TOOLBOX

DELIVERABLE D.T3.2.2

TRANSNATIONAL TOOLBOX FOR APPLYING MULTIMODAL INTEGRATED TARIFF SCHEMES AND TICKETING IN CENTRAL EUROPE

Version 2.0

112019

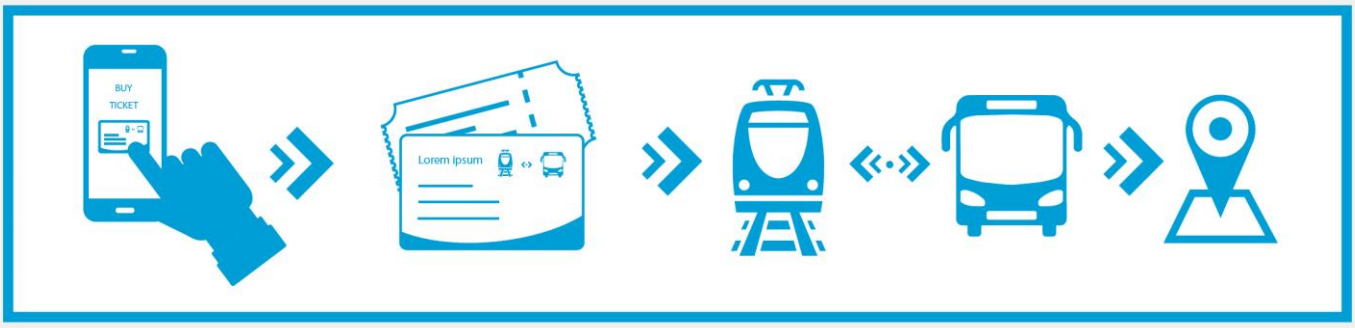
1. Background

ABOUT THE PROJECT

CONNECT2CE project has worked on analysis of the current situation of Central Europe peripheral and cross-border accessibility to regional/national/European networks and hubs in order **to provide tools and toolboxes to help decision makers take the measures and prepare specific projects for gradual improvement of the situation**. A role of decision makers can be taken by any entity, authorised for improvement of cross-border public transport, i.e. public authority, transport agency or transport operator.

The aim of transnational toolboxes is to facilitate improvement of peripheral and cross-border accessibility in Central Europe to regional, national and European networks and hubs.

The objective of the transnational toolboxes is **to provide practical guidance** for public authorities and passenger transport operators **for implementation of measures to improve public transport in the area**.



Objective of transnational tools is to provide the user with identification of different options when strategically planning improvement of cross-border public transport connectivity and suggestions to choose among them (**WHAT TO DO**). The tools are available on EUSurvey web platform:

https://ec.europa.eu/eusurvey/runner/CONNECT2CE_Transnational_tool.

The toolbox gives the user practical guidelines on implementation of improvement system or service in cross-border public transport – **HOW TO DO a project implementation plan**.

2. Toolbox structure

Three Toolboxes have been developed, covering the three main topics addressed by CONNECT2CE project:

*Toolbox for improving **regional and cross-border railway and public transport connections** in Central Europe*	*Toolbox for applying **multimodal integrated tariff schemes and ticketing** in Central Europe*	*Toolbox for implementing **info-mobility systems** in Central Europe*

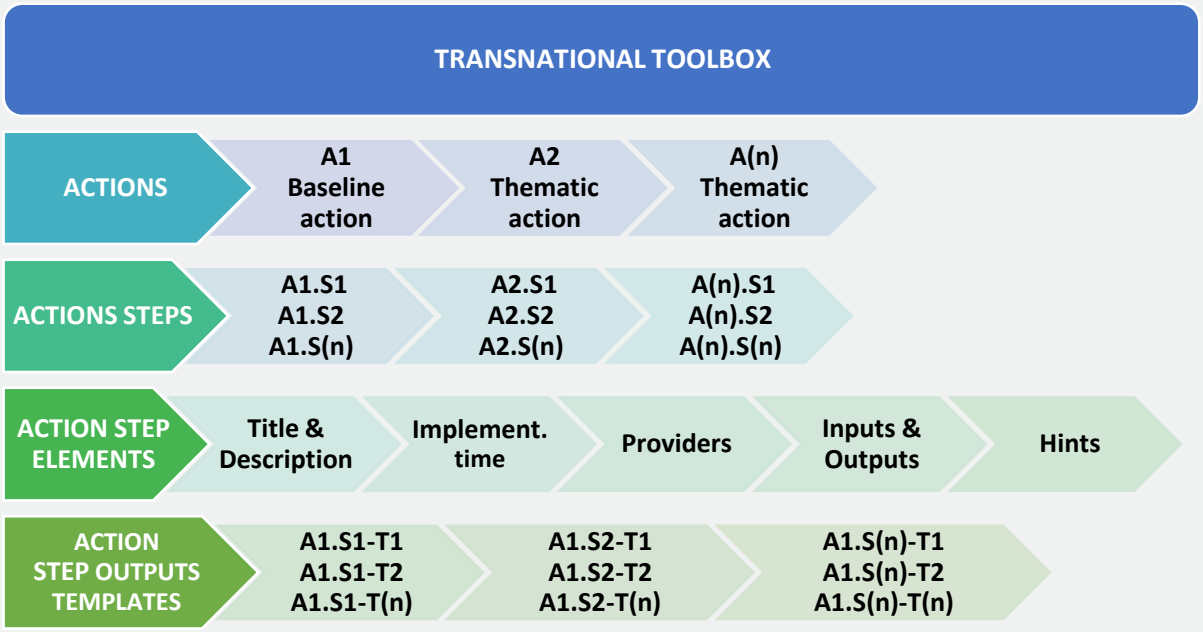
Both, tools and toolboxes together form an aggregated transnational toolbox that answers both questions – **WHAT AND HOW to implement** when taking **measures for improvement of peripheral and cross-border transport accessibility**.

