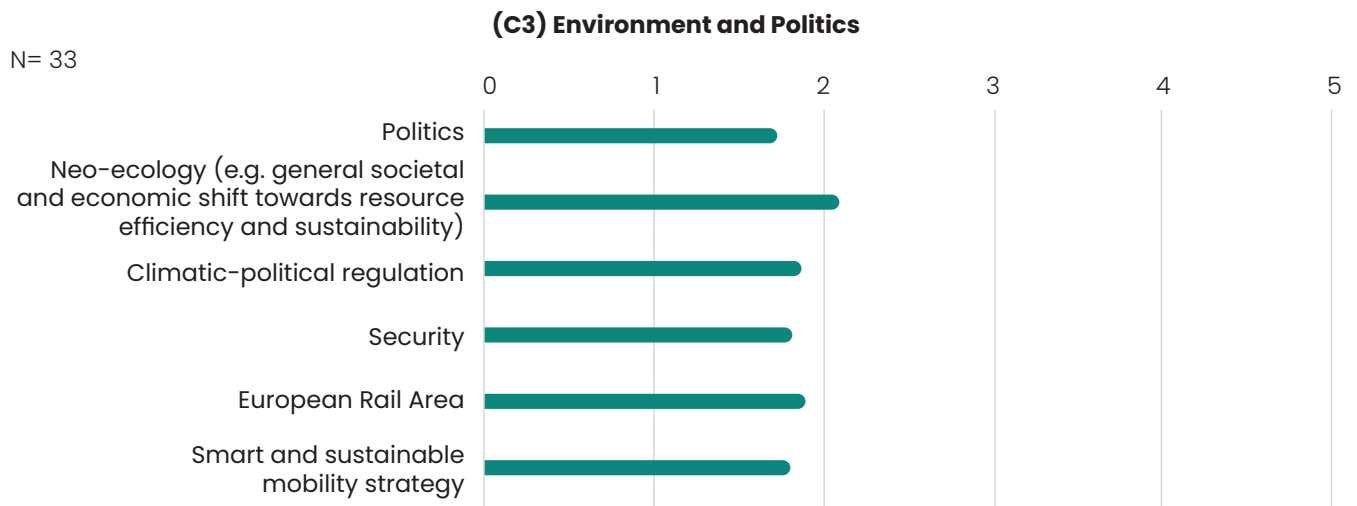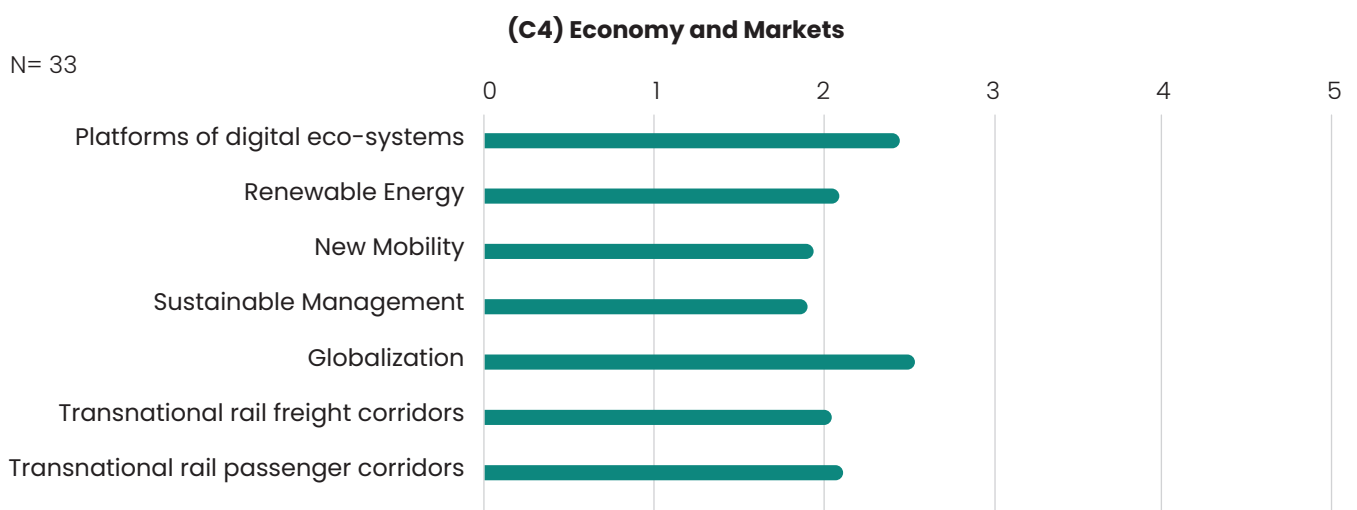
IDENTIFICATION OF CURRENT AND FUTURE SKILLS AND COMPETENCE NEEDS FROM THE OPERATIONAL POINT OF VIEW

By focusing on current and future skills, competence and qualification requirements of the railway operators and infrastructure managers (in parallel, STAFFER Work Package 3 focused on the rail supply industry) this work package addressed a topic, where clearly a knowledge gap existed. Skills and qualification needs were analysed as deriving from technological, social, economic and policy trends impacting on railways. Furthermore, specific needs and issues related to cross-border railway services, including communication and language has also been addressed.

Based on a mixed methodological approach that included focus groups of experts from railway undertakings as well as the academia and professional institutions as well as a large online survey (June 2021) that gained more than 80 responses from 19 Europe countries the work package provided an important basis of data and information for subsequent STAFFER work packages and tasks and the development of concrete activities and pilots.

The analysis of 30 occupational profiles (see Technical Annex WP 2 - Table X3) that are specific to railway operation and infrastructure management show that in terms of EQF levels, railways is dominated by medium level qualification profiles with dominance of EQF levels 3 and 4 to 5 and 6.

A further feature of occupational profiles in railways is the distinctive feature fact that company-related further training and the provision of special knowledge and skills across different occupational groups is important but particularly in operation.

Results of the STAFFER online survey conducted in WP2 focussing on railway operation and infrastructure management show that there is a general trend from medium to more advanced skill levels across all occupational profiles. While tasks that require only low qualification is decreasing, medium and higher qualified profiles face an upward skill shift in germs of fundament, technical as well as transversal skills. The main drivers the upskilling need are new technologies, digitalisation and automation.

FIG.7: STAFFER WP2 SURVEY: EXPECTED SKILLS SHIFTS CONSIDERATING TECHNOLOGICAL TRENDS AND INNOVATIONS IN 30 RAILWAY SPECIFIC OCCUPATIONS

Occupation	Major needs in new skills	Some existing skills reworked	Minor needs in new skills	Skillset remains same	(last)
Operations [Train driver]	32%	16%	25%	2%	25%
Operations [Rail operations manager]	32%	9%	34%	0%	25%
Maintenance [Rail maintenance technician]	32%	14%	27%	0%	27%
[Rail Project Engineer]	30%	9%	30%	0%	32%
Maintenance [Rolling stock engineering drafter/designer]	30%	9%	20%	0%	41%
[Rail traffic controller / Train dispatcher]	29%	7%	27%	2%	36%
Operations [Train driver instructor]	27%	18%	20%	4%	31%
Maintenance [Rolling stock electrician]	27%	14%	25%	0%	34%
Maintenance [Rolling stock engineering technician]	27%	14%	30%	0%	30%
[Rail logistics coordinator]	23%	9%	23%	2%	43%
Operations [Railway brake, signal and switch operators]	21%	19%	19%	2%	38%
[Railway electronic technician]	21%	12%	21%	5%	42%
Maintenance [Rolling stock inspector]	20%	14%	30%	0%	36%
[Transport (infrastructure) engineer]	20%	18%	27%	0%	34%
Operations [Chief conductor / Train crew supervisor]	18%	13%	29%	9%	31%
[Rolling stock engineer]	18%	11%	23%	2%	45%
Customer Service [Ticket sales agent]	17%	19%	24%	2%	38%
Operations [Train attendant]	16%	14%	25%	7%	39%
[Railway infrastructure inspector]	16%	9%	36%	5%	34%
Operations [Train conductor]	13%	16%	38%	4%	29%
Operations [Train preparer]	12%	12%	28%	12%	37%
Customer Service [Railway passenger service agent]	12%	31%	14%	2%	40%
[Rail construction supervisor]	11%	11%	34%	5%	39%
[Railway station manager / director]	9%	19%	23%	5%	44%
Customer Service [Railway sales agent]	9%	19%	30%	2%	40%
Customer Service [Passenger fare controller]	8%	18%	20%	0%	50%
Operations [Train cleaner]	7%	12%	17%	24%	40%
Operations [Shunter]	7%	19%	21%	14%	40%
Operations [Platform dispatch assistant / platform...]	7%	21%	21%	14%	36%
[Rail layer]	7%	12%	12%	19%	51%

Legend:
- Major needs in new skills that should be added to the profile
- Some existing skills need to be reworked or extended
- Minor needs in new skills that should be added to the profile
- Skillset will remain the same

Source: Deliverable D.2.2

An important result of the survey has been that the railway operation and infrastructure system of the future will become more complex and demanding from the perspective of individual workers and employees across all occupational profiles. This means that skill requirements both in the field of fundamental, technological, and soft skills will increase and there will be the need of upskilling and continuous refreshment of the skill base in most occupations, but in those occupations in particular that already today require a higher qualification (EQF level 4 or higher) such as rolling stock engineering design, rail infrastructure project management or maintenance technicians and engineering.

The more in-depth analysis of three occupational profiles (train driver, staff in control centres, technical and engineering staff in infrastructure and maintenance) has shown that in all three profiles, ICT and technological skills will become more important in the future. However, survey respondents and experts have also highlighted the need to improve transversal skills such as problem solving, handling emergencies, team-working and communication skills.

Taking for example the occupational profile of train drivers, according to survey participants, ICT skills as well as technological skills and competences are expected to become more important in the future. Such skills are needed to master new technologies and tools such as mobile devices and other technological equipment both on-board as well as mobile tools. Survey participants also highlighted that ICT requirements are becoming more complex and require more system thinking of train drivers.

However, besides technology related skills, around one quarter of the STAFFER WP2 survey participants also highlighted foreign language skill needs as becoming more important in the future for the job of the train driver. This indicates the fact that large parts of rail freight transport in Europe already today and even more in the future are cross-border. Furthermore, survey participants seem to also anticipate a future increase in transnational passenger transport in Europe.

Closely related to this, a quarter of the participants also highlighted the need of skills, knowledge and competences related to interoperability, i.e., the knowledge about European and national systems of traffic security and control, the understanding of regulation in neighbouring countries, survey participants also highlighted the need that train drivers need to obtain more cross-functional knowledge within railway operation, infrastructure processes and networks.

For other profiles also the research confirmed that railway related occupational profiles are becoming more diversified in terms of professional tasks and skill sets. This is illustrated for example by new occupational profiles that have been developed by companies (most of them in the field of IT and engineering at higher EQF level).

As a general result of WP2, three major areas of needs from the perspective of railway operators and infrastructure emerged that need to be addressed by targeted measures and activities of European cooperation:

- Increasing the efficiency and securing a sufficient workforce for cross-border railway operation and infrastructure by measures related to staff mobility, exchange, stronger cooperation in training, occupational and task profiles (including ESCO profiles)
- Improving the functioning of cross-border freight transport in relation to communication, language, knowledges and competences
- Securing the employability in key railway-related occupations and future-proof them by skills development, developing European thinking and mindsets

Work package 2 feed into the work of the other work packages, in particular those that developed concrete measures and pilot activities (see WP 4 and WP6) as well as provided input for long-term skills strategy for the rail sector (see WP 7).

Co-leaders names:
- Matthias Rohrmann
- Eckhard Voss

Deliverables:
- Deliverable 2.1 Future vision of the rail sector from the point of view of operators and infrastructure managers[1]
- Deliverable 2.2 Identification of skill needs and occupational profiles from the rail operators and infrastructure managers point of view[2]

wmp consult   **DB**

1 https://www.railstaffer.eu/wp-content/uploads/2022/09/STAFFER-D-2.1-Report-consolidated-2022-05-30.pdf
2 https://www.railstaffer.eu/wp-content/uploads/2022/09/STAFFER-D-2.2-Report-consolidated-2022-05-30.pdf

Work Package 3
## Pinpointing supplier needs

ABOUT

What are the current and future skills and competence needs from the suppliers´ point of view? That is the question Work Package 3 tackled.

Based on the groundwork of WP 1 – and alongside the work of WP 2 – the goal was to define a future vision of the rail sector from the perspective of suppliers. The analysis of the needs of the rail supplier took into account the current trends of the rail sector and their specific impact on rail industry suppliers.

