



**DB Rail Academy**

by DB Engineering & Consulting GmbH

# Feasibility Study **Establishing a Regional Centre of Railway Excellence for the Western Balkans**

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Deliverable 2/Task 1: Scenario Analysis



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# Executive Summary



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# 1. Executive Summary

## **Background**

The Western Balkan region, namely Albania, Bosnia and Herzegovina, North Macedonia, Kosovo\*, Montenegro and Serbia have committed to closer integration of their transport markets with the European Union and to the development of the TEN-T comprehensive and core networks to the Western Balkans, based on the relevant EU acquis and in line with the EU accession process.

The progress towards aligning with EU standards is a challenging but structured pathway where regional cooperation and knowledge transfer is a key instrument for meeting foreseen EU standards and implement policy requirements.

In line with the planned integration of the Western Balkan in the EU transport market, the participants at the Rail Excellence Summit in 2023 in Pristina and Doboj highlighted that the main challenge for development of rail transport in the Western Balkans is a lack of skilled human resources and an urgent need for additional training and education. The discussions at the summit emphasized the importance to support skilled human capital in the region and spur innovation and technological development in the rail sector. In this context, the establishment of a Regional Educational and Training Centre for Rail Excellence was proposed to educate and train on implementing EU standards and norms relevant to the rail sector, as stipulated in Annex 1 to the Transport Community Treaty, and to support the modernization drive in the region.

To advance this initiative, Transport Community has commissioned DB Rail Academy to conduct a Feasibility Study on the Establishment of a Regional Centre for Railway Excellence. DB Rail Academy is the international training provider of DB Engineering & Consulting GmbH, a subsidiary of Deutsche Bahn AG. Based on DB expertise in specialized education and training for the railway sector in Germany as well as based on international projects to establish training academies, DB Rail Academy is well placed to advise on this endeavor. The outcome of this study is to present three possible scenarios for the creation of the Centre, followed by the development of a roadmap for its implementation.

## **Summary of the Analysis**

This report outlines the work completed under Task 1: Development of Scenarios, which involved analyzing the current situation in the region concerning legal, economic, infrastructure and operational factors and conducting a needs analysis.

Based on desk research and interviews with senior representatives from railway companies, academic institutions and schools, DB Rail Academy developed three possible scenarios how the regional Training Centre shall be set up.

\* This designation is without prejudice to positions on status and is in line with UNSCR 1244 (1999) and the ICJ Opinion on the Kosovo declaration of independence.

The development of the scenarios is based on analyzing different factors impacting the establishment of the Centre. This also includes comparing the frameworks and situations in different regions and of different educational institutions to derive at recommendations for hosting option for this endeavor.

**Legal Factors:**

- During the study the legal frameworks across the regions were examined. The alignment with national Technical and Vocational Education and Training (TVET) regulations as well as with railway safety laws and rulebooks on railway trainings is a core requirement for the regional Training Academy.
- So far there is no evidence of regionally issued certificates, recognized as railway sector specific training requirements. Yet, there are no legal limitations to a regional certification process if agreed by all partners. The curricula and training facility will need to meet the minimum requirements that are defined for national training centres of railway companies (both Infrastructure Manager and Operator). If this is met, then the Regional Academy as a minimum can provide a “certification of participation” which would be regionally accepted. Issuing regionally accepted train driver licenses or providing other mandatory and legally required trainings by the Regional Centre would necessitate intergovernmental bilateral agreements and needs to be confirmed with national licensing bodies.
- Based on the comparison of local rules and regulations governing the TVET and railway sector, there are no differences across the region. For a cooperation model with a university, all nationally accredited educational facilities in the region are equally positioned to host the Training Academy. Very similar national legal frameworks and limits apply to all of them.
- Additionally, the advancement of the region towards alignment with EU standards were assessed. Based on the European Commission's Enlargement Reports 2024 and the implementation of EU railway legislation, Serbia and Montenegro are most advanced in their progress.
- Visa requirements between Kosovo and Bosnia and Hercegovina could influence the decision on the host for the center, since free movement of people is currently not guaranteed.

**Economic Factors:**

- This analysis included an assessment of local pricing structure as well as an overview of cost categories for a future Centre and potential funding options. While no single region has a crucial economic advantage to host the Centre, Kosovo could present the most cost-efficient option from an economic point of view. The combination of low wages, affordable living costs, and strong economic growth prospects positions Kosovo as a relevant location.

- Cost categories to be considered for the Centre include different investment and operational costs and depend on the scenario option. The development of a clear business plan will need to be at the start of planning and implementation of the Centre. Funding should be provided by the participating governments in the region with external donor funding sources also considered particularly for the initial investment costs but also for support for the operation of the Centre. Considering the limited financial resources of railway companies in the region, additional external funding streams could ensure that training courses can be subsidized. Furthermore, external revenue streams can also be generated through training offers for the private sector on a fee basis.

**Technical Factors:**

- The availability of training equipment and infrastructure for railway education varies across the region. While some institutions have access to simulators, laboratories, and specialized equipment, many rely primarily on theoretical classroom instructions and on-the-job training. The lack of modern simulators, test tracks, and dedicated training facilities limits the practical skills development of railway professionals. Efforts are being made to modernize training capabilities, but overall, the need for substantial investment in technical training infrastructure remains to enhance workforce preparedness and industry standards.
- The new Regional Centre can play a key role to provide and showcase modern equipment and training infrastructure that does not exist on local level. Based on the scenario to be chosen, there are collaboration efforts envisioned to also utilize training infrastructure that already exists, for instance by universities, railway schools as well as railway companies. Most advanced technical training infrastructure can be found in Serbia, Bosnia-Herzegovina, followed by North Macedonia.







**Operational Factors:**

- As part of the feasibility study, universities and railway schools across the region have been assessed. While the region does have a diverse range of railway-related educational programs at vocational and university level, dedicated railway-focused programs are limited and specialized railway education remains underdeveloped. Many railway schools face challenges such as outdated curriculum, infrastructure and a declining number of students interested in railway careers.
- It is recommended that the future Regional Centre shall cooperate closely with the educational facilities related to railway education. This includes support to update their curricula and learning methodology as well as cooperating with universities and schools to conduct joint courses and utilize existing infrastructure and trainers.
- Based on the analysis, Serbia, North Macedonia, and Bosnia and Herzegovina currently offer the most effective railway education in the Western Balkans. Their educational facilities range from academic railway modules with specialized high school and technical

school programs. Their curricula are most aligned with EU standards, and they feature professors and teachers with a special interest in railways.

### Needs Analysis:

The needs analysis is based on the interviews conducted with a variety of stakeholders in the region as well as on future skills demand in the sector. The table below describes the main areas identified that the Regional Centre can be of most benefit to regional stakeholders.

	<b>New Technology/Innovation</b> <ul style="list-style-type: none"> <li>• Training on new and modern infrastructure and rolling stock</li> <li>• Electrification of networks</li> <li>• Signaling systems, ETCS</li> <li>• Provision of specialized training tools and equipment</li> </ul>
	<b>Peer Exchange and Best Practice Learning</b> <ul style="list-style-type: none"> <li>• Regional networking</li> <li>• Exchange of best practice, incl. with EU partners</li> </ul>
	<b>Digital Transformation of the Railway Sector</b> <ul style="list-style-type: none"> <li>• Innovation Lab/Showroom</li> </ul>
	<b>EU Regulations and Norms</b> <ul style="list-style-type: none"> <li>• Training on how to implement EU norms and standards, focus on Safety Management Systems, Accidents Reporting, dangerous goods, certification for ECMs.</li> <li>• Focus on Managers and Supervisors on how to implement EU standards from a managerial perspective.</li> </ul>
	<b>Focus on Cross Border Traffic</b> <ul style="list-style-type: none"> <li>• Support in implementing EU Interoperability Directive for Technical Specifications for Interoperability (TSI) for infrastructure, vehicles, and signaling systems like ETCS</li> <li>• Support in train drivers' education for more cross-boarder traffic (e.g. language)</li> </ul>
	<b>Train the Trainer</b> <ul style="list-style-type: none"> <li>• Training local trainers for them to act as a multiplier</li> <li>• Training in teaching methodology as well as technology, EU rules and regulations</li> </ul>



	<ul style="list-style-type: none"> <li>• Support for universities to update their curriculum and offer more practical options for students</li> </ul>
	<p><b>Marketing: Increase Attractiveness</b></p> <ul style="list-style-type: none"> <li>• Joint marketing campaigns in individual languages (TikTok, Instagram, etc.)</li> <li>• To have a modern Academy as an incentive for young staff</li> <li>• Trade fairs, events – show the future of the railway</li> <li>• Generate qualifications for young talent that are recognized regionally and internationally</li> </ul>

### Risk Analysis:

The establishment of the Regional Centre of Railway Excellence faces several risks, with limited participation from Western Balkan region and lack of funding being the most critical.

Not all regional partners may be immediately willing or prepared to join the initiative, potentially limiting its reach and overall impact. To address this, a phased rollout strategy could be implemented, starting with early mover regions to demonstrate the initiative's success and encourage broader participation over time.

Additionally, securing sufficient funding, particularly for investment costs, remains a significant challenge. Without stable financial resources, the establishment and sustainability of the academy could be at risk. To mitigate this, efforts shall be focused on exploring alternative funding sources, such as international grants, public-private partnerships, and collaborations with international organizations. Encouraging regional partners to actively utilize the Centre and pool their railway training resources will also contribute to financial sustainability. This can include integrating train driver education and mandatory safety-related training for specialized railway functions.

Building a strong regional brand and partnering with established organizations, such as Deutsche Bahn and local educational facilities, will further strengthen the Centre's credibility and help secure long-term support.

### *Proposal for three different scenarios*

The three proposed scenarios for the Regional Centre of Railway Excellence highlight different approaches, each with varying levels of ambition, scope, and financial investment.

**Scenario 1, the Regional Coordination Unit with a Network of Universities**, offers a quick-start, low-investment option, ideal for immediate training needs. This scenario includes a small regional coordination unit hosted by a regional organization. Its focus is on providing regular trainings on EU standards in collaboration with a network of universities in the region and relying on their facilities to conduct the trainings. The target group are managers and supervisors

of regional railway companies, regulators and ministries who will serve as multipliers for their organizations in the implementation of EU norms and standards.

This scenario focuses on regional coordination, flexibility, and leveraging existing university networks, but its limited training scope and lack of branding power may restrict long-term impact.

**Scenario 2, the Regional Railway Institute in Cooperation with a University**, represents a partnership model establishing a Regional Institute hosted by a regional organisation and collaborating with one lead university while relying on a network of local universities and schools. This scenario offers broader training opportunities and a stronger focus on practical experience for university students based on existing training infrastructure by its partners. The target group are engineers, managers and supervisors of regional railway companies, regulators and ministries as well as students of partnering universities. The training focus will be on EU standards as well as modernization and digitalization of railway operations on a fully academic level.

Though requiring more time for planning, this scenario represents an approach with low investment, utilizing existing infrastructure while upgrading the academic training offer in the region and upskilling engineers.

**Scenario 3, the Regional Railway Academy**, presents the most ambitious vision. This model calls for a dedicated, independent institution with specialized training facilities and the capacity to offer both vocational and academic programs at various levels. The target group are technicians, engineers, managers and supervisors of regional railway companies, regulators and ministries as well as trainees who aim for a career in the railway sector. The training focus will be on full vocational training programs based on EU standards as well as on the full scope of upskilling training topics relevant for the region and the sector.

This scenario offers the greatest potential for long-term impact and regional training excellence, but its high investment requirements and extended preparatory phase need to be taken into consideration.

To mitigate the risks associated with these scenarios, particularly the lack of funding and limited participation, a long-term vision is essential. This vision should include convincing regional partners to pool their railway training resources and allocate national training funding to support the academy. A key component of this approach would be integrating train drivers' education and other mandatory, legally required safety-related training within the academy's scope, ensuring comprehensive coverage of essential railway functions.

**Based on this study, our recommendation is to consider a combination of Scenarios 1 and 3, following a gradual approach, starting with Scenario 1 to ensure the political momentum and transitioning towards Scenario 3 in the longer term. This may provide a pragmatic path to building the Regional Centre of Railway Excellence for the Western Balkan, ensuring both immediate and long-term success.**



# 02.

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## **Introduction and Project Context**



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## 2. Introduction and Project Context

The Western Balkan region with signing the Transport Community Treaty has committed to integrate their transport markets with the European Union and to the development of the extension of the TEN-T comprehensive and core networks to the Western Balkans, based on the relevant EU acquis and in line with the EU accession process.

The progress towards aligning with EU standards is a challenging but structured pathway where regional cooperation and knowledge transfer is a key instrument for meeting foreseen EU standards and implement policy requirements.

In line with the planned integration of the Western Balkan in the EU transport market, the participants at the Rail Excellence Summit in 2023 in Pristina and Doboj highlighted that the main challenge for development of rail transport in the Western Balkans is a lack of skilled human resources and an urgent need for additional training and education. The discussions at the summit emphasized the importance to support skilled human capital in the region and spur innovation and technological development in the rail sector. In this context, the establishment of a Regional Educational and Training Centre for Rail Excellence was proposed to educate and train on implementing EU standards and norms relevant to the rail sector and to support the modernization drive in the region.

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Jointly with DB Rail Academy, Transport Community aims to develop a concept Regional to enhance both the quality and availability of transport services through specialized training and capacity-building programs that align with EU standards. The Centre will focus on providing industry-specific technical qualifications and targeted professional development opportunities. Additionally, the curriculum should take a holistic approach, integrating governance, regulatory, economic, technical, and operational perspectives. The objective of this feasibility study is to analyze relevant factors and to provide different scenarios for establishing the Regional Centre for Railway Excellence.

This Scenario Analysis is the second deliverable and first task, which includes a detailed analysis of relevant factors regarding the evaluation of potential development pathways, including an assessment of three distinct scenarios. It outlines the methodology adopted by DB Rail Academy and provides a comprehensive analysis of legal requirements, economic factors, technical aspects & infrastructure, operational considerations, needs assessment, and stakeholder engagement. The analysis focuses on six regional partners: Albania, Bosnia and Herzegovina,



Kosovo, Montenegro, North Macedonia, and Serbia, looking at their respective institutions, transport systems, legal frameworks and training needs. The report serves as a foundation for decision-making by offering concrete insights and structured recommendations for the establishment of the Regional Railway Centre.



# 03.

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## **Approach and Methodology**



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### 3. Approach and Methodology

The Feasibility Study for the Establishment of a Regional Centre of Railway Excellence aims to provide a comprehensive analysis of the legal, technical, and economic conditions across the Western Balkan region. It will also offer different scenarios for establishing the Regional Railway Centre, supporting decision-makers in the public sector. To achieve these objectives, the study follows a structured methodology based on seven key work packages (WPs), incorporating extensive stakeholder engagement and expert interviews.

#### 3.1 Stakeholder Engagement & Expert Interviews

A crucial aspect of our methodology was active engagement with key stakeholders across the region. Firstly, the project team has identified all relevant stakeholders for the process and aligned with the client. Secondly, we have conducted structured interviews with representatives from railway undertakings, infrastructure managers, regulatory bodies, academia, and training institutions. The following table provides a comprehensive list of all organizations and institutions with whom we conducted interviews.

##### **Railway Companies and Infrastructure Managers**

- Albanian Railways (HSH)
- Albrail
- Railways of the Republic of Srpska (ZRS), Bosnia-Herzegovina
- Trainkos, Kosovo
- Infrakos, Kosovo
- Railway Infrastructure of Montenegro (ZICG)
- Public Enterprise for Railway Infrastructure of North Macedonia (MŽI)
- Railway Transport of North Macedonia (MZ Transport)
- Serbia Voz
- Serbia Cargo

##### **Regulatory and Educational Institutions**

- Railway Regulatory Body Kosovo
- Faculty of Mechanical Engineering (Polytechnic University of Tirana)
- Faculty of Traffic and Communications, Doboj (University of East Sarajevo)
- Faculty of Traffic and Communications, Sarajevo (University of Sarajevo)
- Railway Technical School (Belgrade)
- Faculty of Transport and Traffic Engineering (University of Belgrade)
- Faculty of Mechanical Engineering (University of Niš)
- Faculty of Civil Engineering, Ss. Cyril and Methodius University in Skopje

- Faculty of Civil Engineering, University of Montenegro
- Regional School of Public Administration (ReSPA), Montenegro

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**International Experts  
and Organizations**

- Deutsche Bahn AG/ DB Training
- European Union Agency for Railways (ERA)/ ERA Academy
- STAFFER Initiative
- Rail Cluster for South-East Europe (SEE)
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
- EBRD
- KfW Entwicklungsbank

These interviews provided valuable insights into the current challenges and opportunities in railway training and operations. During the interviews we considered all relevant information regarding strategic forecast of national railway system and cooperations scenarios within the Western Balkan region. Furthermore, we identified gaps in current training models and conducted a limited training needs analysis based on the provided input by the different stakeholders. In addition to the interviews, the team also conducted extensive research, analyzing online sources and relevant policy documents to gain a deeper understanding of the sector.