The toolbox is composed of **toolbox actions**. Each action is further **divided to several steps**, related to the thematic field of the particular toolbox. **Toolbox steps** are actually suggested activities for completing the toolbox actions. A particular focus is cast to a **"Project implementation risks assessment" step** for being a **baseline step** to be taken before starting implementation any thematic project activity.

Normally, the **steps** need to be taken in accordance with the time plan but they **can** still **be regarded and implemented independently** taking into consideration of the level of the already implemented integration steps (activities). For implementation of the action **not always all steps are necessary to take**.

The **toolbox is composed of three sections**:

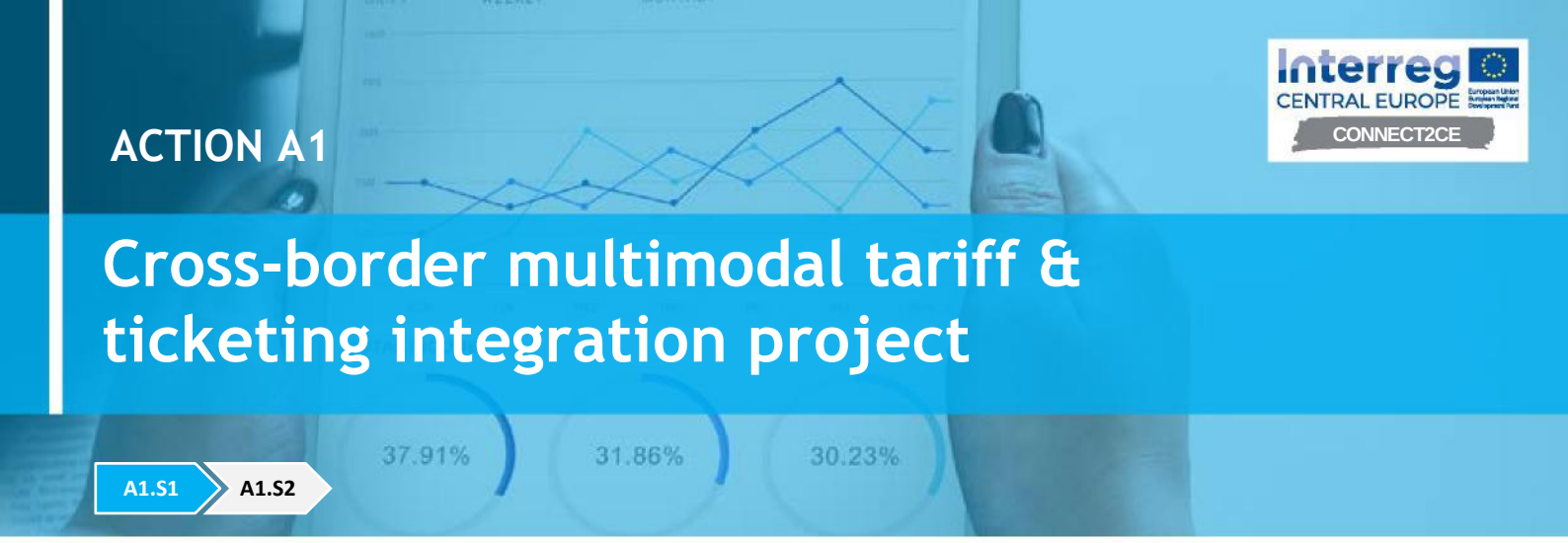
- **toolbox outline**; giving overview of the toolbox (List of contents),
- **description of actions and steps**,
- **tables of contents** and descriptions of output documents; the **templates for all steps** are collected **in the appendix**.



