Deliverable 8.3
Executive Summary

The expected impacts on SPIDER PLUS 2050 mobility vision

Executive summary

According to its shared competence on transport, EU has the right to provide a framework of common transport policy in which the Member States have to pursue the objectives of the Treaties. The goal of the common transport policy is to develop the internal market, that is, the promotion of the free movement of people and goods through the elimination of obstacles at the Member States borders.

Moreover, its shared competence on environment gives the EU the right to adopt measures aiming at driving the transport system toward a sustainable path.

According to this and to the need for policies fostering the development of an integrated and homogeneous European transport system, the EU action is justified and passes the so called necessity test. Furthermore, since the objectives of SPIDER PLUS could be better achieved when coordinated by the Community, the EU action in the scope of the project succeeds also in the so called test of EU Value Added.

The present deliverable provides a comprehensive impact assessment of the solutions identified by the project. The assessment has been elaborated by merging together the findings of D8.1 and D8.2 into a common evaluation schemes, where Cost Benefits Analysis (CBA) results have been integrated with the elaboration of specific sets of Key Performance Indicators and qualitative assessment outcomes for the selected solutions, allowing the identification of the main relevant strategic components which show relevant impact on Vision Components (VCs) and the related Elements (VCEs).

Solutions have been analysed according to the three cluster categories freight, passengers and infrastructure (compare Table 1 - Table 3). The integration of CBA results, KPIs and qualitative impact description and ranking has generated a consistent pattern of estimated effects which allows to evaluate the potential of different sets of solutions, and will lead to a prioritisation of strategies which supports the definition of a strategic road map for reaching the Spider Plus targets.

The most affected vision components for freight solutions are Capacity and Industrialisation.

Other modes of transport have already been industrialised, in particular when considering the sea shipping and air freight operating models. Railway industry still has to be industrialised with a higher degree of automation and modularity aiming at the deployment of economies of scales. Unsurprisingly, all the vision component elements in this category are affected by those freight solutions with relatively high ratings in Average, Adjusted average and Intensity. The VCE Automation is affected by the solutions with an average of 2.5, an adjusted average of 42%, Standardisation has an average impact of 1.67 and an adjusted average of 21%, Economies of scale has an average of 2.5 and an adjusted average of 21%. The less affected VCE in this category is Modular design, with an average impact of 2, but an adjusted average of only 8% and an intensity of only 0.5, meaning that no solution has a crucial and determinant effect on it. When considering the intensity, Automation and Economies of scale still show the highest results: the first has 3 solutions with the maximum impact +++, determining an intensity rate of 3, the latter, with only one solution with the maximum impact +++, has an intensity rate of 1.5.

The second most affected vision component is Capacity:

Within this vision component, Technologies to increase capacity is the element most affected by the analysed solution related to freight. The rating in term of average is 1.57, the adjusted average is 46% and the intensity of impact is 2. This result could be explained when considering the need of capacity in relation to the constraints related to scarce resources. Since the classical investment in capacity – usually represented by the building of new tracks and lines – could be considered as too expensive, other

technological solutions enabling the deployment of more capacity at unchanged infrastructure could be a viable solution. Longer and heavier trains are the solution with the higher impact on the VCE Technologies to increase capacity. It is the most explicative example of what just said: innovation in operational models which need relatively low investment, like the operation of freight trains 1,500 m long, could produce the same effect in term of capacity increase of other investment such the classical ones like the building of completely new railway infrastructures. Innovations in business and operational model and the implementation of other technologies could then help to meet the SPIDER PLUS volume target with a high grade of efficiency and effectiveness.

The most affected vision component for passenger solutions is Seamless Society:

The crucial element in the mobility development vision is the systematisation and standardisation of service lines and their integration, regardless to the mode of transport. It will affect positively the rail system under more than one point of view. Firstly, a well-connected and integrated grid of services setting up together a comprehensive network is a crucial element in fostering the demand and increasing the competitiveness of public transport services. Moreover, systematised and standardised services (precondition for their integration) are a key element in the increase of productive efficiency, reliability and in the decrease of operating costs. It is not by chance then, that the most affected vision component element (not only in the category Seamless society but in all the tables showing impact in the area of passengers) is Integration with other modes of transport, reaching an Average of 2.5, an adjusted average of 48% and an impact intensity of 3. The future of rail transport system will then undoubtedly pass through the integration of all model of transport.

And it is not by chance that the other two most affected vision component elements in the category of Seamless society are Mobility hubs centred around rail and Integration of fares.

The most affected vision component for infrastructure solutions is Capacity:

The relation between the vision component Capacity and the infrastructure solutions can be explained when considering the SPIDER PLUS targets. As highlighted in the paragraph 4.2, setting an increase of railway freight volume by 1.152 btKm and of passenger volume by 721 bPKm (380 bPKm in HSR and 342 bPKm in Conventional rail) within 2050, seems extremely ambitious. In order to accomplish with these targets huge investments and implementation of appropriate solutions aiming at increasing infrastructure capacity are strictly required.