Additionally, DB Rail Academy experts explored cooperation opportunities between schools, academia and railway companies and analyzed existing projects in the region. They also investigated registration and certificates of each of the schools and university for potential cooperation scenarios.

Through intensive communication with all stakeholders, we have secured their participation in the project and information exchange. Additionally, the railway technical meeting with regional infrastructure managers took place on March 27–28, 2025 in Frankfurt am Main. During this event, we successfully presented and discussed the topic with a group of railway infrastructure managers from the Western Balkans. Participants were invited to share their insights through a survey, providing valuable perspectives. It became clear that there is strong interest in the initiative, with broad support for regional cooperation as well as for the involvement and assistance of a European highly developed railway system also to ensure a for strong brand of the future Centre. These findings have been incorporated into the report, further strengthening the stakeholder engagement process and ensuring that the development of the future Regional Railway Excellence Centre aligns with the needs and priorities of key industry actors.

Based on provided stakeholder input and desktop analysis the consultant has shaped the scenarios and prepared recommendations.



## 3.2 Work Package Implementation

Each work package was carried out systematically to ensure a comprehensive assessment:

- **WP 1:** Legal Requirements – A thorough desk research was conducted to map legal frameworks and regulations and evaluate certification recognition processes in each region.
- **WP 2:** Economic Factors – Data collection included an analysis of local cost structure, cost categories and cost scenarios for the Regional Centre as well as potential funding sources.
- **WP 3:** Technical Factors & Infrastructure – An assessment of existing training facilities, equipment, and potential gaps was undertaken to define infrastructure requirements.
- **WP 4:** Operational Factors – A benchmarking of current training programs against EU standards was carried out to identify priority areas for development.
- **WP 5:** Needs Assessment – Demand for railway training was analysed through structured interviews with railway companies and educational institutions.
- **WP 6:** Risk Assessment – Key risks and challenges associated with establishing and operating the Centre were identified and incorporated into scenario modelling.
- **WP 7:** Stakeholder Engagement – Ongoing collaboration with national and international partners ensured alignment with industry needs and regulatory requirements.

## 3.3 Scenario Analysis

The project team presents different scenarios for developing the Regional Railway Centre, as described in more detail in chapter 5. Each scenario was assessed based on its legal, operational, and infrastructure implications. This analysis was particularly relevant in the current macroeconomic and political context of the Western Balkans, ensuring a comprehensive understanding of risks and preconditions that could influence the project's feasibility and sustainability. Based on the findings from all work packages and the developed scenarios, the project team will formulate a roadmap for the most relevant scenario as a next step.



# 04.

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## Analysis



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## 4. Analysis

### 4.1 Legal Requirements

#### 4.1.1 EU regulations relevant for the Railway Training Centre

EU railway regulations focus on ensuring safety, interoperability, market liberalization, and fair competition across member states. The framework is primarily based on the EU Railway Directives, which establish common rules for railway safety, infrastructure access, and licensing. The Fourth Railway Package, adopted in 2016, aims to complete the single European railway area by opening domestic passenger markets to competition and streamlining safety certification and vehicle authorization through the European Union Agency for Railways (ERA).

Key regulations include Directive (EU) 2016/798 on railway safety, which mandates that railway undertakings and infrastructure managers establish safety management systems and obtain safety certificates. Directive (EU) 2016/797 on railway interoperability sets technical standards through Technical Specifications for Interoperability (TSIs) to ensure seamless cross-border operations. Directive (EU) 2012/34 establishes a single European railway area by regulating track access, non-discriminatory pricing, and competition. Annex 3 of this report provides an overview of relevant EU regulations and norms to be considered in this context.

Train driver licensing follows Directive 2007/59/EC, requiring standard qualifications, medical fitness, and periodic assessments. The Regulation on the European Rail Traffic Management System (ERTMS) ensures harmonized and communication across networks. Member states implement these regulations through national railway authorities, with the ERA overseeing coordination and compliance at the EU level.

#### ***EU Train Driver Training Requirements***

Train drivers must undergo structured training that includes general railway knowledge, specific operational rules, and route knowledge. Training is divided into:

- General Professional Training – covering EU railway regulations, safety principles, and communication procedures.
- Infrastructure and Rolling Stock Training – specific to the network and vehicles they will operate.
- Practical and On-the-job Training – under the supervision of certified trainers.

#### ***Other Railway Personnel Training***

EU regulations, including Regulation (EU) 2019/773 on operational safety and TSIs, define training requirements for other key railway roles such as conductors, dispatchers, and maintenance staff. These roles require:

- Initial and periodic training on safety procedures, emergency response, and interoperability standards.
- Competency assessments and refresher courses to maintain qualifications.
- Certification by accredited training Centres in compliance with national and EU regulations.

The European Union Agency for Railways (ERA) oversees harmonization of training requirements, ensuring standardization and mutual recognition of qualifications across member states. Training of railway staff at the EU level is crucial for safety, compliance, efficiency, customer service, and technological adaptation, all of which contribute to the creation of a more interconnected and sustainable European railway network. To fully align with all EU standards, all railway companies from the Western Balkan must train their people and create the relevant environment. Therefore, a regional approach regarding providing training is highly relevant.

To fully understand the national legal preconditions for training of railway staff, certification and licensing process, an extensive analysis of the six partners has been conducted. The detailed analysis can be found in Annex 2: Overview of the legal framework by region.

Within this report, a multi-criteria analysis was also conducted in chapter 4.6, building upon the findings presented here and the European Commission's 2024 Enlargement Reports, which provide a comprehensive evaluation of the region's progress toward EU accession. Emphasis was placed on the implementation of EU railway legislation, with scores assigned to reflect the level of compliance and advancement in aligning railway regulations with EU standards.

#### **4.1.2 Overview of approval and recognition processes for training programs as relevant to the provision of training programs at the Regional Training Centre**

The following table provides an overview of the relevant terminology and options for the recognition process of the Regional Centre.



What it is	Target Group	Purpose	Who Provides It	Recognition
<b>1. Certification</b>				
<b>Recognition that an individual has achieved specific competencies or learning outcomes</b>	Individual learner	Confirms that a person meets required skill/competency standards	<b>Training providers, assessment bodies, or qualification awarding bodies</b> (e.g., National Training Authority, Sector Skills Councils, TVET Examination Boards)	<p>The Regional Centre can directly provide “certification of participation” for any upskilling programs. These certificates prove that participant took part in the regional training but has no formal or legal implication. It needs to be ensured that these certificates are recognized by the different national railway providers. Furthermore, based on bilateral agreements and adherence to EU rules and regulations, the formal responsibility for any legally required training modules as part of the formal education or as part of the upskilling of staff can also be transferred to the Academy in the future. Whether these future certificates might also be accepted by the EU, will need to be confirmed with ERA in due course. Additionally international certification can be provided, e.g. by TÜV or other internationally recognized certifying organizations.</p>

What it is	Target Group	Purpose	Who Provides It	Recognition
<b>2. Accreditation</b>				
<b>Evaluation and formal approval of training institutions or specific programs</b>	Training provider or program	Assures quality and compliance with national education/training standards	Accrediting agencies, national qualification authorities, or TVET regulatory bodies (e.g., TVET Council, National Accreditation Boards)	The new Training Centre has to be accredited with the national qualification authorities as a formal training provider. This can only be confirmed on a national level of the hosting region since there is no regional accrediting body.
<b>3. Licensing</b>				
<b>Legal authorization to act as Infrastructure Manager, Railway Undertaking or Train Driver</b>	Institution or individual	Ensures legal compliance and professional standards	Regulatory bodies, or professional licensing authorities (e.g., Ministry of Education, Ministry of Labor, National TVET Authority)	The Train Driver Licensing process is currently formalized on national level. Yet based on the model of the EU train driver's license, a similar model can be foreseen for the future. Furthermore, the Regional Academy could provide the train driver license holder with regular/updates training which are foreseen by national and EU legislation.

### 4.1.3 National Legal Requirements in Western Balkan

For the purpose of establishing a Regional Railway Excellence Centre, the legal landscape governing the railway sector as well as educational institution and training Centres in the Western Balkan had to be evaluated. The aim is to understand all provisions regarding accreditation of training Centres, the certificates and licenses that need to be obtained when it comes to railway occupations, especially train drivers. The legal framework has been investigated regarding future recognition of certificates issued by the Regional Railway Excellence Centre.

The detailed analysis of all six Western Balkan partners can be found in Annex 2: Overview of the legal framework by region.

Visa regime between some regional partners might be relevant for selecting the location. Currently there is a visa requirement between Bosnia and Hercegovina and Kosovo which does not allow free movement of people and professionals. Kosovo has lifted the visa requirement since January 2025 but there is still no reciprocity to be expected by Bosnia and Hercegovina. All other regions do allow free movement of people without any visa requirements.

#### ***Vocational Education and Training (VET) Systems***

Vocational Education and Training (VET) across the Western Balkans is structured to align with labor market needs and economic development.

In **Albania**, VET is regulated by Law No. 15/2017, offering a 2+1+1 structure that leads to a vocational certificate and State Matura. It includes vocational schools and short-term training Centres (VTCs), with the National Agency for VET and Qualifications (NAVETQ) ensuring quality assurance, while the Ministry of Finance and Economy oversees policy. Funding comes from state budgets, provider income, donor contributions, and sponsorships.

In **Kosovo**, VET is supervised by the Ministry of Education and Science, with employment-related training managed by the Ministry of Labour and Social Welfare. The Agency for Vocational Education and Training and Adult Education (AVETAE) oversees public institutions, including 76 vocational schools and competence Centres in Ferizaj and Prizren, which drive modernization efforts and employment-oriented skill development.

In **Montenegro**, adult education is managed by the Ministry of Education, with training provided by schools, specialized Centres, and private institutions. Licensing is granted by the Ministry to ensure compliance with educational laws, and railway vocational training must meet legal requirements for personnel, equipment, and facilities.

**Bosnia and Herzegovina** follows a decentralized VET model, with different ministries and institutions overseeing training, which is provided by schools, NGOs, and businesses. The Adult Education Centre (AEC) ensures verification, and in Republic of Srpska, VET aligns with EU

regulations. Railway training Centres must adhere to strict legal standards to maintain impartiality.

**North Macedonia** integrates adult education into its broader education system, emphasizing workforce development and social integration. The Adult Education Centre (AEC) manages quality control, while railway certification aligns with EU standards.

**Serbia's** VET system operates under the Law on Adult Education, incorporating both formal and non-formal training. The Ministry of Education, Science and Technological Development oversees adult education, ensuring compliance with national policies. Railway vocational training is governed by the Railway Law and the Law on Railway Safety, with the Railway Directorate managing licensing and compliance with EU regulations.

### ***Railway Regulations***

Railway training and certification in the Western Balkans align with EU standards to ensure safety, interoperability, and compliance with regulatory requirements.

In **Albania**, professional training and licensing of train drivers are regulated by the Railway Code and Railway Safety Authority Law. The Railway Regulatory Authority oversees market competition and infrastructure access, while the Railway Safety Authority ensures licensing and compliance. Train driver licenses are valid for ten years, with ongoing training obligations. Currently there are no trainings provided, since the rules for trainings are rewritten and the railway companies cannot meet standards defined in the Guideline for training issued by the Ministry of Transport. Foreign train driver licenses are only recognized through bilateral agreements.

**Kosovo** follows the Railway Law, with the Railway Regulatory Authority (RRA) managing licensing and safety certification. Infrastructure managers and railway undertakings must meet EU standards, while train driver licensing requires compliance with Technical Specifications for Interoperability (TSIs). Foreign train driver licenses are only recognized through bilateral agreements.

**Montenegro's** railway sector is centrally managed by the infrastructure manager, with the Railway Regulatory Body overseeing licensing and safety compliance. Certifications require renewal every two years to ensure continuous professional development. Foreign train driver licenses are only recognized through bilateral agreements.

In **Bosnia and Herzegovina**, the railway sector operates under a dual system, split between the Federation of Bosnia and Herzegovina (ŽFBH) and the Republic of Srpska (ŽRS), coordinated by the Railway Regulatory Body (RRB). This body oversees international regulations, licensing, and safety compliance, while training Centres must be authorized and meet strict technical standards defined through rulebooks issued by the respective Transport Ministry of the entity. Foreign train driver licenses are only recognized through bilateral agreements.



The railway regulations of **North Macedonia** require licensing and certification through the Railway Regulatory Agency and Railway Safety Authority. Train drivers and railway workers must fulfill specific training and health criteria, with foreign train driver licenses recognized only through bilateral agreements.

**Serbia's** railway sector follows EU directives, with the Railway Directorate managing licensing, safety authorizations, and certification. Railway training Centres must comply with strict legal requirements, with certifications valid for five years. The professional competence of railway workers is assessed every two years, and foreign train driver licenses are only recognized through bilateral agreements.



### Conclusion

Based on the legal analysis, all six regions and all national educational facilities are equally relevant to host the Training Academy. The described legal framework and limits apply to all of them.

Alignment with national VET and railway safety laws and rulebooks on railway training centres is a relevant requirement for the regional Training Academy. So far there is no evidence of regionally issued certificates, which were recognized as railway sector specific training requirements, since the interviewees confirmed only national certification. Yet, on legal level, this is not prohibited.

Depending on the scope of work/the selected scenario of the future regional training centre (see chapter 5) the requirements for accreditation of the Centre and offered curricula (including trainers) may change. This needs to be assessed in detail based on the selection of scenario and host region.

In this regard it should be considered partnering with nationally accredited VET centres, academic centres or railway training institutions due to existing accreditation of those.

While professional/upskilling training programs could be provided by the Regional Training Academy, it is relevant to consider that the curricula and training facility meet the minimum requirements that are defined for the training centres of the railway companies (both

Infrastructure Manager and Operator). If this is met, then the Regional Academy could provide a training evidence “confirmation of participation” which would be regional accepted.

Yet, issuing regionally accepted train driver licenses by the Regional Academy would necessitate intergovernmental bilateral agreements and influence national licensing bodies roles and responsibilities.

## 4.2 Economic Factors

### 4.2.1 Analysis of Local Cost Structures

As part of the assessment of economic factors for the establishment of a Regional Centre of Railways Excellence, relevant macroeconomic indicators for the Western Balkans have been collected. These include Gross Domestic Product (GDP) per capita, projected economic growth rate for 2025, inflation rates, unemployment rates, average monthly gross salaries, the cost-of-living index and public debt. The objective is to identify the most cost-effective location for the centre, considering both macroeconomic conditions and local cost structures. The following table provides an overview of different economic indicators:

Category	Albania	Bosnia & Herzegovina	Kosovo	Montenegro	North Macedonia	Serbia
<b>GDP per capita (€ in PPP) [1]</b>	12,79	12,77	9,97	18,98	14,68	16,31
<b>GDP growth rate for 2025 in % [2]</b>	3,4	3,2	3,9	2,5	3,5	4,2
<b>Forecast Inflation rates (avg. %) [3]</b>	> 3	~ 2	-	-	~ 2	3,7
<b>Average unemployment rate (in %) [1]</b>	10,7	13,2	12,4	13,1	13,1	9,5
<b>Average monthly gross salary (€) [1]</b>	694	955	610	987	892	1001
<b>Cost of living index [4]</b>	44,8	36,4	29,4	37,9	34,6	42,1
<b>Public Debt (% of GDP) [3]</b>	55.1	36.8	-	72.8	53.9	48.0

The economic performance in the region varies significantly. Montenegro has the highest GDP per capita, followed by Serbia and North Macedonia, while Kosovo and Bosnia and Herzegovina show the lowest values, indicating different levels of prosperity. These differences are crucial when evaluating the overall cost structure of a potential Regional Centre of Railways Excellence. Projected GDP growth rates for 2025 range from 2.5% (Montenegro) to 4.2% (Serbia), with Kosovo showing a relatively strong forecast of 3.9%. This suggests a moderately growing regional

economy. Inflation rates and unemployment levels also differ, but these indicators generally reflect the region's evolving economic conditions and stability.