3. Toolbox outline

The objective of transnational toolbox for applying multimodal integrated tariff schemes and ticketing in Central Europe (**"Transnational toolbox on integrated tariff & ticketing"**) is to provide **guidelines for implementation of the tariff and ticketing integration actions in cross-border areas of Central Europe** and consists of three actions. Implementation of the **Action A1 is a prerequisite for successful implementation of the other actions**. Actions and pertaining steps are presented in the presented table. **A detailed description of each step follows below the table.**

Action	Step
Action A1: Cross-border multimodal tariff & ticketing integration project	Step A1.S1: Set-up of a cross-border multimodal tariff & ticketing integration project
	Step A1.S2: Project implementation risks assessment
Action A2: Integration of tariff schemes	Step A2.S1: Analysis of tariffs at the cross-border transport area
	Step A2.S2: Integrated tariff scheme model
	Step A2.S3: Integrated tariff products
	Step A2.S4: Financing and revenue ticket clearing model
	Step A2.S5: Integrated tariff management
Action A3: Integration of ticketing systems	Step A3.S1: Analysis of existing local ticketing systems
	Step A3.S2: Cross-border integrated ticketing system concept
	Step A3.S3: Concept of technical solution
	Step A3.S4: Cost estimation
	Step A3.S5: Rules of cross-border integrated ticket system use
	Step A3.S6: Description of ticketing system operation
	Step A3.S7: Technical standardization of ticketing system
	Step A3.S8: Purchase of equipment
	Step A3.S9: Technical implementation of ticketing system
	Step A3.S10: Cross-border ticketing system testing
	Step A3.S11: Deployment of the ticketing system
	Step A3.S12: Ticketing system operation



ACTION A1

Cross-border multimodal tariff & ticketing integration project

A1.S1 A1.S2

STEP A1.S1 - Set-up of a cross-border project

To outline

Elaboration and signing of an agreement on cooperation on project for implementation of the cross-border multimodal tariff and ticketing integration.

PROVIDERS

Responsible actors: authorised public transport entities form the area, project ordering authority.
Involved actors: transport operators.

INPUTS

Data: expressed needs for cross-border multimodal transport tariff & ticketing integration.

Sources: formal initiative, letter of intent, international agreements, call for tenders for EU projects, national/local strategies, legislation and organisational acts on public transport.

OUTPUTS

O1.1.1: Agreement on cooperation on cross-border multimodal tariff & ticketing integration (**A1.S1-T1**)

IMPLEMENTATION TIME

short		long
○	●	○

HINTS

Activities within this step should be finished in 3 months but **can vary depending on availability of resources** (state of documented and non-documented agreements among the partners) and **extent of the cross border-area** (e.g. number of authorities, transport modes…).

Before starting project implementation formal prerequisites and financing of the project must be provided: contract among authorised public transport providers, EU project co-financing agreement & partnership agreement etc.

To avoid possible misunderstanding between parties **a legal translation of an agreement is recommended**.

Cross-border multimodal tariff & ticketing integration project

STEP A1.S2 - Project implementation risks assessment

Assessment of risks and barriers that can substantially impact feasibility of implementation of a cross-border project and identification of measures for risks mitigation.

To outline

PROVIDERS

Responsible actors: project ordering authority, appointed project research team.
Involved actors: transport operators, authorised public transport entities form the area.

INPUTS

Data: technical, social, organisational, legal environment data at cross-border transport area.

Sources: transport authorities, transport operators, social contacts, reference projects, formal and informal initiatives, letter of intent, international agreements, national/local strategies, legislation and organisational acts on public transport, financial sources and funding schemes, etc.

OUTPUTS

O1.2.1: Project implementation risks management plan (**A1.S2-T1**)

IMPLEMENTATION TIME

short		long
●	○	○

HINTS

Risks and barriers to harmonisation of multimodal cross-border public transport systems and facilities are usually **similar for the entire Central Europe area**.

It is **important to identify differences on each side of the border line that can represent obstacle for implementation** in terms of: funding of public transport systems, responsibilities of transport authorities (national, regional level), tendering procedures and practices, development planning horizons (e.g. 15 years strategic planning horizon in Germany), commitment to bilateral agreements, technical backgrounds and existing solutions, organisational backgrounds, cultural characteristics, availability of financial resources etc.