WP 3 aimed to provide an overview of specific macro-trends impacting rail industry suppliers, identifying the necessary skill shifts, and analyzing current and future needs for skills and competencies. This package focused on assessing workforce capabilities and developing strategies to address skill gaps, ensuring the rail supply industry remains competitive in both local and international markets. The methodology developed in WP 1 was applied to identify the needs of rail suppliers, complemented by expert interviews and a data scrolling approach[1] for deeper insights.

The findings indicated a significant demand for skills across the rail industry, particularly in digitalization. Companies used the 70-20-10 learning model, which combines 70% on-the-job learning, 20% learning through relationships, and 10% formal training. This model ensures a broad base of up-skilling and deepens learning through role modeling and peer-to-peer approaches. Future strategies should incorporate diverse elements to address skill gaps and maintain high employability and adaptability.

The consultation process and survey reports identified several challenges to workforce capability. The rail supply industry lags behind other industries in adapting training approaches and leveraging new technologies. Lack of standardization is a significant barrier, compounded by the substitution of electronic components for mechanical ones and the reduction in asset lifespan. These factors hinder the sector's ability to match skill supply with future demand.
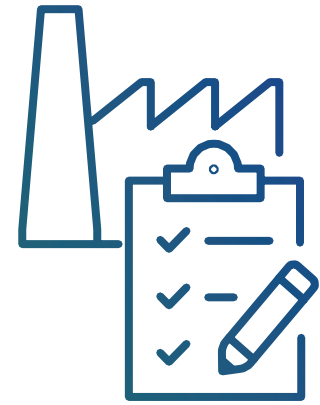
In-depth discussions and surveys highlighted several skills that will see stronger demand over the next decades, including:

- Systems engineering
- Cloud-based signaling
- Cybersecurity
- Remote condition monitoring
- Virtual reality simulators and trainers
- Customer service skills for autonomous services
- Big data analysis

The industry also anticipates a need for generic skills as rail transforms into a technology-driven sector with stronger links to transport networks, education providers, manufacturing, and government. Key skills in this area include problem-solving, communication, and collaboration.

Moreover, technological innovation is a key driving force for new skills in the rail supply industry. Innovations in automation, digitalization, and big data are changing the types of skills required. New technologies will influence railway maintenance and labor activities, promoting preventive and predictive measures over reactive ones. This shift will drive the digitalization of the sector and necessitate new learning techniques.

Technological systems will drive a strong demand for systems engineers, as well as changes in communication systems. Advances in signaling networks will require new capabilities for operation and maintenance. The sector is moving towards digital communication technologies, leading to a growth in demand for electrical and signaling engineers and maintenance personnel.

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1 Data scrolling approach is a method used in digital storytelling where text and graphics are presented in a way that unfolds as the user scrolls down the page

Nevertheless, non-technical skills are equally important. Flexibility, adaptation to change, and a commitment to continuous learning are critical. Leaders will need effective change management strategies to navigate uncertainties and risks. Communication skills are vital for knowledge transfer within rail organizations, and a collaborative mindset is essential for partnering with external parties.

WP 3 highlighted a broad demand for skills and learning needs, with an urgency that matches the pace of change and business needs. The rail industry must embrace diverse learning strategies, not just training, to address skill gaps and ensure workforce adaptability. Future skills discussions require diverse perspectives on market trends, products, and technologies. Critical incidents techniques help understand context and derive skill needs.

Top future skills identified include:

- Soft Skills: Collaboration and problem-solving.
- Hard Skills: Holistic understanding, system thinking, bridging traditional and digital approaches, and life-cycle management.

Suppliers expect the STAFFER project to provide better-prepared and skilled employees, bridging the skill gap by connecting traditional rail professions with modern digital approaches. The project should also raise awareness of the rail industry's importance and promote its image as a modern, dynamic sector. The collaboration among industry players, educational institutions, and trade unions is essential to meet future demands and challenges.
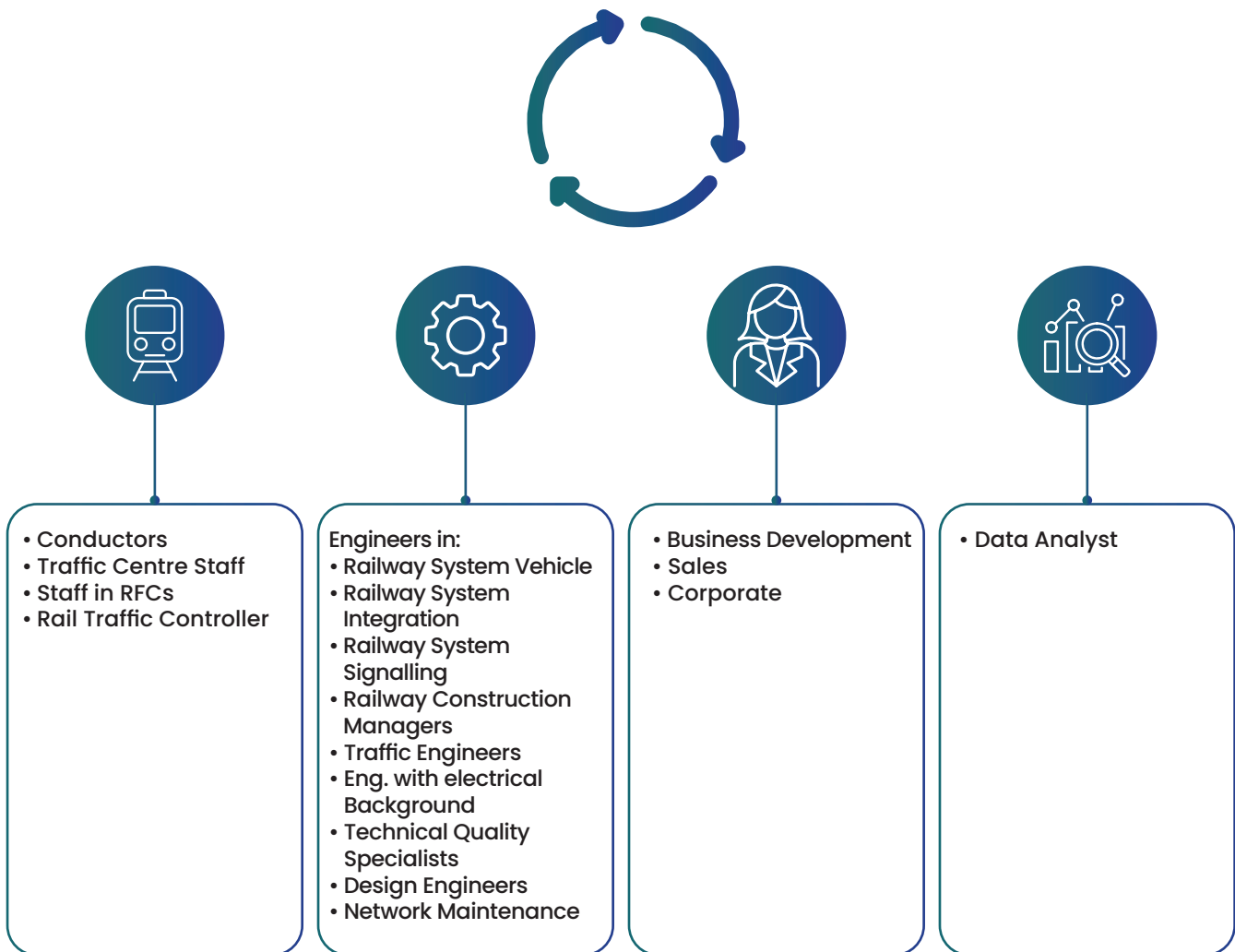
By addressing these needs, WP 3 ensures that the rail supply industry remains competitive and capable of meeting the evolving demands of the market. The findings and recommendations from WP 3 provide a roadmap for developing a skilled, adaptable, and resilient workforce ready to tackle future challenges in the rail industry.

FIG. 8 EXPERT INTERVIEWS: OVERALL RESULTS
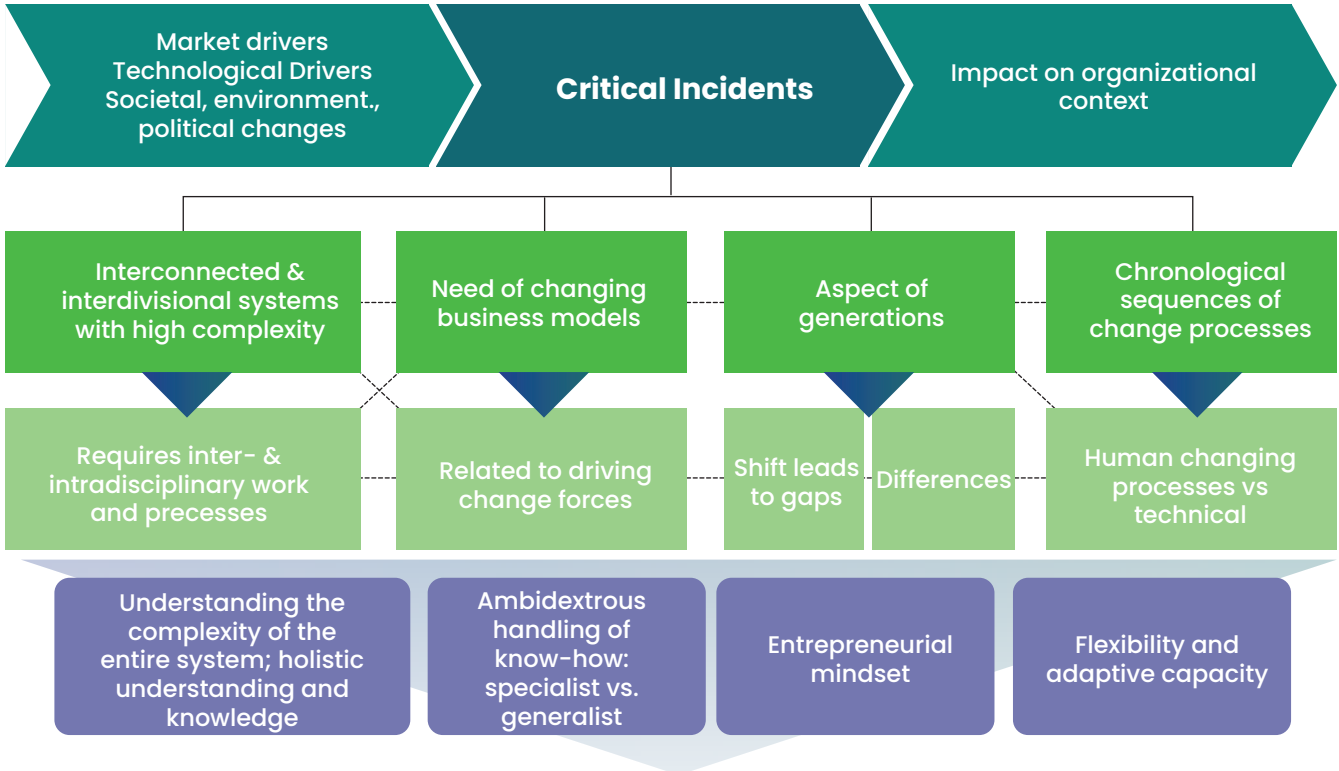
Source: Deliverable 3.2 Identification of skill needs and occupational profiles from the point of view of suppliers.

FIG.9 RAIL OCCUPATIONAL PROFILES

• Conductors • Traffic Centre Staff • Staff in RFCs • Rail Traffic Controller	Engineers in: • Railway System Vehicle • Railway System Integration • Railway System Signalling • Railway Construction Managers • Traffic Engineers • Eng. with electrical Background • Technical Quality Specialists • Design Engineers • Network Maintenance	• Business Development • Sales • Corporate	• Data Analyst

Source: Deliverable 3.1 Future vision of the rail sector from the point of view of the rail supply industry

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Co-leaders names:
- Garazi Carranza
- Sabine S.Schneider

Deliverables:
- Deliverable 3.1 Future vision of the rail sector from the point of view of the rail supply industry[1]
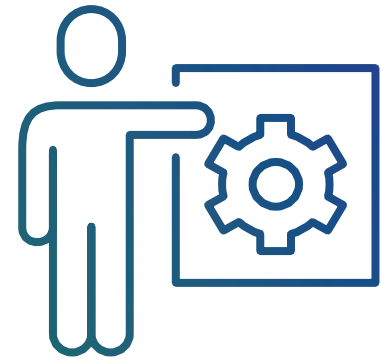- Deliverable 3.2 Identification of skill needs and occupational profiles from the point of view of suppliers[2]

MAFEX SIEMENS

Work Package 4
Promoting mobility and exchange and developing training

ABOUT

Following on the work carried out in Work Packages (WPs) 1, 2 and 3, this group set its sights on creating ambitious training programmes for students and rail professionals hoping to make their mark on Europe's mobility paradigm. Together, they mapped the main education providers' – both Vocation, Education and Training (VET) and higher education – existing programmes and courses across the EU that provide final certifications and/or diplomas in rail.