A significant factor in determining the cost-effectiveness of the centre is the wage structure. Average gross salaries in the region range from €610 in Kosovo to €1,001 in Serbia, highlighting considerable wage differentials. Kosovo stands out with the lowest wages, which could contribute to reduced labor costs for the regional centre. Additionally, Kosovo also benefits from the lowest cost of living index (29.4), compared to higher values in other regions like Albania (44.8) and Serbia (42.1). These lower costs would help minimize both operational expenses and living costs for employees and trainees, making Kosovo an attractive option. Kosovo's economic profile is further strengthened by its above-average GDP growth and moderate unemployment rate of 12.4%. Despite its lower GDP per capita, Kosovo offers an affordable environment for running a training centre, with significant savings on wages and general expenses.

In contrast, while Serbia and North Macedonia have higher GDPs and slightly stronger growth rates, their higher wages and cost of living indices make them less cost-effective choices. Montenegro, despite its higher GDP per capita, faces lower growth projections and a higher cost of living, further limiting its appeal as a potential location.

From a macroeconomic stability perspective, Kosovo's relatively low wages and cost of living provide a favorable balance between affordability and economic viability. While Montenegro has the highest GDP per capita (€18.98), its high salaries (€987) and low GDP growth rate (2.5%) indicate a less favorable cost structure. Similarly, Albania and Bosnia & Herzegovina have moderate costs but do not offer the same level of affordability and workforce availability as Kosovo.

While there are minimal economic differences between the Western Balkan region, none of the factors present a decisive advantage for one specific location. Each region presents a mix of benefits and challenges, such as cost efficiency in Kosovo and Bosnia and Herzegovina, economic stability in Serbia, and moderate wages in North Macedonia and Montenegro. Given these relatively balanced economic conditions, the final decision should be guided by a combination of factors, including logistical considerations, accessibility, and regional partnerships.

Key economic aspects to consider include:

- **Cost Efficiency:** Kosovo and Bosnia and Herzegovina offer lower labor and living costs, making them financially attractive.
- **Economic Growth:** Serbia and Kosovo have the highest growth rates, indicating long-term stability and development potential.
- **Labor Market:** Higher unemployment rates in Bosnia and Herzegovina (13.2%) and Montenegro (13.1%) may lead to a greater supply of qualified personnel.





### Conclusion

While no single region has a crucial economic advantage to host the Centre, Kosovo could present the most cost-efficient option from an economic point of view. The combination of low wages, affordable living costs, and strong economic growth prospects positions Kosovo as a relevant location, ensuring long-term sustainability while offering significant cost savings compared to other regional options.

## 4.2.2 Defined Cost Categories and Cost Scenarios

The cost categories associated with the establishment of any training centre or academy can be divided into two main categories: capital expenditures (CAPEX) and operating expenses (OPEX).

- **CAPEX** includes investments in long-term assets required to launch the Academy. This primarily involves expenses related to infrastructure and technological setup: building costs, procuring equipment, acquiring software, and establishing IT infrastructure and portfolio development.
- **OPEX** encompasses the ongoing costs associated with the day-to-day operations of the Academy. This includes expenses for staff salaries, administrative and maintenance costs, expenses for program implementation.

In the following table, we present a general breakdown of CAPEX and OPEX associated with the establishment and ongoing activities of a training centre. For the Regional Centre of Railway Excellence, the exact cost categories depend on the choice of scenario. Core cost drivers are usually investment costs in the building by either constructing or renovating it, procurement and maintenance costs of specialized technical equipment and staff costs.

### CAPEX

#### Building Infrastructure & Construction

<b>Costs for building</b>	All expenses related to the construction. This includes site preparation, structural materials, labor, architectural and engineering fees, permits, and compliance with local building regulations. It covers landscaping, parking, and safety features like fire protection systems
<b>Investment in furniture for training rooms</b>	Chairs, tables, whiteboards and storage units

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**Costs for setting up physical labs & technical workstations, or any infrastructure related to simulation-based training**

Laboratory benches, technical tools, measurement and special railway equipment, and computers with specialized software (e.g. pantographs, brake systems, doors, water supply systems, rolling stock components, engines; for outside area section of track (sleepers, rails), power transmission lines, rolling stock)

**Multimedia & technology**


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**Training tools & software**

Covers the acquisition of specialized tools and software essential for skill development and interactive learning. This includes software for learning management systems (LMS), content creation tools, and railway-specific applications. It may also involve licenses for simulation programs and platforms that support both in-person and remote training.

**Projectors, smartboards, VR/AR technology**

Includes the costs for digital projectors, interactive smart boards, and associated accessories. Also investment in virtual and augmented reality equipment, such as VR headsets, AR glasses, motion sensors, and compatible devices. This category also includes software for creating immersive simulations.

**Audio-visual conferencing systems**

Involves the setup of AV equipment for remote and hybrid learning, including high-quality cameras, microphones, speakers, and conference software.

**Equipment & Hardware**


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**Purchase of computers, servers, and networking infrastructure**

Includes costs for acquiring computers, laptops, and workstations for both administrative and training purposes. This category also covers high-performance servers for data storage and processing, along with essential networking equipment like routers, switches, firewalls, and cabling

**Specialized training equipment (simulators, etc.)**

Specialized equipment tailored for railway hands-on training in specific skill areas (e.g. simulators for train drivers)

**Portfolio development**


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**Training development**

Investment in expanding the Academy's training offerings (designing, updating, and refining training programs). This may involve designing innovative programs and creating a diversified portfolio of courses that align with industry trends

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and organizational goals.

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**Development or purchase of training materials, courseware, textbooks, or other physical or digital resources**

Involves costs for creating or purchasing the resources needed to support training activities. This includes for example textbooks, manuals, e-learning modules, and multimedia content.

## **OPEX**

### **Operations**

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**Expenses for electricity, water, heating, cooling, and internet**

Covers the recurring expenses for essential services that ensure a comfortable and functional training environment. This includes electricity for lighting and equipment, water for daily operations, heating and cooling to maintain optimal temperatures, and reliable internet connectivity for digital resources and communication

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**Waste disposal and building cleaning services**

Involves the costs associated with regular waste management and cleaning services to maintain a safe and hygienic environment. This includes daily cleaning of training rooms, offices, and common areas, as well as the disposal of waste in accordance with environmental regulations and best practices

### **Staff**

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**Salaries for trainers and instructors, admin staff, IT support, etc.**

Encompasses the ongoing salary and benefits for all personnel involved in the academy's operations. This includes trainers and instructors who deliver the courses, administrative staff who handle logistics, and IT support personnel responsible for maintaining digital and technical systems

### **Building Support**

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**Ongoing maintenance of buildings, including repairs to training equipment and technical installations**

Covers regular upkeep and repair costs to ensure that the facilities and equipment remain in good condition. This includes repairs to physical infrastructure, such as plumbing, electrical systems, and HVAC, as well as any technical installations critical to training

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<b>IT support and maintenance</b>	Refers to the continuous technical support and maintenance services required to keep IT infrastructure operational. This includes troubleshooting, software updates, hardware replacements, and cybersecurity measures to protect systems and data
<b>Other expenses</b>	
<b>Ongoing costs for software licenses, online training platforms, or digital libraries</b>	Includes the recurring expenses for software subscriptions, licensing fees, and access to digital platforms or libraries. This category covers tools essential for course delivery, digital learning resources, and any specialized software required for training programs
<b>Travel expenses for trainers</b>	Covers the costs of travel for trainers and instructors, which may include transportation, accommodation, and meals. This is particularly relevant for off-site training sessions, conferences, or industry events
<b>Event costs</b>	Includes any additional costs for hosting events at the Academy, such as catering costs, external technical equipment for the events etc
<b>Insurance</b>	Involves regular premiums for various insurance policies, including liability insurance, property insurance, and health and safety coverage. These policies are essential to protect the academy from unforeseen risks and liabilities
<b>Marketing</b>	Ongoing marketing expenses to promote the academy's programs and attract participants. This includes digital advertising, printed materials, social media campaigns, public relations efforts, and partnerships
<b>Logistics</b>	Covers logistical expenses necessary for the smooth operation of the academy. This may include costs related to transporting materials and equipment, organizing events, managing inventory, and coordinating training schedules
<b>Others</b>	A flexible category for any additional, unforeseen costs that may arise in the course of daily operations. This could include emergency repairs, special event costs, or temporary staffing needs, providing a buffer to cover any unexpected operational requirements



**Example: Trainer Fees in Serbia, North Macedonia and Montenegro**

The costs for trainers in Serbia, North Macedonia, and Montenegro have been categorized based on experience levels:

Category	Daily rates (€)
<b>Public Officials</b>	100-150 EUR
<b>Up to 5 years of experience</b>	150-200 EUR
<b>5-10 years of experience</b>	200-250 EUR
<b>Plus 10 years of experience</b>	250-400 EUR
<b>International Experts</b>	500-1000 EUR

**Conclusion**

Cost categories to be considered for the Centre include different investment and operational costs and depend on the scenario option. The development of a clear business plan will need to be at the start of planning and implementation of the Centre. Funding should be provided by the participating Governments in the region with external donor funding sources also considered particularly for the initial investment costs but also for support for the operation of the Centre. Taking into account the limited financial resources of railway companies in the region, additional external funding streams could ensure that training courses can be subsidized. Furthermore, external funding streams can also be generated through training offers for the private sector on a fee basis.

**4.2.3 Mapping of Potential Funding Sources**

The Western Balkans region benefits from a variety of financial and technical instruments designed to support socio-economic development, infrastructure projects, and private sector growth. These funding mechanisms include technical assistance as well as grants, loans, guarantees, and equity financing provided by European and international financial institutions. The following sections provide examples of funding opportunities potentially available for the Regional Centre of Railways Excellence for the Western Balkans. The exact funding formalities

will need to consider based on the Scenario chosen and during the planning phase of the project. The chapters below focus on higher volume financial assistance. Additional to these, there are also additional frameworks in the educational sector such as Erasmus+, Europe Horizon or the Connecting Europe Facility.

### ***Western Balkans Investment Framework (WBIF)***

The Western Balkans Investment Framework (WBIF) serves as a financial platform that coordinates and harmonizes investments for economic growth in the region. Established in 2009, it is a joint initiative of the European Union, financial organizations, bilateral donors, and beneficiary countries. As the primary instrument for implementing the EU's Economic and Investment Plan for the Western Balkans, the WBIF plays a crucial role in mobilizing resources for development. Furthermore, it forms an integral part of the Western Balkans Growth Plan, helping to distribute financial resources through the Reform and Growth Facility. [5]

Funding provided through the WBIF mainly consists of grants for infrastructure, digitalization, environmental projects, energy, transportation, and private-sector initiatives. It will need to be discussed with the WBIF coordinators if this funding can apply to the future Academy and under which conditions.

### ***Economic and Investment Plan (EIP) for the Western Balkans (2021-2027)***

The Economic and Investment Plan (EIP) for the Western Balkans was designed to attract both public and private investment to the region. Supported by the Western Balkans Guarantee Facility, the plan seeks to enhance regional economic integration and ensure financial stability.

It consists of the following different packages:

Program	Funding	Priorities
<b>IPA III</b>	€9bn	Infrastructure, digitalization, regional market integration, human capital development, entrepreneurship, European Green Deal, governance, and rule of law
<b>Western Balkans Guarantee Facility</b>	€20bn	Private investment support through guarantees for economic risk mitigation
<b>Covid-19 EU Support Package</b>	€3.3bn	Support for health sector, business and public sector, socio-economic recovery and transport of equipment

IPA III and the Western Balkan Guarantee Facility are under the Multi-annual Financial Framework 2021-2027. Applications for the EIB can only be submitted via the WBIF. [6]

The economic and investment plan for the Western Balkans consists of the following instruments: the Western Balkans Enterprise Development and Innovation Facility (EDIF), the Regional Energy Efficiency Programme (REEP), the European Fund for Southeast Europe (EFSE) and the Green for Growth Fund (GGF).

Instrument	Objective	Main Focus	Partner Organizations
<b>WB EDIF</b>	Supporting SMEs by improving access to financing	Equity financing, guarantees, advisory services	EIB, EBRD, EIF
<b>REEP</b>	Enhancing energy efficiency and promoting renewable energy	Financing technical assistance, policy support	WBIF, ERBD, KfW, EU Commission
<b>EFSE</b>	Promoting entrepreneurship and economic development	Micro and small business financing via local banks	Local financial intermediaries, EU
<b>GGF</b>	Reducing energy consumption and CO2 emissions	Loans for sustainable energy projects via local partners	EIB, KfW, EU

### ***New Growth Plan for the Western Balkans***

An additional financial mechanism supporting the region is the New Growth Plan for the Western Balkans, which is based on the Economic and Investment Plan described above. This initiative aims to accelerate economic development, promote structural reforms, and facilitate the region's gradual integration into the European Union.

To achieve these objectives, a total of €6 billion has been allocated, consisting of €2 billion in grants and €4 billion in loans. These funds originate from the Multiannual Financial Framework (MFF) and additional EU programs such as the Recovery and Resilience Facility. The financial support will be distributed through the Reform and Growth Facility, ensuring targeted investments in strategic areas. [7] The Reform and Growth Facility is a funding instrument for the Western Balkans (2024-2027) aimed at accelerating economic convergence and integration with the EU. This facility complements IPA III and is a key part of the Western Balkans Growth Plan, linking funding to concrete reform commitments.

### ***Council of Europe Development Bank (CEB)***

The Council of Europe Development Bank (CEB) is a founding member of the WBIF and provides financing instruments to support projects across the Western Balkans. The bank offers grants,

loans, and interest rate subsidies to a range of eligible borrowers, including governments, municipalities, and financial institutions. Each loan is customized based on the specific requirements of the project and developed in collaboration with the CEB.

Project financing options include project loans, program loans, the European co-financing facility, public financing instruments, and cross-sector loans. Applications must include a detailed project description, a sustainability assessment, and a financial plan, specifying estimated costs and funding requirements.

### ***KfW Development Bank***

The KfW Development Bank and its subsidiary DEG finance development and economic projects across the Western Balkans. KfW primarily supports infrastructure, climate, and environmental projects, as well as the development of sustainable economic structures, employment promotion and vocational training. The institution provides financial instruments such as grants, development loans, and promotional loans.

KfW already funds the upgrading of vocational training schools in the region, for instance in the context of the new “Good Jobs for Serbia” Program. Therefore, they could be a relevant option for funding the planned Regional Centre. Additionally, there is the Regional Challenge Fund (RCF) which is a KfW financing instrument for strengthening vocational training and improving labor force development. It provides funding between €150,000 and €600,000 per project, supporting initiatives that improve technical skills and labor market integration. Applicants must demonstrate a collaborative approach by involving at least one vocational training Centre and two companies. [8]

### ***European Bank for Reconstruction and Development (EBRD)***

The European Bank for Reconstruction and Development (EBRD) provides loans ranging from €3 million to €250 million, based on current market interest rates. The Western Balkans is a priority region for the EBRD. Today, the EBRD remains one of the largest institutional investors in countries of the region, with more than €18 billion invested to date.

The Bank focuses on financing sustainable infrastructure and strengthening regional connectivity, and they will also continue encouraging the transition to more rail transport, especially by financing the main European and regional corridors. During the data collection phase of this report, EBRD coordinators were interviewed, and they showed a great interest in the future project of a Regional Training Centre.