Good practices from other cross-border projects and **experiences** from previous cooperation in this cross-border area should be taken into consideration.

ACTION A2

Cross-border integration of tariff schemes

A2.S1 A2.S2 A2.S3 A2.S4 A2.S5

STEP A2.S1 - Analysis of tariff schemes at the transport area

Analysis of the existing tariff schemes and analysis of the ticket sale at the cross-border transport integrated area - for all transport modes taking part in the integration.

To outline

PROVIDERS

Responsible actors: appointed project team.
Involved actors: transport operators, transport authorities.

INPUTS

Data: tariff models, tariff products, tariff time validity framework, volume of ticket sale, financing of tariff discounts and revenue clearing of existing integrations.

Sources: authorised tariff entities, published tariff and rules of ticket use, legislation or contract on integration and operational documents, ticket sale data.

OUTPUTS

O2.1.1: Report on current situation of cross-border integrated transport area tariff systems (A2.S1-T1)

IMPLEMENTATION TIME

short		long
○	●	○

HINTS

Differences among state regulations and transport modes are expected in terms **of ticket discounts beneficiaries categories** (different age of children discount …). Particular **attention** must be paid **to detected differences and to the discount financing rules**.

Cross-border integration of tariff schemes

STEP A2.S2 - Integrated tariff scheme model

To outline

Elaboration of the proposal of the integrated tariff model, tariff calculation model and definition of the integrated single ticket price list.

PROVIDERS

Responsible actors: appointed project team.
Involved actors: transport operators, transport authorities.

INPUTS

Data: requirements ensuing from the agreement on cross-border integration project, analysis of the existing cross-border tariff systems.

Sources: O1.1.1: Agreement on cross-border integration project, O2.1.1: Report on current situation of cross-border transport area tariff systems.

OUTPUTS

O2.2.1: Proposal of integrated cross-border multimodal tariff model (A2.S2-T1)

IMPLEMENTATION TIME

short		long
○	●	○

HINTS

Coordination of different aspects and situations **can be time consuming**.

The **integrated tariff** should be **competitive to other public transport tariff** and should also **consider personal transport costs**. **The integrated multimodal tariff** is advised to be favourable **(lower)** in comparison to single mode tariff schemes. To apply this the **actual transport operation costs** must be determined and **integrated tariff co-financing** should be considered.

Cross-border integration of tariff schemes

STEP A2.S3 - Integrated tariff products

To outline

Elaboration of the proposed integrated products (types of tickets). Definition of time validity, territorial validity, user entitlement discounts, general discounts, ticket ID status (anonymous, personal), rules of ticket use per each ticket type.

PROVIDERS

Responsible actors: appointed project team.
Involved actors: transport operators, transport authorities.

INPUTS

Data: requirements ensuing from the agreement on cross-border integration project, analysis of the existing cross-border tariff systems.

Sources: O1.1.1: Agreement on cross-border integration project, O2.1.1: Report on current situation of cross-border transport area tariff systems.

OUTPUTS

O2.3.1: Proposal of cross-border integrated multimodal tariff products (**A2.S3-T1**)

IMPLEMENTATION TIME

short		long
○	●	○

HINTS

Harmonisation of ticket types (products) should observe specific definitions of entitlements in the respective cross-border area (e.g. ticket discount policy in the area). **Modification of legislations** may need to ensue.

Stakeholders should be **engaged in the early phases** of ticket products development. **Coordination** of different aspects and situations **can be time consuming**.

Definitions of entitlement to integrated tariff discounts is advised to **adopt the most favourable single tariff option for the passengers** (e.g. among different national discounts, one defining children age up to 6 and another up to 10 years, it is recommended to select the age of 10 years).

Cross-border integration of tariff schemes

STEP A2.S4 - Financing and ticket revenue clearing model

Elaboration of a proposal of financing model of integrated tickets (co-financing). Elaboration of a proposal of a revenue sharing (clearing) model to distribute ticket revenue among the participating operators. Simulation of integrated ticket revenue per operator, transport mode, transport area.

To outline

PROVIDERS

Responsible actors: appointed project team.

Involved actors: transport operators, transport authorities, authorised financial auditor.

INPUTS

Data: existing financing models of public transport services, requirements ensuing from agreement on cross-border integration project, ticket sale, integrated tariff products.

Sources: O1.1.1: Agreement on cross-border integration project, O2.1.1: Report on current situation of cross-border transport area tariff systems, O2.3.1: Proposal of cross-border integrated multimodal tariff products.

