



Ben@Rail

Deliverable D 1.1

Simplified stakeholder tree and weighting matrix of requirements

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1. Executive Summary

Ben@Rail intends to provide recommendations for the R&I priorities set in the European Union Rail Joint Undertaking (Europe's Rail Joint Undertaking ERJU) Master Plan. These recommendations are based on the requirements and expectations of the stakeholders of the European railway system. Therefore, if combined with the objectives of the Master Plan, strengthens the effectiveness of EU-funded Research & Innovation (R&I) activities. To ensure this, first it is necessary to identify the currently and prospective important stakeholders that are involved and/or interested in the railway sector. Then, gather the stakeholders' requirements and expectations regarding the European railway system. Subsequently, the requirements are weighted in order to highlight the different importance for the respective stakeholders.

This document provides a collection of the stakeholders of the European rail system. A total of 13 different main stakeholder categories have been identified. These main categories were further divided into 44 sub-stakeholders. All stakeholders are presented systematically and structured graphically in a simplified stakeholder tree.

For the identified stakeholders, their requirements have been collected, analysed, ordered and weighted. The result of this process is a weighting matrix, which is particularly relevant for the further progress of the project. The weighting matrix consists of 380 major requirements, followed by another 1100 unweighted minor requirements structured in their sub-layers. Over almost all stakeholders, economic requirements in particular, such as low costs or high revenues, are given priority. However, aspects of safety, punctuality, reliability and low emissions are also rated highly.

Furthermore, besides the listed requirements, core requirements were qualitatively derived from interviews with stakeholder representatives, as they were explicitly named in a large number of interviews. Their main concern is the harmonization of cross-border processes in the railway system and the harmonization of national regulations. Especially these fields are seen by stakeholders as powerful facilitations in connection with railway systems. Therefore, from stakeholders' point of view, the fulfilment of these qualitative core requirements will contribute the best to enable the increase of competitiveness and market share of rail transport.

2. Abbreviations and acronyms

Abbreviation / Acronym	Description
WP	Work package
R&I	Research and innovation
EU	European Union
JU	Joint Undertaking
ABIM	Advanced Business and Innovation Model
ROSCO	Rolling Stock Company



3. Background

The present document constitutes the Deliverable D 1.1 “Simplified stakeholder tree and weighting matrix of requirements” in the framework of WP1, Task 1.3.

4. Objective/Aim

The project Ben@Rail intends to provide recommendations for R&I priorities to be set in the ERJU Master Plan based on the requirements and expectations of the stakeholders of the European railway system. An overview of the expected outcomes from the ERJU R&I activities is given and then matched with the stakeholders' requirements and expectations to form suggestions for present and future R&I fields funded by the European Union. By means of its innovative and scientific approach, Ben@Rail's ambition is to become the framework and reference for the evaluation and prioritisation of EU-funded R&I activities in railway transport.

The focus of this document lies on the stakeholders and their requirements, which resembles the contents of WP 1. The document's overall objective is to identify the currently and prospective important stakeholders that are involved or interested in the railway sector, collect the stakeholders' requirements and expectations regarding the European railway system and to weight these requirements.

The stakeholders are identified by considering existing studies and systematic and scientific approaches. After identifying the relevant stakeholders, a stakeholder tree is created (see section 5.1). The gathering of the stakeholders' requirements and expectations is performed in a similar way by building upon existing studies. Applying methodical approaches and carrying out interviews with stakeholders the requirements are completed (see section 5.2). Lastly, this document contains a weighting of the requirements based on expert knowledge to highlight the different priorities of each stakeholder. This is captured in a weighting matrix (see section 5.3).

The document's results can be used for matching the defined outcomes of R&I activities of the ERJU with the stakeholders' requirements and expectations to create evidence-based recommendations for the ERJU Master Plan.

5 Simplified stakeholder tree and weighting matrix of requirements

This chapter describes the methodological approach and the results of this deliverable. First, section 5.1 lists the identified stakeholders and presents them in a simplified stakeholder tree. Section 5.2 describes the procedure for determining the requirements of the stakeholders. Both, stakeholders and their requirements, have been gathered by means of creative and systematic methods like brainstorming and existing studies.

For this the main sources of contribution were:

- “Weiterentwicklung des Advanced Business and Innovation Model (ABIM) Rail” (IFS, VIA, Siemens AG, 2017, unpublished) [2]
- “Stakeholder Consultation Strategy” (European Commission, Guidelines 2014) [3]
- IMPACT-2: D 3.1 [4], D 4.2 [5], D 4.4 [6], D 5.1 [7], D 6.2-6.5 [8–11], D 7.1-7.2 [12, 13], D 9.1 [14]
- “Europe’s Rail Joint Undertaking - Master Plan (Draft)” (European Commission, 2021) [15]
- “Untersuchung der volkswirtschaftlichen Bedeutung des deutschen Bahnsektors auf Grundlage der Beschäftigungswirkung“ (Deutsches Zentrum für Schienenverkehrsforschung, 2021) [16]

ABIM [2] was used as the basis for the categorisation of stakeholders and already provided a set of general requirements to most stakeholders. The Stakeholder Consultation Strategy [3] helped to enhance the list of stakeholders systematically by checking the different stakeholder categories mentioned there.

The deliverables published by IMPACT-2 were used to further extend the number of requirements, that belong to the identified stakeholders. For example deliverable D3.1 [4] provided basic requirements like R1.1: Short travel time from door to door, R1.2 Low costs, which was derived from “low ticket price” and R1.4.1 High punctuality for the stakeholder “End User – Traveller”. Another example can be shown by technical-functional requirements like “easy and fast technical approval/certification” and “standardisation” as well as “low noise emissions” or “standardisation” that were applicable to a wide range of stakeholders from rail industry (e.g. Stakeholders 19 to 21 - Vehicle Manufacturing Company, or Stakeholder 3 to 5 - Train Operating Companies).

The ERJU Master Plan was not only used to extract R&I concepts but also helped complementing the stakeholder list.

Potential Stakeholders have been derived by the requirements the given concepts of the master Plan arose from and have been added to the stakeholder collection.

"Untersuchung der volkswirtschaftlichen Bedeutung des deutschen Bahnsektors auf Grundlage der Beschäftigungswirkung" [16] was carried out by order of the German Centre for Rail Traffic Research (DSZF) at the Federal Railway Authority (EBA) and helped extending the list of stakeholders and defining the different stakeholder categories. For example the differentiation of Train Operating Companies in "Passenger", "Freight" and "Maintenance" has been extracted from this publication as well as the differentiation of "Vehicle Manufacturing Industry", "Infrastructure Managers" or "R&I".

The identified stakeholders were then grouped in thirteen different categories of main-stakeholders. This was discussed through participatory process in targeted interviews and adjusted until the categories matched all identified stakeholders sufficiently. This approach tried to balance the stakeholders evenly and not to over- or underrepresent any stakeholder through the selected categories. This enables a fair evaluation of the impact of the technological concepts published in the ERJU Master Plan.

The requirements have been further collected by using checklists for setting up a requirement list described in [1]. This method gives a list of properties for a product (e.g. dimensions, kinematics, assembly, recycling, etc.) that can be used as inspiration for a complete list of requirements.

Although in this project the requirements do not describe a specific product but the European Railway System in general, such methods still are very useful to systematically identify all necessary requirements. For each sub-stakeholder, a first list of requirements was created by means of the methods mentioned above and literature research. In addition, core requirements have been justified and derived from interviews with stakeholder representatives.

Finally, the weightings of these requirements are transferred into a weighting matrix, which is presented in section 5.3.

5.1 Simplified stakeholder tree

Thirteen different main stakeholder categories have been identified and are arranged in the stakeholder tree (Figure 1). From there they branch out into sub-stakeholders, who represent different interests within the group. In total 44 sub-stakeholders have been considered.

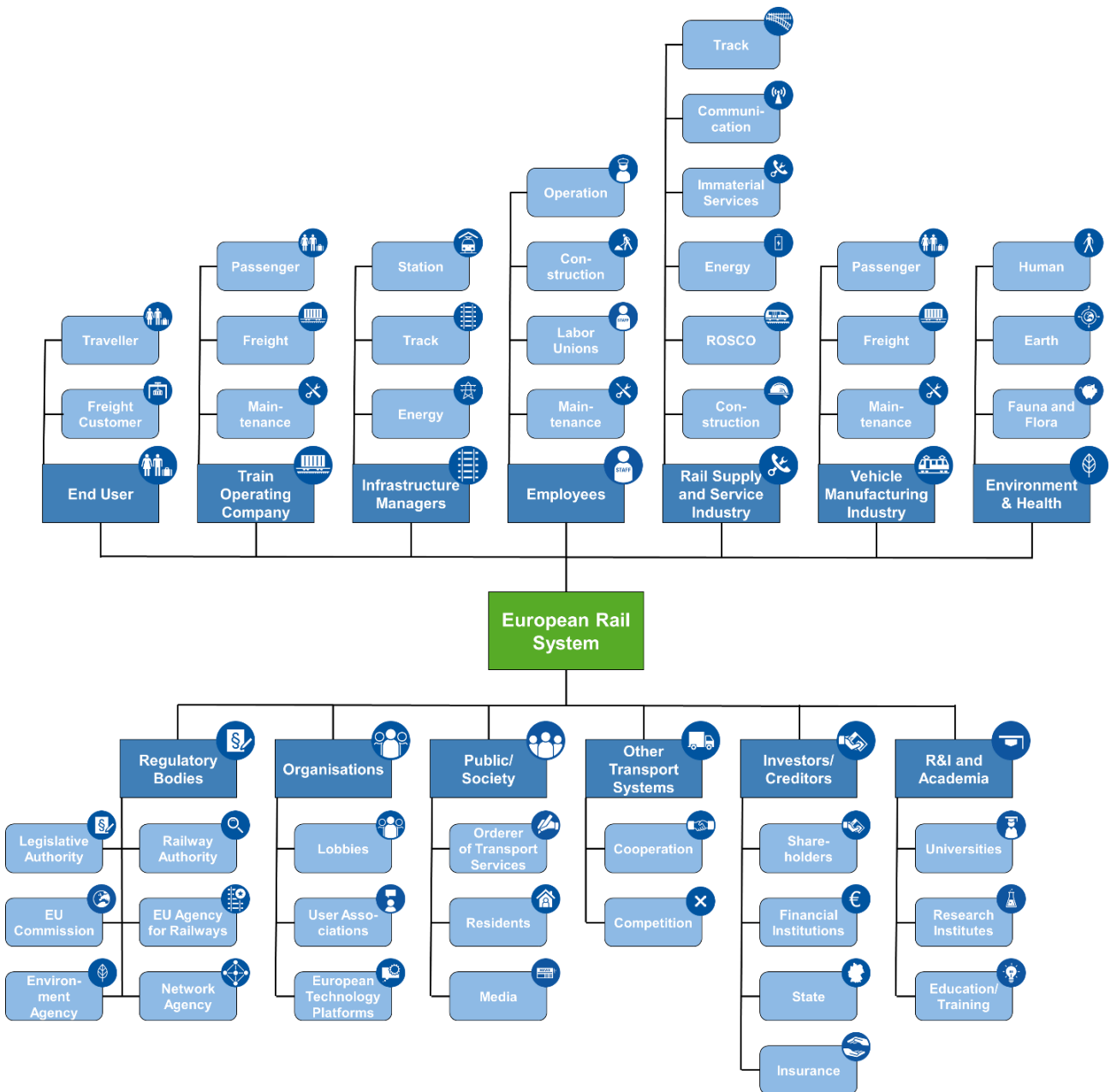


Figure 1: Simplified stakeholder tree of the European Rail System

The 44 sub-stakeholders were first identified by means of above-mentioned methodology. Then, the main stakeholders were formed based on the sub-stakeholders to create a stakeholder tree. The main stakeholders represent overall categories, that are made up of sub-stakeholders fitting within the main category. No specific requirements are assigned to these main stakeholders.