### Conclusion

There are multiple funding instruments available, including financial and technical assistance and several programs focusing on the transport sector, the transformation to a stronger rail sector and on education. Depending on the Scenario, the timetable, the needed volume and the funding plan need to be developed in the next step. There certainly will be a need for support for the investment phase as well as more limited support for the operational costs of academy.

## 4.3 Technical Factors

This chapter focuses on defining the infrastructure requirements and identifying the necessary equipment for the establishment of the Regional Centre of Railway Excellence. A crucial part of this process is assessing the existing railway infrastructure, training facilities, and technical equipment across the region. The goal is to identify gaps and opportunities for upgrading technical capacities, ensuring that future training meets international railway standards and modern operational needs.

### 4.3.1 Infrastructure Overview

As described in the methodology chapter, a detailed data collection process was conducted, engaging multiple stakeholders from railway infrastructure companies, railway operators, academic institutions, and regulatory bodies in the region. The assessment revealed substantial variations in infrastructure development and technical capacity.

The railway infrastructure in the region varies significantly in terms of electrification, modernization, and available training facilities. Several electrification projects are ongoing or planned, aiming to expand electrified railway networks and modernize rolling stock and maintenance depots:

- Albania Railway is working towards electrifying 42 km of railway by 2025, with a long-term plan to extend to 120 km.
- Montenegro has 167 km of mostly electrified railway, though it lacks high-speed trains, test tracks, and simulators.
- North Macedonia has a railway network of approximately 900 km, but not all sections are functional, with plans for expansion and electrification in the coming years.
- Serbia Voz is modernizing its depots and electrifying tracks, with new infrastructure for Stadler and CRRC train maintenance under construction.

These modernization efforts highlight the need for updated training infrastructure to keep pace with new technologies and operational demands.

### 4.3.2 Existing Training Equipment

A review of training institutions and railway companies revealed significant disparities in the availability of training equipment. Across the region, railway operators reported that they do not have any dedicated technical training infrastructure. Instead, they rely solely on classroom-based theoretical training and on-the-job learning. Many companies emphasized the lack of modern simulators, test tracks, and specialized maintenance training facilities, which limits the effectiveness of workforce development and hinders practical skills acquisition.

- Serbia: *Železnicka Tehnicka Skola* has some simulators, but there are simulators that are rented from a German company “Die Länderbahn” only available to students two times a year and a braking laboratory access, but its workshops are outdated. The *Faculty of Transport and Traffic Engineering in Belgrade* has a computer lab and simulation software but lacks a fully integrated practical curriculum. The *Faculty of Mechanical Engineering, University of Nis* offers specialized labs for surface roughness and railway vibration measurements, along with dedicated computer labs. It is equipped with advanced equipment and software for comprehensive railway testing and analysis. *Srbija Voz* is modernizing training capabilities, prioritizing advanced simulators.
- Bosnia and Herzegovina: Some universities have laboratory facilities and plan to acquire simulators through external funding. The *University of East Sarajevo in Dobo*j has training facilities, computer lab and classrooms, but lacks railway-specific equipment. The *Faculty of Transport and Communications, University of Sarajevo* has classrooms and computer labs, but lack research laboratories, sufficient equipment and possible training facilities. *Željeznički Skolski Centar in Sarajevo* has laboratory for hydraulics and pneumatics, classrooms, workshops and computer labs.
- Albania: The *Faculty of Mechanical Engineering, University of Tirana* has Physical-Mechanical Laboratory and CAD/CAM Technology Laboratory but lacks workshops and relies on partnerships with national railway companies for internships. The *Faculty for Civil Engineering, University of Tirana* includes laboratories that are related to Civil Engineering studies, such as Geodezy and Geomatics Laboratories and Computer Laboratories.
- Kosovo: *Trainkos* operates training programs but lacks simulators and advanced equipment.
- North Macedonia: The *SUGS Vlado Tasevski* offers classroom trainings and has laboratory facilities similar to the *Faculty of Civil Engineering of the University in Skopje*, that has different labs (computer, geotechnical, lab for steel and metal structures).
- Montenegro: Classrooms and computer laboratories exist, but there is a general lack of train test tracks, simulators, and specialized maintenance training facilities.



### Conclusion

The availability of training equipment and infrastructure for railway education varies across the region. While some institutions have access to simulators, laboratories and specialized equipment, many rely primarily on theoretical classroom instructions and on-the-job training. The lack of modern simulators, test tracks, and dedicated training facilities limits the practical skills development of railway professionals. Efforts are being made to modernize training capabilities, but overall, the need for substantial investment in technical training infrastructure remains to enhance workforce preparedness and industry standards. Most advanced technical training infrastructure by universities as well as operators can be found in Serbia, Bosnia-Herzegovina, followed by North Macedonia.

#### 4.3.3 Identified Gaps and Challenges in Training Infrastructure

From the assessment, several key infrastructure gaps have been identified:

- **Lack of Standardized Training Facilities:** While some institutions have access to railway equipment, there is no uniform standard across the region. Many universities rely on external internships rather than in-house practical training.
- **Limited Availability of Simulators:** Most institutions lack simulators, which are essential for modern railway training. Planned acquisitions in Serbia and Bosnia and Herzegovina will help bridge this gap but remain insufficient for regional needs.
- **Aging Infrastructure and Equipment:** While electrification projects are ongoing, outdated depots, maintenance facilities, and rolling stock limit training effectiveness.
- **Insufficient Practical Training Capacity:** Many institutions offer theoretical education but lack the necessary workshops and technical tools to provide hands-on experience.

#### 4.3.4 List of Requirements for the Training Infrastructure

To implement the proposed improvements, a detailed list of infrastructure requirements is essential based on the chosen Scenario, covering:

1. Modernized workshops equipped with railway-specific tools and machinery.

2. Full-scale and desk-based simulators for practical training.
3. Electrified test tracks for hands-on operation and maintenance exercises.
4. Upgraded depots and maintenance facilities.
5. Digital training tools and software for railway operations and traffic management.
6. Collaboration spaces for joint training programs and research initiatives.

#### 4.3.5 Overview of Equipment and Costs

A comprehensive equipment and cost overview is necessary to plan and allocate funding effectively. The implementation of a fully equipped training Centre requires significant investment in key technical equipment:

Equipment	Estimated Cost Range	Purpose
<b>Full-scale train simulators</b>	€500,000 – €1,500,000	Hands-on driver and operational training
<b>Desk-based simulation systems</b>	€50,000 – €200,000	Cost-effective training for theory and basic operations
<b>Railway braking laboratory</b>	€100,000 – €300,000	Hands-on training for braking system operations and maintenance
<b>Electrification training kits</b>	€50,000 – €150,000	Teaching railway electrification principles
<b>Track maintenance tools and machines</b>	€200,000 – €500,000	Practical training in track repairs and maintenance
<b>Digital learning platforms</b>	€20,000 – €100,000	Online and interactive training support
<b>Rolling stock (used for training)</b>	Variable (depends on availability)	Practical training on real train components
<b>Workshop modernization and equipment</b>	€500,000 – €2,000,000	Upgrading outdated facilities





### Conclusion

The new Regional Centre can play a key role to provide and showcase modern equipment and training infrastructure that does not exist on local level. Based on the Scenario to be chosen, there are collaboration efforts envisioned to also utilize training infrastructure that already exists, for instance by universities, railway schools as well as railway companies.

## 4.4 Operational Factors

### 4.4.1 Analysis of Universities and Educational Curricula

This chapter presents an analysis of universities, technical schools and other educational institutions in the Western Balkan region that could potentially contribute to the establishment of a Regional Railway Centre of Excellence. The analysis is based on a comparison of educational institutions offering programs in Civil Engineering, Mechanical Engineering, Transport, and Traffic Studies, as well as the specific programs that technical and vocational schools offer. The goal is to focus on the key criteria such as the relevance of railway engineering in the programs, duration of programs, curriculum structure, collaboration with relevant railway operators, EU standards alignment etc. The institutions analyzed in this study are diverse in terms of their educational levels (vocational high school, faculty, academies etc.), specialization in railway engineering and connections to railway industry etc. Below is an overview of the key institutions that were analyzed:

#### **Albania:**

- Faculty of Civil Engineering, Tirana: This Faculty offers comprehensive education in civil and construction engineering. While the Faculty provides a solid foundation in various civil engineering disciplines, it does not specialize in railway engineering. It aligns its curriculum with EU standards through participation in initiatives like the Bologna Process and the Erasmus+ program. The faculty has laboratories and research facilities for civil engineering subjects but lacks a strong focus on specialized railway systems.
- Harry Fultz Institute: The Harry Fultz Institute offers combined high school and community college-level education, providing programs in electronics, automotive mechanics, and business with its curricula aligned with EU standards. It does not offer specialized education in railway engineering.

- Faculty of Mechanical Engineering, Tirana: The Faculty of Mechanical Engineering in Tirana offers a 3–4-year university diploma with a focus on mechanical engineering. A mandatory subject, Railway Transport, is included in both the professional and scientific master's programs. Despite the faculty's involvement in modernization projects, there is a limited job market for students in Albania's railway field, and practical training opportunities are scarce due to the lack of specialized equipment.

### ***Bosnia and Herzegovina:***

- Faculty of Transport and Communications of Sarajevo, Sarajevo: The Faculty of Transport and Communications in Sarajevo offers Bachelor's, Master's, and Ph.D. programs in Traffic and Communications Engineering, with a specialized module in Railway Traffic. The curriculum is designed to align with EU standards. The faculty maintains strong cooperation with the Infrastructure Manager of the Federation of Bosnia and Herzegovina (Železnička Federacija Bosne i Hercegovine - ZFBH), providing students with the opportunity to complete a 180-hour field-training as part of their practical part of studies. Recently, ZFBH has introduced scholarships for students entering the Railway Traffic module, further enhancing the program's appeal.
- The faculty is well-connected with both national and international universities. However, the institution faces limitations in terms of infrastructure, particularly regarding facilities, equipment, and the capacity to meet modern railway training needs. Furthermore, the faculty has a relatively small enrolment in the Railway Traffic module. For instance, while the quota for the 2024 academic year was set at 10 students, only 6 students were admitted into the program.
- Faculty of Transport and Traffic Engineering, University of East Sarajevo, Doboj: This is another key institution in Bosnia and Herzegovina as well as a railway hub of the region, offering a focus on transportation engineering, including railway subjects and EU aligned curricula. The Faculty has a good cooperation with the Infrastructure Manager of Republic of Srpska (Železnice Republike Srpske - ZRS). The faculty is well equipped in terms of classrooms, laboratories etc. Professors and engineers from ZRS act as mentors for students. Practical training involves daily logs, regular mentoring and 80 hours of practice as per the syllabus. Graduates transition to the railway system and undergo a year of supervised training before taking a professional exam. However, the faculty has relatively limited accessibility, which could pose challenges for attracting students, universities and industry professionals from across the region.
- Railway School Centre (Željeznicki Školski Centar), Sarajevo: A public institution within the organization of the Ministry of Education. This vocational institution is offering programs specifically tailored for careers in the mechanical, electro engineering and traffic sector where there is a railway specific module for railway staff such as train drivers, train technicians etc. It has different equipment needs fulfilled such as classrooms, computer laboratories, hydraulics and pneumatics laboratories and

workshops. This institution offers a curriculum that is tailored specifically for railway staff in duration of either three or four years, depending on the profession. General education and professional-theoretical classes are held in the offices of the centre. Teaching is classroom-style. About 75% of practical classes are conducted in school workshops, and the remaining 25% in the facilities of companies with which the centre has signed an agreement such as the Infrastructure Manager of Federation (ZFBH), cargo partners, as well as DB, where the practical parts of the curriculum is held.

### **Kosovo:**

- Faculty of Mechanical Engineering, Pristina: This faculty offers following courses: Thermoenergetics and Renewable Energy, Mechatronics, Industrial Engineering and Management and Traffic and Transport module that ensures traffic engineers to mainly work on the recording, analysis, planning, maintenance and development of road and rail infrastructure and traffic flow management in order to increase the level of road or rail safety, but dedicated railway subjects are not a primary focus. The faculty aligns with EU standards through participation in the Bologna Process and Erasmus Plus Program. Their laboratories and research facilities support general mechanical engineering topics, such as thermodynamics and materials science, but not a specific focus on railway engineering

### **Montenegro:**

- Faculty of Civil Engineering, University of Montenegro: It offers a range of civil engineering courses at the Bachelor's, Master's, and Ph.D. levels. There are no subjects that are railway-related on bachelor level, but on the master's level, the "Traffic Roads" module includes two subjects related to railways: "Design and Construction of Railways" and "Railway Superstructure." However, the absence of dedicated, specialized railway programs limits the faculty's ability to provide comprehensive railway-specific education and training having its primary focus on civil engineering.

### **North Macedonia:**

- Faculty of Technical Sciences, University Saint Kliment Ohridski, Bitola: This institution offers Bachelor and Master programs with specialized modules for railway transport. This faculty has a good connection with other Universities in Belgrade, Doboj and Podgorica and its curricula are aligned with EU procedures. The primary challenge for this institution is the need to update and expand its laboratory and training facilities to accommodate modern railway technologies as well as the limited accessibility.
- Faculty of Civil Engineering, Ss. Cyril and Methodius University, Skopje: This faculty features a specialized Department of Railways and offers railway-related courses across other departments. It is involved in international research projects and has strong ties with the state's Infrastructure Manager. With excellent facilities, experienced professors,

and an EU-aligned curriculum, it attracts students passionate about railways. The faculty also maintains strong connections with universities and high schools like SUGS Vlado Tasevski.

- **SUGS Vlado Tasevski:** This is a vocational high school that offers a 4-year program for Railway Transport Technicians, providing both theoretical and hands-on training. The school is well-equipped with modern infrastructure, ensuring students gain practical experience alongside their academic studies. The program is designed to meet the growing demand for professionals in the railway sector, offering excellent opportunities for both young people and adults. With a focus on railway transport, the school prepares students for careers in the railway industry, equipping them with the skills needed for maintenance, operations, and management in the sector. Their alignment with industry needs ensures that graduates are well-prepared to enter the workforce.

### **Serbia:**

- **Faculty of Technical Sciences, University of Novi Sad:** The Faculty of Technical Sciences offers a solid foundation in traffic engineering, including some railway-related electives in its curriculum. However, its focus is more on general traffic systems, with limited hands-on railway training.
- **Faculty of Transport and Traffic Engineering, University of Belgrade:** This Faculty provides a more comprehensive curriculum with specialized courses in railway traffic. This faculty benefits from strong industry links with Serbian Railways and the Ministry of Transport, offering students internships and job placement opportunities. The faculty has plenty of classrooms and space and its curriculum is fully aligned with EU standards through Erasmus Plus Program as well as Bologna process.
- **Railway Technical School in Belgrade:** This secondary school offers education for railway occupations with a combination of theoretical and practical knowledge conducted in “Serbia Train” facilities. Workshops exist but are outdated. One laboratory exists for braking and MMA simulators. The curriculum includes Rulebook 646, used across Western Balkans. Thirty railway-related occupations exist, but only 20 are covered by legislation. Train drivers require NOKS level 4 certification. Maintenance staff (level 3) face recruitment challenges due to low salaries.
- **Faculty for Mechanical Engineering, Nis:** This faculty has a strong involvement in railway research, with the largest research group in Serbia. The faculty collaborates with Serbian Railways. Railway-related subjects are included in the mechanical engineering curriculum, and the faculty has strong ties with the Traffic Faculty in Belgrade. The curriculum aligns with EU standards. Practical labs and equipment for railway research and signaling are part of the training infrastructure.