OUTPUTS

O2.4.1: Proposal of cross-border financing and ticket revenue clearing model (A2.S4-T1)

IMPLEMENTATION TIME

short		long
○	●	○

HINTS

A **clearing model** should be based on **agreement among the parties**. **Revenue model** can be defined by using exact ridership data or agreed flat shares. **Attention** should be particularly paid **to multi-operator tariff system** where various operators operate on the same line or network and passenger is free to choose any of them for the same part of the trip. **On-field research** of ticket use at operators **is recommended** to determine the revenue clearing shares.

Countries in general apply **different VAT rates** for the ticket sale. As the final ticket price is defined by the integrated tariff (the same, no matter in which country it is sold), the **actual value of the ticket**, entering the revenue sharing model, **differs upon the place of sale** (country). The revenue differences need to be taken into account when planning transport revenue and financing of the tariff. Another option for VAT calculation exist, to **apply the VAT rate, valid in the country where the longest part of the integrated ticket is operated**.

Cross-border integration of tariff schemes

STEP A2.S5 - Integrated tariff management

To outline

Deployment and formalizing of integrated tariff management model (entities, organization of the entities and authorities, tariff management rules, financing of management). Adoption and implementation of the integrated tariff model and ticket products (implementation of tariff management model).

PROVIDERS

Responsible actors: appointed project team, authorised decision making public transport entities.
Involved actors: transport operators, transport authorities, professional transport related unions.

INPUTS

Data: existing tariff management systems: entities, organization, tariff management rules, authorities, financing of management.

Sources: O1.1.1: Agreement on cross-border integration project, legislation and organisational acts on public transport.

OUTPUTS

O2.5.1: Proposal of cross-border integrated tariff management model (**A2.S5-T1**)

O2.5.2: Regulative act governing the cross-border integrated multimodal tariff model, integrated products and integrated tariff management (**A2.S5-T2**)

IMPLEMENTATION TIME

short ○ ○ ● **long**

HINTS

Regulative act adoption might take a **long time**. It should be **internationally harmonised, consolidated, adopted and put into force**. The time depends on procedural factors, political will and other administration issues.

The **decision making public transport authorities** will formalize the integrated tariff management model and take part in adoption of the integrated tariff model.

Cross-border integration of ticketing system

STEP A3.S1 - Analysis of existing local ticketing systems

Technical and operational analysis of the existing ticketing systems on the cross-border integration area for all transport modes included in the integration.

To outline

PROVIDERS

Responsible actors: appointed project team.
Involved actors: transport operators, transport authorities.

INPUTS

Data: existing technical implementation of ticketing system, products, info mobility systems, rules of ticket use, ticket validation & control, stationary and in-vehicle ticket sale network, reporting, authorised ticket management entity.

Sources: operational documents describing existing ticketing systems, inventory and operational data provided by the transport authorities and operators.

OUTPUTS

O3.1.1: Report on current situation of cross-border transport area ticketing systems (A3.S1-T1)

IMPLEMENTATION TIME

short		long
○	●	○

HINTS

Analysis of existing ticketing systems is broken down to each transport operator and each transport mode.

The analyses should **focus on the capacity of the existing ticketing systems** which can be **upgraded** to the target integrated ticketing system technical solution.

Cross-border integration of ticketing system

STEP A3.S2 - Cross-border integrated ticketing system concept

Definition of the concept of integrated multimodal ticketing system: lines network (cross-border, urban, etc.), integrated ticketing products, price policy, co-financial policy, revenue clearing policy, relation between urban – inter-urban transport, transport operators participation in the system.

To outline

PROVIDERS

Responsible actors: appointed project team, transport authorities.
Involved actors: transport operators.

INPUTS

Data: expressed needs for cross-border multimodal transport tariff & ticketing integration.

Sources: O1.1.1: Agreement on cooperation on cross-border multimodal tariff & ticketing integration.

OUTPUTS

O3.2.1: Concept of the cross-border integrated ticketing system (A3.S2-T1)

IMPLEMENTATION TIME

short		long
●	○	○

HINTS

Consolidation of different regulations and authorities related to integration of existing ticketing systems can be **time consuming**. It is important to **include all stakeholders in the early phases** of integrated ticketing concept development in order to save time for its implementation.

Cross-border integration of ticketing system

STEP A3.S3 - Concept of technical solution

Definition of the concept of technical solution for the cross-border multimodal ticketing system: technology, entities, processes and data-flow.

To outline

PROVIDERS

Responsible actors: appointed project team, technology provider.
Involved actors: transport operators and their technology providers, transport authorities.

INPUTS

Data: requirements derived from the agreement on cross-border integration project and investment plans, analysis of existing local ticketing systems.