The **End User** is composed of two sub-stakeholders: travellers and freight customers. Travellers can be business or private travellers with an individual need for personal mobility. The differentiation between business and private travellers was preferred over the division between long distance and commuter travellers as otherwise many more different combinations of long- and short distance, and private and business travellers had to be introduced with many overlaps between the outcomes of their weightings. Freight customers, including shippers and single freight customers, are people or companies with a considerable need to transport goods.

On the primary market for passengers and cargo, train operating companies compete for these end-users. The **Train Operating Company (TOC)** is providing railway services for passenger and/or freight transport. Next to operating trains, TOCs are often in charge of maintaining the rolling stock material. Similarly to the end users case, TOCs have been differentiated between passenger and freight transport according to the actual mode of operation and the special case of in-house maintenance, as this was deemed more meaningful concerning the corresponding requirements.

Different TOCs can compete on the secondary market for the limited capacity on the railway infrastructure. The **Infrastructure Managers** are responsible for establishing and operating the rail infrastructure, and for keeping it in good condition. The infrastructure encompasses tracks, stations, and energy supply.

TOCs, infrastructure managers, and other stakeholder groups, are engaging workers. The **Employees** form a stakeholder group. The railway system has direct, as well as indirect and induced employment effects. Three relevant groups of employees are those in operation, construction and maintenance. In Europe, the interests of employees are often represented by labour unions.

Furthermore, the following groups are affecting the Railway System:

The **Rail Supply and Service Industry** interacts with the above-mentioned stakeholders. This group involves all suppliers and providers of goods and immaterial services such as rolling stock leasing companies (ROSCO).

The **Vehicle Manufacturing Industry** represents another stakeholder group. Different manufacturers compete in tenders of TOCs and/or orderers of transport services with each other. They produce and sell rolling stock material and components. This contains locomotives, carriages, and their equipment.

Environment & Health are affected by the railway system. The influences of rail transport can have an impact on humans, the earth and flora and fauna. This stakeholder group is related to all

other stakeholders. Regarding other transport systems, rail transportation might be more environmentally friendly. To protect environment and health, legal restrictions can be imposed by regulatory bodies. The stakeholder can for example be represented by environmental groups.

Regulatory Bodies act as supervisors of the meeting of rules and laws and advocate the interests of different stakeholders. Governments and parliaments set up a legal framework wherein the railway system can operate. Agencies check the compliance of all TOCs, infrastructure managers, and new vehicles to regulations and laws.

Organisations can formulate their interests and thus have an impact on the rail system. In this group stakeholders like lobbies, user associations and European technology platforms are represented.

Public/Society includes several groups such as orderers of transport services, residents and the media. The latter is directly linked with TOCs regarding the dissemination of information.

Other Transport Systems have an influence on the railway system. On the one hand, there is competition between them. On the other hand, there is cooperation in creating intermodally connected travel chains.

Investors/Creditors provide the money that is required by train operating companies, infrastructure managers and vehicle manufacturers. Within the group it can be distinguished between different investors, who can have dissimilar interests.

R&I and Academia encompass all institutions related to research and education.

5.2 Requirements of stakeholders

The stakeholders that have been identified in WP1.1 are now analysed individually to gather their specific requirements by using above mentioned methods. These requirements are of general nature and do not solely focus on R&I activities, therefore giving a better overview of the overall needs of each stakeholder.

Through the analysis of the stakeholders' requirements, the project identified 380 major requirements and 1100 minor requirements. These major requirements represent clusters of different minor requirements (sub-requirements). This approach has been taken to ensure that the minor requirements, often very specific (e.g. sanitary facilities available), could be combined with similar requirements into major requirements (e.g. high level of comfort) to ultimately allow an accurate weighting and rating process maintaining an adequate level of complexity without loss of information.

Moreover, minor requirements were employed to support the evaluation of the corresponding major requirement. In those cases where requirements could not be combined into a major requirement, they were listed on their own. Furthermore, this approach permitted to align the level of detail in the requirements with the selected level of detail in the concepts.

First of all, a set of requirements for all stakeholders using the project teams' knowledge, systematic methods as well as the existing studies mentioned in the introduction of section 5 was gathered. This set comprises requirements that are obviously relevant for each stakeholder (e.g. "costs") but also specific requirements, only matching a single stakeholder (e.g. "personal comfort zone" for the End User- Traveller).

This first set of requirements was then enhanced through targeted interviews of representatives for the main categories of stakeholders. This approach ensured that the stakeholders' point of view was reflected in the best way and the requirement list was completed. For this, a total of 22 interviews were conducted with various representatives of the main stakeholder categories. The discussions were used to expand and complete the collection of requirements. In this way, a comprehensive and valid representation of the requirements can be guaranteed.

The interviewees cover the following stakeholders: End User (3), Train Operating Company (1), Infrastructure Managers (3), Rail Supply and Service Industry (1), Vehicle Manufacturing Industry (3), Environment & Health (1), Regulatory Bodies (4), Organisations (6), Public/Society (1), R&I and Academia (1). Interview partners can also represent several stakeholders in the process. Stakeholders from international companies and organisations situated mostly in Germany were interviewed to make the best use of available contacts in short available time. Nevertheless, the requirements represent the stakeholders very well, as various stakeholder groups were

interviewed that have broad knowledge about and long experience in the whole European Railway sector.

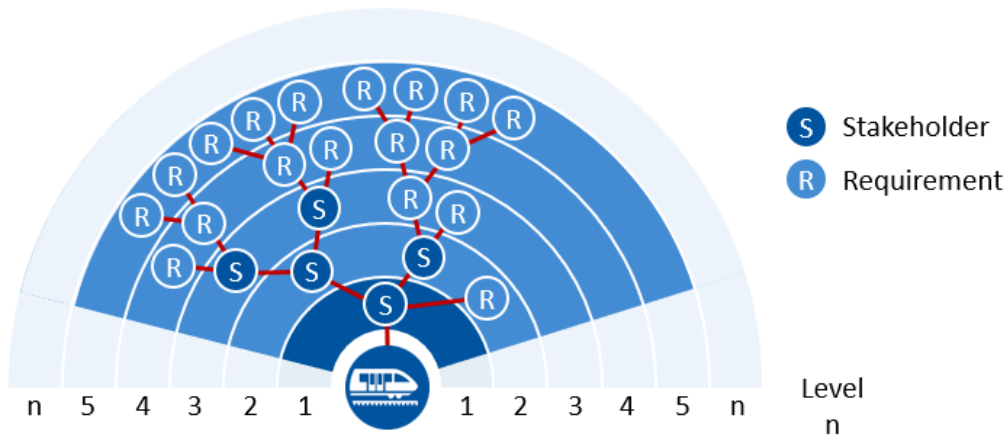


Figure 2: Structure of the stakeholder and requirements analysis

Figure 2 shows the stakeholders and their requirements are structured hierarchically. The layout starts with level 1, where only stakeholders are listed. This is followed by a further breakdown into sub-stakeholders or directly subsequent requirements. Requirements can be arranged in the structured model between level 2 and level n. The requirements that directly follow a stakeholder are particularly important for this stakeholder. Each chain of requirements begins with a general requirement and ends with a more precise one.

For this reason, the requirements are listed in different layers, as certain requirements are connected in categories. For example, the requirement “low costs” of the sub-stakeholder “Train Operating Company (Passenger)” can be divided into the following three categories:

Table 1: Sub-layers of the requirements “costs”

Number	Type	Category	Name	Description
3.2	Requirement	Costs	Low costs	-
3.2.1	Requirement	Costs	Low costs for vehicle financing	Low cost for leasing the vehicle and low number of vehicles needed
3.2.2	Requirement	Costs	Low operating costs	Low labour and energy costs as well as low charges for infrastructure (track, station).
3.2.3	Requirement	Costs	Low other costs	Taxes, no penalties, etc.

The general high-level requirements (in this case 3.2 “Low costs”) were identified first and then gradually expanded with sub-requirements. Both, general high-level requirement and sub-requirements were identified by the afore mentioned techniques. Depending on stakeholder and requirement the depth of sub-layers varies. The complete requirement list containing all requirements of all sub-stakeholders can be found in the **annex**, as presenting all tables within this chapter would limit readability of this deliverable.

5.3 Weighting matrix of requirements

After compiling the stakeholder requirements, a weighting is assigned to selected requirements of each stakeholder. This enhances the importance of the requirement. The analysis includes the types of requirements, as to whether it might be mandatory or rather desirable. As different stakeholders might have the same requirement but with different importance, each requirement is weighted for each stakeholder. In this way, different needs of different stakeholders can be considered.

The weighting of the requirements was performed for the main categories of requirements to keep the weighting comparable between different stakeholders. If further specification was necessary, sub-layers were also weighted. The weighting scale was defined between 0 and 3, where the exact description is as shown in Table 2:

Table 2: Weighting scale

Weighting	Importance for stakeholder
0	Not important
1	Rather not important
2	Rather important
3	Important

The weighting scale is structured with values between 0 and 3, where a requirement that scored 0 points has no importance to the stakeholder and, on the other hand, a requirement that scored 3 points has a very high importance for the stakeholder.

Like the gathering of requirements, the weighting was also performed in targeted interviews with representatives of the main stakeholder categories. The interviewees were asked to apply the above weighting scale to the single requirements of their assigned stakeholders. The corresponding weightings can be found in the “weight”-column in the tables in the **annex**. If more than one interviewee for one stakeholder was available, the weightings represent an average value that can deviate from the whole numbers defined for the weighting scale. If no statements were available regarding the weighting, the weightings are made on the basis of the expertise of the project team and of literature research.