Based on the analysis as described above, the following three institutions were selected as most relevant from an educational perspective and are described in the table below:

Category	Serbia	North Macedonia	Bosnia and Herzegovina
<b>University-Level Programs</b>	<p>Faculty for Mechanical Engineering, Nis (specialized railway research and courses)</p> <p>Faculty of Transport and Traffic Engineering, Belgrade (comprehensive railway curriculum)</p>	<p>Faculty of Civil Engineering, Ss. Cyril and Methodius University in Skopje</p> <p>Faculty of Technical Sciences, University of St Kliment Ohridski</p>	<p>Faculty of Transport and Communications of Sarajevo</p>
<b>Vocational High School Programs</b>	<p>Railway Technical School, Belgrade (focus on railway occupations with practical training)</p>	<p>SUGS Vlado Tasevski (4-year Railway Transport Technician Program with strong practical training and education of young people and adults)</p>	<p>Railway School Centre (Željeznicki Školski Centar), Sarajevo (4-3 years programs dedicated to the railway specific occupations)</p>
<b>Curriculum Focus</b>	<p>Specialized in railway engineering, traffic flow management and railway safety</p>	<p>Specialized in railway engineering, traffic flow management, and railway systems</p>	<p>Specialized in railway engineering, railway systems, railway occupations</p>
<b>Industry Collaboration</b>	<p>Strong links with Serbian Railways, Ministry of Transport, as well as a good collaboration with Railway technical school</p>	<p>Strong links with Railway Infrastructure of North Macedonia Manager, as well as a good collaboration with technical school</p>	<p>Strong link to Infrastructure Manager of Bosnia and Herzegovina</p>
<b>EU Alignment</b>	<p>Bologna Process, Erasmus+ Program, and EU-aligned curriculum</p>	<p>Bologna Process, Erasmus+ Program, and EU-aligned curriculum</p>	<p>Bologna Process, Erasmus+ Program, and EU-aligned curriculum</p>



Category	Serbia	North Macedonia	Bosnia and Herzegovina
<b>Key Strengths</b>	Strong railway research, collaboration with industry, well-equipped labs and facilities	Strong railway research, collaboration with industry, well-equipped labs and facilities	Good railway research, and collaboration with industry



## Conclusion

While the region does have a diverse range of railway-related educational programs at vocational and university level, dedicated railway-focused programs are limited and specialized railway education remains underdeveloped. Many railway schools face challenges such as outdated curriculum, infrastructure and a declining number of students interested in railway careers.

It is recommended that the future Regional Centre shall cooperate closely with the educational facilities related to railway education. This includes from the perspective of support to update their curricula and learning methodology as well as cooperating with universities and schools to conduct joint courses and utilize existing infrastructure and trainers.

Based on the analysis, Serbia, North Macedonia, and Bosnia and Herzegovina offer the most relevant railway education in the Western Balkans. However, it is to be noted that in Bosnia and Herzegovina, the Railway School (Željeznički Školski Centar) in Sarajevo stands out as the best-equipped vocational training institution for railway education. However, the weakness lies within the university-level programs, where the Faculty of Transport and Communications in Sarajevo is not as strong in its railway specialization. The Faculty's railway program falls short in

comparison to those in Skopje and Belgrade, where the institutions offer a higher standard of railway education and specialization.

#### 4.4.2 Identified Gaps in Curricula and Training Programs

Through our interviews and research, we have identified significant gaps in railway education. These include the following:

- **Lack of Specialized Railway Engineering Courses:** Many universities and technical schools offer general engineering and transportation programs but lack dedicated railway engineering courses. Key subjects such as railway infrastructure, railway electrification, signaling systems, and rolling stock maintenance are either missing or only available as elective courses. While some institutions provide railway-related modules within broader engineering programs, there is no consistent, specialized curriculum focusing solely on railway engineering.
- **Insufficient Coverage of Modern Railway Technologies:** Existing curricula primarily focus on traditional railway systems, with little integration of modern railway technologies. Subjects like high-speed rail systems, European Rail Traffic Management System (ERTMS), digital signaling, and sustainable railway infrastructure are either optional or not covered at all. The lack of structured education on these topics leaves graduates unprepared for advancements in the railway sector.
- **Limited Practical Training and Simulation-Based Learning:** While some programs incorporate theoretical railway transport modules, practical training opportunities are limited. Many curricula lack access to modern railway simulators, test tracks, or real-world training environments. Workshops are often outdated, and practical education is not fully integrated into the learning process. Without hands-on experience, students struggle to develop the necessary skills for railway operations and maintenance.
- **Gaps in Railway Operations, Infrastructure, and Electrification Training:** Many curricula provide only basic railway traffic principles, without covering advanced topics such as railway scheduling, operational efficiency, freight transportation logistics, and multimodal interoperability. Additionally, railway-specific construction and maintenance subjects, such as track design, superstructure maintenance, and geotechnical considerations, are often missing or limited to elective courses. Electrical engineering and mechatronics programs also lack railway-focused content, with minimal emphasis on railway electrification, power supply systems, and traction technologies. This results in a knowledge gap in critical areas needed for the modernization and expansion of railway networks.
- **Outdated Rulebooks and Teaching Materials:** In several regions, railway education still relies on outdated rulebooks such as Rulebook 646, which does not align with current EU

railway regulations. While some programs integrate EU standards into their curriculum, there is no uniform approach to updating educational materials. Professors often rely on personal research and guest lectures to stay informed, leading to inconsistencies in knowledge dissemination.

- **Limited Integration of Digitalization and Smart Railway Systems:** Digital transformation in the railway industry, including AI-driven predictive maintenance, smart railway networks, and automated control systems, is not adequately covered in existing curricula. The lack of structured courses on digital railway solutions prevents students from gaining the expertise required for future railway innovations.

#### 4.4.3 Recommendation on Priority Training Programs

The new Regional Centre of Railway Excellence can provide a variety of courses based on the chosen Scenario. Based on the interviews and as described above, the focus shall be on European standards and modernization but also on basic railway skills training.

The following list provides examples of potential courses that could be offered in the future Centre. Annex 5 provides further details on these courses including content, duration and target group. All these courses can be provided by DB Rail Academy based on their international training portfolio. [9]

#### *Training Categories:*

##### **Innovation & Digitalization**

- **AI for Railways: Let machines learn for you:** Get an introduction into how Artificial intelligence (AI) offers endless possibilities for rail companies in terms of using data more efficiently, refining processes and developing new business models
- **Digital Planning and Construction (BIM):** Get a general overview of the 5D/BIM methodology and explains the federal initiative to support the introduction of BIM in the construction sector
- **Core Technologies of Digital Railways:** This course explains the core technologies as the basis for connected rail and mobility companies in the digital age

##### **Rail Infrastructure & Rolling Stock, e.g.**

- **ETCS Fundamentals:** Get an overview of the European Train Control System (ETCS) as a new common train protection system, which ensures increased safety and higher train frequency on the tracks
- **Interoperability of Overhead Contact Line Systems:** Get an introduction into the interoperability characteristics of overhead contact line systems.

##### **Rail Operations & Maintenance**

- External and Internal Maintenance Guidelines: Get an introduction into the external and internal maintenance guidelines and an overview of relevant standards (DIN/EN/ISO) and get to know the relevant excerpts from applicable EU directives & regulations
- Principals of EU Railway Operations: Comprehensive overview of components and subsystems of the railway operations and important rules and requirements. Learn more about the European Train Control System and the European Rail Traffic Management System as well as acquire a better understanding of overall interrelationships and dependencies, which helps to ensure a safe and successful railway operation and its systems

### **Rail Quality, Safety & Security**

- Management Systems & Process Management: comprehensive overview of the basics of management systems and process management for railway companies based on European law and standards. In addition, focus closely on quality, risk, safety and process management as well as the continuous improvement process; Fundamentals of an integrated management system using the example of quality management according to DIN EN ISO 9001:2015, risk management according to ISO 31000 and safety management system according to Directive 2004/49/EC

#### **4.4.4 Relevant Initiatives and Stakeholders on European level**

This chapter provides an overview of the recent EU initiative STAFFER as well as the ERA Academy and potential lessons learnt or ideas that can be transferred to the future Regional Centre.

##### ***Skill Training Alliance for the Future European Rail System (STAFFER)***

The STAFFER project was initiated under the auspices of the European Commission with a duration from 2020 to 2024. It had been developed with the objective of promoting education and training activities within the rail sector, addressing skill shortages, and driving digital transformation. Key aims included the development of professional profiles, training programmes and qualifications, as well as the implementation of mobility programmes and practical internships for students, trainees and employees. The project's overarching aim was to identify skills gaps in the European railway sector and to adapt training and curricula in cooperation with vocational training institutions and universities. Additionally, STAFFER focused on recruiting more people for cross-border rail transport, to increase efficiency and promote employability, and to drive forward the digitalization of the railway sector for a more efficient and future-oriented railway sector.

The project was divided into 9 work packages.

Work Package	Task
1	Identification of current and future needs for skills and competences in the railway sector. Creation of a methodological framework for work packages 2 and 3. Objectives: To provide an overview and introduction to the competence model
2	Qualification requirements for railway operators and infrastructure managers.
3	Qualification and competence requirements from the perspective of railway suppliers. Objectives: To define a future vision of the railway sector from the suppliers' perspective. Consideration of current trends in the railway sector and their impact on suppliers.
4	Develop ambitious training programs for students and rail professionals to shape the European mobility paradigm. Inventory of training providers in the EU: vocational education and training (VET); higher education Analysis of existing programs and courses offering final certificates/diplomas in the rail sector. Identification and assessment of common qualification standards (QS). Evaluation of existing programs based on the skills required. Design new or complementary curricula to provide necessary skills.
5	To transfer and validate new and updated mobility and training programs and curricula. Determinate whether these programs improve the employability of students and young professionals in rail transport.
6	Implementation of the training programs for the rail sector developed in WP 4. Methodology and monitoring: Establish a methodology and performance indicators for continuous monitoring of the programs and their results. Target group: Students, trainees, interns and other staff groups in the railway sector.
7	To develop a long-term strategy and action plan to tackle the skills shortage in European rail transport. Ensure that European railways continue to play a leading role in transport technology and provide high-quality jobs.
8	Dissemination of the project results among railway stakeholders and relevant educational institutions in Europe. Definition of qualification-related policy



Work Package	Task
	recommendations for regional, national and European decision-makers.
9	To ensure that the consortium acts as a unit and delivers high-quality results.

As a subsequent result, the implementation and action plan for the railway sector strategy was established, consisting of 50 specific activities in the six main areas:

- Increasing the attractiveness of jobs in the railway sector and promoting diversity
- Improving cooperation between the railway sector and educational institutions
- Developing new training programs at all levels of education
- Promoting mobility programs for students and employees
- Development of mobility and training programs for cross-border railways
- Coordinating the implementation of the qualification strategy for the railway sector

The STAFFER project has been instrumental in addressing the challenges of skills and labor shortages in the European railway sector. A key success has been the creation of links between different regions and countries, particularly within the railway sector. In addition, standardized recommendations were developed that are in line with EU directives and Initiatives such as the Rail Ambassador Program and mentoring programs for under-represented groups have increased the attractiveness of the industry, contributing to a more diverse workforce.

Despite these successes, the project faced several challenges. It was not possible to establish a standardized language for the curricula due to insufficient English language skills in some regions. There was also a lack of coordinated cooperation between the EU, national governments and the railway sector, which was obstructed by insufficient funding and cooperation. Another problem was the ageing workforce and the low interest of women in the industry, as the sector is still perceived as male dominated. In addition, digital transformation places high demands on new skills, leading to a discrepancy between existing and required qualifications.

### ***European Union Agency for Railways (ERA)***

The European Union Agency for Railways (ERA) acts as a central EU body for the standardization of railway directives and provides targeted education and training programs. One of the departments of ERA focusing on regional training provision. The training offered by this ERA Academy includes both large-scale webinars and formalized training programs. The focus is on teaching EU directives and standards and increasingly on technical topics such as digitalization and technical regulations. Courses are delivered in-house, on-site or virtually and are targeted at different audiences in the railway sector. While training on EU standards is offered free of charge, specialized, industry-specific training is often associated with costs. The following

training courses are an example of the training portfolio that ERA has implemented and how they work:

Organisational Just Culture Training	
<b>General Training Info:</b>	Training: Just Culture Training Target Group: Rail professionals and safety specialists. Language: English
<b>Training Content / Modules:</b>	<ul style="list-style-type: none"> <li>- Initialize understanding and care</li> <li>- Explore operational reasoning</li> <li>- Explore system influences</li> <li>- Decide and implement</li> <li>- Disseminate outcomes and monitor</li> <li>- Integrate just culture</li> </ul>
<b>Training Methods:</b>	Participants will develop an action plan tailored to their specific situation, with the training structured around two online sessions per day, following the "ERA Just Culture Flow." On the final day, participants will present their action plans, receiving feedback and engaging in discussions about their chosen actions.

Safety Leadership Training	
<b>General Training Info:</b>	Training: Safety Leadership Training Target Group: Rail professionals and safety specialists. Language: English
<b>Training Content / Modules:</b>	<ul style="list-style-type: none"> <li>- Safety Vision</li> <li>- ABC Behavioral Model</li> <li>- Just and Fair Treatment</li> <li>- Safety Leadership Principles</li> <li>- Decision Making</li> <li>- Safety Culture</li> </ul>
<b>Training Methods:</b>	The training involves presenting a case study through a film, followed by a presentation to explore key lessons, encouraging active participant exchange and deepening knowledge through role play.

As described above in the context of the STAFFER Initiative, the ERA Academy also faces challenges such as language and organizational barriers in different EU countries. The adaptation of EU regulations and the implementation of standardized qualifications are often hampered by differing national requirements and the insufficient spread of English as a common language. There are a few lessons learnt based on the experience of the ERA Academy with a regional training approach:

- The involvement of relevant national authorities, such as ministries, railway supervisory authorities and national investigative bodies (NIBs), is recommended for the effective implementation of EU legislation.
- Co-operation with universities in the different EU countries is most relevant, especially in the context of academic models.
- Logistical aspects such as travel time need to be taken into account.

The operating model and potential relevance of the ERA Academy is further described in chapter 5.4.



### Conclusion

The analysis of STAFFER provided important lessons that are particularly relevant for further planning and implementation of the Regional Centre. The STAFFER project highlighted that the introduction of a single language for regional training programs, mostly English, is very difficult and often unlikely, as English skills are not sufficiently developed among railway staff. Establishing common technical training programs also proved difficult, as there was often a lack of interest among national stakeholders. For many EU countries this is due to the fact, that railway education is often already very advanced and there is no obvious benefit by a regional training offer.

The ERA Academy can serve as a relevant case study for the Regional Centre since it is the main institution on EU level offering railway related trainings on EU standards. The ERA Academy could also present an interesting partner institution for the future Centre, e.g. ERA trainers can be invited for specific trainings relevant to EU directives.

#### 4.4.5 Human Resource Plans for Training Academies

A general overview on HR plans and organizational development will be needed to establish a Regional Centre of Railway Excellence. The full scope of the organizational structure depends on the selected scenario. It is also important to recognize that there is no one-size-fits-all approach to organizational structure. Countless variations exist depending on industry practices, regional characteristics, and specific organizational needs. Therefore, the structure presented here is a generalized example, adaptable to a variety of contexts.

We have outlined seven key departments in the proposed organizational structure, illustrated in the figure below. Among these, three core departments stand out as essential to the Centre's primary operations: HR & Business Development, Training Development & Execution and Facility Management and Quality. The HR & Business Development department will focus on recruiting and staffing trainers, managing personnel, and ensuring a hiring process. Meanwhile, the Training Development & Execution department will be responsible for creating, implementing, and evolving training programs, including the integration of e-learning solutions where appropriate. This team should ensure that training content is effective and aligned with the Academy's educational goals. Equally significant for the success of the project is the Facility Management & Quality department, which will be tasked with overseeing the physical maintenance and operational efficiency of the Centre. This department will manage facilities to ensure that all spaces are conducive to training activities, while also handling any technical requirements to keep IT infrastructure functioning at a high level, thereby supporting both in-person and digital learning environments.

In addition to these core functions, three other departments will play supportive roles that are vital to the smooth operation of the Centre: Sales & Marketing, Finance, and Customer Service. Sales & Marketing will focus on promoting the academy's offerings, engaging with potential clients, and increasing enrolment. The Finance department will manage budgeting, accounting, and financial planning. Lastly, Customer Service will handle admissions and registrations as well as feedback management.

Another department, Research & Development (R&D), is proposed to drive innovation and elevate the academy's training approach. This R&D department will focus on Training Innovation, Methodology, and Research, aiming to develop cutting-edge training methodologies, incorporate new learning technologies, and conduct research to keep the academy's offerings relevant and effective.