WP 4 also identified and evaluating common Qualification Standards (QS), assessing existing programmes based on the abovementioned WPs' analysis of needed skills and designing new or complimentary curricula to give students and professionals the skills they need to push rail to the next level.

This group created the courses that will allow rail to thrive in the years to come. Their work focused on providing pathways that will provide students the capacities needed to manufacture cutting-edge rail products, operate and maintain them and be equipped to utilise the ICT skills required for the digitalisation of our sector – ranging from the Internet of Things to (big) data analytics and cybersecurity.

MAIN GOALS

Mobility and training programmes development was undertaken within WP4 by exploiting the outcomes of WP1, WP2 and WP3 in terms of future visions of the rail sector and its skills needs.

The WP was aimed at:

1. mapping the main education providers (VET and higher education) and the existing education programmes and courses which provide certifications in European educational institutions;

2. identifying common Qualification Standards (QS) and the relevant measurement procedures to evaluate the existing and designed training programmes;

3. evaluating the existing VET and higher education programmes with respect of the skill needs identified in WP 2 and WP 3, but also with the aim of setting up a basis for QS harmonization, cooperation, exchange of experiences, and learning from each other;

4. designing/complementing existing and new training curricula for the skills required for manufacturing of rail products, operating and maintaining rail products, and more general ICT skills for digitalization in rail transport (such as internet of things, (big) data analytics and cybersecurity).

ACTIVITIES

Task 4.1 mapped all the existing VET and higher-education institutions providing European recognized certifications and/or diplomas related to the rail sector with their associated EQF levels. It is a relevant benchmark of the existing programmes and constitutes the basis for the development/integration of new ones.

A public version of the database is published (https://www.railstaffer.eu/existing-rail-training-initiatives/).

Task 4.2 aimed at identifying common qualification standards and the relevant procedures to evaluate the existing training programmes and to adapt and develop mobility and training paths, programmes and courses. (relevant for the Task 4.5). Two tools were established: 1) a skill recollection form template to collect information on one specific skill in a standard way (EQF level, assessment modalities, short description, learning outcomes, etc.), and 2) a database sheet to gather inputs, and to allow tracing the existing, emerging (new) and changing (already existing but evolving) occupational profiles and skills.

Task 4.3 performed a benchmarking of the existing railway sector VET paths, curricula and courses identified in Task 4.1, highlighting new and emerging innovative teaching and training approaches and best practices such as e-learning/e-training, blended/collaborative learning, gamified learning, etc.

Task 4.4 analyzed the results from the final reports of Task 1, 2 and 3. A total of 105 possible fields of action were selected. The selection was based on the criteria of high discussion objective of the respondents, relevance for STAFFER and the conformity with the target audiences in STAFFER. In the end, 69 topics remained that were rated as important.

The task also collected proposals for appropriate measures. In this step, the partners were asked to contribute ideas and proposals for concrete measures to the 69 topic areas identified. A total of 176 measures were compiled in a comprehensive table.

At the same time, the results from Task 4.1 were evaluated and suitable content was included in the collection of topics for Task 4.4. In total, 9 training formats were integrated into the results of Task 4.4. The results are divided into training programmes for company staff, academic offers, mobility programmes and conference/workshop formats. After a quality check combining duplicates and disabling non-usable contributions, 140 proposals remained, representing a first output of 4.4. This collection was handed over to the downstream WP.

Task 4.5 was responsible for the development of the training curricula. To do this, a matching between skills and EQF levels was performed: the skills identified by the previous WPs were analyzed and divided according to the different EQF levels (Fig. 10).

In parallel, the analysis of the requirements was conducted and specific procedures and constraints for introducing new training and mobility programmes or complement existing ones were identified for the involved Countries.

Finally, six training curricula to be developed for low and high EQF levels were selected, according to the occupational profiles priority and criticality defined by WP2 and WP3:

- Train drivers
- Rail traffic/operations technicians
- Railway systems technicians
- Railway systems engineers
- Rail traffic/operations engineers
- Rail transport engineers

FIG.10: SKILL AND KNOWLEDGE: EQF DEFINITIONS INTERSECTIONS
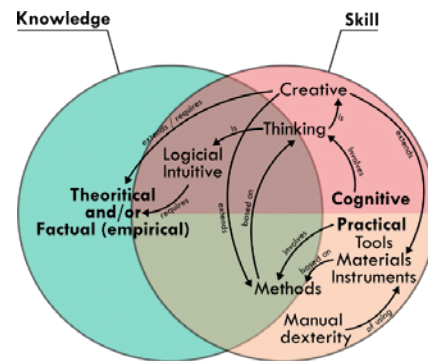
RESULTS

WP4 defined the programme contents for the selected occupational profiles that are compliant with the European standards (such as the European Quality Assurance in Vocational Education and Training (EQAVET) and the European Credit System for Vocational Education and Training (ECVET)) and take into account the regulations of different European Countries to promote mobility.

The programmes include soft skills, STEM (Science, Technology, Engineering, and Math) skills, job specific skills, with a focus on new and possible (joint) training contents and mobility plans.

FIG.11: SKILL AND EQF LEVELS MATCHING: FORMAL METHODS EXAMPLE

	Bachelor programmes		**Master programmes**		**PhD** / **Professional career**
Mathematics Introdcutions to algorithms Python programming Living languages	Algorithmic and programs 1 Logical and digital systems Mathematical found. & tools .. Formal languages Transversal skills: - languages - tools & digital culture - prof. & pers. projects	Algorithmic and programs 2/3 Descrete maths & logics Computer architectures Program compilation Program complexity Program optimization Advanced object-oriented apps. Data analysis Transversal skills: - languages - prof. & pers. projects ...	Component-based sw. design approches Concurrent, real-time and parallel apps. Distributed apps. & cyber-physical systems Non-classical logics Logic and computation models Programming language semantics Computer (embedded) systems modeling CD Certification of safety-critical software Formal design (abstraction & refinement) Verification decision procedures & tools: - proofs, auto-deduction, - model-checking, testing ...	Specific research subject ... **EQF 8** **EQF7** Accelerated programmes as needed (norms & standards like ERTMS, CBTC, EN501 28, risk assessment, hazard analysis, requirement engineering, startegic planning...).	
EQFs 3/4	**EQF 5**	**EQF 6**	**EQF7**		
SECONDARY LEVEL	**TERTIARY LEVEL**				

Co-leaders names:
- Alice Consilvio
- Valérie Poupardin

Deliverables:
- Deliverable 4.1 Map of the existing educational providers and programmes[1]
- Deliverable 4.2 Identification of Qualifications Standards[2]
- Deliverable 4.3 Benchmarking of the existing programmes and catalogue of the best practices[3]
- Deliverable 4.4 Development of new training contents and modules reflecting new needs in the field of cross-border railways, communication and language[4]
- Deliverable 4.5 Development of Mobility and Training Programmes[5]

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1   https://www.railstaffer.eu/existing-rail-training-initiatives/
2   https://www.railstaffer.eu/wp-content/uploads/2022/09/WP4.2-final-report-V2.0__quality-check.pdf
3   https://www.railstaffer.eu/wp-content/uploads/2022/09/D.4.3-Benchmarking-of-the-existing-programmes_v7.pdf
4   https://www.railstaffer.eu/wp-content/uploads/2024/09/D4.4_Final-Report.pdf
5   www.railstaffer.eu/wp-content/uploads/2024/09/D4.5_public.pdf

Work Package 5
Increasing employability

ABOUT

The main objectives of WP5 were the development of a theoretical and methodological frame for the analysis of employability in the rail sector, including the individual perspectives of infrastructure managers and rail operators as well as suppliers within the sector, to validate and continuously evaluate training and mobility programmes in regards of employability and career opportunities. This includes an integrated overview on employability within the rail sector, the validation of pilot implementations and the provision of an evaluation tool for educational programmes (to continuously analyse these programmes).

To achieve these goals and objectives WP5 was structured in four tasks:

- T5.1 to identify criteria and measurable indictors to evaluate employability
- T5.2 and T5.3 to assess employability from the point of view of infrastructure managers and rail operators (5.2) and suppliers (5.3) and test the developed instruments in form of trail assessments
- T5.4 to give an integrated overview on employability, with focus on the STAFFER implementations, and to provide a tool for the continuous evaluation

In Task 5.1 the working group of the University of Belgrade (UB) developed a theoretical and conceptual framework for employability within the scope/ boundaries of the project. Suggested indicators were taken through desk research, from EQAVET, E&T2020, ESS, CEDEFOP and Skills mismatch main documents. Offered indicators were previously filtered due to overlapping of indicators from different sources (especially for EQAVET and CEDEFOP indicators). In a conceptualization phase UB outlined the employability concept, including a definition of employability and the identification of dimensions and criteria:

"Employability refers to the combination of factors which enable individuals to progress towards or gain employment, to stay in employment and to progress during their career." (CEDEFOP)

Within this definition three dimensions of employability were identified: to get a job, stay in job and build a career.
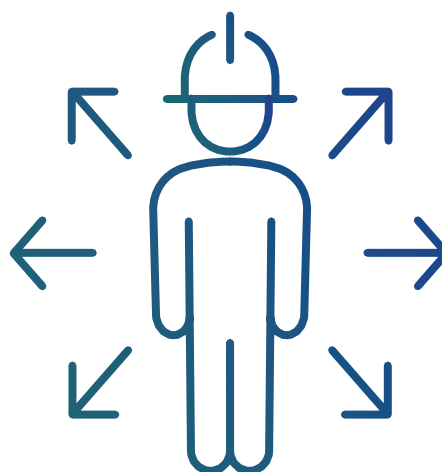
In an operationalization phase UB compiled, based on the conceptual frame and research on existing employability metrics, an initial list of metrics (indicators) for the measurement of employability. Through two phases of survey with the whole STAFFER consortium the working group – a first phase for addition of indicators and a second for the evaluation and selection of indicators via RACER method – consolidated a set of metrics:

- **employability indicators:** 13 mostly quantitative (results) indicators to measure the quality of an educational programme regarding the effects on the participant (satisfaction, improvement), the quality of the provider (success rates, employed graduates) and the frame conditions (labour market and sector)
- **employability audit:** a set of items in 5 dimensions, with a focus on success factors to make enablers visible and to be used primarily as a development tool,
- **employability mapping tool:** a set of employability attributes to map curricula and check if and where relevant competences and skills are developed within the programme.

In a next stage of WP5 these metrics were fine-tuned by the relevant stakeholder groups of infrastructure managers and rail operators in Task 5.2, led by DB, and suppliers in Task 5.3, coordinated by Alstom. Both task leaders decided on a joint methodology for their subtasks and on the audit tool as the preferred instrument to further develop and refine, they also decided to integrate the mapping attributes into the audit. Within these parallel tasks the working groups, consisting of STAFFER partners from the respective stakeholder groups, specified the audit tool (selection and addition of items) from their individual perspectives via discussions and another RACER evaluation. The specified audit tool now contains 71 items from the perspective of rail operators (including 24 employability attributes) and 67 from the perspective of suppliers (including 27 employability attributes). The audit tool was pre-tested on educational programmes for selected target groups. Within this phase of WP5 the understanding and thereby the conceptual frame once again was specified with the differentiation between the different perspectives of employability enablers

and results regarding educational programmes: the perspectives of E&T-Providers, participants/employees and employers (equivalent to the stakeholder groups).