Stakeholders can have different weightings for different requirements for example depending on the purpose of their trip (private or business trip). In order to consider such aspects in the evaluation, different weightings may be used in the sub-layers of the sub-stakeholders.

The final weightings represent a combination of a general weighting done by the project members and the weighting of the stakeholders that have been interviewed. This method helps to make the results generally more acceptable, as otherwise the rating of a single interviewee defines the Ben@Rail – GA101046258

weight of a whole stakeholder.

To consider the better knowledge of the stakeholder’s needs, the interviewee’s weighting has a double share in the combined weighting, than the weighting carried out by the team.

Due to a partially existing heterogeneity of the stakeholders, deviating weightings are possible. This applies in particular to the traveller, who may be time-, comfort- or cost-oriented. Furthermore, as with the stakeholder “lobbies”, it can occur that interests contradict each other because of the combination of different lobby associations but is not critical for further progress, as the contradicting interests are considered through the different stakeholders the different lobbies represent. The requirements of the lobbies therefore focus on shared requirements that are not contradictory. The selected weighting methodology nevertheless ensures that a suitable basis has been created for the following work packages.

The complete set of weightings for all requirements was then inserted into a weighting matrix that can be multiplied with the concept rating matrix, which is part of further work steps of this project. Table 3 shows a general version of the matrix with all sub-stakeholders and their weightings. In this compact version of the weighting matrix, the requirements are merged together by showing the number of requirements and sub-layers of each stakeholder (X).

In this exemplary table stakeholder 1 has two sub-requirements in the first requirement category (1.1.1, 1.1.2) and one requirement in the second category (1.2). Stakeholder 2 has just a single requirement in the first category and stakeholder 3 has one sub-requirement in the first requirement category (3.1.1) and one requirement in the second category (3.2).

Table 3: Exemplary and simplified weighting matrix of requirements for all stakeholders and selected requirements

Stakeholder (X)	Requirement X.1	Requirement X.1.1	Requirement X.1.2	Requirement X.2
Stakeholder 1	1.1	1.1.1	1.1.2	1.2
Stakeholder 2	2.1			
Stakeholder 3	3.1	3.1.1		3.2

This table has the sole purpose of creating a layout that is clearly arranged and comprehensible. The actual mathematical matrix has far more columns, as the different sub-layers of the stakeholders’ requirements are not necessarily comparable with each other.

The full version of the table, which is split into two parts can be found in the **annex**. The full ratings can also be found in the **annex** as part of the full requirements list. The following table gives a short overview of the three highest weighted and therefore most important requirements in each of the thirteen main stakeholder categories.

Table 4: Highest weighted requirements within the main stakeholder categories

Main-Stakeholder	1st Requirement	2nd Requirement	3rd Requirement
End User	Low costs/fares	No cancellations	Safety
Train Operating Company (TOC)	Low operating costs	Easy and comprehensible homologation process	Maximum usage of railway lines
Infrastructure Manager	Low costs	Good accessibility of the station	Technical functional requirements
Employees	Good conditions regarding working hours and work-life balance	Health and Safety	Good working conditions for members (Labour Unions)
Rail Supply and Service Industry	High Revenue	Low manufacturing costs	Low bureaucratic burdens, o. a.
Vehicle Manufacturing Industry	High Revenue	High number of sales	Low material cost, o. a.
Environment & Health	Prevention of climate change	Low emissions / pollution,	No unnecessary impact on forests, vegetation and landscape + wildlife
Regulatory Bodies	Protection of goods and people -> Compliance with legislature and standards	Anti-discriminatory access	Interoperability, o. a.
Organisations	High safety	Running trains more frequently	High degree of digitalisation and automation
Public / Society	High punctuality	No cancellations	Low noise
Other Transport Systems	Multimodality	Adaption of infrastructure for interoperability	Higher share of investment
Investors / Creditors	High return	High profits (of rail-system)	Low risks of payment default
R&I and Academia	Possibility to reinvest in projects	Continuous funding of new research projects	Continuous supply of new research projects

6 Conclusions

This deliverable D 1.1 “Simplified stakeholder tree and weighting matrix of requirements” creates the basis to assess the effects of R&I activities on the stakeholders’ expectations. For this purpose, all relevant stakeholders with a legitimate interest in the European Railway System have been collected and included in a stakeholder tree to visualize their dependencies. The stakeholders have been identified by building upon existing studies such as the ongoing project IMPACT-2, the unpublished study conducted by RWTH Aachen University (IFS, VIA) and Siemens and various documents of the European Commission and European Technology Platforms and using creative systematic methods that were also used to gather requirements.

By creating a stakeholder tree, a distinction has been made between the main stakeholder categories and sub-stakeholders which aimed to create a fair division between the stakeholders and an unbiased basis for the later analysis. After having identified all relevant stakeholders, their specific requirements were collected, analysed, ordered and weighted. To ensure the scientific approach, requirements were gathered by using creative and systematic methods and were completed by carrying out interviews with different stakeholders from areas, where the project’s broad knowledge of the railway sector needed to be supplemented. Having analysed and ordered the requirements in different layers, a weighting of selected requirements has been performed based on the interviewee’s priorities, the experience of the project team and existing literature.

Results of the analysis are thirteen different main stakeholder categories, which have been identified and are arranged in the stakeholder tree. Furthermore 44 sub-stakeholders have been considered. For these sub-stakeholders, a total of 380 main requirements were included in the weighting. In addition, 1100 more detailed minor requirements are listed in the corresponding sub-layers. Justified and completed by various stakeholders of the main categories in 22 interviews, this collection of requirements can thus be described as a sufficient basis for the further processing of the project.

In the weighting process it was noticed that the upper part of the weighting scale (0-3 points) is mainly used, since unimportant requirements tend not to be mentioned due to system constraints. The weightings were evaluated during interviews with representative stakeholders, although not all sub-stakeholders could be included in the survey.

The following requirements have been identified as most important concerning the weighting process of the stakeholders’ requirements:

- Low costs/fares for tickets/operation/shipping/manufacturing
- High revenue/return/funding
- High safety
- High punctuality/no cancellations
- Prevention of climate change/low emissions/low pollution

- Interoperability
- Low noise

Tables with a more detailed weighting of different requirements can be found in the **annex**.

Due to the different number of requirements of each sub-stakeholder, a standardization of the weighting is to be provided in the further procedure. In this way, the requirements of each sub-stakeholder are considered equally in the subsequent review of their fulfilment.

Particularly relevant are the statements of the 22 interviewed representative stakeholders, which on the one hand are reflected in the requirements and their weightings, but on the other hand also allow qualitative conclusions regarding the European Railway System. Within the interviews, not only a weighting of the requirements was performed but additional comments, expectations and remarks that were repeatedly mentioned in a large number by different stakeholders were collected and reformulated into requirements.

To double check the weighting of the requirements, the stakeholder representatives' comments on the most important core requirements were collected additionally. These relevant core requirements can be abstracted here, which were mentioned consistently in a large number of the interviews:

- Harmonization of cross-border processes
- Standardization of national regulations, data formats and interfaces
- Increase of competitiveness and market share of rail transport
- Increase punctuality
- Improvement of noise protection measures
- High degree of digitalisation and automation
- Harmonized coordination and information on construction activities
- Intensified exchange of national R&I activities

With the help of the results shown in D 1.1, it is subsequently possible to evaluate the research objectives and the technological concepts of the European vision of future rail systems on the basis of the fulfilment of the stakeholder requirements. For this, the weighted requirements of the relevant stakeholders are compared with the concepts of the R&I activities (see D 2.1). Finally, it is possible to derive evidence-based recommendations for the ERJU Master Plan.

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8 Appendices

Table 5: Requirements and Weightings 1.-1.5

Path	Type	Name	Description	Weight		Wish(w)/Need(n)
				Private Traveller	Business Traveller	
1	Stakeholder	End User (Traveller)				
1 1	Requirement	Short travel time from door to door	Short travel time on board, few changes between trains and/or other modes of transport, quick access to train and stations and good connection between different modes of transport	2,9	3,0	w
1 2	Requirement	Low costs	Costs are made up of fares for the train journey, additional service costs as well as costs for access to and departure from the station. Also incorporated are discounts, bonus systems and an easy and understandable pricing system.	3,0	1,9	w
1 3	Requirement	High level of comfort				
1 3 1	Requirement	Pleasant surroundings	Design, ambience, haptic, etc. of trains and stations	1,2	2,0	w
1 3 2	Requirement	Comfortable journey	Comfortable train ride in general which is influenced by noise levels, riding comfort (acceleration, vibration), the design of seating and standing areas, air condition and heating as well as lighting and viewing conditions	2,7	2,6	w
1 3 3	Requirement	Accessibility	Good accessibility of the station, the train and all incorporated facilities.	2,9	2,2	n
1 3 4	Requirement	Convenient and easy travel	Travelling offers the possibility to make use of the travel time (e.g. available workspaces, shopping), offers food and beverages and sufficient luggage storage.	2,4	2,7	w
1 3 5	Requirement	Sanitary facility availability	Depending on the length of the journey, sanitary facilities need to be available and in proper working condition.	2,6	2,7	w/h
1 3 6	Requirement	Easy ticket purchase	The process of buying a ticket is easy, intuitive and locally available, does not comprise the necessity to buy different tickets for just one journey and can be paid for in various ways. Furthermore prices can be compared easily, a language selection is available and the validation and check-in /-out process is clear and intuitive.	2,8	2,2	w
1 3 7	Requirement	Reservation possibility	A reservation of seats is possible.	1,6	2,5	w
1 3 8	Requirement	Personal comfort zone	A certain privacy is maintained within the train and different areas for different needs are offered (e.g. quiet zones, bike racks, etc.)	1,7	2,6	n
1 4	Requirement	High reliability				
1 4 1	Requirement	High punctuality	Trains start punctual and arrive on time at final destinations and especially at interchanging stations for connecting trains.	2,7	3,0	w
1 4 2	Requirement	No cancellations	The booked service is provided without the need to find a replacement connection.	3,0	3,0	w
1 4 3	Requirement	Good disturbance and complaint management	Customer service can be contacted 24/7, is able to offer help and customer needs and complaints are incorporated in system customisation.	2,8	2,5	w
1 5	Requirement	Maximum information with minimum effort	The traveller is provided with all information he wishes without having trouble to obtain this information. This incorporates availability of information as early as possible, high visibility, high reliability, consistency, completeness and good content presentation.	2,7	2,5	w