## Organisational Structure for the operations of a Training Academy



Sales & Marketing	HR & Business Development	Training Development & Execution	Finance	Facility Management & Quality	Customer Service	Research & Development
Sales & Acquisition	Trainer Recruitment, Management and Staffing	Training Development	Budget & Forecast	Facility Management	Admissions & Registrations	Training Innovation & Methodology
Product Management	Business Development	Training Execution	Accounting & Payroll	IT & Technical support	Participants Support	Research
Marketing & Communications	Employee Development*	E-Learning	Controlling	Quality assurance	Feedback Management	
Market Analysis				Health, Safety and Compliance		
Event Management**	<p>*For Academy's staff (also instructor development and certification)</p> <p>** In case event spaces will be rented to externals</p>					



## 4.5 Needs Assessment: Skills demands in the region now and in the future

### 4.5.1 General Overview on Future Developments in Skills Demand in the Railway Sector

The demand for workers in the railway industry is expected to rise overall in the coming years. While the need for technical staff is projected to increase between 2020 and 2035, the demand for administrative employees may decline by up to 16%<sup>1</sup>. The strongest increase is anticipated in customer service roles, driven by a higher number of passenger trains and more frequent schedules. Demand is also expected to grow for safety system specialists, track mechanics, train drivers, and engineers. However, automation will likely reduce the need for traffic controllers.

A major shortage of skilled professionals is forecast from 2030 [10], especially in the roles of train drivers, engineers, and technicians. This is due to both sector expansion and demographic changes, as many experienced workers will reach retirement age. Additionally, competition from other industries, particularly in technical and digital fields, highlights the need for new approaches to workforce development and recruitment.

Skill requirements in the railway industry are becoming more diverse. Alongside traditional technical knowledge, management and IT competencies are gaining importance, particularly in mechatronics, IoT, big data analytics, and artificial intelligence. Digital skills are becoming essential across nearly all job categories. Future demands will increasingly focus on critical thinking, problem-solving, creativity, and communication. English will become the primary language for international railway operations. Technical professions, including engineers and train drivers, will need to continuously update their skills due to digitalization and automation, whereas support staff (e.g., cleaners, platform assistants, ticket inspectors) are unlikely to experience major changes in skill requirements.

Skills	Description
<b>Technical Skills</b>	As automation and digitalization advance, expertise in safety systems, automated train control, renewable energy, sensor technology, and big data analytics is becoming crucial. Engineers and technicians will need to work with robotics, predictive maintenance, and innovative materials.
<b>Digital Skills</b>	IT literacy is now fundamental for all roles, with specialized knowledge required for software engineers, civil engineers, and

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<sup>1</sup> Skills and competences development of future transportation professionals at all levels SKILLFUL. (2017). Deliverable D1.1 Future scenarios on skills and competences required by the Transport sector in the short, mid and long-term.

Skills	Description
	telecommunications specialists. Key areas include programming languages, cybersecurity, cloud computing, and digital design tools. Operational roles such as traffic controllers and safety mechanics must also master digital tools and predictive maintenance technologies.
<b>Organizational Skills</b>	Many positions require a comprehensive understanding of railway operations. Managers need system-wide knowledge, while safety officers must integrate various aspects of the sector. Future developments in work organization and management approaches will also shape organizational competencies.
<b>Social Skills</b>	The shift towards a more modern, customer-focused, and internationally integrated railway sector makes communication skills vital at all levels. This is particularly relevant in transnational projects, where English proficiency and cross-cultural collaboration are becoming essential. Engineers must combine technical expertise with teamwork and communication abilities, while train drivers will need to enhance passenger interaction skills.
<b>Personal Skills</b>	Adaptability, independent working, and resilience are increasingly important. Professionals must be able to analyze complex situations and develop innovative solutions, whether dealing with technical malfunctions or logistical challenges. The ability to work across disciplines and understand the railway system is becoming a highly valued competence.

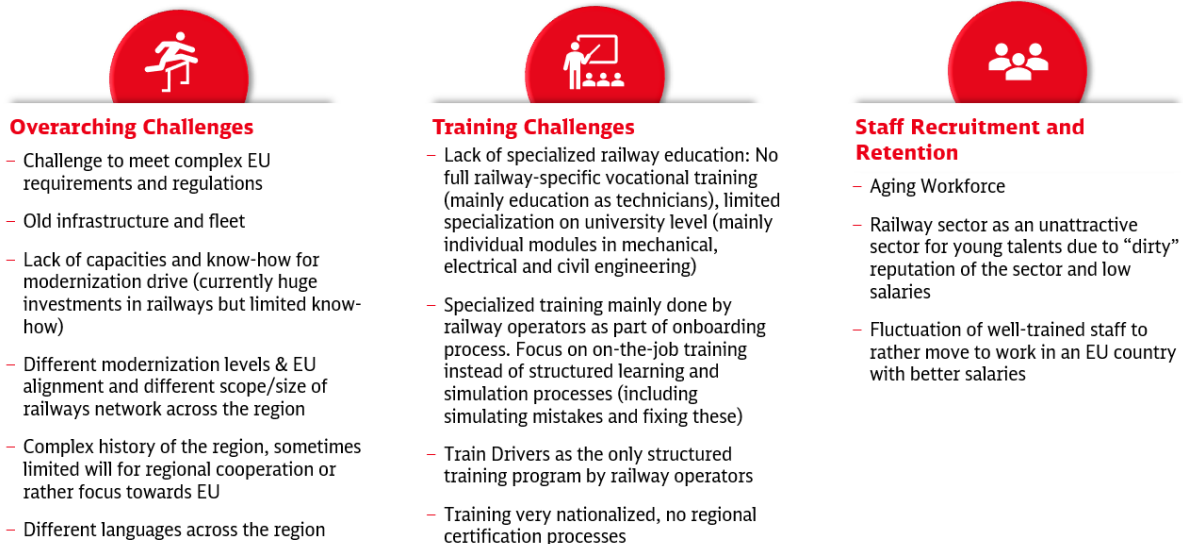
#### 4.5.2 Challenges and Training Needs in the Western Balkans Railway Sector

The railway sector in the Western Balkans faces several challenges that hinder its modernization and alignment with EU standards. A key issue is the aging workforce, with the average employee age exceeding 50, making it difficult to recruit and retain young talent. The sector struggles with an unattractive image due to low salaries, limited career prospects, and outdated infrastructure, leading to a high turnover of skilled professionals who seek better opportunities in EU countries. Additionally, education and training programs in the region are often insufficiently specialized, with universities and technical schools offering only general transport curricula rather than targeted railway engineering programs. A lack of practical training infrastructure, such as modern simulators and hands-on learning environments, further exacerbates the skills gap.

Beyond human resource challenges, the railway sector also contends with disparities in regulatory frameworks and modernization levels across the region. While there is some alignment with EU standards, many national regulations remain inconsistent, creating barriers to cross-border interoperability. Furthermore, the region's railway infrastructure is outdated, requiring significant investment and expertise to implement modern technologies such as electrification and advanced signaling systems. However, the current lack of technical know-how limits the ability of institutions and companies to effectively manage these modernization efforts.

To address these challenges, a coordinated, regional approach is necessary. A Regional Centre of Railway Excellence could play a crucial role in harmonizing training standards, developing specialized curricula for modern railway technologies, and establishing train-the-trainer programs to enhance local capacities. By promoting the railway sector as a viable and attractive career option through scholarship initiatives and partnerships with educational institutions, the academy could help bridge the skills gap and improve workforce retention. Moreover, fostering regional cooperation would enable cost-sharing, knowledge transfer, and joint infrastructure projects, while alignment with EU institutions could facilitate funding and certification processes. Investing in modern training facilities, including simulation technologies and practical learning environments, would further support the development of a highly skilled workforce capable of driving the railway sector's transformation.

### There are several challenges and gaps for consideration



### 4.5.3 Target Group Clustering

Based on the interviews and the detailed analysis on establishing a Regional Centre, several target groups were identified as most relevant future target group for the Centre:

- Operational staff: train drivers and dispatchers for new technologies, new rolling stock, new signaling and dispatching systems
- Maintenance staff: technicians and engineers for modern rolling stock and technology, upgraded infrastructure
- Railway safety staff: supervisors' level for safety standards

The focus of the training programs shall be on both new staff for onboarding and more railway specific education as well as practical experience and for upskilling of existing staff, particularly regarding modern technology. There were recommendations by several interviewees to focus on supervisor roles, for those to fully understand the concept and implementation of EU regulations and to coordinate the implementation of these in their companies and organizations as multipliers.

Beyond the staff of railway operators, other important target groups could be regulators and employees of railway supplier companies.

## 4.6 Providing a Multi-Criteria Analysis to assess potential hosting options

### 4.6.1 Methodology

One of the objectives of the feasibility study is to assess the feasibility and readiness of Albania, Bosnia & Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia to host the Regional Centre. To achieve an objective overview of hosting options, a multi-criteria analysis was conducted based on the described four key factors: Legal Factors, Economic Factors, Technical Factors, and Operational Factors. Each factor was scored on a scale from 1 to 3, with a maximum possible total score of 12 points. The evaluation criteria for each factor are as follows:

- **Legal Factors:** Since the general legal framework conditions for setting up a Regional Centre are very similar across the region, it was decided to rate the different regions based on their progress towards implementing EU standards. Therefore, Legal Factors were assessed based on the national European Commission's Enlargement Reports 2024<sup>2</sup>, which provide a detailed evaluation of the region's progress toward EU accession. The focus was specifically on the implementation of EU railway legislation. Scores were assigned based on the level of compliance and progress in railway regulatory alignment with EU standards.

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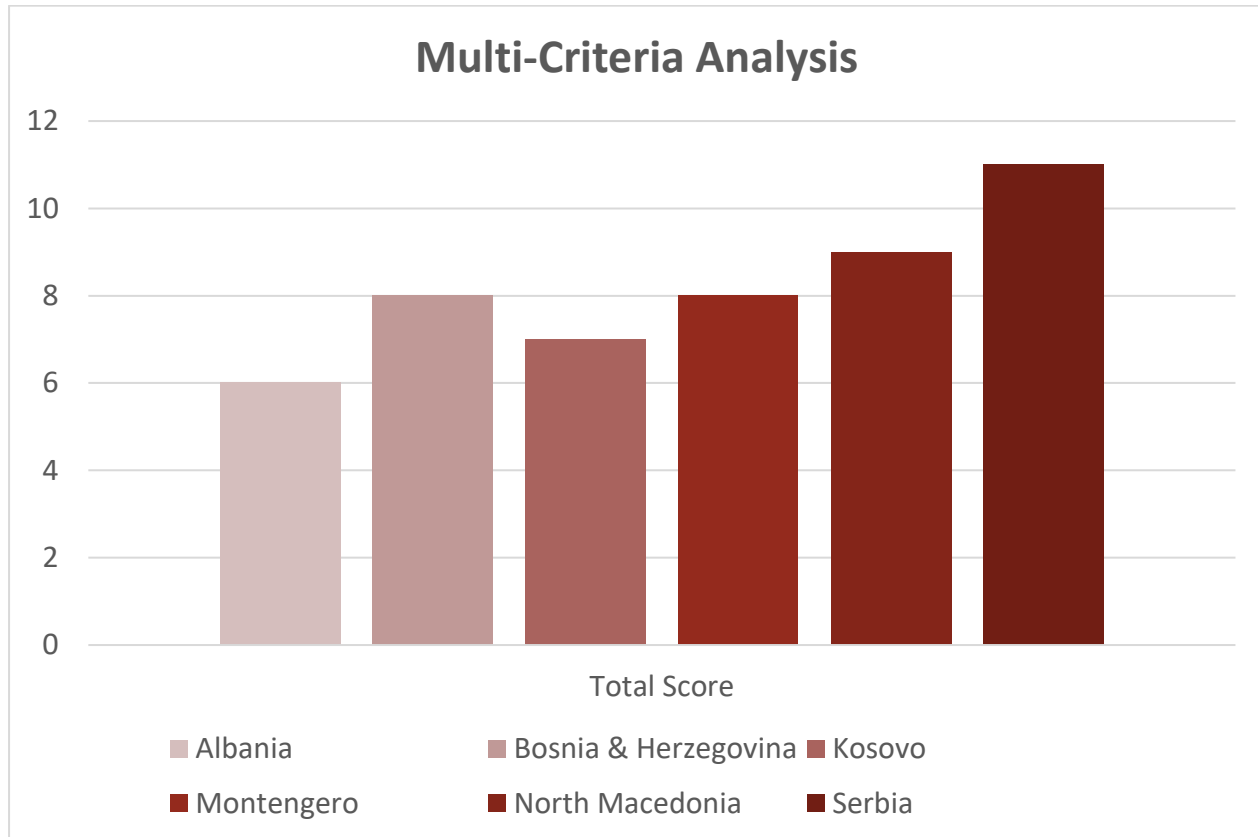
<sup>2</sup> European Commission: Enlargement Reports 2024, [https://commission.europa.eu/news/enlargement-reports-2024-commission-outlines-progress-and-priorities-candidate-countries-2024-10-30\\_en](https://commission.europa.eu/news/enlargement-reports-2024-commission-outlines-progress-and-priorities-candidate-countries-2024-10-30_en)

- **Economic Factors** were evaluated using our analysis of key economic indicators, focusing on salary levels, cost of living, and growth rate. The most favorable score was given to regions with low wages and cost of living but a high growth rate, as these conditions suggest potential for sustaining a centre of excellence and attracting investments.
- **Technical Factors** were assessed based on the availability and quality of educational and training infrastructure related to railway development. Regions with well-equipped universities, vocational schools, and training facilities scored higher, while those with limited or no technical infrastructure were rated lower. The presence of partnerships with industry stakeholders also influenced the evaluation.
- **Operational Factors** were evaluated based on the presence of academic programs, research institutions, and specialized railway training. Regions with well-established railway research Centres, dedicated university programs, and strong collaboration between academia and the railway industry were rated more favorably. In contrast, those with only basic or fragmented railway-related education and training offerings received lower scores.

The following table presents the assessment based on the different factors and the respective scorings:

	Legal Factors	Economic Factors	Technical Factors	Operational Factors	Sum
<b>Albania</b>	2	2	1	1	6
<b>Bosnia &amp; Herzegovina</b>	1	2	3	2	8
<b>Kosovo</b>	2	3	1	1	7
<b>Montenegro</b>	3	2	1	2	8
<b>North Macedonia</b>	2	2	2	3	9
<b>Serbia</b>	3	2	3	3	11





#### 4.6.2 Analysis

The highest-scoring region in our analysis is Serbia, which demonstrates strong legal compliance, a well-developed technical infrastructure, and robust operational capacity. Serbia benefits from a university, research institutions, and railway schools, positioning it as a prime candidate for hosting a Regional Railway Centre of Excellence.

Bosnia & Herzegovina and North Macedonia follow closely, showing strengths in technical and operational aspects but moderate performance in legal and economic factors. These regions could serve as potential co-hosts or regional hubs.

Montenegro exhibits strong legal compliance but lacks sufficient technical infrastructure. Kosovo scores highly in economic factors but lacks significant technical and operational railway structures. Albania ranks lowest, indicating significant gaps in technical and operational railway development, making it less suitable for hosting the Centre in its current state.



### Conclusion

Our multi-criteria analysis highlights significant variations in readiness for establishing a Regional Railway Centre of Excellence across the Western Balkans. While Serbia stands out as the most advanced option, others such as Bosnia & Herzegovina and North Macedonia also demonstrate potential. The choice of host also depends on the scenario to be chosen.



05.

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## Description of the Three Scenarios



**DB Rail Academy**  
by DB Engineering & Consulting GmbH

## 5. Description of the Three Scenarios

### 5.1 Summary of Scenarios

Based on the analysis presented in the previous chapters, three development scenarios have been proposed for establishing a Regional Centre of Railway Excellence. Each scenario represents a different level of ambition, institutional setup, training scope and financial investment. Different scenarios can also be considered as phases to start quickly but to achieve a longer-term vision of the future academy.

#### ***Scenario 1: A Regional Coordination Unit with a Network of Universities***

The option of a Regional Coordination Unit with a Network of Universities represents the most basic approach to establishing a training structure. In this scenario, a training coordination unit is established within a regional body, serving as a facilitator for learning initiatives rather than a physical academy.