In Task 5.4, led by UASFHE, the preliminary work was consolidated and further developed into different instruments in order to provide an integrated overview on employability and career opportunities with a focus on the pilot implementations of WP6 and to design a tool for the continuous evaluation of training and mobility programmes. This means Task 5.4 will provide 1) an analysis of the status quo of existing rail-related programmes on employability as well as an analysis of curricula from the STAFFER consortium based on the mapping attributes, 2) an evaluation/validation of the pilot implementations regarding especially employability enablers, and 3) an evaluation scheme for the continuous evaluation, particularly to evaluate the results and the medium- and long-term effects of the programmes but also to have a comprehensive scheme for evaluating educational programmes in terms of increased employability and career opportunities.
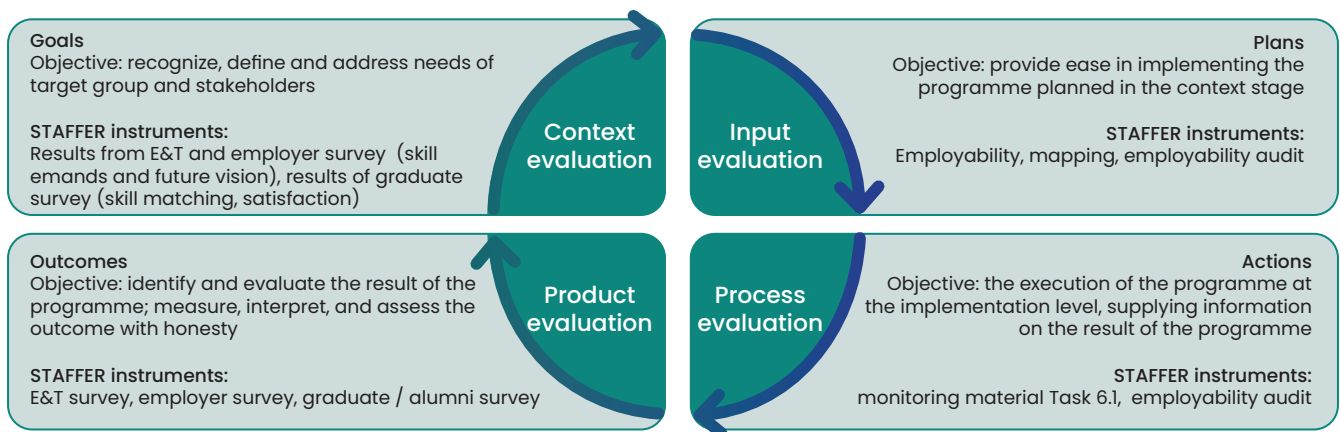
The analysis of the status quo (1) aims to give an overview on employability enablers and results within (existing) educational rail-related programmes and should serve as a baseline and comparison for later analysis as well as reference point of comparison for the new and updated programmes and curricula. It includes two employability surveys (for E&T-Providers and employers), which are based on the consolidated list of indicators, an analysis of existing (selected) curricula of E&T-providers within the consortium,

based on the mapping attributes. Therefore, the analysis also serves as a pre-test for the mentioned surveys and other instruments. In addition to the survey and the curriculum analysis, the results of the trial assessments of the audit from Tasks 5.2 and 5.3. will be incorporated into the conclusion. The validation of pilot implementations (2) concentrates on employability enablers, since the effects are hard to measure and interpret with such a short distance to the completion of the programme or course. For the validation of the pilots an adapted version of the employability audit will be used and adjusted according to the type of implementation. For the continuous evaluation of programmes and especially the project implementations (3) the developed employability metrics are integrated in a more holistic evaluation model: an adaptation of the CIPP model by Stufflebeam, containing four stages of evaluation – **Context, Input, Process and Product** – which covers the whole process of developing an educational programme.

Therefore, the main outputs and outcomes of WP5 are:

- **theoretical understanding and conceptual framework of employability including KPIs**
- **instruments to plan, monitor and evaluate rail related educational programmes in context of employability and career opportunities**
- **insights and information on employability within educational programmes in the rail sector from the perspectives of relevant stakeholders**
- **validation/evaluation of pilots and implementations.**

FIG.12: STAFFER EVALUATION MODEL FOR INCREASED EMPLOYABILITY

Goals
Objective: recognize, define and address needs of target group and stakeholders

STAFFER instruments:
Results from E&T and employer survey (skill emands and future vision), results of graduate survey (skill matching, satisfaction)

Context evaluation

Input evaluation

Plans
Objective: provide ease in implementing the programme planned in the context stage

STAFFER instruments:
Employability, mapping, employability audit

Outcomes
Objective: identify and evaluate the result of the programme; measure, interpret, and assess the outcome with honesty

STAFFER instruments:
E&T survey, employer survey, graduate / alumni survey

Product evaluation

Process evaluation

Actions
Objective: the execution of the programme at the implementation level, supplying information on the result of the programme

STAFFER instruments:
monitoring material Task 6.1, employability audit

Co-leaders names:
- Michael Lehmann
- Thomas Kämpfe
- Anastasia Lobanova

Deliverables:
- Deliverable 5.1 Criteria and measurable indicators to evaluate employability and career opportunities[1]
- Deliverable 5.2 Assessment of employability and career opportunities from the point of view of rail operators and infrastructure managers[2]
- Deliverable 5.3 Assessment of employability and career opportunities from the point of view of suppliers[3]

1   https://www.railstaffer.eu/wp-content/uploads/2022/09/D5.1-Criteria-and-measurable-indicators-to-evaluate-employability-and-career-opportunities-final.pdf
2   https://www.railstaffer.eu/wp-content/uploads/2024/09/D5.2_final-report-V1.0_final_quality-check.pdf
3   https://www.railstaffer.eu/wp-content/uploads/2024/09/D5.3_Final-report-v1.1_public.pdf

Work Package 6
Implementing training programmes
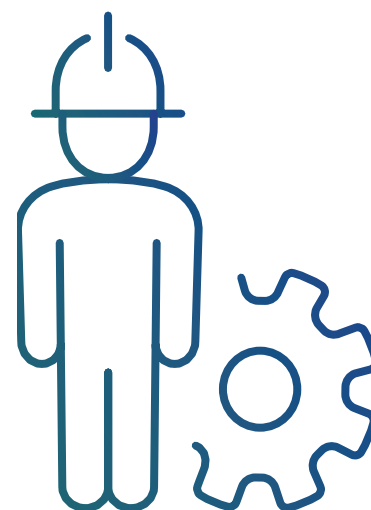
ABOUT

Let's get to work! Work Package (WP) 6 was where the rolling stock hit the track – this group was tasked with actually implementing the training programmes developed in WP 4.

Partners partaking in these activities established a methodology and a set of key performance indicators to best continuously monitor the implemented programmes and their achievements. From there, they created a framework, or scheme, to facilitate transnational mobility students, apprentices, trainees or other staff groups in the rail industry.

Lastly, the WP set up Vocational Education and Training (VET) at the lower and higher European Qualification Framework (EQF) levels as pilot cases to design new courses, or adapt existing ones, to introduce necessary knowledge and work-based activities needed to enhance skills in rail.

TASK 6.1: CONTINUOUS PROGRAMMES MONITORING METHODOLOGY

TThe task aims to establish measures and tools for ongoing monitoring and evaluation of implemented programmes in STAFFER. It seeks to detect implementation bottlenecks and assess both positive and negative impacts of activities. Aligned with EQAVET standards for quality management, it presents a results-based management approach to ensure all stakeholders contribute effectively to program outcomes.

The task offered guidelines and templates for evaluators to assess progress towards objectives, gauge program effectiveness, and identify areas for improvement or replication.

TASK 6.2: IMPLEMENTATION OF CROSS-EUROPEAN STUDENT MOBILITY PROGRAMMES AND WORK-BASED INTERNSHIPS

The task aims to develop a standardised process for rail sector students to identify, apply for, and be accepted at, institutions offering rail-related courses.

To this end, the project website was designed to provide information on the courses offered by all participating educational institutions, application information and a short common application form.

Moreover, regarding the short term, a Student Mobility pilot project in the form of a BIP (Blended Intensive Programme) on the "Rail technology and Mobility" will be implemented in 2024. It will be hosted by UASSP in St. Pölten (Austria) on winter semester 2024 (the physical part will be held from 25 to 29 November 2024) and will involve about 15 international teachers, maximum 25 international railway students from 6 countries (Estonia, Germany, Italy, Lithuania, Romania and Slovakia), also from STAFFER partner universities (UASFHE and UNIGE) and 38 home students.

Finally, regarding the long term, the proposal for a new Rail BIP was elaborated. It consists of a one-month programme in which the first week is online and the other three weeks are jointly organised by a University, a Railway Operator and an Industry in a different host country. Its objectives are to enable students to learn about the different railway realities throughout Europe, to encourage a European scale thinking about the development of railways and to promote the exchange of experiences in a multicultural and multidisciplinary environment.

TASK 6.3: IMPLEMENTATION OF CROSS-EUROPEAN APPRENTICE MOBILITY PROGRAMMES AND WORK-BASED INTERNSHIPS

Apprenticeships both for initial learners at company level as well "higher apprentices" at university level are regarded as a form of learning and training that perfectly combines theory and practice with high quality outcomes. Against the labour shortage in technical occupations, apprenticeships are also regarded as having a positive impact on recruitment and retention of learners for companies, in particular if they offer the possibility of spending periods of practical learning in a company abroad. Therefore, apprentices and Erasmus-type mobility offers are very much promoted by EU initiatives such as the European Alliance for Apprenticeships or the Erasmus+ Programme.

But the railway sector is lagging behind: there are some best practice examples of regular exchange activities (e.g. in Germany and France) but an evaluation of the Erasmus+ database carried out in task 6.3 has shown, that hardly any railway companies have been engaged in mobility projects for apprentices and initiative learners.
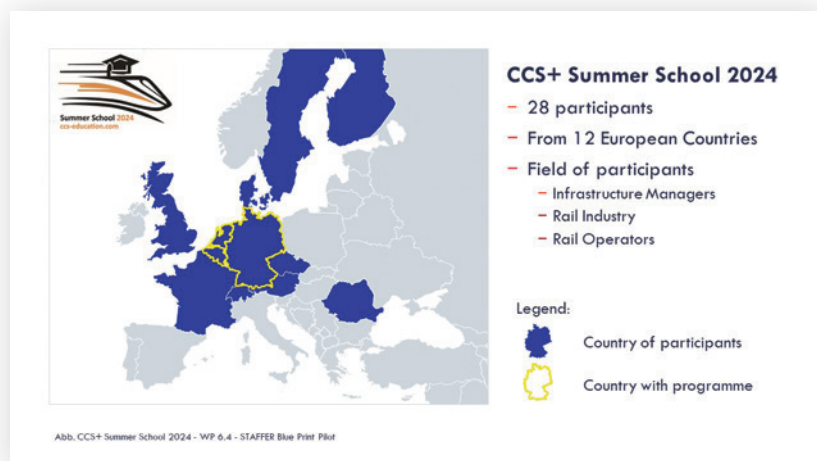
Therefore, the provision of information, guidance and support to railway undertakings to railway companies, including practical support for pilot activities and making applications for Erasmus+ co-financing has been one important strand of activities in this task. The vision is to establish and set in place a "Railway Erasmus Scheme".

TASK 6.4: IMPLEMENTATION OF CROSS-EUROPEAN STAFF MOBILITY PROGRAMMES AND WORK-BASED INTERNSHIPS

The specific challenges of task 6.4 with the objective of implementing a cross-European staff mobility program and work-based internships refer to the target group of "workers" in the railway industry.

Compared to students, trainees and interns, this target group has the fewest opportunities for mobility in a professional context, both in terms of external funding and internal availability. The decisive driver of the implementation of such programmes is therefore the motivation of the sending organization and managers as sponsors. We identified the "European Mindset" as basis for this: In the context of our pilot "CCS+ Summer School", the "European Mindset" shaped the common railway operator view of the ERTMS/ETCS system as major topic, which is currently being implemented throughout Europe. After a successful initial run in 2023, the rail infrastructure companies DB InfraGo AG and Pro Rail B.V. ongoing act as organizing companies for the STAFFER Blueprint Pilot project, as well as other railway undertakings sending participants to the CCS+ Summer School 2024. The aim is to get a common understanding of the future challenges and the need of cross boarder cooperation regarding a European rail system based on the ETCS technology.

The goal of future efforts must therefore be to establish a specific external financial support framework for this target group and to increase Europe wide acceptance as part of the EQF. Additionally, the establishment of a support framework in marketing, event management, networking and communication as STAFFER has provided in the pilot, would lower the hurdles of cross boarder mobility programs significantly.

CCS+ Summer School 2024
- 28 participants
- From 12 European Countries
- Field of participants
  - Infrastructure Managers
  - Rail Industry
  - Rail Operators

Legend:
- Country of participants
- Country with programme

Abb. CCS+ Summer School 2024 - WP 6.4 - STAFFER Blue Print Pilot

TASK 6.5: IMPLEMENTATION OF VET AT EQF LEVELS 3 TO 5

Four partners were directly involved in implementing low-level EQF programmes:

1- The railway dedicated training center "For.Fer Srl".

2- The higher technical institutes "HTL Mödling" and "HTL Rennweg".

3- The higher education and research institution, the "Conservatoire national des arts et métiers" (Cnam), a specialist in continuous and initial apprenticeship training programmes

For.Fer implemented four training programmes: train preparer, train attendant, train driver, and basics of railway techniques. The train driver training programme was selected as the pilot programme for Task 6.5.

HTL Mödling and HTL Rennweg are not specifically rail-focused technical institutes. However, efforts were made to implement rail-specific drive systems and a mandatory subject-specific internship (in collaboration with ÖBB) as pilot programmes. Additionally, HTL Rennweg has implemented rail-related IT training.

With the agreement of the Scientific Board of the "Equipe Pédagogique Nationale de l'Electronique, Energie Electrique, Automatique et Mesure" and the Training Council, the Cnam has submitted:

- A new EQF Level 4 Professional Specialisation Diploma (DSP) in Electric Battery Construction and Maintenance. This diploma has been approved and registered in the National Directory of Professional Certifications (RNCP) and is introduced in the context of the growing importance of electromobility.