Table 6: Requirements and Weightings 1.6-2.8

Path	Type	Name	Description	Weight		Wish(w)/Need(n)
1 6	Requirement	Maximum Safety & Security				
1 6 1	Requirement	Safety	The train ride has to be accident-free as well as the entering/leaving of trains, stations and platforms. Furthermore emergency equipment is available (e.g. fire extinguisher, AED, etc.).	2,9	2,7	n
1 6 2	Requirement	Minimal health risks	The risk to suffer from any health risk needs to be minimised (e.g. infections from contagious diseases)	2,7	2,7	n
1 6 3	Requirement	Security	Protection against any kind of crimes and offences, availability of emergency call installations, surveillance, physical presence of staff as well as providing an inviting environment by open, spacious and bright design.	2,5	2,9	n
1 7	Requirement	Reducing environmental impact	The possibility to travel eco-friendly with low impact on fauna and flora, low emissions and a focus on renewable energy sources.	1,3	1,2	w
1 8	Requirement	Low access/change resistance	The overall change from any other mode of transport to train travel is easy and does not seem complicated or unrealistic.	2,0	2,0	w
				Shipper	Freight Customer	
2	Stakeholder	End User (Freight Customer)				
2 1	Requirement	Short transport time from door-to-door	Short time between goods leaving the sender and goods arriving at their final destination. This incorporates a high transport speed, short waiting times, direct connections, etc.	2,4	2,3	w
2 2	Requirement	Low costs				
2 2 1	Requirement	Low fares	Low fares for shipments.	2,8	2,9	w
2 2 2	Requirement	Quantity discount, discount for regular transports	Discounts are applied, if goods are shipped in huge quantities or in regular intervals.	1,8	1,8	w
2 2 3	Requirement	High utilization rate of the transport container	The ordered service is utilized as much as possible, (e.g. 1 container is the smallest unit but only goods for 1/2 container shall be shipped)	2,6	1,8	w
2 2 4	Requirement	Refund for delays		1,8	2,5	w
2 3	Requirement	High reliability				
2 3 1	Requirement	Defined pickup time	knowledge of pick up time is clear	2,6	2,8	w
2 3 2	Requirement	Defined arrival time	knowledge of time frame for arrival is clear	2,3	2,7	w/h
2 4	Requirement	Maximum Safety & Security	Goods are protected against theft, damage during handling (e.g. uninterrupted cold chain) and hazardous goods are transported safely.	2,6	2,4	n
2 5	Requirement	Low access resistance	It is easy for a customer to switch from any other mode of transport to rail transport due to a good advisory service, few bureaucratic burden, uncomplicated booking, etc.	2,4	2,6	w
2 6	Requirement	Low environmental impact	Low emissions during transport, conservation of resources and usage of renewable energy sources.	1,6	1,8	w
2 7	Requirement	Positive external perception towards customers	customers approve with offered services, share the same values	2,3	2,0	w
2 8	Requirement	Maximum information with minimum effort	Information about the whereabouts of the shipment are available, complete, correct and available as early as possible	2,2	2,5	w

Table 7: Requirements and Weightings 3.-4.5

Path	Type	Name	Description	Weight			Wish(w)/Need(n)
				High Speed	Regional	Urban	
3	Stakeholder	Train Operating Company (Passenger)					
3 1	Requirement	High revenues	High revenue from fares, transport contracts and secondary sources (e.g. catering, additional services)	1,6	1,5	0,8	w
3 2	Requirement	Low costs					
3 2 1	Requirement	Low costs for vehicle financing	Low cost for leasing the vehicle and low number of vehicles needed	2,1	2,9	1,6	w
3 2 2	Requirement	Low operating costs	Low labour and energy costs as well as low charges for infrastructure (track, station).	3,0	2,3	1,7	w
3 2 3	Requirement	Low other costs	Taxes, no penalties, low cleaning costs, low costs for shunting, etc.	2,2	2,3	2,3	w
3 3	Requirement	Positive external perception	The External perception comprises an attractive design, positive reporting in the media, positive customer experiences, positive perception as an employer, clean trains, etc...	2,8	2,8	2,1	w
3 4	Requirement	Compliance with technical-functional requirements	Manufacturers and infrastructure managers comply with all technical requirements, operational rules are clearly defined, etc.	2,9	2,2	1,6	n
3 4 1	Requirement	Easy and comprehensible homologation process	Homologation process is easy to understand, so that everyone has the same conditions	3,0	3,0	3,0	w
3 5	Requirement	Other requirements					
3 5 1	Requirement	High degree of digitalisation and automation	Processes within the rail system are digital and automated to speed up services and lower costs.	2,1	2,0	2,1	w
3 5 2	Requirement	Maximum usage of the trains / maximum utilization	Trains are used at their maximum capacity.	2,9	2,9	2,2	w
3 5 3	Requirement	Maximum usage of railway lines	All railway lines are used at their maximum capacity, main lines as well as urban lines.	3,0	3,0	3,0	w
3 5 4	Requirement	Consistent and standardized operational requirements	Ensuring easier and faster operations.	2,5	2,5	2,5	w
				State owned	Private		
4	Stakeholder	Train Operating Company (Freight)					
4 1	Requirement	High revenues	Revenues from fares, transport contracts and secondary sources.	2,8	2,9		w
4 2	Requirement	Low costs					
4 2 1	Requirement	Low expenses for vehicle financing	Low cost for leasing the vehicle and low number of vehicles needed	2,3	3,0		w
4 2 2	Requirement	Low operating costs	Low labour and energy costs as well as low charges for infrastructure (track, station) and few marshalling.	3,0	3,0		w
4 2 3	Requirement	Low maintenance costs	High reliability of rolling stock, low number of broken waggons, short unavailability times.	2,9	3,0		w
4 2 4	Requirement	Low other costs	Taxes, no penalties, low cleaning costs, low costs for shunting, etc.	2,9	2,9		w
4 3	Requirement	Positive External Perception	Positive customer feedback, positive media coverage, environmental sustainability, etc.	2,7	2,8		w
4 4	Requirement	Technical-functional requirements	Manufacturers and infrastructure managers comply with all technical requirements, operational rules are clearly defined, etc.	2,9	2,9		n
4 4 1	Requirement	Easy and comprehensible homologation process	Homologation process is easy to understand, so that everyone has the same conditions	2,5	2,5		n
4 5	Requirement	Other requirements					
4 5 1	Requirement	High degree of digitalisation and automation	Processes within the rail system are digital and automated to speed up services and lower costs.	2,8	2,8		w
4 5 2	Requirement	Maximum use of railway system	Trains are used at their maximum capacity.	2,8	2,8		w
4 5 3	Requirement	Consistent and standardized operational requirements	Ensuring easier and faster operations.	2,5	2,5		w
4 5 4	Requirement	Orientation of the train path application process to short-term planning periods for freight traffic	Train path requests are to be ordered long-term, often without a customer order.	2,5	2,5		w

Table 8: Requirements and Weightings 5.-7.3

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
5	Stakeholder	Train Operating Company (Maintenance)			
5 1	Requirement	Low costs	Low costs due to less failure, efficient usage of the workshop capacity, low operating costs and low other costs	2,3	w
5 2	Requirement	Short unavailability times due to maintenance or failure	Optimised maintenance timetables, predictive maintenance and a short distance to the next workshop.	2,9	w
5 3	Requirement	Safety	Comprises occupational health and safety as well as preventive maintenance and repair and a good quality control	2,3	n
5 4	Requirement	Low environmental impact	Use of environmental friendly materials, energy from renewable sources and creating low emissions (air, soil, water, noise, etc.)	1,8	w
5 5	Requirement	Technical-functional requirements	Requirements, technical standards and guidelines are stated clearly.	2,9	n
6	Stakeholder	Infrastructure Managers (Station)			
6 1	Stakeholder	Station (Passenger)			
6 1 1	Requirement	High revenues	High revenues from leasing of shops, parking fees, advertisement and public funding	2,7	w
6 1 2	Requirement	Low costs	Low rents for buildings, low write-off costs, low operating and maintenance costs	2,9	w
6 1 3	Requirement	Technical-functional requirements	Clear guidelines for fire protection, emergency plans and burglary protections. Clear guidelines by the regulatory bodies.	2,8	n
6 1 4	Requirement	Good accessibility of the station	Access is possible for all travellers.	2,9	w
6 2	Stakeholder	Station (Freight)			
6 2 1	Requirement	High revenues	high revenues from customer and user fees and public funding	2,4	w
6 2 2	Requirement	Low costs	Low investments, operation and disposal costs.	2,8	w
6 2 3	Requirement	Technical and functional requirements	Protection against fire, burglary and vandalism and clear guidelines, requirements and rules by the regulatory bodies.	2,4	n
6 2 4	Requirement	Good accessibility of the freight terminal	Freight terminal is situated near customers or shippers and has sufficient space for lorries, ships etc.	2,7	w
6 2 5	Requirement	High punctuality of incoming trains		2,8	w
6 2 6	Requirement	High degree of digitalisation and automation		2,8	w
7	Stakeholder	Infrastructure Managers (Track)			
7 1	Requirement	High revenues	Revenue consisting of train path charge and a high number of train rides over the track.	2,7	w
7 1 1	Requirement	Public funding	Funding of infrastructure by public bodies.	2,6	w
7 2	Requirement	Low costs		3,0	w
7 2 1	Requirement	Low LCC (Life Cycle Costs)	Low investments, operation and disposal costs also considering maintenance costs (low wear).	2,8	w
7 2 2	Requirement	Low other costs		2,3	w
7 3	Requirement	Low environmental impact	Low emissions in air, soil and water as well as noise and vibration emissions.	1,9	w