Sources: O1.1.1: Agreement on cross-border integration project, O3.1.1 Report on current situation of cross-border transport area ticketing systems.

OUTPUTS

O3.3.1: Technical solution of cross-border integrated multimodal ticketing IS (**A3.S3-T1**)

IMPLEMENTATION TIME

short ● **long** ○ ○

HINTS

Coordination and presentation of technical solution to the technology providers of the existing systems that will be integrated is crucial for success of the project and **assuring an open (standardized) system**.

In order to keep low cost of cross-border integrated ticketing system implementation it is **advisable to apply a predominant technical solution** if it meets technical requirements.

Consolidation of different ticketing technologies can be successfully arranged **by applying bar code ticketing** (paper, mobile app) because smart card security kays system and different technologies of smart cards could be much more difficult to harmonize and implement.

The **project launching/ordering authority** should **coordinate stakeholders' inputs**.

Cross-border integration of ticketing systems

STEP A3.S4 - Cost estimation

Estimation of cost of integrated multimodal ticketing project implementation and system operation.

To outline

PROVIDERS

Responsible actors: appointed project team.
Involved actors: N/A.

INPUTS

Data: technical solution of cross-border multimodal integrated ticketing system, inventory and operational data provided by the transport authorities and operators.

Sources: O3.3.1: Technical solution of cross-border multimodal integrated ticketing IS, O3.1.1 Report on current situation of cross-border transport area ticketing systems.

OUTPUTS

O3.4.1: Calculation of project cost for implementation & operation (**A3.S4-T1**)

IMPLEMENTATION TIME

short ● **long** ○ ○

HINTS

Cost estimation will help decision makers to assess project feasibility and benefits. It is **based on proposed technical solution** for a cross-border multimodal integrated ticketing system and **estimation of scope of this system**. Due to non-availability of exact data to this phase, especially in different countries, quantities of the required equipment and other sources are **usually based on approximate estimations**.

Cross-border integration of ticketing system

STEP A3.S5 - Rules of cross-border integrated ticket system use

Guidelines of use of ticketing system for the end users - passengers; a description of elements and processes: ticket products, ticket media, ticket sale, ticket validation & control, customer relation, personal data protection etc.

To outline

PROVIDERS

Responsible actors: appointed project team.
Involved actors: transport operators, transport authorities.

INPUTS

Data: existing rules and practices of ticketing systems in use, technical preconditions of integrated ticketing system use (relation to technology).

Sources: O3.3.1: Technical solution of cross-border multimodal integrated ticketing IS, O3.1.1 Report on current situation of cross-border transport area ticketing systems.

OUTPUTS

O3.5.1: Rules of use of cross-border multimodal integrated ticketing system for passengers (**A3.S5-T1**)

IMPLEMENTATION TIME

short		long
○	○	●

HINTS

Rules of ticketing system use refer to the adopted technical solution **(harmonisation is needed)**. The rules should be published by the integrated transport authority **(passenger info-mobility system)**.

The guidelines, prepared by the project group, **must be presented to the transport operators** and coordinated with the entity that issues the Rules **(the integrated transport authority)**.

Cross-border integration of ticketing system

STEP A3.S6 – Description of ticketing system operation

To outline

Guidelines of operating of cross-border integrated ticketing system - guidelines for transport operators and transport authority; a description of elements, information systems and processes - terminal equipment: ticket products, ticket media,, ticket sale, ticket validation & control, customer relation, personal data protection, server system: infrastructure management, timetable management, reporting, data exchange with terminal equipment etc.

PROVIDERS

Responsible actors: appointed project team.
Involved actors: transport operators, transport authorities.

INPUTS

Data: existing rules and practices of ticketing system operation, technical preconditions of ticketing system operation (relation to technology).

Sources: O3.3.1: Technical solution of cross-border multimodal integrated ticketing IS, O3.1.1 Report on current situation of cross-border transport area ticketing systems.

OUTPUTS

O3.6.1: Rules of cross-border multimodal integrated ticketing system for transport operators (**A3.S6-T1**)

O3.6.2: Description of operating of the cross-border multimodal integrated ticketing system for integrated ticketing authority (ITA) (**A3.S6-T2**)

IMPLEMENTATION TIME

short		long
○	○	●

HINTS

Rules of operating of a ticketing system refer to the adopted technical solution, in terms of operation of terminal equipment, communication with the central server etc. The rules should be **published by the integrated transport authority** and integrated or referenced in the **operational contract with the transport operator** that is participating in integrated ticketing system

The guidelines for transport operators **must be communicated to the operators** and coordinated with the entity that issues the Rules (integrated transport authority).