- A new EQF level 5 Diploma of Scientific and Technical University Studies (DEUST) in "Electronics, Electrical Energy, and Control", with a specific path dedicated to the Maintenance of Energy Systems for Modern Transport. The programme was submitted on May 2024 to the National Directory of Professional Certifications.

The Cnam is developing two rail-specific courses, available in both French and English, which will be hosted online: an EQF Level 3 course titled "Applied Physics for Railway Systems" and an EQF Level 4 course titled "High-Speed Train Braking System: Fundamentals and Maintenance Applications."

TASK 6.6: IMPLEMENTATION OF VET AT EQF LEVELS 6 TO 8

Eleven partners were directly involved in implementing new courses or adapting existing ones at EQF levels from 6 to 8 (bachelor, master, PhD) based on the training programmes defined by WP4 for the following job profiles: "Railway systems engineer", "Rail traffic/operation engineer", "Rail transport engineer" and "Railway systems technician". A total of 24 programmes will be implemented, also beyond the STAFFER term (see figure in technical annex).

Of these, the 8 that the partners (CESI, CTU, ESTACA, SGH, UASSP, UNIGE and UNIROMA1) implemented in the academic year 2023/2024 were taken as pilot projects (see figure in technical annex).

A ninth pilot project was the summer school on "The European Railway System" held at Sapienza University of Rome from 10 to 19 July 2024 with the participation of teachers of different partners (CNAM, UASFHE, UNIGE and UIROMA1), the European Union Agency for Railway, FS, Alstom and Hitachi Rail for the organisation of educational visits, and 32 students from 9 universities and 7 European countries (Italy, France, Germany, Austria, Serbia, Croatia and Slovenia). The aim of this initiative, which is expected to become an annual event beyond the STAFFER term, is to provide university students from different backgrounds with a systemic view of European rail transport and instill in them a passion for this sector.

TASK 6.7: "IMPLEMENTING OF MOBILITY AND TRAINING PROGRAMS IN THE FIELD OF CROSS-BORDER RAILWAYS, COMMUNICATION AND LANGUAGE"

Following the results of previous work packages task 6.7 has carried out multifaceted activities in cross-border railway cooperation in transnational focus groups. The overall activities of the 5 sub-working groups - focused on cross-border cooperation, efficiency improvements, future skills and modern qualifications - are listed in the appendix and explained in the task 6.7 final report. All concrete measures and formats developed can be used as good practices for upcoming initiatives. The activities should be continued to provide a framework for sustainably growing cross-border exchange and cooperation. Here are some examples of jointly developed practices that may guide future activities as role models:

Digital learning formats (digitalisation, language, railway operation):

A simulation developed on the function of railway brakes was translated into 14 languages (lead DB Training / Czech technical University of Prague). A MOOC platform to raise awareness on the importance of BIM (Building Information Modelling) was developed (lead UdI/SNCF). Both formats are now available barrier-free, Europe-wide and at no costs.

A study of existing training concepts for ETCS for train drivers provides an overview of existing approaches and includes lessons learnt and suggestions for the design of training courses (Lead DB Training).

Two surveys on language and language training in cross-border traffic were carried out and a template for the translation of ETCS technical terms was developed. (Lead DB Training / ÖBB). Practice-oriented exchange on language training for train drivers between ÖBB and SNCB.

Cross-border exchange, network and collaboration formats:

The aim is to create a model for European cooperation in the areas of railway and language training, joint production and exchange of existing learning materials. A format for an ongoing DB/SNCF expert exchange on the topics of AI/BIM/Digital Learning Materials was initiated and implemented.

Diversity and an European mindset have been promoted in 4 key initiatives. In the context of gender diversity: the cross-Border Mentoring Program for female engineers with participants from suppliers, railway operators, infra-structure and respective academic institutes; and a first evaluation on job attractiveness for female train drivers.

For 'European Mindset' a first definition is provided, coming with related survey results. And a video sets a spotlight on train drivers promoting cross-border transportation.
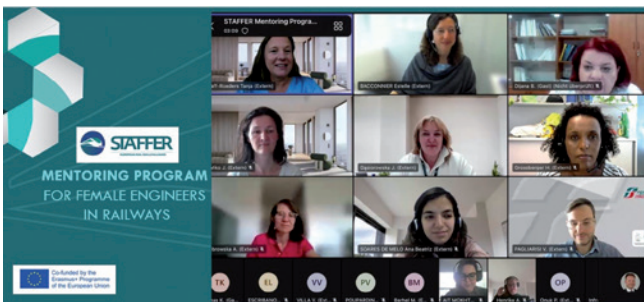
STAFFER Mentoring Program for Female Engineers in Railways meeting

Summer school organised in Rome.

Co-leaders names:
- Luca Rizzetto
- Khaled Itani
- Michel Terré

Deliverables:
- Deliverable 6.1 Continuous programmes monitoring methodology[1]
- Deliverable 6.2 STAFFER student mobility programme[2]
- Deliverable 6.3 STAFFER Apprentice Mobility programme[3]
- Deliverable 6.4 STAFFER Staff Mobility programme[4]
- Deliverable 6.5 Implementation of VET at EQF levels 3 to 5[5]
- Deliverable 6.6 Implementation of VET at EQF levels 6 to 8[6]
- Deliverable 6.7 Implementation of mobility and training programmes in the field of cross-border railways, communication and language [7]

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1 https://www.railstaffer.eu/wp-content/uploads/2024/09/D6.1_final-report_quality-check.pdf
2 https://www.railstaffer.eu/mediaroom/d6-2-staffer-student-mobility-programme/
3 https://www.railstaffer.eu/mediaroom/d6-3-staffer-apprentice-mobility-programme/
4 https://www.railstaffer.eu/mediaroom/d6-4-staffer-staff-mobility-programme/
5 https://www.railstaffer.eu/mediaroom/implementation-of-vet-at-eqf-levels-3-to-5/
6 https://www.railstaffer.eu/mediaroom/implementation-of-vet-at-eqf-levels-6-to-8/
7 https://www.railstaffer.eu/mediaroom/implementation-of-mobility-and-training-programmes-in-the-field-of-cross-border-railways-communication-and-language/

Work Package 7
Thinking ahead

ABOUT

Addressing Europe's rail skill mismatch is no easy task, but STAFFER looked to develop a strategy that allows future Europeans to access careers in rail and the sustainable mobility solutions they create.

STAFFER partners in Work Package (WP) 7 worked to devise a long-term strategy and action plan that will make sure that European rail continues to be a world leader in transport technologies, provides quality jobs and allows citizens to safely and responsibly transport themselves and goods.

Under the STAFFER umbrella, WP 7 partners collaborated closely with their colleagues in WPs 4 and 6 – concerned with trainings development and implementation, respectively – to extrapolate a means of allowing the next generations to continue to benefit from STAFFER for years after its 4-year mandate.

A LONG-TERM STRATEGY AND ACTION PLAN FOR THE RAIL SECTOR: "ATTRACTING AND UPSKILLING A QUALIFIED WORKFORCE FOR A SMART AND SUSTAINABLE RAIL SECTOR IN EUROPE"

Work Package 7 consisted of developing a long-term strategy and action plan to ensure that the railway sector has the workforce needed for the future, both in terms of number and skills, that is prepared for challenges and tasks arising from EU regulation, deepening the Single European Rail Area by further market liberalisation, digitalisation, demographic and social factors as well as ambitious European goals to increasing the share of rail in in transport modes in order to reach the Green Deal targets. The results
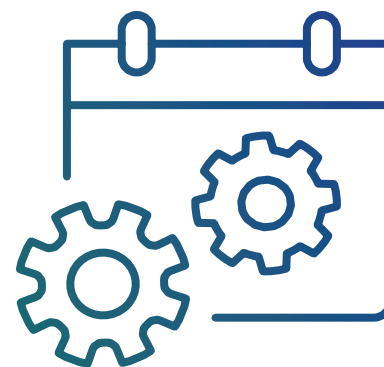
achieved during the last STAFFER year from November 2022 – October 2023 are intended to provide a longer-term roadmap and action plan for the whole rail sector – rail supply industry, operation and infrastructure management – that carries on the work started in STAFFER after the project is completed.

The long-term strategy is based on a collective approach and gained from input of all STAFFER partners, including the two European peak level sector associations UNIFE and CER. It consists of four tasks and deliverables:

- An integrated long-term sector skills strategy for the rail sector where key results and learnings gained in the first three years of the STAFFER blueprint activities were considered and three key pillars of strategic orientations and goals were defined (D7.1).

- Acknowledging the key challenges of the need to make the rail sector more attractive for workers, but also for young learners and students, a second task identified promising practices and made recommendations that also feed into the sectoral strategy (D7.2),

- A third element of the long-term strategy consists of considerations and important aspects related to gaining political and financial support for the educational programmes beyond the lifetime of the STAFFER project (D7.3)

- Finally, and in close collaboration with the other tasks, a long-term action plan for the sectoral skills strategy was designed that includes about 50 specific activities in key fields of action that are linked to the three pillars of the strategy (D7.4).

The following figure provides an overview of the taxonomy of the long-term strategy: It is based on the comprehensive analyses and investigations carried out in the first three years of STAFFER on challenges and future needs in the context technological, social, economic and political factors of influence and requirements, including detailed insights into the future of more than 30 rail specific occupational profiles or skills and competence needs that are required in cross-border railway operation.

Informed by STAFFER activities of skills' intelligence, the long-term strategy of the rail sector should foster and promote the **core aim** of ***"Attracting and upskilling a qualified workforce for a smart and sustainable rail sector in Europe".***

In order reach this goal, the long-term skills strategy for the rail sector rests on **three main pillars**:

- The first pillar consists of measures and activities improving employability, making the rail sector as well as sector related opportunities of initial and higher vocational training and education more attractive young talents and for a more diverse workforce.

- The second pillar describes a set of measures, actions and activities related to the provision of State of the Art and future proof occupational education and training in the rail sector. In this context a bundle of needs have been identified by the STAFFER Blueprint activities: From intensifying the cooperation between rail sector companies and VET schools and higher education institutions, the need to pay more attention to the skills needs in smaller and medium-sized companies to the development of new, innovative formats of education and training for initial learners and existing staff.

- The third pillar consists of skill related as well as other measures and activities that should facilitate the implementation of the European Rail Area and the transition from national to European mindsets. Given the accelerated technical and operational harmonisation triggered by digital technologies and solutions but also against the need to develop a sufficient and well-skilled workforce for the expected increase in cross-border railway operation, there is a need to develop skills but also mindsets for a European rather than purely national framed railway culture and environment.
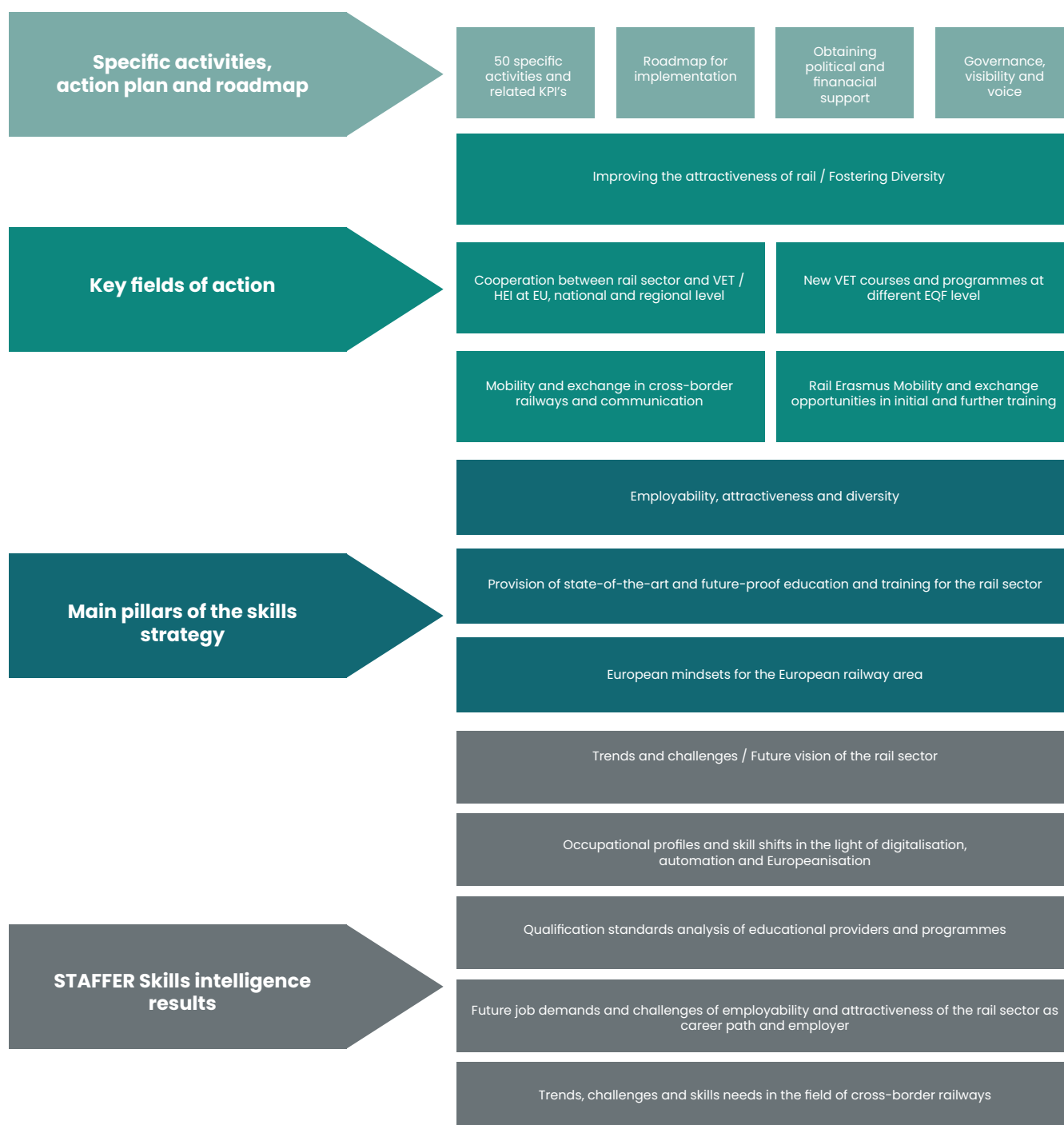
In order to implement the three pillars of core issues that need to be addressed, the STAFFER consortium has defined **six deriving fields of action:**