A network of participating universities in the region and in selected EU countries would be established. Specialized short-term trainings (max 2 weeks) are offered at various locations, in cooperation with the participating universities or through online platforms, depending on the target audience. This scenario primarily focuses on the upskilling of senior staff from railway operators, regulators, and suppliers—serving as multipliers who disseminate knowledge within their organizations.

This model allows for a quick start, flexibility and lower investment but has little brand power and only limited scope of training portfolio.

The geographic location for this scenario depends on the hosting organization, see the following chapter 5.2 for further information.



## ***Scenario 2: A Regional Railway Institute in Cooperation with a University***



This scenario proposes the establishment of a regional training facility in close collaboration with universities, ideally situated on or near the campus of one selected lead university. This allows for effective utilization of existing infrastructure, academic resources, and expert lecturers.

This institute builds on a partnership with one lead and hosting university and a satellite network with other local universities and railway schools, positioning them as core partners in delivering training. Railway schools will complement the academic training efforts for practical

experience for students and railway staff to test equipment and to train on.

Training activities can then also be conducted in the regions and by all university partners, supported by trainers of the Regional Institute, ensuring broader outreach and local customization.

This scenario primarily focuses on ensuring relevant content and practical experience for students as well as the upskilling of academic staff from railway operators, regulators, and suppliers including engineers in technical positions as well as supervisors, managers and others. Courses would be between 1 week to 3 months additional to existing university courses and covering mandatory trainings for railway staff (e.g. safety related). This model requires a longer planning and preparatory phase than Scenario 1 to agree the courses and recognition processes but has also little investments since rooms and workshops of partners will be used. Similarly to Scenario 1, the Institute should be hosted by a regional organization (see the following chapter) on a political level and will be closely aligned to the lead university but will have its brand and own range of training programs on the academic level.

There are different options for the location of the Regional Institute. Based on the multicriteria analysis presented in chapter 4.6 and based on the combination of a very relevant faculty and a railway school, Belgrade is the best option. The local Faculty of Transport and Traffic Engineering in Belgrade has a long-standing history of railway curriculum and relevant degrees. Combined with the Railway Technical School in Belgrade, which will be upgraded and modernized as part of a KfW funded program, and training facilities by the local operators, this location can provide the best conditions for a Regional Institute.

Another option is Skopje in North Macedonia combining the Faculty of Civil Engineering, Ss. Cyril and Methodius University in Skopje and SUGS Vlado Tasevski Railway School which both also feature relevant railway education to wider scope than the other universities and schools assessed (see chapter 4.4. for the detailed analysis).



### ***Scenario 3: A Regional Railway Academy***

The most ambitious scenario is the Regional Railway Academy. This Academy will be established as an independent educational institution with its own building and specialized workshops. The goal is to provide high-quality vocational training and further education and upskilling for various professional groups including the academic and the technician level. This scenario also features a strong network with local universities and railway schools for localized and customized trainers of the Academy.



The training portfolio will include functional vocational training programs for railway specific professions (up to 2 years) as well as modules for the academic level and upskilling for existing staff.

In the medium term, the program can be expanded to include dual vocational training programs according to German standards (with IHK certification). This could increase the quality and attractiveness of the Academy with young people and provide graduates with the option to work and be recognized in other European countries.

This model requires a long planning and preparatory phase and has high investment costs for the building and the required infrastructure. However, this Regional Academy can present the most relevant long-term vision for the region and can also built on Scenario 1 if a more short-term process is envisioned as an initial step.

The Railway Academy can be hosted in any of the Western Balkan Regions since it will be its own legal entity and independent of existing regional specifications. To ensure best political neutrality, it is recommended to plan for a regional call for hosts and governments can apply.



## 5.2 Overview of Potential Hosting Organizations

Depending on the choice of scenarios, a hosting organization will need to be selected to ensure strategic linkages to the political level and best funding opportunities. Based on the assumption that Transport Community will not be able to act as host in the future, different alternatives can be considered as hosts, as described further below based on the following criteria.

Criteria for hosting entity:

- Regional scope
- Registered legal entity
- Registered to receive EU funding as well as have access to other funding sources
- Focus on transport sector
- Established network of educational institutes in the region

### ***Western Balkans 6 Chamber Investment Forum***

The Western Balkans 6 Chamber Investment Forum (WB6 CIF) was established in 2017 as a joint initiative of chambers of commerce and industry associations from Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro, and Serbia. The forum represents the interests of over 350,000 companies, particularly small and medium-sized enterprises (SMEs).

The primary objectives of the WB6 CIF include deepening regional economic integration, reducing trade barriers, promoting the Western Balkans as a unified investment destination, and supporting regional financing programs such as the Regional Challenge Fund to enhance competitiveness.

They are very well connected and also have experience with TVET programs. From a legal perspective, they will be able to host the Academy but to be checked with their vision and mission. All six WB chambers of commerce and industry are members with national coordinators which is positive for the communication with railway operators as well.

### ***Education Reform Initiative of South Eastern Europe***

The Education Reform Initiative of South Eastern Europe (ERI SEE) is a regional platform for cooperation in the field of education and training. It supports national reforms in education and training through various regional activities: <https://www.erisee.org/priorities/vocational-education>. While ERI SEE can receive EU funding and could be considered as a hosting option, its scope extends beyond the Western Balkans Six (WB6). Additionally, its primary focus is on general education topics, as it is funded through national ministries of education. Further assessment is required to explore which role this initiative can play in the future Centre as a host and for the decision-making process.

### ***Rail Cluster South-East Europe***

The Rail Cluster South-East Europe (RCSEE) is a railway cluster based in Belgrade, founded in 2016 by 32 companies and organizations from Serbia, Germany, Austria, Slovenia, Croatia, and Bosnia-Herzegovina. It primarily consists of private companies in railway technology, as well as research and educational institutions. The cluster promotes cooperation in major infrastructure projects and supports training and education initiatives in the region.

The RCSEE Rail Cluster has an extensive network of universities and private sector suppliers, facilitating knowledge transfer and training initiatives. It organizes annual railway conferences with an educational component and collaborates with European experts and universities to provide specialized training. The cluster's focus on railway modernization, alignment with EU standards, and engagement with regional stakeholders, including ministries and railway operators, ensures strategic linkages at both technical and political levels. Additionally, its experience in fostering partnerships between academia, industry, and policymakers makes it well-positioned to support the development of a regional training and certification framework.

### ***Regional Cooperation Council***

The Regional Cooperation Council (RCC) is an intergovernmental organization that promotes regional cooperation and supports European integration in South East Europe. Headquartered in Sarajevo, Bosnia and Herzegovina, it was established in 2008 as the successor to the Stability Pact for South Eastern Europe. Its initiatives focus on key areas such as digital transformation, transport, trade, and innovation, aiming to enhance stability and prosperity in line with EU policies and standards. The RCC has an extensive experience in fostering regional collaboration and supporting European integration in South East Europe. It engages with a diverse array of stakeholders, including governments, international organizations, and donors, to promote economic and social development in the region. Its established networks and expertise in coordinating regional initiatives could contribute to the strategic objectives of the Regional Centre, particularly in aligning with EU standards and facilitating multi-stakeholder partnerships.

### ***DB Rail Academy or other similar institution***



DB Rail Academy, the international external training provider of DB Engineering & Consulting, brings extensive expertise in training and competence development within the transport sector. With a strong track record in delivering high-quality education worldwide, DB Rail Academy offers comprehensive solutions, from training needs analysis to the operation of academies. Additionally, its established network of educational institutions supports knowledge exchange and collaboration. Leveraging over 185 years of experience in the railway industry, DB Rail Academy is well positioned as a potential academy operator, offering tailored training programs that address the evolving needs of transport professionals.

DB Rail Academy can provide ongoing support in various ways of establishing the regional academy, ensuring the successful establishment and operation of the academy:



- **Support Concept & Construction Phase** – Assistance in designing and setting up the academy's structure and operational framework.
- **Alignment of the Training Portfolio** – Ensuring that the academy's programs align with industry needs and best practices.
- **Providing Selected Trainings** – Delivery of specialized training programs tailored to regional and sector-specific requirements.
- **Expert Advice on Specific Topics** – Access to subject matter experts for guidance on key transport-related issues.
- **Curriculum Development** – Designing and structuring educational content to meet international standards.
- **Train-the-Trainer Programs** – Capacity-building initiatives to qualify local trainers and ensure long-term knowledge transfer.
- **Study Tours and Know-How Transfer** – Organizing practical learning experiences and best practice exchanges with industry leaders.

### 5.3 Comparison of the three Scenarios in Detail




The following table presents a comparison of the different proposed Scenarios



	Scenario 1: A Regional Coordination Unit with a Network of Universities	Scenario 2: A Regional Railway Institute in Cooperation with a University	Scenario 3: A Regional Railway Academy
 <b>Host/ Management Entity</b>	<ul style="list-style-type: none"> <li>- Hosted by a regional entity</li> </ul>	<ul style="list-style-type: none"> <li>- Hosted by a regional entity depending on national legal framework and options. The host will need to agree bilateral agreements with relevant ministries to utilize and co-fund the Institute</li> <li>- Physical entity on campus of lead partner university or a specific floor at university building</li> <li>- Depending on collaboration with host and university partner can be registered via them or as independent training centre</li> <li>- Collaboration with DB Rail Academy</li> </ul>	<ul style="list-style-type: none"> <li>- Independent legal entity, to be registered as full independent training centre</li> <li>- Can be operated in collaboration with an international already recognized railway training provider/centre such as Deutsche Bahn (e.g. DB Rail Academy as a shadow operator)</li> </ul>
 <b>Choice of region/ city</b>	<ul style="list-style-type: none"> <li>- Regional Cooperation Council (RCC) Secretariate: Sarajevo, Bosnia &amp; Herzegovina</li> <li>- Education Reform Initiative of South Eastern Europe – ERI SEE: Belgrade, Serbia</li> <li>- Office of SEE Rail Cluster: Belgrade, Serbia</li> <li>- Others</li> </ul>	<ul style="list-style-type: none"> <li>- Belgrade: University of Belgrade and Railway Technical School</li> <li>- Skopje: University of Saints Cyril and Methodius University of Skopje and Vlado Tasevski Railway School, North Macedonia</li> </ul>	<ul style="list-style-type: none"> <li>- Open call for hosting city</li> </ul>


	Scenario 1: A Regional Coordination Unit with a Network of Universities	Scenario 2: A Regional Railway Institute in Cooperation with a University	Scenario 3: A Regional Railway Academy
<p><b>Partners</b></p>	<ul style="list-style-type: none"> <li>Host entity partners with a network of regional universities and schools as well as with EU partners as relevant (e.g. ERA Academy and DB Rail Academy)</li> </ul>	<ul style="list-style-type: none"> <li>Lead university partner and railway school</li> <li>Network of local universities and schools</li> <li>ERA Academy (for curriculum and specialized training)</li> <li>DB Rail Academy (for curriculum, specialized training, trainers, international certification)</li> <li>SEE Rail Cluster (but focus also on Croatia and Slovenia, supplier companies)</li> </ul>	<ul style="list-style-type: none"> <li>Network of local universities and schools</li> <li>DB Rail Academy (for curriculum and ToT, international certification, shadow management, organizational development of Academy)</li> <li>Other training facilities in the region and the EU</li> <li>ERA Academy (for EU specialized training)</li> </ul>
<p><b>Training Offer</b></p>	<ul style="list-style-type: none"> <li>Focus on 1 training topic per quarter on EU regulations, e.g. TSI &amp; Safety Management Systems. These regular trainings are held at one of the local university partners in cooperation with DB Rail Academy and ERA Academy (possibly using their trainers and training materials)</li> <li>Peer exchange – organizing networking meetings/ events between universities, railway operators, suppliers on new technologies etc</li> <li>1 time/ year: study tour to one regional partner for site visits</li> </ul>	<ul style="list-style-type: none"> <li>Regular training program every week</li> <li>Courses based on relevant EU regulations and standards, selection of most relevant ISO norms, in collaboration with DB Rail Academy and ERA Academy</li> <li>Modules on new technologies and digitalization for students and engineers</li> <li>Support for universities to modernize and upgrade their degree programs and modules</li> <li>Trainings on demand by regions</li> <li>Peer exchange – organizing networking meetings/ events between universities, railway operators, suppliers on new technologies etc</li> <li>1 time/ year: study tour to one regional partner for site visits</li> <li>Explore marketing options to make sector more attractive for students</li> </ul>	<ul style="list-style-type: none"> <li>Several training courses per week</li> <li>Courses based on relevant EU regulations and standards, selection of most relevant ISO norms</li> <li>Regular technical courses on new technologies, innovation</li> <li>Basic courses on introduction to railway for job seekers interested in starting a career in railways</li> <li>Full vocational training programs (up to 3 years), including one program based on the German dual system and certified by IHK</li> <li>Trainings on demand by regions</li> <li>Support for universities to modernize and upgrade their degree programs and modules</li> <li>Include Marketing options to make sector more attractive</li> </ul>

	Scenario 1: A Regional Coordination Unit with a Network of Universities	Scenario 2: A Regional Railway Institute in Cooperation with a University	Scenario 3: A Regional Railway Academy
 <b>Trainer Pool</b>	<ul style="list-style-type: none"> <li>- Utilization of professors and lecturers of the university network</li> <li>- External trainer pool of regional and EU experts depending on topics</li> <li>- Utilization of DB trainers and ERA trainers on EU Regulations</li> </ul>	<ul style="list-style-type: none"> <li>- 2 full- time trainers (working on training coordination, training development and conducting trainings)</li> <li>- Utilization of professors and lecturers of the university and school</li> <li>- External trainer pool of local and international/ EU experts for specialized topics and new modules</li> <li>- Utilization of DB trainers and ERA trainers on EU Regulations</li> <li>- Mandatory onboarding for all trainers including training methodology, political sensitivities, overview on EU regulations, technical requirements</li> </ul>	<ul style="list-style-type: none"> <li>- Several full-time trainers with different expertise and language skills</li> <li>- External trainer pool of local and international experts for specialized topics and specific languages</li> <li>- Mandatory onboarding for all trainers including training methodology, political sensitivities, overview on EU regulations, technical requirements</li> <li>- Utilization of DB trainers for variety of topics</li> <li>- Utilization of ERA trainers on EU Regulations</li> </ul>
 <b>Training Venues</b>	<ul style="list-style-type: none"> <li>- Only classrooms needed, no infrastructure/ technical workshops</li> <li>- At partner universities' facilities, at external event facilities such as conference hotels etc</li> <li>- At EU partners facilities, e.g. DB Training Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>- Independent physical entity (building on campus or a specific floor at university building) including classrooms, computer labs and limited technical labs/ workshop (s)</li> </ul>	<ul style="list-style-type: none"> <li>- Stand-alone building in host city</li> <li>- Building to be used for trainings but also regional events, incl. outside area possibly next to railway tracks/ station for training purposes</li> <li>- Possibly include accommodation options in the building or close by</li> </ul>



	Scenario 1: A Regional Coordination Unit with a Network of Universities	Scenario 2: A Regional Railway Institute in Cooperation with a University	Scenario 3: A Regional Railway Academy
 <b>Target Group</b>	<ul style="list-style-type: none"> <li>– Supervisor and management level of railway companies, supplier companies, ministries, relevant authorities – focus on strategic and regulatory level (Multipliers)</li> </ul>	<ul style="list-style-type: none"> <li>– Students of railway related degree programs and interested in a railway career</li> <li>– Supervisor and management level of railway companies, ministries, relevant authorities – focus on strategic and regulatory level (Multiplier)</li> <li>– Engineers of railway operators across different functions</li> </ul>	<ul style="list-style-type: none"> <li>– Trainees of railway related job profiles such as train drivers, dispatcher, maintenance technician etc</li> <li>– Engineers in relation to new technologies</li> <li>– Technical staff for maintenance and operations</li> <li>– Other staff related to the railway sector (suppliers)</li> <li>– Supervisor and management level of railway companies, ministries, relevant authorities – focus on strategic and regulatory level (Multiplier)</li> <li>– Local trainers from the region to be trained in new technologies etc</li> </ul>
 <b>Language</b>	<ul style="list-style-type: none"> <li>– English</li> <li>– Local languages on demand and for specialized training in the region</li> </ul>	<ul style="list-style-type: none"> <li>– English</li> <li>– Local languages on demand and for specialized training in the region</li> </ul>	<ul style="list-style-type: none"> <li>– English</li> <li>– Local languages on demand and for specialized training</li> </ul>
 <b>Certification</b>	<ul style="list-style-type: none"> <li>– Certificate of participation by hosting entity or respective local partner university</li> </ul>	<ul style="list-style-type: none"> <li>– Certificate of participation by hosting entity or university partner</li> <li>– Regionally recognized certificates for specific courses through bilateral agreements</li> <li>– International certification by DB Rail Academy or others</li> </ul>	<ul style="list-style-type: none"> <li>– Certificate of participation by Regional Railway Academy</li> <li>– Regionally recognized certificates for specific courses through bilateral agreements</li> <li>– International certification by DB Rail Academy or others</li> </ul>