All the vision component elements in the category Capacity are affected by infrastructure solutions, but the mostly affected is Freight hubs, with an average of 3, an adjusted average of 29% and an intensity of 2, meaning that the implementation of the proposed solutions will have a sure and persistent impact on the VCE. Capacity is not only related to the network but to the whole system. The increase in volume requires not only higher capacity in term of paths and tracks but also in hubs and nodes. Passengers and goods won't merely travel, to travel but their journeys have to originate and finish in apposite structures like hubs like stations, intermodal terminals or rail ports.

Table 1: Aggregated impact analysis on VCE - Freight solutions

VC	VCE	Automatic centre buffer coupling	Continuous electric wire	Hybrid locomotives	Longer and heavier trains	Automated marshalling yards	Automation of handling of CT-units	New designed freight wagons	Comprehensive ICT based management and operation	AVERAGE	ADJUSTED AVERAGE	INTENSITY
CAPACITY	HS infrastructure											
	Metropolitan areas infrastructures											
	Bypasses and passing tracks				+					1	0.04	0
	Technologies to increase capacity	+	+		+++	++	++	+	+	1.57	0.46	2
	Freight hubs					+				1	0.04	0
SEAMLESS SOCIETY	Mobility hubs centred around rail											
	Integration with other modes of transport						+++			3	0.13	1
	Integrated marketing of services											
	Integration of fares											
ROLLING STOCK	Speed			+++						2	0.13	1
	Reliability	+	++							1.5	0.13	0.5
	Comfort and interior design											
	Modularity and standardisation		+					++		1.5	0.13	0.5
INDUSTRIALISATION	Automation	+++	+			+++	+++			2.5	0.42	3
	Standardisation	++		+				++		1.67	0.21	1
	Modular Design							++		2	0.08	0.5
	Economies of scale				+++	++				2.5	0.21	1.5
ICT	E-ticketing											
	Journey planning											
	Industrial ICT tools		++			+	++		++	1.75	0.29	1.5
	E-freight		+					+++	++	2	0.25	1.5

Table 2: Aggregated impact analysis on VCE - Passenger solutions

VC	VCE	Double stock wagons	New designed train sets	Automated operation	High frequent services and integrated timetable	Optimised connectivity of different types of services	Introduction of comprehensive carefree travelling	Train coupling and sharing of train modules	AVERAGE	ADJUSTED AVERAGE	INTENSITY
CAPACITY	HS infrastructure										
	Metropolitan areas infrastructures										
	Bypasses and passing tracks										
	Technologies to increase capacity	+++	+	+++				+	2	0.38	2
	Freight hubs										
SEAMLESS SOCIETY	Mobility hubs centred around rail					++			2	0.10	0.5
	Integration with other modes of transport			++	+++	++	+++		2.5	0.48	3
	Integrated marketing of services				+				1	0.05	0
	Integration of fares				++		++		2	0.19	1
ROLLING STOCK	Speed	++	++						2	0.19	1
	Reliability										
	Comfort and interior design	+++	+						2	0.19	1
	Modularity and standardisation										
INDUSTRIALISATION	Automation										
	Standardisation										
	Modular Design	++	++						2	0.19	1
	Economies of scale										
ICT	E-ticketing						+++		3	0.14	1
	Journey planning				++		+++		2.5	0.24	1.5
	Industrial ICT tools										
	E-freight										

Table 3: Aggregated impact analysis on VCE - Passenger solutions

VC	VCE	Upgrading and extension of the network	ETCS	European intermodal network of terminals	European railport network	European rail freight corridors	Optimisation of operation	Holistic integration of all modes in a new designed hubs	AVERAGE	ADJUSTED AVERAGE	INTENSITY
CAPACITY	HS infrastructure	+++							3	0.14	1
	Metropolitan areas infrastructures	+++							3	0.14	1
	Bypasses and passing tracks	+++					+		2	0.19	1
	Technologies to increase capacity		++			+			1.5	0.14	0.5
	Freight hubs			+++	+++				3	0.29	2
SEAMLESS SOCIETY	Mobility hubs centred around rail			++				+++	2.5	0.24	1.5
	Integration with other modes of transport			+				+++	2	0.19	1
	Integrated marketing of services										
	Integration of fares										
ROLLING STOCK	Speed										
	Reliability		0/+						0.5	0.05	0
	Comfort and interior design										
	Modularity and standardisation										
INDUSTRIALISATION	Automation										
	Standardisation					+++			3	0.14	1
	Modular Design										
	Economies of scale			++	++	++			2	0.29	1.5
ICT	E-ticketing										
	Journey planning										
	Industrial ICT tools										
	E-freight										