1. Improving the attractiveness of rail
2. Cooperation between the rail sector and VET, Higher Education Institutions at EU, national and regional level
3. Development of new VET courses and programmes at different EQF level
4. Mobility and exchange in cross-border railways and communication
5. "Railway Erasmus": Mobility and exchange opportunities in initial and further training
6. Coordination, sustainability and stakeholder involvement

This further layer of concretisation of the long-term strategy has also been a way of providing a grid for gather specific activities, i.e. concrete ideas for follow-up measures and initiatives as well as pilots that already have been launched by the STAFFER consortium or single partners or are regarded as crucial for implementing the long-term strategy after the ending of the STAFFER project.

As a result, a **repository of specific activities** in the six fields of action will constitute a key part of the long-term strategy, the action plan and roadmap for implementation. This also includes measures and requirements in terms of European coordination, visibility of the European rail sector's skills strategy and communication at European and national level. The repository consists of a brief description of about 50 specific measures and activities supporting and underpinning the long-term strategy and the action plan, including indicators such as "owners/sponsors", target groups, partners/stakeholders involved, key performance indicators as well as initial ideas on possible funding sources.

FIG.13: TAXONOMY OF THE LONG-TERM STRATEGY AND ACTION PLAN FOR THE RAIL SECTOR

Specific activities, action plan and roadmap	50 specific activities and related KPI's	Roadmap for implementation	Obtaining political and finanacial support	Governance, visibility and voice

Improving the attractiveness of rail / Fostering Diversity

Key fields of action	Cooperation between rail sector and VET / HEI at EU, national and regional level	New VET courses and programmes at different EQF level
	Mobility and exchange in cross-border railways and communication	Rail Erasmus Mobility and exchange opportunities in initial and further training

Employability, attractiveness and diversity

Main pillars of the skills strategy

Provision of state-of-the-art and future-proof education and training for the rail sector

European mindsets for the European railway area

Trends and challenges / Future vision of the rail sector

Occupational profiles and skill shifts in the light of digitalisation, automation and Europeanisation

STAFFER Skills intelligence results

Qualification standards analysis of educational providers and programmes

Future job demands and challenges of employability and attractiveness of the rail sector as career path and employer

Trends, challenges and skills needs in the field of cross-border railways

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Co-leaders names:
- Eckhard Voss
- Andrew Nash

Deliverables:
- Deliverable 7.1 Sectoral skills strategy[1]
- Deliverable 7.2 Making rail sector a great place to work[2]
- Deliverable 7.3[3]
- Deliverable 7.4 Designing and implementing the action plan of the sectoral skills strategy[4]

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1   https://www.railstaffer.eu/mediaroom/sectoral-skills-strategy/
2   https://www.railstaffer.eu/mediaroom/making-rail-sector-a-great-place-to-work/
3   https://www.railstaffer.eu/mediaroom/d7-3/
4   https://www.railstaffer.eu/wp-content/uploads/2024/09/D7.4-2024-09-30-Action-plan-of-the-sectoral-skills-strategy.pdf

Work Package 8
Strengthening rail by communication and dissemination of results

ABOUT

How could STAFFER both disseminate the project's results among all rail stakeholders and relevant educational institutions in Europe, and define skills-related policy recommendations addressed to regional, national and European decision makers?

Work Package (WP) 8 was committed to three different objectives:

- Developing a communication strategy and establishing a dissemination plan to facilitate widespread information and knowledge transfer within the consortium during and beyond the project's lifespan

- Communicating STAFFER's successes to relevant stakeholders using social media, events and more

- Reaching out to regional, national and European decision makers to share STAFFER results on the best way of building skills in rail!

The first task of WP8, which was co-lead by CER and UNIFE, was to prepare the Communication, Dissemination & exploitation plan. This was achieved during the first 6 months of the project with the aim to facilitate wide-spread information and knowledge transfer amongst and beyond the members of the consortium (and beyond the project life-time).

Target audience

The project's outreach activities aimed to reach the widest audience possible, with the resources available. The following stakeholders were considered the main targets for dissemination:

- Academic, Vocational & Educational Training (VET) institutions
- Students and learners
- The European railway operating community and rail supply industry, including workers
- Research community (European and non-European)
- European, national and regional policy-makers
- Social partners
- General public
- Press

To effectively share project progress with the above-mentioned audiences, the dissemination of the project comprised of three major activities tailored to reach each of the different stakeholder groups:

- Communication to the rail sector and relevant governmental bodies
- Communication to the general public
- Dissemination of project results addressing specific targeted stakeholders.

WP8 utilised direct consultation with academic and VET institutions, discussions with authorities ranging from the local to European level across Europe, widespread attendance and participation at rail sector events, the development of publications and media materials and general use of public media.

In order to effectively disseminate the project, a variety of dissemination tools were established and mobilised to communicate this initiative's progress. A cohesive project identity was created that informed the design of all communication materials ranging from the project website to physical publications to social media visuals. This included an easily recognisable graphic identity (including STAFFER logo) which was used in the project public website, templates for presentations and a flyer presenting the project.

Website

A project website was created to host information and deliverables - www.railstaffer.eu. The website provides a clear overview of the project and was regularly updated with the latest news, events and publications involving or created by STAFFER. The objectives and results of the project are also detailed, as is STAFFER's structure and the project's operations.

Social media

Staffer was active on both twitter and LinkedIn in order to boost awareness amongst target audiences. STAFFER social media accounts were coordinated by the WP8 co-leaders who also relied on the partners' social media presences to maximise the project's reach. Consortium partners supported the work package's efforts by amplifying and disseminating these communication materials throughout the collaboration's duration.

Press & Media

WP8 also worked closely with both European and sector press to ensure related coverage, with dedicated articles in specialised magazines and journals (examples include the International Railway Journal, Euractiv, and CER and UNIFE Newsletters).

Conferences

WP8 also strived to ensure continued visibility for the project during conferences, congresses & trade fairs throughout Europe (amongst many others, InnoTrans, Trako, SIFER, SMARTRail Europe, Expo Ferroviaria, Transport Research Arena etc).

Example of social media dissemination.

STAFFER animation.

Watch the animation by scanning the QR code.

STAFFER Mid-term Conference

A number of own events were also organised which included the project mid-term conference (Brussels, 13 October 2022) which brought together the project partners, key stakeholders in the EU rail sector and representatives from educational institutions. During the 2022 edition of InnoTrans, WP8 organised a side event on 21 September entitled "Skills for the Rail Sector: adapting training curricula and attracting talent". A key section of the high-level conference Next Gen-RAIL: Building the Workforce of Tomorrow for the rail sector, organised in March 2024, was dedicated to STAFFER project's main results, lessons and policy recommendations with a relevant panel discussion.

WP8 was also responsible for the organisation and logistics of the STAFFER Final Conference (Brussels, 24 October 2024) which brought together project partners, advisory board, key stakeholders, representatives from academia, youth organisations and institutional partners.

Deliverables

To support project dissemination a number of different deliverables were produced to present the project ambitions and its findings and results. These included a series of informative video reels (Identified job profiles, Skills, Soft Skills and STAFFER project goals), infographics (Skills, Job profiles, Benefits), an animated video presenting the project aims, a brochure, a European Year of Skills video and of course the mid and final reports.

WP 8.3 also developed policy recommendations to finalise the STAFFER project (please see related chapter).

European Year of Skills STAFFER video

Co-leaders names:
- Cliona Cunningham
- Ana Manuelito

Deliverables:
- Deliverable 8.4 Policy recommendations and exploitation activities[1]


Work Package 9
Delivering quality

ABOUT

STAFFER was committed to pushing skills in rail forward, Work Package (WP) 9 keeps us on task! Tasked with ensuring the consortium moves as one unit and delivers high-quality results, this group:

- Was active throughout the lifecycle of the project

- Planned and organised STAFFER's overall actions

- Guaranteed that it reached its objectives on time and on budget

- Brought out the best from the consortium by pushing for quality deliverables and results

The aims of WP 9 were devoted to the effective project management:

1. planning, organizing, and controlling the integrated effort of the consortium;

2. guaranteeing the achievement of the project objectives within the time schedule and budget;

3. assure the quality of the project deliverables and results. .
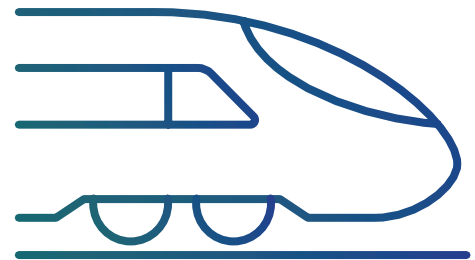
To these aims, the following activities were performed during the whole project life-time:

- Coordinating the project administration, financial, and technical management;

- Planning meetings of the consortium, which will be a mix of face-to-face meetings and virtual meetings.

- Managing the project effectively, reporting problems and issues, establishing contingency plans, handling disputes, and guaranteeing on time delivering;

- Continuous risk monitoring;

- Monitoring and assessing the quality of the project deliverables and results;

- Managing the collection, revision, and submission of deliverables;

- Providing regular communications (within the consortium and towards the European Commission) to keep everyone informed about changes to plan and possible delays.

Co-leaders names:
- Angela Di Febbraro
- Alice Consilvio
- Nicola Sacco

Università di **Genova**

Railway Sector Skills Strategy Implementation and Action Plan

STAFFER developed a Railway Skills Sector Strategy Action Plan in Task 7.4. This action plan is based on the results of all STAFFER work packages and discussion among the partners. The action plan consists of 50 specific activities in the following fields:

1. Increase the attractiveness of railway sector employment and foster diversity.

2. Improve cooperation between the railway sector and educational institutions at the VET and HEI levels.

3. Develop new VET courses and programmes at all educational levels.

4. Increase railway sector student and staff mobility programmes.

5. Develop staff mobility and training programmes in the field of cross-border railway, communication and language.

6. Coordinate railway sector skills strategy implementation.

Most of these activities have been implemented and/or tested in prototype form but the project has clearly shown the need for continued efforts in these activities and consequently recommends that interested partners and others build upon the STAFFER results by further developing these activities. The following sections summarise these activities. Additional details are given in the Deliverable 7.4.

1. INCREASE THE ATTRACTIVENESS OF RAILWAY SECTOR EMPLOYMENT AND FOSTER DIVERSITY

Increasing the rail sector's attractiveness is of central importance for tackling the sector's current and future worker shortage. The central aim of these activities is to give potential candidates a better insight into the many attractive career options in the railway sector. The recommended activities also include actions to increase the attractiveness of rail sector careers for traditionally underrepresented groups such as women.

The activities are:

1. Support formation of ambassador networks to represent railway sector employers.

2. Support cooperative marketing between employers and education institutions at real life events including job fairs, school visits, and company visits.

3. Support cooperative marketing between HEIs or VETs.

4. Create rewards and incentive programs for employees committed to fostering inclusion and improving company culture.

5. Engage with influencers outside of the railway bubble.

6. Develop and implement mentoring programme for female leaders.

7. Support efforts to build European Mindsets.

8. Develop programmes to improve the attractiveness of railway sector employment and work on career development paths focused on diversity within railway companies.

9. Disseminate good practices and innovative approaches for addressing labour shortages and attracting talent.

10. Organise a Skills and Labour Forum in the field: "Transport and mobility" to address labour and skills strategies in the railway sector.