	Scenario 1: A Regional Coordination Unit with a Network of Universities	Scenario 2: A Regional Railway Institute in Cooperation with a University	Scenario 3: A Regional Railway Academy
 <b>Staffing</b>	<ul style="list-style-type: none"> <li>- 2-3 training and railway experts in the coordination unit, who could also cover some of the trainings</li> </ul>	<ul style="list-style-type: none"> <li>- Head of Academy</li> <li>- Project Managers/ Training Coordinators</li> <li>- Full-time trainers</li> <li>- Admin support role</li> <li>- Maintenance support for the building</li> </ul>	<ul style="list-style-type: none"> <li>- Head of Academy</li> <li>- Administrative unit for running the academy</li> <li>- Team of Project Managers/ Training Coordinators</li> <li>- Team of Full-time trainers</li> <li>- Team for the Maintenance of the Building, the workshops and the systems</li> </ul>
 <b>Infrastructure</b>	<ul style="list-style-type: none"> <li>- Rooms that can be used for training purposes at hosting entity, partner universities and schools</li> <li>- No technical equipment</li> </ul>	<ul style="list-style-type: none"> <li>- Classrooms</li> <li>- Innovation lab</li> <li>- Utilization of other existing training infrastructure, e.g. at University, Railway School or Railway Operators</li> </ul>	<ul style="list-style-type: none"> <li>- Classrooms</li> <li>- Computer labs</li> <li>- Innovation lab</li> <li>- Signaling and dispatching lab</li> <li>- Outdoors training area (tracks, ETCS, overhead lines etc.)</li> <li>- Desk based simulators for different rolling stock</li> </ul>

	Scenario 1: A Regional Coordination Unit with a Network of Universities	Scenario 2: A Regional Railway Institute in Cooperation with a University	Scenario 3: A Regional Railway Academy
 <p><b>Business Model</b></p>	<ul style="list-style-type: none"> <li>- EU or other funding and possibly subsidized fees per course by participants</li> <li>- Main costs items: (1) staff costs for Training Unit; (2) trainer costs; (3) travel costs; (4) curricula development</li> </ul>	<ul style="list-style-type: none"> <li>- Initial external funding for set up and initial few years</li> <li>- Membership model with different companies and universities</li> <li>- All trainings for a fee by customers but subsidized, also offers for private sector for potentially higher fees</li> <li>- Main costs items: (1) building (shared with university) (2) Staff costs; (3) trainer costs (some trainer costs shared with university); (4) travel costs; (5) curricula development</li> </ul>	<ul style="list-style-type: none"> <li>- Initial external funding for set up and initial few years</li> <li>- Fixed contributions by all members</li> <li>- All trainings for a fee by customers but subsidized</li> <li>- High investment costs to be covered by external funding</li> <li>- Commercial business model including external revenue streams by relevant private sector in the region</li> <li>- Main costs items: (1) Investment costs in building and training infrastructure (2) building and infrastructure operations and maintenance; (3) Staff costs; (4) trainer costs; (5) travel costs; (6) curricula development</li> </ul>

## 5.4 Examples and Case Studies for each Scenario

### ***A Regional Coordination Unit with a Network of Universities: Example of the ERA Academy***

The ERA Academy can serve as an example for the decentralized scenario featuring a regional coordination unit to manage the training portfolio: The Training Academy offers a range of specialized programs designed to support national safety authorities, notified bodies, railway undertakings, infrastructure managers, and other railway professionals. These training courses focus on key areas such as railway safety, interoperability, the Common Safety Method (CSM), the Common Safety Targets (CST), the European Rail Traffic Management System (ERTMS), and the application of European Union railway legislation.

By delivering structured training aligned with EU regulations and technical specifications, the ERA academy ensures consistent understanding and application of the EU railway framework across Member States. Courses are designed and delivered by experienced ERA experts and are often complemented by interactive workshops, case studies, and real-world examples. Courses are delivered at ERA's headquarters in Valenciennes, France or virtually and are targeted at different audiences in the railway sector. Main target group are managers and supervisors.

The training program on EU standards is fully subsidized as part of the wider ERA mandate and offered free of charge. However, the ERA Academy also offers customized specialized, industry-specific training in any of the EU regions. They are planning to extend their services on training programs further.

The Academy consist of a team of currently 2 training coordinators who also work as trainers themselves.

Currently they provide certificates of participation to all people trained. They are planning to consider accrediting ERA Academy as a formal training institution on European level to also be able to provide formal certification. However, there is no process yet established for regional training certificates so this will need to be further explored first.

### ***A Regional Railway Institute in Cooperation with a University: Example of a joint learning facility of TU Darmstadt and Deutsche Bahn***

The collaboration between Technical University Darmstadt (TU Darmstadt) and Deutsche Bahn serves as an exemplary cooperation model between academia and industry. As part of this cooperation, a Chair for Railway Systems and Railway Technology was established at TU Darmstadt in 2007, supported by Deutsche Bahn and focusing on research and technological advancements in railway systems. Beyond the endowed chair, TU Darmstadt and Deutsche Bahn have engaged in an extensive innovation partnership. Joint research projects tackle key

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challenges in the railway sector, with a particular emphasis on European Train Control System (ETCS) implementation and optimization.

A central component of this cooperation is the Eisenbahnbetriebsfeld Darmstadt (EBD), a railway operations simulation facility established in 2006. The facility serves as a training and research environment and includes track fields as well as simulating real-world railway operations through digital signaling and switch controls. This partnership between TU Darmstadt and Deutsche Bahn exemplifies how universities and industry leaders can work together while both benefitting. The university can provide their students real real-world experience through simulations and practical courses developed by DB as the railway operator. They join forces for research that is relevant from a scientific as well as from a company point of view.

The cooperation with the Technical University can also serve as positive promotion for Deutsche Bahn as an employer among young people and students.

### ***A Regional Railway Institute in Cooperation with a University: Example of the cooperation between the Faculty of Dobož with government and industry partners***

The collaboration between the Faculty of Dobož and its Centre for Testing Road Vehicles, alongside the Ministry of Transport and Communication of Bosnia and Herzegovina and Ministry of Traffic and connections of Republic of Srpska, serves as another example of how academic institutions can effectively partner with government and industry to address practical challenges in the road sector. The Vehicle Testing Centre provides professional training services in the field of traffic and transport, testing of motor vehicles and their components for individuals and legal entities from Bosnia and Herzegovina and abroad. The Centre is a sub-organizational unit of the Scientific and Research Centre of the Faculty of Traffic in Dobož, which deals with other activities within the framework of the registered activities of the Faculty. The Centre, although not a separate legal entity, operates within the Faculty's organizational structure and is managed under the Faculty's authority, with a separate sub-bank account for financial operations. The Ministry of Transport and Communication is a critical investor in the Centre's development, providing significant funding for advanced testing equipment, technologies, and infrastructure. The Centre not only works closely with government bodies and other institutions but also serves as a direct resource for citizens, facilitating vehicle testing and certification processes. The Ministry is responsible for issuing the confirmation of certification for the road vehicles tested at the Centre, ensuring compliance with national safety standards.

The Centre's services are extended to third parties through formal contracts. While the Centre's primary focus is on providing testing and certification services, there is also an emphasis on joint research projects between academia and industry. These projects typically focus on improving road safety, vehicle technology, and compliance standards. Through this collaboration, both the Faculty of Dobož and the Ministry of Transport and Communication and Ministry of Traffic and connections of Republic of Srpska aim to advance the knowledge base in the road sector.

This partnership exemplifies how universities can play a crucial role in fostering innovation and serving as a bridge between government and industry in addressing real-world challenges.

### ***A Regional Academy: Example of the Regional School of Public Administration as a regional institute***

The Regional School of Public Administration (ReSPA) is an intergovernmental organization based in Montenegro, dedicated to enhancing regional cooperation, strengthening administrative capacities, and promoting public sector reform in the Western Balkans. Established in 2010 with support from the European Union and the governments of the Western Balkans, ReSPA serves as a regional hub for capacity building, knowledge exchange, and policy dialogue in public administration and governance. Its founding members include Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia, and Kosovo.

ReSPA was established through an open call, allowing interested regions to submit hosting concepts, with Montenegro ultimately being selected as the host. As an international organization, ReSPA operates under a formal treaty signed by its member states. This treaty defines different membership statuses, allowing countries to join as full-fledged or associate members. The organization functions under the authority of the Ministries of Public Administration, with its governance structure overseen by a Steering Committee at the ministerial level.


The ReSPA Training Institute delivers a wide range of training programs, workshops, conferences, and peer-to-peer learning activities. The institute also focuses on developing leadership and managerial skills among civil servants, promoting a culture of professionalism and accountability within the public sector. Training is delivered by expert practitioners, academics, and professionals from within the region and EU member states, ensuring both contextual relevance and European best practice standards.


Although ReSPA does not offer a formal certification process, participants receive certificates of participation, which are recognized by all member countries as relevant professional training. The organization is supported by a dedicated secretariat consisting of approximately 20 staff members who form the core operational team, ensuring the effective implementation of its mandate.

With its headquarters in Montenegro, ReSPA is not only a training institute but also a catalyst for public sector modernization and regional integration in the Western Balkans. Through its initiatives, it contributes directly to the broader goals of European integration and good governance.



## 5.5 Comparison of advantages and disadvantages of the different scenarios

	Scenario 1: A Regional Coordination Unit with a Network of Universities	Scenario 2: A Regional Railway Institute in Cooperation with a University	Scenario 3: A Regional Academy
 <b>Pros</b>	<ul style="list-style-type: none"> <li>- Fast to implement</li> <li>- No investment costs</li> <li>- Clear focus on EU standards and training</li> <li>- Low cost model</li> <li>- Little need to travel for railway operators staff since training sessions to be held regionally</li> <li>- Multiplier Model: Exclusive network option for important roles/stakeholders in the region</li> <li>- No legal limitation</li> </ul>	<ul style="list-style-type: none"> <li>- Sharing costs with university and school partners for venues, trainers/ lecturers, training infrastructure</li> <li>- Upgrading of universities for higher quality standards, this will have an impact across the educational quality in the whole region and also increase the attractiveness of the sector</li> </ul>	<ul style="list-style-type: none"> <li>- Independent Academy</li> <li>- Strong independent brand across the region and beyond</li> <li>- Long lasting sustainability and scope to support modernization drive across the whole region</li> <li>- Will have some high technology railway related technical equipment to attract participants that can also be used by students and therefore increase the attractiveness of the sector</li> <li>- Highest quality standards based on EU standards and based on German Dual Vocational System</li> </ul>

	Scenario 1: A Regional Coordination Unit with a Network of Universities	Scenario 2: A Regional Railway Institute in Cooperation with a University	Scenario 3: A Regional Academy
 <b>Cons</b>	<ul style="list-style-type: none"> <li>- Finding suitable host organization which has sufficient capacities, expertise and political mandate and option to apply for EU funding (optimum: a registration as a training Centre needed)</li> <li>- Language only English due to focus rather on managerial and supervisor level</li> <li>-</li> <li>- Small reach and limited training offer</li> <li>- Dependence on partner institutions/ network for training delivery</li> </ul>	<ul style="list-style-type: none"> <li>- Dependency on lead university partner</li> <li>- Participants need to travel to Centre for courses</li> <li>- may be a conflict because of the actual localization of who is cooperating here</li> <li>- Challenge to establish own brand in context of hosting entity and</li> </ul>	<ul style="list-style-type: none"> <li>- High investment and running costs</li> <li>- High political investment to convince members to co-fund and license this Centre to ensure that its part of the formal training plan – complex Governance structure</li> <li>- Requires strong commitment by all members and willingness to transfer their training requirements/ responsibilities to the regional level instead of the national level</li> </ul>

## Key Differences

	Scenario 1	Scenario 2	Scenario 3
Academic Training Offer	✓	✓	✓
Vocational Education			✓
Exclusive Technical Workshops and Equipment			✓
Certificate of Participation	✓	✓	✓
Regional Certification (recognized in WB)		✓	✓
International Certification (e.g. DB / IHK)			✓
Legally Registered Training Centre		✓	✓
Own Legal Entity			✓

## 5.6 Risk Analysis of the Scenarios

Regardless of the scenario chosen for the Regional Centre of Railway Excellence, key risks must be considered. These risks have varying degrees of probability and impact, but they remain central challenges that need to be addressed through effective mitigation strategies.

- **Limited Participation from Western Balkan Regions**

Not all regions may be willing or ready to join the initiative immediately, which could limit the academy's reach and effectiveness. This risk is possible with a medium impact across all models.

*Mitigation Measures:* A phased rollout, starting with "early mover" regions to demonstrate success, could encourage other areas to join over time.

- **Lack of Funding (particularly for Investment Costs)**

One of the most significant risks across all scenarios is the lack of financial resources, especially for covering initial investment costs. Without sufficient funding, the sustainability of the academy could be compromised. This risk is likely and highly impactful in all three models.

*Mitigation Measures:* Exploring alternative funding sources, such as international grants, public-private partnerships, and collaborations with international organizations, can help secure financial stability.

- **Difficulty in Finding the Right Host**

Support is crucial for ensuring the long-term success and recognition of the academy. Identifying a suitable host may be challenging, but failing to secure one could hinder progress. This risk is unlikely but could have a significant impact if it occurs.

*Mitigation Measures:* A strategic approach to engaging potential hosts—highlighting the initiative’s economic and educational benefits—can improve the chances of gaining support.

- **Universities’ Reluctance to Partner**

In scenario two, the success of the initiative depends on the willingness of universities to collaborate. However, some institutions may not see enough value in participating. While this risk is unlikely, its impact would be significant if it materialized.

*Mitigation Measures:* Clearly communicating the benefits for universities could incentivize their involvement.

- **Language Barriers and Insufficient English Proficiency**

Since the training academy aims to attract participants from various regions, language proficiency could be a major challenge. If participants do not have sufficient English skills, course effectiveness may suffer. This risk is considered likely with a medium impact in all scenarios.

*Mitigation Measures:* Providing multilingual training materials, offering preparatory language courses, or including local language support could help overcome this challenge.

- **Mismatched Curriculum with Industry Needs**

If the training programs do not align with market demands and industry trends, graduates may struggle to find employment, reducing the academy’s credibility.

*Mitigation Measures:* Close collaboration with industry stakeholders to ensure the curriculum remains relevant and regularly updated and support by an international training provider, e.g. DB Rail Academy.

- **Administrative and Bureaucratic Challenges**

Depending on region, setting up an educational institution may involve complex administrative and regulatory hurdles, slowing down implementation.

*Mitigation Measures:* Engaging legal and policy experts early on to navigate local regulations efficiently.

- **Lack of Long-Term Sustainability**

Even if the Centre is successfully launched, ensuring its long-term sustainability could be a challenge. Dependence on external funding or short-term grants might create financial instability.

*Mitigation Measures:* Developing a self-sustaining business model, such as membership fees, industry partnerships, or government-backed support, could help secure the academy’s future.

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# 06.

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## Annexes



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## **6. Annexes**

- **Annex 1: List of conducted interviews**
- **Annex 2: Overview of the legal framework by region**
- **Annex 3: Overview of relevant EU regulations and norms**
- **Annex 4: DB Examples of technical equipment for workshops**
- **Annex 5: Examples of relevant training courses**

The annexes will be provided in separate PDF documents additional to the report.



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