Cross-border integration of ticketing system

STEP A3.S7 - Technical standardization of ticketing system

Technical description of the system and all elements of cross-border integrated ticketing system and guidelines for maintenance and upgrading in a technical standard. A technical standard makes the system open, allows integration of existing ticketing systems owned by transport operators and opens participation to all technology providers in maintenance and development of the system.

To outline

PROVIDERS

Responsible actors: appointed project team, technology provider.
Involved actors: transport operators and their technology providers, transport authorities.

INPUTS

Data: concept of technical implementation of ticketing system and final implementation modifications.

Sources: O3.3.1: Technical solution of cross-border multimodal integrated ticketing IS, actual technical implementation.

OUTPUTS

O3.7.1: Technical standard of cross-border multimodal integrated ticketing system (**A3.S7-T1**)

IMPLEMENTATION TIME

short **long**

○ ○ ●

HINTS

Integrated ticketing standard provides description of operation and integration of all parts of the integrated ticketing system and rules for verification of the parts if they are replaced or additional parts (equipment) is added to the system.

Technology standard needs to be **communicated to the technical providers** of the transport **operators in early phases of system development** in order for them to understand it and to provide technical feedback on its implementation feasibility.

Standard prevents monopoly of one technology provider, either on server (@transport authority) or terminal side (@transport operators) of the system.

Integration of ticketing systems

STEP A3.S8 - Purchase of equipment

To outline

Specification of a purchase order for the integrated ticketing system equipment (technical specifications of HW and SW, quantities, users, location of delivery), selection of suppliers, elaboration of delivery plan.

PROVIDERS

Responsible actors: appointed project team, technology provider.
Involved actors: transport operators and their technology providers, transport authorities.

INPUTS

Data: required HW and SW (servers + terminals), all vehicles, fixed PoS terminal locations (manned & unmanned), ticket controllers and inspectors.
Sources: O3.1.1 Report on current situation of cross-border transport area ticketing systems, inventory lists related to transport operators

IMPLEMENTATION TIME

short ○ ● **long** ○

OUTPUTS

O3.8.1: Definition of demand - definition of migration scenarios for terminal equipment (upgrade, replacement)

O3.8.2: List of required integrated ticketing terminal equipment (A3.S8-T2)

O3.8.3: List of required integrated ticketing server equipment (system HW+SW)

O3.8.4: Delivery of equipment

HINTS

A**ll vehicles** must be **completely fitted with new equipment** whereas the stationary locations can be fitted progressively with system development (due to multiple options).
Enough funds must be provided for sufficient terminal equipment. For small projects also **manual procedures** are applicable (e.g. visual check of integrated tickets – e.g. Ljubljana – Trieste integrated ticketing pilot project). Manual methods are not convenient for automatic data processing.
Migration scenarios strongly **impact demand** (quantities and types of equipment) for terminal equipment and activities: upgrades, replacement of existing equipment (fully or partially).
Even if purchase is split to separate orders (e.g. by countries) the **same technical requirements for equipment must be met**.
Order some **spare items of terminal equipment** (redundant equipment).
A takeover record and compliance list should be provided for the supplied equipment.
A hire of terminal equipment may be an option for pilot projects implementation.

Cross-border integration of ticketing system

STEP A3.S9 - Technical implementation of ticketing system

Development of SW applications for cross-border multimodal integrated server and terminal system and interfaces to the existing ticketing systems at the transport operators or transport authorities.

To outline

PROVIDERS

Responsible actors: technology provider.
Involved actors: N/A.

INPUTS

Data: concept of technical solution of the integrated ticketing system, software development kit for terminal applications, software development environment for PC.

Sources: O3.3.1: Technical solution of cross-border multimodal integrated ticketing IS, O3.7.1: Technical standard of cross-border multimodal integrated ticketing system.

OUTPUTS

O3.9.1: delivery of application SW (server + terminals)

IMPLEMENTATION TIME

short		long
○	○	●

HINTS

Application development of ticketing system is tightly related to the development of the technical standard – it is worked out in parallel. It is **mandatory to follow the standard** or the standard needs to be amended accordingly – this is **crucial to assure open access** to any technology providers supporting the ITA and transport operators.

Cross-border integration of ticketing system

STEP A3.S10 - Cross-border ticketing system testing

To outline

Laboratory verification - proof of operation of the integrated ticketing system. On-field pilot project testing.

PROVIDERS

Responsible actors: project team (system + technology provider).
Involved actors: transport operators and their technology providers, transport authorities, passengers.

INPUTS

Data: definition of pilot project scope: equipment, electronic media, area, lines, products, users; definition of rules of use and operation.