2. IMPROVE COOPERATION BETWEEN THE RAILWAY SECTOR AND EDUCATIONAL INSTITUTIONS AT THE VET AND HEI LEVELS

It is critical that educational institutions understand the needs of railway sector employers in order to refine and develop appropriate training and academic programs. These five activities are designed to improve this coordination:

1. Perform skills intelligence: Identify future railway sector skills needs and job roles.

2. Harmonise occupational profiles at EU level by updating ESCO profiles.

3. Create a database and network of railway related VET schools / institutes engaged in railway training.

4. Link communities of practice and excellence in VET: Intensifying, extending and deepening cooperation between national and regional railway eco-systems.

5. Develop and implement railway sector awareness programmes for secondary and high schools.

3. DEVELOP NEW VET COURSES AND PROGRAMMES AT ALL EDUCATIONAL LEVELS

Educational institutions must develop and offer courses and programmes tailored to the needs of railway sector employers. This requires constantly refining and developing courses to address changing needs such as new technologies and customer needs. STAFFER partners implemented some pilot programmes based on project results and are planning to implement several further programmes after the project. The following specific activities are designed to help continue implementation of this important work.

1. Maintain and update online database of rail related education programmes.

2. Identify and highlight best practices in railway education and training programmes.

3. Create additional new training programmes and contents for EQF level 3-5.

4. Create additional new academic programmes and contents fort EQF level 6-8.

5. Create new double, multiple or joint degree programmes.

6. Continue STAFFER summer school on "The European Railway System".

7. Establish multi-stakeholder working groups addressing the skills building process.

8. Develop harmonised training/academic modules on key or emerging topics (e.g. ETCS, interoperability, etc.) for different occupational profiles.

Railway Sector Skills Strategy Implementation and Action Plan

4. INCREASE RAILWAY SECTOR STUDENT AND STAFF MOBILITY PROGRAMMES

Educational mobility programmes such as ERASMUS+ provide students and workers with valuable experience helping them learn about different ways to work, new social skills, and about cultural differences – all of which were identified in STAFFER as critical needs for the railway sector's future development. The following specific activities have been developed in STAFFER that aim to promote more learning mobility and the opportunity to visit companies or VET institutions in other countries for a learning period or internship.

1. Promote railway sector apprenticeship and learning mobility.

2. Develop guidance and practical support for companies to create Rail Apprentice Mobility Programmes.

3. Establish a platform and pool for rail apprentice mobility programmes for use by interested rail company and VET institutions.

4. Develop and implement a new Railway Blended Intensive Programme (BIP).

5. Develop and implement an online database of rail related internships.

6. Support the establishment of bilateral Erasmus agreements between European universities offering railway-related courses.

7. Develop and implement a "Virtual Railway Academy" website providing information on physical and online training resources.

5. DEVELOP STAFF MOBILITY AND TRAINING PROGRAMMES ABOUT CROSS-BORDER RAILWAYS, COMMUNICATION AND LANGUAGE

Achieving the European Commission's ambitious railway sector goals will require significantly increasing cross border railway transport. To meet this objective staff must learn the new skills and mindset oriented towards a European railway system. STAFFER recommends the following specific activities to help meet this need:

1. Organise cross border railway expert and practitioner focus group to develop occupational profiles related to cross-border railway operation and interoperability.

2. Develop ERTMS learning programmes for all levels from beginners to experts.

3. Update the occupational profile and define common skills needs and knowledges for train drivers.

4. Develop online course modules and materials on cross border railway transport.

5. Establish a competence centre on railway language (training).

6. Organise and support train-the trainer exchange and joint seminars on cross-border railway skills.

6. COORDINATE RAILWAY SECTOR SKILLS STRATEGY IMPLEMENTATION

The STAFFER project investigated railway sector skills needs deeply and developed numerous programmes designed to address these needs. However, skills needs will continue to change, for example as new technologies are developed and implemented. Therefore, there may be a need to continue the programmes developed in STAFFER as well as create new ones. This would require some form of coordination and organisation on a voluntary basis, as it has been done by certain other sectors.. It should be emphasised that all proposed activities will be open to all interested stakeholders whether STAFFER partners or not, and that and that there will be no obligation for STAFFER partners to participate. The following specific activities are recommended to coordinate continued railway skills sector strategy implementation.

1. Develop approach for sustaining STAFFER efforts and gaining stakeholder support.

2. Create a European platform for Rail Skills.

3. Organise a process for strengthening skills intelligence links between industry and educational providers.

4. Organise bi-annual high-level railway HR and skills conference.

5. Provide a forum for communicating railway sector skills needs and creating shared visions.

6. Provide railway sector specific commitments and contributions to EU initiatives on skills and sustainable employment.

7. Develop and organise a voluntary European Railway Skills Alliance to coordinate skills strategy implementation. This activity would depend on stakeholders' willingness to engage, on the defined scope of activities and on resources available.

Deliverables:
Deliverables 7.4 Designing and implementing the action plan of the sectoral skills strategy[1]

Policy Recommendations

1 INTRODUCTION

The European rail sector is at a pivotal point where addressing skills shortages and enhancing workforce development are critical for its future success. The rail sector plays a vital role in achieving Europe's social, economic, and environmental targets, making it imperative to cultivate a highly qualified and diverse workforce. The current landscape reveals significant challenges such as an aging workforce, a shortage of new entrants, and the need for new skills to handle technological innovations and sustainability goals.

To tackle these challenges head-on, the ERASMUS+ STAFFER project has been initiated, bringing together 31 partners and numerous stakeholders from across the rail sector for a period of four years (2020-2024). This project focuses on developing comprehensive policy recommendations to ensure the rail sector can attract, train, and retain the necessary talent.

These recommendations aim to create attractive career opportunities, enhance education and training for smart and sustainable railways, and promote a unified European Railway Area of Skills. By focusing on these three key areas, the sector can build resilience and ensure it is well-equipped to meet future demands. The proposed policies are designed for implementation by key decision-makers and stakeholders at both the EU and national levels, ensuring a coordinated and strategic approach to workforce development.

2 POLICY RECOMMENDATIONS SUMMARY

SCALE-UP THE SECTOR'S EMPLOYABILITY, ATTRACTIVENESS, AND DIVERSITY

- At the **European level**, the recommendations are geared towards making the rail sector more appealing and accessible to a diverse workforce. Initiatives such as the Rail Ambassador Programme aim to foster a positive image of the rail sector by coordinating and exchanging best practices across the EU. The emphasis on diversity and inclusion is evident through guidelines and platforms that encourage participation from underrepresented groups, including women and LGBTQ+ communities. By supporting programmes like the STAFFER Mentoring Program for female engineers, the EU level policies aim to build a more inclusive and diverse workforce that can drive innovation and growth in the rail sector.

- At the **national level**, the recommendations emphasize local engagement and visibility. School outreach programmes should be proposed to inspire young students, particularly girls, by providing them with role models from the rail sector. Marketing campaigns aim to enhance the public image of the rail sector, making it more attractive to a broader audience. Financial resources should be allocated for events like 'Rail Job Days' to actively engage potential candidates and showcase the various career opportunities within the sector. These national-level initiatives are designed to create a strong local presence and make the rail sector a compelling career choice for diverse talents.

- Within the **rail sector** itself, companies are encouraged to take proactive steps to promote employability and inclusiveness. Appointing Rail Ambassadors within companies can provide a firsthand perspective of working in the sector, helping to humanize and personalize it. Utilizing social media and online learning platforms can keep employees and potential recruits informed about sector developments and job opportunities. Creating an inclusive workplace culture is essential, and companies are encouraged to support employee referrals and showcase job opportunities through virtual tours and employee testimonials. These actions aim to create a welcoming and dynamic work environment that attracts and retains diverse talents.

ADVANCE EDUCATION AND TRAINING NEEDED FOR SMART AND SUSTAINABLE RAILWAYS

- At the **European level**, the recommendations focus on building a robust educational framework that supports the sector's needs. Developing EU-wide workforce education strategies, particularly in STEM and digitalization, is crucial for preparing the future railways. The introduction of a "Railway Erasmus" programme is proposed to facilitate student exchanges and apprenticeships, promoting cross-border learning and collaboration. Expanding the activities of Europe's Rail Joint Undertaking on skills development would ensure that education and research programmes are aligned with sector's needs. Additionally, a portal for Europe-wide rail-related educational programs should be set-up as it would provide a centralized resource for students and professionals seeking training opportunities.

- At the **national level**, the recommendations emphasize collaboration between the rail sector and educational institutions. By partnering with schools and universities, curricula can be developed

to reflect the skills and profiles needed by the railway workforce. Establishing local hubs of railway engineering expertise will foster innovation and knowledge-sharing within the sector. National policies should also support the establishment of dedicated railway faculties in technical universities, ensuring a steady pipeline of well-trained graduates. These initiatives should be backed by national funding to support the development and implementation of targeted training programmes.

- **Funding** is a critical component of these recommendations. Supporting companies, including SMEs, to implement training programmes through European and national funds is essential for building a skilled workforce. Establishing a network of universities offering railway courses will ensure consistent and high-quality education across the sector. Promoting internships and apprenticeships in collaboration with educational providers will give students hands-on experience and a clearer pathway to employment. These funding mechanisms are designed to ensure that the rail sector has the resources needed to invest in continuous learning and upskilling.

- The **rail sector** itself must invest in continuous learning and upskilling of its staff to keep pace with technological advancements. Training programmes must be adapted to incorporate new technologies, ensuring that employees are well-prepared for future challenges. Partnerships with educational institutions can provide opportunities for guest lectures, field trips, and recruitment initiatives, helping to bridge the gap between education and employment. Promoting internships and apprenticeships will give students practical experience and highlight the long-term employment prospects within the sector. These efforts aim to create a culture of lifelong learning and professional development within the rail sector.

DEEPEN THE SINGLE EUROPEAN RAILWAY AREA OF SKILLS

- At the **European level**, the recommendations aim to create a more cohesive and integrated railway workforce. Strengthening transnational education and expert exchange programmes will facilitate knowledge-sharing and collaboration across borders. Simplifying funding procedures for cross-border educational initiatives will encourage participation and make it easier for institutions to engage in these programmes. Supporting the standardization of technical, operational, and infrastructure-related rules across Europe will ensure that skills and qualifications are recognized and transferable, fostering a more unified and flexible workforce.

- At the **national level**, the recommendations focus on enhancing the mobility and adaptability of the workforce. Promoting language and soft skills training will prepare employees for international rail services and improve communication and collaboration within a diverse workforce. Encouraging exchange programmes for railway staff will allow them to gain experience in different countries and bring back best practices to their home organizations. These initiatives aim to create a workforce that is not only skilled but also adaptable and capable of thriving in a dynamic and interconnected European rail sector.

- Within the **rail sector**, companies are encouraged to invest in training for new digital technologies like the European Rail Traffic Management System (ERTMS). Fostering a European mindset by supporting cross-border projects and services will enhance collaboration and innovation. Enhancing cooperation across European borders will build a unified railway workforce, capable of meeting the sector's future challenges. By investing in these areas, the rail sector can ensure it has a skilled and flexible workforce that can support the development of a Single European Railway Area (SERA).

3 CONCLUSION

The rail sector is instrumental in achieving Europe's sustainability goals but faces significant skills and workforce challenges. The policy recommendations aim to improve employability, advance education and training, and integrate skills across the Single European Railway Area. Implementing these recommendations requires a coordinated effort from the EU, national governments, and the rail sector, driven by adequate funding and collaboration. By addressing these challenges, the rail sector can build a skilled workforce capable of supporting Europe's green transition and meeting future demands.