Table 9: Requirements and Weightings 7.4-9.5

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
7 4	Requirement	Technical-functional requirements	Clear requirements from regulatory bodies and the public (planning of new lines), technical functional requirements do not exclude certain manufacturers	2,9	n
7 5	Requirement	High availability	Low construction time, minimum failure rate and short maintenance times.	2,2	w
7 6	Requirement	Space/land available for new tracks/track expansion	If an expansion of infrastructure is needed or decided upon, space (land) for this expansion is available.	1,3	w
7 7	Requirement	Consideration of private railway infrastructure companies in national expansion strategies		2,5	w
8	Stakeholder	Infrastructure Managers (Energy)			
8 1	Requirement	High revenues	High revenue from energy sales.	2,5	w
8 2	Requirement	Low costs			
8 2 1	Requirement	Low energy production costs	Own power plant, flexible energy mix, low LCC and low purchase costs.	2,6	w
8 2 2	Requirement	Low energy distribution costs	Reduced line costs due to high voltage net and low-loss conversion.	2,5	w
8 3	Requirement	Low environmental impact			
8 3 1	Requirement	Low emissions	Low emissions in air, soil and water as well as emission of noise and vibration.	2,3	w
8 3 2	Requirement	Resource efficiency	Efficient use of fuel for power plants and materials needed for construction and maintenance.	2,4	w
8 3 3	Requirement	Preservation of fauna and flora		1,8	w
8 3 4	Requirement	Electrified lines	High percentage of electrified lines on railway tracks, to lower local emissions.	2,3	w
8 4	Requirement	Technical-functional requirements	Clear requirements from regulatory bodies and the public and stable grid.	2,5	n
8 5	Requirement	High availability	No blackouts.	2,8	w
9	Stakeholder	Employees (Operation)			
9 1	Requirement	High wage			
9 1 1	Requirement	Low working hours		2,6	w
9 1 2	Requirement	High bonus for shift work		2,6	w
9 1 3	Requirement	Regular pay rise		2,5	w
9 1 4	Requirement	Additional pension schemes		2,1	w
9 2	Requirement	Good conditions regarding working hours and work-life balance	Conditions describe the total number of working hours, flexibility and predictability (e.g. of shifts), attractive working hours (no working hours at night / the weekend), sufficient rest during work and between shifts	2,8	w
9 3	Requirement	Positive work environment	The work environment comprises promotion opportunities, possibility for professional development, secure labour contracts, no discrimination, a comfortable workspace (air quality, lighting, low noise, etc.).	2,5	w
9 4	Requirement	Health and safety	Occupational health and safety, healthy working environment and maximum security on-board.	2,8	n
9 5	Requirement	Equality	No discrimination of staff and diverse staff.	2,3	w

Table 10: Requirements and Weightings 10.-12.5

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
10	Stakeholder	Employees (Construction)			
10 1	Requirement	High wage			
10 1 1	Requirement	Low working hours		2,6	w
10 1 2	Requirement	High bonus for shift work		2,6	w
10 1 3	Requirement	Regular pay rise		2,5	w
10 1 4	Requirement	Additional pension schemes		2,1	w
10 2	Requirement	Good conditions regarding working hours and work-life balance	Conditions describe the total number of working hours, flexibility and predictability (e.g. of shifts), attractive working hours (no working hours at night / the weekend), sufficient rest during work and between shifts	2,8	w
10 3	Requirement	Positive work environment	The work environment comprises promotion opportunities, possibility for professional development, secure labour contracts, no discrimination, a comfortable workspace (air quality, lighting, low noise, etc.),	2,5	w
10 4	Requirement	Health and safety	Occupational health and safety, healthy working environment and maximum security on-board.	2,8	n
10 5	Requirement	Equality	No discrimination of staff and diverse staff.	2,3	w
11	Stakeholder	Employees (Labour Unions)			
11 1	Requirement	High number of memberships	High number of employees in the company (strikes have an effect) and also high number of paying members.	2,6	w
11 2	Requirement	Good working conditions for members	The working conditions basically consist of the employees requirements. They comprise a high salary, few working hours, health and safety measures, attractive working hours, etc.	2,8	w
11 3	Requirement	Labour Unions are heard by employers	Members are willing to strike.	2,6	w
11 4	Requirement	Low costs	Costs consist of administrative costs, costs for lawsuits and strikes.	1,8	w
12	Stakeholder	Employees (Construction)			
12 1	Requirement	High wage			
12 1 1	Requirement	Low working hours		2,6	w
12 1 2	Requirement	High bonus for shift work		2,6	w
12 1 3	Requirement	Regular pay rise		2,5	w
12 1 4	Requirement	Additional pension schemes		2,1	w
12 2	Requirement	Good conditions regarding working hours and work-life balance	Conditions describe the total number of working hours, flexibility and predictability (e.g. of shifts), attractive working hours (no working hours at night / the weekend), sufficient rest during work and between shifts	2,8	w
12 3	Requirement	Positive work environment	The work environment comprises promotion opportunities, possibility for professional development, secure labour contracts, no discrimination, a comfortable workspace (air quality, lighting, low noise, etc.),	2,5	w
12 4	Requirement	Health and safety	Occupational health and safety, healthy working environment and maximum security on-board.	2,8	n
12 5	Requirement	Equality	No discrimination of staff and diverse staff.	2,3	w

Table 11: Requirements and Weightings 13.-16.3

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
13	Stakeholder	Rail Supply and Service Industry (Track)			
13 1	Requirement	High revenue	High profit margins and high sales.	2,9	w
13 1 1	Requirement	Winning tender offers	Good and worthy contracts are won.	2,7	w
13 2	Requirement	Low expenses			
13 2 1	Requirement	Low material costs		2,8	w
13 2 2	Requirement	Low manufacturing costs	Costs consisting of labour and energy costs as well as a high lot size and therefore cheaper manufacturing.	2,9	w
13 2 3	Requirement	Low administrative costs	Internal costs for administration.	2,5	w
13 2 4	Requirement	Low other costs		2,4	w
13 3	Requirement	Low bureaucratic burdens	Easy and fast technical approval, uniform approval criteria and clear guidelines.	2,7	w
14	Stakeholder	Rail Supply and Service Industry (Communication)			
14 1	Requirement	High revenue	High profit margins and high sales.	3,0	w
14 2	Requirement	Low expenses			
14 2 1	Requirement	Low material costs		2,5	w
14 2 2	Requirement	Low labour costs		2,7	w
14 2 3	Requirement	Low administrative costs		2,5	w
14 2 4	Requirement	Low other costs		2,4	w
14 3	Requirement	Low bureaucratic burdens	Easy and fast technical approval, uniform approval criteria and clear guidelines.	2,8	w
14 4	Requirement	Possibility to gather data for other purposes	The company is able to gather data from its products to improve their service and the product itself.	2,0	w
14 5	Requirement	Harmonised data formats and interfaces		2,8	w
15	Stakeholder	Rail Supply and Service Industry (Immaterial Services)			
15 1	Requirement	High revenue	High profit margins and high sales.	2,8	w
15 2	Requirement	Low expenses			
15 2 1	Requirement	Low labour costs		2,7	w
15 2 2	Requirement	Low administrative costs		2,6	w
15 2 3	Requirement	Low other costs		2,4	w
16	Stakeholder	Rail Supply and Service Industry (Energy)			
16 1	Requirement	High revenue	High profit margins and high sales.	2,9	w
16 1 1	Requirement	Winning tender offers	Good and worthy contracts are won.	2,6	w
16 2	Requirement	Low expenses			
16 2 1	Requirement	Low material costs		2,8	w
16 2 2	Requirement	Low manufacturing costs		2,8	w
16 2 3	Requirement	Low administrative costs		2,4	w
16 2 4	Requirement	Low other costs		2,4	w
16 3	Requirement	Low bureaucratic burdens	Easy and fast technical approval, uniform approval criteria and clear guidelines.	2,7	w

Table 12: Requirements and Weightings 17.-19.5

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
17	Stakeholder	Rail Supply and Service Industry (Rolling Stock Company)			
17 1	Requirement	High revenue	High revenue from sales and leasing	3,0	w
17 1 1	Requirement	Winning tender offers	Good and worthy contracts are won.	2,6	w
17 2	Requirement	Low expenses			
17 2 1	Requirement	Low material costs		2,7	w
17 2 2	Requirement	Low manufacturing costs	Costs consisting of labour and energy costs as well as a high lot size and therefore cheaper manufacturing.	2,4	w
17 2 3	Requirement	Low administrative costs		2,5	w
17 2 4	Requirement	Low other costs		2,3	w
17 3	Requirement	Low bureaucratic burdens	Easy and fast technical approval, uniform approval criteria and clear guidelines.	2,5	w
18	Stakeholder	Rail Supply and Service Industry (Construction)			
18 1	Requirement	High revenue	High revenue from sales.	2,9	w
18 1 1	Requirement	Winning tender offers	Good and worthy contracts are won.	2,6	w
18 2	Requirement	Low expenses			
18 2 1	Requirement	Low material costs		2,8	w
18 2 2	Requirement	Low manufacturing costs	Costs consisting of labour and energy costs as well as a high lot size and therefore cheaper manufacturing.	2,7	w
18 2 3	Requirement	Low administrative costs		2,4	w
18 2 4	Requirement	Low other costs		2,4	w
18 3	Requirement	Low bureaucratic burdens	Easy and fast technical approval, uniform approval criteria and clear guidelines.	2,5	w
19	Stakeholder	Vehicle Manufacturing Industry (Passenger)			
19 1	Requirement	High revenue			
19 1 1	Requirement	High vehicle price		2,8	w
19 1 2	Requirement	High number of sales	High Lot sizes and therefore cheaper production	2,9	w
19 1 3	Requirement	Sale of additional services and features	Services like maintenance are sold additionally.	2,8	w
19 1 4	Requirement	Winning tender offers	Good and worthy contracts are won.	2,5	w
19 2	Requirement	Low expenses			
19 2 1	Requirement	Low material costs		2,9	w
19 2 2	Requirement	Low manufacturing costs	Costs consisting of labour and energy costs	2,6	w
19 2 3	Requirement	Low engineering costs		2,5	w
19 2 4	Requirement	Few follow-up costs	Costs created through warranty cases or other necessary adaptations.	2,2	w
19 2 5	Requirement	Low administrative costs		2,1	w
19 2 6	Requirement	Low selling expenses	Low expenses for sales and marketing.	1,7	w
19 3	Requirement	Positive external perception		2,1	w
19 4	Requirement	Certification	Easy and fast technical approval, uniform approval criteria and clear guidelines.		
19 4 1	Requirement	Low certification costs		2,5	w
19 4 2	Requirement	Low times for certification		2,6	w
19 4 3	Requirement	clear specifications and conditions	Easy understanding, clear and equal conditions for everyone	2,5	w
19 5	Requirement	Fair competition	All competitors stick to the rules and the rules are fair for all companies attending a tender offer and do not exclude specific companies through indirect requirements.	2,8	w