Annexes

Technical Annex WP 2

NEW OCCUPATIONAL PROFILES DEVELOPED ACCORDING TO RAILWAY OPERATION AND INFRASTRUCTURE MANAGERS DURING THE FIVE-YEAR PERIOD 2016 – 2021
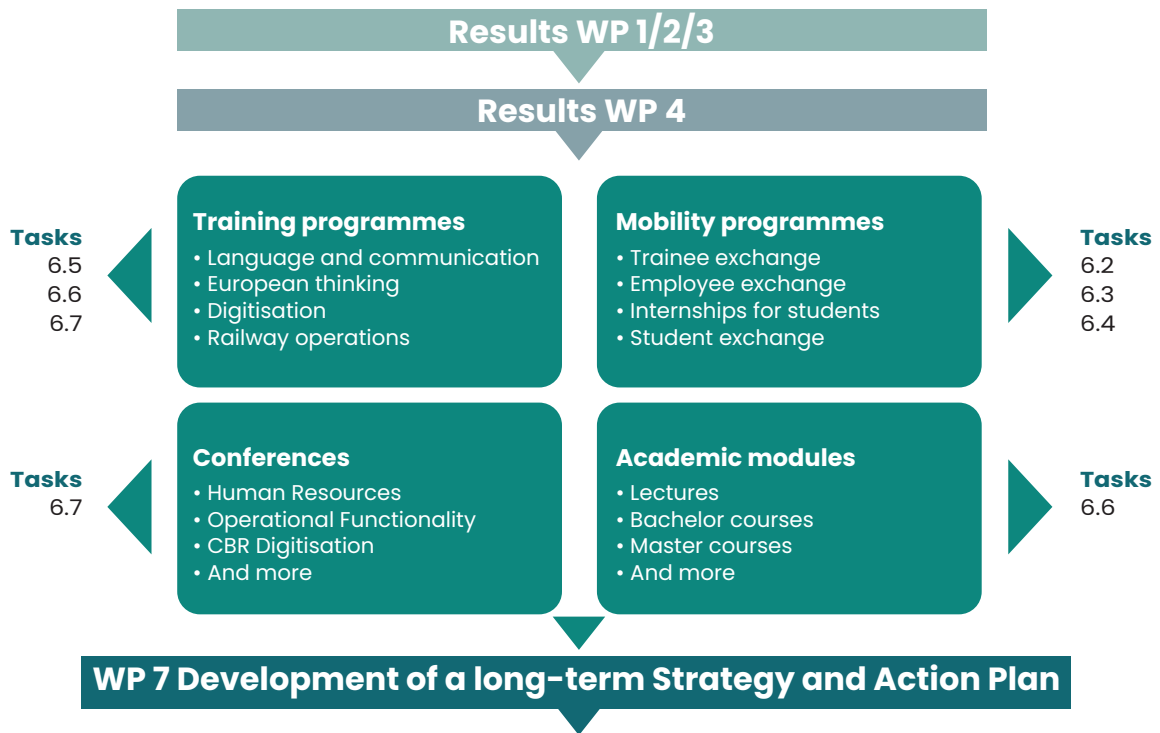
Railway domain	Occupational profile	Staff category
Infrastructure	▪ Railway station manager / director	▪ Manager
	▪ Rail Project Engineer	▪ Professional
	▪ Transport (infrastructure) engineer	▪ Professional
	▪ Rolling stock engineer	▪ Professional
	▪ Railway infrastructure inspector	▪ Technician
	▪ Rail construction supervisor	▪ Professional
	▪ Rail logistics coordinator	▪ Clerical and support
	▪ Rail traffic controller / Train dispatcher	▪ Clerical and support
	▪ Railway electronic technician	▪ Technician
	▪ Rail layer	▪ Elementary
Operations	▪ Rail operations manager	▪ Manager
	▪ Train driver instructor	▪ Professional
	▪ Train attendant	▪ Services and sales
	▪ Chief conductor / Train crew supervisor	▪ Services and sales
	▪ Train conductor	▪ Services and sales
	▪ Train driver	▪ Plant and machine operators and assemblers
	▪ Railway brake, signal and switch operators	▪ Plant and machine operators and assemblers
	▪ Shunter	▪ Plant and machine operators and assemblers
	▪ Platform dispatch assistant / platform assistant	▪ Plant and machine operators and assemblers
	▪ Train preparer	▪ Plant and machine operators and assemblers
	▪ Train cleaner	▪ Elementary
Maintenance	▪ Rail maintenance technician	▪ Technician
	▪ Rolling stock engineering technician	▪ Technician
	▪ Rolling stock inspector	▪ Technician
	▪ Rolling stock engineering drafter/designer	▪ Technician
	▪ Rolling stock electrician	▪ Technician
Customer service	▪ Ticket sales agent	▪ Customer and sales
	▪ Railway sales agent	▪ Customer and sales
	▪ Railway passenger service agent	▪ Customer and sales
	▪ Passenger fare controller	▪ Customer and sales

Source: STAFFER Deliverable D2.1

Technical Annex WP 6

TASK 6.6

Overview of the implementation of training programmes (also beyond the STAFFER term) at EQF level from 6 to 8:

In WP 6 the measures from the previous previous work packages were further developed and operationalised and provide the input for WP 7

Results WP 1/2/3

Results WP 4

Tasks 6.5 6.6 6.7

Training programmes
• Language and communication
• European thinking
• Digitisation
• Railway operations

Mobility programmes
• Trainee exchange
• Employee exchange
• Internships for students
• Student exchange

Tasks 6.2 6.3 6.4

Tasks 6.7

Conferences
• Human Resources
• Operational Functionality
• CBR Digitisation
• And more

Academic modules
• Lectures
• Bachelor courses
• Master courses
• And more

Tasks 6.6

WP 7 Development of a long-term Strategy and Action Plan

Number of partners involved	11
Number of programmes	24
Percentage of EQF level covered	100%
Total n. of expected learners at EQF level 6	<200
Total n. of expected learners at EQF level 7	>50÷60
Total n. of expected learners at EQF level 8	>few

Educational partner	Number of programmes	EQF levels covered		
		6	7	8
AUTh	2		1	1
CESI	4	2	2	
CTU	1		1	
ESTACA	2		2	
SGH	4	1	3	
TUD	2	1	1	
UASFHE	1		1	
UASSP	1	1		
UB	1		1	
UNIGE	2		1	1
UNIROMA1	4		2	2
Total n. of progammes	**24**	**5**	**15**	**4**
Total n. of expected learners	**>740**	**109**	**>635**	**>36**

Selected programme	Number of programmes
Railway systems engineering	6
Rail traffic/operations engineering	2
Rail transport engineering	13
Railway systems technicians	2
European Railway System	1
Total n. of progammes	**24**

Overview of the 8 Pilot VETs that the partner universities implemented individually in A.Y. 23/24:

Educational partner	Partner programme name	EQF level	New/existing programme	Duration of the programme	N. of ECTS of the programme	Specific module(s) to be implemented
CESI	"Post Master Degree Manager of construction projects option Urban Transport (Mastère Spécialisé® Management de Projets de Construction, Option Transports Ferroviaires, Urbains et Nouvelles Mobilités)"	7	Existing	1 academic year	75	12 teaching modules
CTU	Transportation Systems and Technology	7	Existing	2 academic years	125÷132	3711R004 – ITS - Intelligent transport systems
ESTACA	Transport engineering / System design	7	Existing	5, 4 or 3 academic years	300	Cybersecurity and the Internet of Things (IoT)
SGH	Postgraduate course in "Ogranistation of extra-urban public transport"	7	New	2 semesters	30	–
UASSP	Innovation and the European Railway Mindset	6	New	60 minutes	NA	3 x 20 minute videos with discussion notes, to be given as part of an existing class
UNIGE	Master of Science in "Safety engineering for transport, logistics and production"	7	Existing	2 academic years	120	"Rail Transport (Sustainable Powertrains and Green Mobility in Rail Transport), Sustainable Rail and Road Infrastructure (How to design and modelling the track access charges system for the use of the infrastructure)"
UNIROMA1	Master of Science in "Transport Systems Engineering"	7	Existing	2 academic years	120	Railway Engineering, Public Transport Management
	Post-Master course in "Railway Infrastructure and Systems Engineering"	8	Existing	1 academic year	60	12 teaching modules of 4 ECTS each

TASK 6.7

The results of the 5 working groups, elaborated in close collaboration with the aforementioned partners, are listed in the following table:

DB

Technologies & Digitalisation	European Mindset & Diversity	Language	Communication+ Networking	Railway operation
Lead: DB (Reymund Weitzel) Co-lead: SNCF (Patricia Nieto-Esteban) Core Group: *CESI, ÖBB, ESTACA* Results: • Overview on European ETCS Training Concepts (DB) • E-Learning "What is BIM?" A MOOC on BIM in Railway subjects (SNCF)	Lead: ÖBB (Tanja Pfaff-Röders) Co-Lead: DB (Olaf Kittlaus) Core Group: IŽS, *UASFHE, FS, SNCF + PKP* Results: • Video: 'National Railways and European challenges' • Digital format: What does European Mindset mean to you? • Mentoring Program: female employees in engineering (ÖBB and DB)	Lead: DB (Vanessa Gnoth) Co-lead: ÖBB (Carine Sterling-Raoul) Core Group: *IŽS, SNCF, CESI* Results: • Status quo analysis language training for safety critical staff • Analysis ETCS translation variation and development of general template • Exchange on language training for train drivers (ÖBB and SNCB)	Lead: DB (Arpad Domjan) Core Group: *IŽS, Uni Roma, CTU, FS, SNCF, CESI* Results: • Blueprint for European cooperation in areas of railway training, joint production and exchange of existing learning media • Exchange event for experts from DB and SNCF (BIM, AI, ETCS)	Lead: DB (Jannik Sielaff) Co-Lead: CTU (David Vodak) Core Group: *SNCF, ÖBB, ESTACA* Results: • Brake simulation in 14 languages and training concept (CTU/DB) • Energy Saving (Survey, Training Concept) (DB) • Research Guide on energy saving within the railway sector (CTU)

Technical Annex WP 7

In all four tasks results of the completed STAFFER WPs were used as inputs and to inform new research. These data, along with extensive consultation with all STAFFER partners, were used to develop draft reports which were reviewed by all the partners and revised in a multi-step process. Final reports / deliverables for the first three tasks were completed in March 2024. The final Deliverable D7.4 will be completed in October 2024.

Deliverable 7.1, "Developing an integrated sectoral skills strategy for the rail sector -Attracting and upskilling a qualified workforce for a smart and sustainable rail sector in Europe", consisted of two main parts: first, a summary of the STAFFER findings, and second, a proposed skills strategy. The skills strategy focused on three pillars: (1) increasing employability, attractiveness, and diversity of the railway workforce, (2) providing state-of-the-art and future-proof education and training in the rail sector, and (3) fostering European mindsets for the European railway area. The report describes a series of recommendations for achieving these pillars including training and mobility programs for students and workers, strategies for making the sector more attractive and the workforce more diverse, and educational programs. As outlined above the pillars of increasing sector attractiveness and creating training and education programs were further developed in tasks 7.2 and 7.3.

Skills strategy pillar 3, fostering European mindsets in the railway sector, was clearly identified by STAFFER partners (especially operators) as a key need. European railways have a long history of being nationally focused which makes it difficult for railway transport to be attractive for international goods and passenger travel. Despite the development of new technologies like ETCS, funding for cross border improvements, and regulations encouraging competition the amount of cross-border traffic remains below the level needed to meet the EC's ambitious modal shift goals. A key STAFFER finding is that the mindset or perspective of workers and organisations must shift from nationally oriented to Europe-oriented. The task 7.1 report describes this problem in more detail and presents several strategies for addressing it including cross-border mobility programs for workers, new training programs focused specifically on developing the European-mindset and integrating the concept into academic programs. As outlined above specific actions for achieving this pillar were developed in Task 7.4.

Task 7.2 developed strategies for increasing the attractiveness of the rail sector with a particular focus on attracting more highly skilled workers to help railways and suppliers develop and implement new

technologies, and to increase workforce diversity. A survey carried out in STAFFER WP 2 showed that the most important challenge from an HR perspective is to increase the attractiveness of railway jobs. The task was completed using desk research, partner input and questionnaires.

There is a large amount of literature on attracting workers and recruiting strategies although little is focused specifically on the railway sector. Consequently, general techniques were identified and customised for railways. These techniques were then revised based on input from key stakeholders to create a marketing strategy for the railway sector. The main efforts were to identify which target groups and job profiles are most relevant for a strategy and to understand how modern marketing and recruiting techniques could be used to attract these people to the railway sector. The communication channels considered included digital, online social media and real-life events (live events). The resulting strategy had two main goals: first, to improve the visibility of careers in the rail sector, and second, to improve the image of the rail sector as a whole.

Task 7.3 consisted of preparing an action plan for the full set of vocational training, academic education, and in-house learning programs needed in the railway sector. The plan does not specifically define these programs but rather a process for identifying educational needs, developing appropriate courses, and creating tools for increasing the quality and efficiency of the process. The plan's actions are all based on the activities and lessons-learned by actually undertaking these steps in previous STAFFER WPs. The final report describes potential funding sources and the key stakeholders responsible for implementing the programme. These sections were used to help inform Task 7.4. The action plan itself consists of tables listing the specific actions, potential funding programs for these actions, and the stakeholders to be involved.

Task 7.4 consisted of preparing an action plan for the full skills strategy. As outlined above, the skills strategy consists of three pillars (increasing attractiveness, developing educational programs, and fostering a European mindset). These pillars are described in more detail in the deliverables of tasks 7.1, 7.2 and 7.3. The action plan consists of a set of specific activities, grouped in six fields of actions, aimed at implementing these three pillars. The actions are presented in tables which also identify the stakeholders, potential funding, implementation examples, and KPIs for each action. The task started by preparing a set of draft actions. These actions were then revised based on input from all STAFFER partners and other key stakeholders. The final set of actions are presented in the Task 7.4 report.

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