Table 13: Requirements and Weightings 20.-22.3

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
20	Stakeholder	Vehicle Manufacturing Industry (Freight)			
20 1	Requirement	High revenue			
20 1 1	Requirement	High vehicle price		2,8	w
20 1 2	Requirement	High number of sales	High Lot sizes and therefore cheaper production	2,8	w
20 1 3	Requirement	Sale of additional services and features	Services like maintenance are sold additionally.	2,7	w
20 1 4	Requirement	Winning tender offers	Good and worthy contracts are won.	2,9	w
20 2	Requirement	Low expenses			
20 2 1	Requirement	Low material costs		2,3	w
20 2 2	Requirement	Low manufacturing costs	Costs consisting of labour and energy costs	2,3	w
20 2 3	Requirement	Low engineering costs		2,2	w
20 2 4	Requirement	Few follow-up costs	Costs created through warranty cases or other necessary adaptations.	2,9	w
20 2 5	Requirement	Low administrative costs		2,1	w
20 2 6	Requirement	Low selling expenses	Low expenses for sales and marketing.	2,1	w
20 3	Requirement	Positive external perception		2,0	w
20 4	Requirement	Certification	Easy and fast technical approval, uniform approval criteria and clear guidelines.		
20 4 1	Requirement	Low certification costs		2,9	w
20 4 2	Requirement	Low times for certification		2,9	w
20 5	Requirement	Fair competition	All competitors stick to the rules and the rules are fair for all companies attending a tender offer and do not exclude specific companies through indirect requirements.	2,9	w
21	Stakeholder	Vehicle Manufacturing Industry (Maintenance)			
21 1	Requirement	Low costs	Low costs for spare parts, labour, workshops, energy, etc.	2,9	w
21 2	Requirement	High revenue	High revenue through maintenance, that is sold as a service and not part of any warranty cases.	3,0	w
21 3	Requirement	Short repair times	Quick and easy access to spare parts and standardised procedures.	1,5	w
21 4	Requirement	Winning tender offers	Good and worthy contracts are won.	2,9	w
21 5	Requirement	Safety	Occupational health and safety in the workshop and quality control of maintenance work to prevent safety issues. Also comprising preventive maintenance and repair.	2,9	n
21 6	Requirement	Low environmental impact	Use of environmental friendly materials, energy from renewable sources and low emissions.	2,5	w
21 7	Requirement	Technical-functional requirements	Easy and fast technical approval, uniform approval criteria and clear guidelines.	2,7	n
22	Stakeholder	Environment and Health (Human)			
22 1	Requirement	Low noise emission	due to noise in train (health), by trains passing by, noise at stations	2,3	w
22 2	Requirement	Low vibrations	during train ride , can cause sickness; vibrations passed on in the environment	1,7	w
22 3	Requirement	Cleanliness	clean trains (aisle, seats, sanitary installations) and station to prevent health problems	1,9	w

Table 14: Requirements and Weightings 22.4-25.6

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
22 4	Requirement	Appropriate climate (train and station)	temperature, humidity	1,4	w
22 4 1	Requirement	Environment friendly air conditioning	within the train	1,8	w
22 5	Requirement	Comfortable design of seating/standing area in train	seats/ ceilings have certain measurements appropriate for every body shape	1,6	w
22 6	Requirement	Safety	passenger gets to destination safely	2,5	n
22 7	Requirement	Security	no fear of being harassed, robbed or hurt	2,2	n
22 8	Requirement	Easy orientation within the train	passenger always knows his way within train, can find everything (e.g. toilets, bistro) easily	1,6	w
22 9	Requirement	Accessibility	PRM can access train and station	2,4	n
23	Requirement	Environment and Health (Earth)			
23 1	Requirement	Environment friendly rail system			
23 1 1	Requirement	Prevention of climate change	Climate change is directly connected to emission of CO ₂ and other greenhouse gases.	3,0	w
23 1 2	Requirement	Low emissions/pollution	Emissions in air, soil and water as well as noise and vibration emitted by trains and infrastructure components	3,0	w
23 1 3	Requirement	Prevention of resource scarcity	Use of recycled materials, no waste of materials and use of sustainable materials.	2,2	w
23 2	Requirement	Sustainable waste management	Use of recyclable materials.	2,5	w
24	Stakeholder	Environment and Health (Fauna & Flora)			
24 1	Requirement	No unnecessary impact on forests, vegetation and landscape		2,6	w
24 2	Requirement	No unnecessary impact on wildlife (habitats, mortality, protected species)		2,6	w
25	Stakeholder	Regulatory Bodies (Railway Authority)			
25 1	Requirement	Protection of goods and people -> Compliance with legislature and standards	Companies (train operators, manufacturers, etc.) comply with the rules set by the authority. The rules tackle the fields of safety, accessibility, interoperability, environment and employees.	3,0	n
25 2	Requirement	Maximum Safety	Compliance to norms referring to safety, approval of new rolling stock material, investigation of accidents (prevention)	2,5	n
25 3	Requirement	Low expenses		2,5	w
25 4	Requirement	Improvement of the overall rail system	Improvement of the rail system in different aspects (reliability, capacity, safety, etc.)	1,4	w
25 5	Requirement	Fast and easy authorisation process	No backlog of authorisations, clear and defined rules and specifications.	2,6	w
25 6	Requirement	Clear distribution of tasks for different authorities	No tasks, where responsibilities are not defined.	2,8	w

Table 15: Requirements and Weightings 26.-28.1.7

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
26	Stakeholder	Regulatory Bodies (EU Agency for Railways (ERA))			
26 1	Requirement	Improvement of the overall rail system	Improvement of the rail system in different aspects (reliability, capacity, safety, etc.)	2,8	w
26 2	Requirement	Contribute to the effective functioning of a Single European Railway Area without frontiers			
26 2 1	Requirement	Railways safety	Overall safety of the railway system (few accidents, few incidents, etc.)	2,9	n
26 2 2	Requirement	Interoperability	Seamless transport within the whole EU, and accessibility of the rail system.	2,9	w
26 2 3	Requirement	Less technical barriers	to fulfil SERA	2,9	w
26 2 4	Requirement	High accessibility and use of railway system information		2,2	w
26 3	Requirement	Fast development of consistent regulations	No backlog of authorisations, clear and defined rules and specifications.	2,7	w
26 4	Requirement	Clear distribution of tasks for different authorities	No tasks, where responsibilities are not defined.	2,1	w
26 5	Requirement	Protection of goods and people -> Compliance with legislature and standards	Companies (train operators, manufacturers, etc.) comply with the rules set by the authority. The rules tackle the fields of safety, accessibility, interoperability, environment and employees.	2,9	n
27	Stakeholder	Regulatory Bodies (Network Agency)			
27 1	Requirement	Fair competition			
27 1 1	Requirement	Anti-discriminatory access	no disadvantages regarding ethnicity, gender, etc.	3,0	n
27 1 2	Requirement	Legitimate pricing for train paths	plausible pricing	2,9	n
27 1 3	Requirement	Transparent access/process	reasonable and understandable processes	2,9	n
27 2	Requirement	Ensuring sufficient capacity of the railway network in compliance with legal and formalistic aspects	The capacity meets the needs by the train operating companies and offers sufficient buffer for an increase in traffic.	2,9	w
27 3	Requirement	Improvement of the overall rail system	Improvement of the rail system in different aspects (reliability, capacity, safety, etc.)	2,1	w
27 4	Requirement	Reliability of operators/railway employees	e.g. in communication	2,1	w
28	Stakeholder	Regulatory Bodies (Environment Agency)			
28 1	Requirement	Low environmental impact			
28 1 1	Requirement	Low emissions	Low emissions in air, soil and water and low emissions of noise and vibration.	2,8	w
28 1 2	Requirement	Conservation of resources	Use of non-rare earths and other scarce materials (recycling)	2,5	w
28 1 3	Requirement	Use of renewable energy sources		2,8	w
28 1 4	Requirement	Preservation of flora and fauna -> Compliance with legislature and standards		2,9	n
28 1 5	Requirement	Increased use of environmentally friendly transport modes		2,8	w
28 1 6	Requirement	Efficient use of resources	Use of lesser resources for new vehicles and infrastructure (maintenance) and increased use of recycled materials.	2,8	w
28 1 7	Requirement	Recycling strategies available		2,5	w

Table 16: Requirements and Weightings 29.-30.4

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
29	Stakeholder	Regulatory Bodies (Legislative Authority)			
29 1	Requirement	Enforcing the interests of the population	Representing the interests of the people (residents, travellers, etc.), industry and organisations.	2,7	n
29 2	Requirement	Good mobility			
29 2 1	Requirement	Good connection of the deputies' constituencies	Good connection of different constituencies as well as within each constituency.	2,3	w
29 2 2	Requirement	High international accessibility	Existence of regional transnational passenger connections.	1,8	w
29 2 3	Requirement	High national coverage	Good coverage in rural regions, good connection between urban agglomerations and high number of sidings and branch lines for factories	2,2	w
29 2 4	Requirement	Fast and direct regional, national and transnational connections		2,2	w
29 2 5	Requirement	Sufficient capacity of the rail network	The capacity meets the needs by the train operating companies and offers sufficient buffer for an increase in traffic.	2,5	w
29 3	Requirement	Low expenses			
29 3 1	Requirement	Low subsidies	Low subsidies have to be paid for train operating companies and infrastructure managers.	2,0	w
29 3 2	Requirement	High revenue from taxes		2,2	w
29 3 3	Requirement	High revenue from state-owned railway connected companies		2,2	w
29 4	Requirement	Low environmental impact	Low emissions in air, soil and water + low noise and vibration emissions, use of renewable energy sources, preservation of flora and fauna, etc.	2,1	w
29 5	Requirement	Acceleration of processes	Acceleration of planning, approval and contracting and other processes as well as more investments in research.	1,9	w
29 6	Requirement	Creation of jobs		2,2	w
29 7	Requirement	Legal and technical compliance	Companies (train operator, manufacturer, etc.) stick to the rules set by the regulatory bodies.	2,6	n
30	Stakeholder	Regulatory Bodies (EU Commission)			
30 1	Requirement	Good mobility			
30 1 1	Requirement	Existence of transnational connections for passengers		2,6	w
30 1 2	Requirement	Existence of transnational train paths for cargo transport		2,6	w
30 1 3	Requirement	High implementation of interoperability	Intermodal connected travel chains for passengers (good connection to and from stations) and goods (good transition between different cargo transport methods).	2,6	w
30 1 4	Requirement	Sufficient capacity of the rail network	The capacity meets the needs by the train operating companies and offers sufficient buffer for an increase in traffic.	2,5	w
30 2	Requirement	Promotion of scientific and technological progress	Funding of research projects	1,9	w
30 3	Requirement	Reduction of social exclusion and discrimination	Affordability of train tickets and accessibility for people with restricted movement (PRM)	2,2	w
30 4	Requirement	Low expenses	Low administrative costs and low subsidies.	1,9	w

Table 17: Requirements and Weightings 30.5-32.6

Path	Type	Name	Description	Weight	Wish(w)/Need(n)		
30	5	Requirement	Sustainability				
30	5	1	Requirement	Shifting traffic to rail	2,3	w	
30	5	2	Requirement	Low environmental impact	2,5	w	
30	6	Requirement	Legal and technical compliance	Companies (train operator, manufacturer, etc.) stick to the rules set by the regulatory bodies; Rules are accepted and carried out by national authorities and should be uniform in the whole EU.	2,5	n	
30	7	Requirement	Improvement of the overall rail system	Improvement of the rail system in different aspects (reliability, capacity, safety, etc.)	2,5	w	
31		Stakeholder	Organisations (Lobbies)				
31	1	Requirement	Higher investment in infrastructure	Higher budget for new infrastructure and maintenance of old infrastructure.	2,8	w	
31	2	Requirement	Expansion of infrastructure				
31	2	1	Requirement	Increasing rail network	Rail connections to small industrial parks / companies and long distance travel available for smaller cities.	2,6	w
31	2	2	Requirement	Fast realisation	Bureaucratic processes are streamlined, building schedules are planned realistically and approved fast.	2,6	w
31	2	3	Requirement	Increasing capacity of existing tracks	more operations on existing tracks	2,5	w
31	3	Requirement	Higher transport performance	Increase of night traffic and the overall number of passengers (freight volume carried) as well as door to door solutions	2,5	w	
31	4	Requirement	Electrification of railway network	less combustion engines, lower environmental impact (operator lobby)	1,9	w	
31	5	Requirement	Higher market share for railway transport	Subsidies for rail traffic, lower taxes for energy, tickets, etc. and lower track prices.	2,3	w	
31	6	Requirement	Environmental friendly mobility	by using electrified lines, having waste managements, etc. (environmental lobby)	2,3	w	
31	7	Requirement	Competitive advantage compared to other transport modes	Shift in subsidies from road to rail and tolls for road traffic.	2,5	w	
31	8	Requirement	Low expenses	low expenses for companies in the railway business (lower taxes, lower track prices, etc.)	2,1	w	
31	9	Requirement	Subsidies to the rail industry should not distort competition between operators	Subsidies do not enable specific companies to gain an advantage concerning tender offers (fair competition)	2,2	w	
32		Stakeholder	Lobbies (User Associations)				
32	1	Requirement	Dense infrastructure	Direct routes are available between bigger cities and manufacturers, suppliers and goods depots, train stations and goods depots are situated nearby (home or factory) and connecting services to and from the station are available.	2,2	w	
32	2	Requirement	Travel time is short				
32	2	1	Requirement	Running trains more frequently	2,9	w	
32	2	2	Requirement	Trains are punctual	2,8	w	
32	2	3	Requirement	Door to door solution	2,6	w	
32	2	4	Requirement	Routes are available	2,5	w	
32	3	Requirement	Good customer service	Good service on the train, good customer service, flexible booking system and good communication with the operator.	2,7	w	
32	4	Requirement	Low cost	Cheap fares, bonus systems, etc.	2,5	w	
32	5	Requirement	Environmental friendly mobility		1,9	w	
32	6	Requirement	Requirements of the traveller / freight customer	The user associations represent the end user (Traveller or Freight Customer) and therefore empathise his requirements.	2,3	w	

Table 18: Requirements and Weightings 33.-34.6

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
33	Stakeholder	Lobbies (European Technology Platforms)			
33 1	Requirement	High economic competitiveness	Increasing capacity of the rail network and cost-efficiency and improving the collaboration between shippers and logistics providers for an efficient supply chain.	2,8	w
33 2	Requirement	High safety	High safety during the train ride and at the station.	2,9	w
33 3	Requirement	Multimodality	Improved connection/change between different modes of transport.	2,7	w
33 4	Requirement	Low environmental impact	Reduced emissions in air, soil and water as well as noise and vibration emissions.	2,7	w
33 5	Requirement	High degree of digitalisation and automation		2,9	w
33 6	Requirement	Collaboration of organisations (to achieve climate neutrality)		2,1	w
33 7	Requirement	Improvement of the overall rail system	Improvement of the rail system in different aspects (reliability, capacity, safety, etc.)	2,2	w
34	Stakeholder	Public/Society (Orderer of Transport Services)			
34 1	Requirement	Short travel time from start to destination	Short travel time on board, few changes between trains, quick access to train, intermodal connected travel chains combined with a high coverage of the region and long operating times.	2,2	w
34 2	Requirement	High modal split of public transport			
34 2 1	Requirement	High accessibility	Good accessibility of stations and trains	2,2	w
34 2 2	Requirement	High attractiveness	Train travel is attractive for passengers (pleasant surroundings, comfortable journey, etc.)	2,9	w
34 2 3	Requirement	Low costs	Cheap fares, bonus systems and low costs for access to and departure from stations.	2,2	w
34 2 4	Requirement	Good offer	Good transport offer for end users, e.g. high frequent train rides	2,5	w
34 3	Requirement	Low expenses			
34 3 1	Requirement	Low subsidies for train operating companies		2,2	w
34 3 2	Requirement	Low administrative costs		1,5	w
34 4	Requirement	High revenues	High revenues from transport contracts and tickets.	2,1	w
34 5	Requirement	High reliability			
34 5 1	Requirement	High punctuality		3,0	w
34 5 2	Requirement	No cancellations of trains or routes		3,0	w
34 5 3	Requirement	Availability of alternative connections	Different routes are available for the same journey.	2,0	w
34 5 4	Requirement	Good disturbance and complaint management	for customer, possibility for improvement is there	2,6	w
34 6	Requirement	Maximum information with minimum effort	The traveller is provided with all information he wishes without having trouble to obtain this information. This incorporates availability of information as early as possible, high visibility, high reliability, consistency, completeness and good content presentation.	2,7	w

Table 19: Requirements and Weightings 34.7-37.3

Path	Type	Name	Description	Weight	Wish(w)/Need(n)	
34	7	Requirement	Maximum safety and security			
34	7	1	Requirement	Safety	2,9	n
34	7	2	Requirement	Minimal health risks	2,8	n
34	7	3	Requirement	Security	2,9	n
34	8	Requirement	Reducing environmental impact	Few emissions from trains and infrastructure and limited impact on flora and fauna.	2,6	w
34	9	Requirement	Easy and comprehensible legal regulations	Ensuring equal understandings for everyone	2,5	n
35		Stakeholder	Public/Society (Residents)			
35	1	Requirement	Concentrated working and relaxed living, sleep			
35	1	1	Requirement	Low noise	3,0	w
35	1	2	Requirement	Little vibrations	2,8	w
35	1	3	Requirement	Low shading	2,1	w
35	2	Requirement	Healthy living			
35	2	1	Requirement	Little pollutions	2,8	w
35	2	2	Requirement	Preservation of fauna and flora	2,1	w
35	3	Requirement	Easy living			
35	3	1	Requirement	High accessibility of home	2,6	w
35	3	2	Requirement	Few level crossings (waiting time)	2,3	w
35	4	Requirement	High property value	trains and building do not disturb residents property	2,5	w
36		Stakeholder	Public/Society (Media)			
36	1	Requirement	Frequent and substantial news content	media often gets latest important news	2,4	w
36	2	Requirement	Openness of railway connected stakeholders to communicate	low effort for media to get news by railway connected stakeholders	2,8	w
37		Shareholder	Other transport modes			
37	1	Requirement	Competition			
37	1	1	Requirement	Higher share of investments	2,2	w
37	1	2	Requirement	Higher share of passenger transport	0,9	w
37	1	3	Requirement	Higher market share for freight transport	0,9	w
37	2	Requirement	Cooperation			
37	2	1	Requirement	Multimodality	2,7	w
37	2	2	Requirement	Forum for exchange	2,0	w
37	2	3	Requirement	Good cooperation	2,1	w
37	3	Requirement	Adaption of infrastructure for interoperability	Ensuring interoperability to enable easy transition of different transport modes.	2,5	w

Table 20: Requirements and Weightings 38.-40.2.4

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
38	Stakeholder	Investors & Creditors (Shareholders)			
38 1	Requirement	Reliable companies			
38 1 1	Requirement	Punctual payment	of e.g. dividends	2,8	w
38 1 2	Requirement	Good liquidity	companies are able to pay	2,7	w
38 1 3	Requirement	Transparency	understandable processes	2,5	w
38 1 4	Requirement	Compliance to laws and regulations	trustful companies	2,4	n
38 2	Requirement	Good business model			
38 2 1	Requirement	High profits		2,8	w
38 2 2	Requirement	Low risks	more chances to get profit	2,5	w
38 2 3	Requirement	Sustainable business model		1,8	w
38 2 4	Requirement	High degree of innovation		1,7	w
38 3	Requirement	High return		2,8	w
38 4	Requirement	High degree of participation in decision making		1,8	w
38 5	Requirement	Compliance to ESG criteria			
38 5 1	Requirement	Environmental criteria	criteria concerning low energy use, waste, pollution,	2,1	w
38 5 2	Requirement	Social responsibility	criteria concerning business partners that share same values	2,0	w
38 5 3	Requirement	Governance criteria	criteria concerning accurate and transparent accounting methods	2,1	w
38 6	Requirement	Stable price development	lowering risks of losing money	2,2	w
39	Stakeholder	Investors/Creditors (Financial institutions)			
39 1	Requirement	Reliable redemption of debts			
39 1 1	Requirement	Reliable companies	ability to pay, willing to pay, punctual	2,6	w
39 1 2	Requirement	Good business model		2,5	w
39 1 3	Requirement	Low risks of payment default	economic stable to have ability to pay	2,8	w
39 1 4	Requirement	Place of trial in the EU		2,5	w
39 2	Requirement	High return		2,8	w
39 3	Requirement	Compliance to ESG criteria			
39 3 1	Requirement	Environmental criteria	criteria concerning low energy use, waste, pollution,	1,7	w
39 3 2	Requirement	Social responsibility	criteria concerning business partners that share same values	1,6	w
39 3 3	Requirement	Governance criteria	criteria concerning accurate and transparent accounting methods	2,0	w
40	Stakeholder	Investors/Creditors (State)			
40 1	Requirement	Financial aims			
40 1 1	Requirement	High economic productivity	key factor for success	2,2	w
40 1 2	Requirement	Good business model	to ensure good economic productivity	2,3	w
40 1 3	Requirement	Reliability		2,5	w
40 2	Requirement	Political aims			
40 2 1	Requirement	Construction projects are finished as planned	e.g. new track lines	2,6	w
40 2 2	Requirement	Safeguarding jobs	high recognition of population	2,3	w
40 2 3	Requirement	Good cooperation with railway systems of other countries	international recognition	1,7	w
40 2 4	Requirement	Low environmental impact	low environmental footprint	2,0	w

Table 21: Requirements and Weightings 41.-44.6

Path	Type	Name	Description	Weight	Wish(w)/Need(n)
41	Stakeholder	Investors/Creditors (Insurance)			
41 1	Requirement	Detailed information given in case of accident	for better evaluation of case	2,7	w
41 2	Requirement	Reliability	of customers	2,5	w
41 3		High profits			
41 3 1		High insurance contributions		2,7	w
41 3 2		Low risks of insurance case		2,7	w
41 3 3		Low amount of loss per insurance case		2,7	w
42	Stakeholder	R&I and Academia (Universities)			
42 1	Requirement	Continuous supply of new research projects	Calls for new research projects from industry or publicly funded are available.	2,7	w
42 2	Requirement	Sufficient stream of new motivated beginners	A high number of motivated and competent students applies for courses and studies in the field of railways.	2,5	w
42 3	Requirement	Platforms for sharing of research and knowledge	For example conferences, journals, etc.	2,6	w
42 4	Requirement	Sponsorship / cooperation with partners from industry		2,4	w
42 5	Requirement	Interesting and relevant projects		2,4	w
42 6	Requirement	Many competent graduates.	A high number of competent graduates finishes their studies.	2,2	w
42 7	Requirement	Industry is open for new developments / scientific approaches		2,6	w
42 8	Requirement	High public funding	High public funding for the university but also for research projects.	2,7	w
42 9	Requirement	Multilingual training	Students have the ability to work within the EU. (e.g. training in English)	1,7	w
42 10	Requirement	Degrees are accepted internationally		2,6	w
43	Stakeholder	R&I and Academia (Research Institutes)			
43 1	Requirement	Continuous funding of new research projects	Calls for new research projects from industry or publicly funded are available.	2,8	w
43 2	Requirement	High profit	High profit margin from projects.	2,0	w
43 2 1	Requirement	Possibility to reinvest	Reinvestments in projects.	3,0	w
43 3	Requirement	Low expenses		1,9	w
43 4	Requirement	Interesting and relevant projects		2,6	w
43 5	Requirement	Ability to work independently on projects	Institutes are independent from other institutions	2,5	w
44	Stakeholder	R&I and Academia (Education/Training)			
44 1	Requirement	"Easy"/"high quality" training for drivers, rail traffic controllers etc.	Beginners are trained easily and finish as high quality employees.	2,6	w
44 2	Requirement	Sufficient stream of new motivated beginners	A high number of motivated and competent beginners applies for education and job trainings in the field of railways.	2,4	w
44 3	Requirement	High profit	benefits of having qualified staff wins against effort	1,9	w
44 4	Requirement	Low expenses	education effort/ costs low	2,0	w
44 5	Requirement	Multilingual training	staff has the ability to work within the EU. (e.g. training in English)	1,7	w
44 6	Requirement	Degrees are accepted internationally	international work is possible	2,4	w

Table 22: Interview partners

Beuven, T., RTB CARGO GmbH
Finken, K., Scheidt & Bachmann GmbH
Grandsart, D., European Passengers' Federation
Häußler, A., Siemens Mobility GmbH
Kreft, H., Hamburg Port Authority
Lambrecht, M., Umwelt Bundesamt
Laumen, P., Scheidt & Bachmann GmbH
Mannsbarth, H., Alstom Transport Deutschland GmbH
Müller, C., DVV Media Group GmbH
Naumann, K.-P., Fahrgastverband PRO BAHN e.V.
Schlaht, J., European Rail Research Advisory Council (ERRAC)
Schmitz, M., Verband deutscher Verkehrsunternehmen e.V. (VDV)
Schuster, H., Greenpeace in Zentral- und Ostereuropa
Urban, P., Institut für Kraftfahrzeuge (ika) RWTH Aachen University
Zerban, F., Bundesverband SchienenNahverkehr e.V.

Not mentioned by name

Infrastructure Manager, Station, Passenger
Infrastructure Manager, Station, Freight
Vehicle Manufacturing Company
Several international Regulatory Bodies

Interview guide

The interviews are carried out as online meeting (ca. 30 minutes) with a short presentation, highlighting the following steps:

1. Interviewees are shown the list of 13 main stakeholder categories and asked, whether they agree with the category that was assigned to them (their institution / company).
2. The second step are two open questions that aim to identify general expectations and requirements of the stakeholder that is represented by the interviewee. The questions are:
 - a. What do you (as a stakeholder of category XY) expect of the European railway system in general?
 - b. What are your general requirements as a stakeholder of category XY?
3. In the third step, the weighting table of the corresponding stakeholder main category is shared with the interviewee which then has to rate the given requirements according to the specified weighting scale in Chapter 5.3 (0-3 points).
4. The fourth step aims to identify research potential within the main stakeholder categories. The interviewee is again shown the list of 13 main stakeholder categories and asked the following question: Are you seeing research potential in a specific field?
5. The last step gives a summary of the contents of the 6 flagship areas of the ERJU-Master Plan. The interviewee is asked the following question: Do you agree with the current strategy by the European Joint Railway Undertaking.
6. The interviewee is asked whether he or she has some comments to add.

In each step, interviewees were presented with the required information and were able to ask questions about the methodology.

Table 23: Compact weighting matrix – part I

Stakeholder	Sub-Stakeholder	Nummer	Requirements																								
			X.1	X.1.1	X.1.2	X.1.3	X.1.4	X.1.5	X.1.6	X.1.7	X.2	X.2.1	X.2.2	X.2.3	X.2.4	X.2.5	X.2.6	X.3	X.3.1	X.3.2	X.3.3	X.3.4	X.3.5	X.3.6	X.3.7	X.3.8	
End User	Traveller	01	2,9/3,0																								
	Freight Customer	02	2,4/2,3																								
Train Operating Company	Passenger	03	1,6/1,5/0,8																								
	Freight	04	2,8/2,9																								
	Maintenance	05	2,3																								
Infrastructure Managers	Station	06		2,7	2,9	2,8	2,9																				
	Track	07	2,7	2,6																							
	Energy	08	2,5																								
Employees	Operation	09		2,6	2,6	2,5	2,1																				
	Construction	10		2,6	2,6	2,5	2,1																				
	Labor Unions	11	2,6																								
	Maintenance	12		2,6	2,6	2,5	2,1																				
Rail Supply and Service Industry	Track	13	2,9	2,7																							
	Communication	14	3,0																								
	Immaterial Services	15	2,8																								
	Energy	16	2,9	2,6																							
	Rolling Stock Company	17	3,0	2,6																							
	Construction	18	2,9	2,6																							
Vehicle Manufacturing Industry	Passenger	19		2,8	2,8	2,8	2,2																				
	Freight	20		2,5	2,5	2,2	2,6																				
	Maintenance	21	2,8																								
Environment & Health	Human	22	2,3																								
	Earth	23		3,0	3,0	2,2																					
	Fauna and Flora	24	2,6																								
Regulatory Bodies	Railway Authority	25	3,0																								
	EU Agency for Railways	26		2,8																							
	Network Agency	27		3,0	2,9	2,9																					
	Environment Agency	28		2,8	2,5	2,8	2,9	2,8	2,8	2,5																	
	Legislative Authority	29	2,7																								
	EU Commission	30		2,6	2,6	2,6	2,5																				
Organisations	Lobbies	31	2,8																								
	User Associations	32	2,2																								
	European Technology Platforms	33	2,8																								
	Orderer of Transport	34	2,2																								
Public/Society	Residents	35		3,0	2,8	2,1																					
	Media	36	2,4																								
	Coopetition	37		2,2	0,9	0,9																					
Investors/Creditors	Shareholders	38		2,8	2,7	2,5	2,4																				
	Financial Institutions	39		2,6	2,5	2,8	2,5																				
	State	40		2,2	2,3	2,5																					
	Insurance	41	2,7																								
R&I and Academia	Universities	42	2,7																								
	Research Institutes	43	2,8																								
	Education/Training	44	2,6																								

Table 24: Compact weighting matrix – part II

Stakeholder	Sub-Stakeholder	Nummer	X.4	X.4.1	X.4.2	X.4.3	X.5	X.5.1	X.5.2	X.5.3	X.5.4	X.6	X.6.1	X.6.2	X.6.3	X.7	X.7.1	X.7.2	X.7.3	X.8	X.9	X.10
End User	Traveller	01	2,6/2,4	2,7/3,0	3,0/3,0	2,8/2,5	2,7/2,5															
	Freight Customer	02	2,9/2,2/1,6				2,4/2,6						1,6/1,8	2,9/2,7	2,7/2,7	2,5/2,9	1,2/1,2				2,0/2,0	
Train Operating Company	Passenger	03	2,9/2,9	2,5/2,5				2,1/2,0/2,1	2,9/2,9/2,2	3,0/3,0/3,0	2,5/2,5/2,5											
	Freight	04	1,8				2,9	2,8/2,8	2,8/2,8	2,5/2,5												
	Maintenance	05																				
Infrastructure Managers	Station	06	2,9				2,2					1,3										
	Track	07	2,5				2,8															
	Energy	08	2,8				2,3															
Employees	Operation	09	2,8				2,3															
	Construction	10	1,8																			
	Labor Unions	11	2,8				2,3															
	Maintenance	12																				
Rail Supply and Service Industry	Track	13	2,0				2,8															
	Communication	14																				
	Immaterial Services	15																				
	Energy	16																				
Vehicle Manufacturing Industry	Rolling Stock Company	17																				
	Construction	18		2,2	2,2	2,5	2,8															
	Passenger	19		2,7	2,8		2,7															
Vehicle Manufacturing Industry	Freight	20	2,5				2,8					1,4				2,7						
	Maintenance	21	1,4	1,8			1,6					2,5				2,2				1,6		
Environment & Health	Human	22																				
	Earth	23																				
	Fauna and Flora	24	1,4				2,6					2,8										
Regulatory Bodies	Railway Authority	25	2,1				2,9															
	EU Agency for Railways	26	2,1																			
	Network Agency	27																				
	Environment Agency	28	2,1				1,9					2,2				2,6						
	Legislative Authority	29	1,9					2,3	2,5			2,5				2,5						
Organisations	EU Commission	30	1,9				2,3					2,3			2,5					2,1	2,2	
	Lobbies	31	2,5				1,9					2,3										
	User Associations	32	2,7				2,9					2,1				2,2						
	European Technology Platforms	33	2,1					3,0	3,0	2,0	2,6	2,7					2,9	2,8	2,9	2,6	2,5	
Public/Society	Orderer of Transport Services	34																				
	Residents	35																				
	Media	36																				
Other Transport Systems	Coopetition	37	1,8					2,1	2,0	2,1		2,2										
	Shareholders	38																				
Investors/Creditors	Financial Institutions	39																				
	State	40																				
	Insurance	41	2,4				2,4					2,2				2,6				2,7	1,7	2,6
R&I and Academia	Universities	42	2,6				2,5															
	Research Institutes	43	2,0				1,7					2,4										
	Education/Training	44																				