Sources: O3.1.1 Report on current situation of cross-border transport area ticketing systems, O3.8.2: List of required integrated ticketing terminal equipment.

OUTPUTS

O3.10.1: Report on cross-border multimodal integrated ticketing system testing (**A3.S10-T1**)

IMPLEMENTATION TIME

short		long
○	●	○

HINTS

Laboratory testing and verification of the system takes place in parallel with development but the on-field testing needs a defined period and resources. The **on-field testing** should involve all critical parts of the system (e.g. different integration equipment), selected operators, products and users.

A report should provide **check of ticketing system implementation**: compliance to the rules and technical standard, quality of operation, troubleshooting and modifications of functions.

Cross-border integration of ticketing system

STEP A3.S11 - Deployment of the ticketing system

To outline

Elaboration of a detailed operational plan, installation and inventory of equipment, training of the personnel (transport operators, sales, management authority), system takeover (technical and functional) and management authority, promotion activities, contracting of operations.

PROVIDERS

Responsible actors: project team (system + technology provider).
Involved actors: transport operators and their technology providers, transport authorities, passengers.

INPUTS

Data: inventory list of terminal equipment and its specifications, inventory list of system HW and SW for server system.

Sources: O3.8.2: List of required integrated ticketing terminal equipment, O3.8.3: List of required integrated ticketing server equipment (system HW+SW).

OUTPUTS

O3.11.1: Takeover record & compliance list

O3.11.2: Delivery of the system into operation

O3.11.3: Promotional activities

O3.11.4: Contracts of operations with the transport operators

O3.11.5: Cross-border agreement on ticketing system operation

IMPLEMENTATION TIME

short		long
○	●	○

HINTS

Transport operators and ticket sale agents must be contracted for participation in the integrated ticketing system; all rules, processes, responsibilities, reporting and financing must be stipulated (operational and financial agreement).

Preparation of contracts and agreements can be very time consuming on the account of coordination of different local (country-specific) rules and situations.

Cross-border integration of ticketing system

STEP A3.S12 - Ticketing system operation

To outline

Technical and functional monitoring of the cross-border multimodal integrated ticketing system, providing of integrated service to the users (support and control for users, handling complaints, harmonisation of timetables, upgrades of integrated ticketing system etc.).

PROVIDERS

Responsible actors: appointed maintenance team (system + technology).
Involved actors: transport operators and their technology providers, transport authorities, passengers.

INPUTS

Data: rules of system use, operation and technical specifications of the integrated ticketing system and its parts.

Sources: O3.5.1: Proposal of cross-border financing and ticket revenue clearing model, O3.6.1: Rules of cross-border multimodal integrated ticketing system for transport operators, O3.6.2: Rules of operating of the cross-border multimodal integrated ticketing system for integrated ticketing authority (ITA), O3.7.1: Technical standard of cross-border multimodal integrated ticketing system, maintenance contract.

OUTPUTS

O3.12.1: Regular system monitoring and operation

IMPLEMENTATION TIME

N/A

HINTS

Efficient information support to the users **(info-mobility system)** and **operators (computer aided operation and post-operation reporting information system)** facilitates running and use of the ticketing system and consequently raises their satisfaction.

Operational performance and ridership needs to be monitored in order to improve cross-border integrated ticketing system deficiencies and to enhance or add the functionalities according to the needs of users and operators.

APPENDIX

A1.S1-T1

ToC of agreement on joint venture

Contents

To outline To step

APPENDIX

A1.S1-T1

ToC of agreement on joint venture

Contents

To outline To step

APPENDIX

A1.S2-T1

Project implementation risks management plan

Risk management table

To outline To step

Identified Risk	Probability of a risk (points) ***Low*** *= 1 point* ***Medium*** *= 2 points* ***High*** *= 3 points*	Possible risk impact (points) ***Low*** *= 1 point* ***Medium*** *= 2 points* ***High*** *= 3 points*	Risk assessment (points)	Risk mitigation measures	
				What to do	Reference to step
A	B	C	D=B*C	E	F

Priority of risk mitigation measures actions:

Risk assessment points	Level of priority	Actions
1-2	Low	Risk monitoring needed.
3-5	Medium	Risk monitoring, act if necessary.
6-9	High	Implementation of risk mitigation measures.

APPENDIX

A2.S1-T1

ToC of report on current situation of cross-border transport area tariff systems

Contents

To outline To step

1. **Description of tariff models and ticket price calculation models per transport mode and transport operator**
2. **Analysis of tariff products**

   Ticket types and features analysis is performed per transport mode and transport operator. The analyses of each type of ticket include time validity, territorial validity, user discounts, general discounts, ticket ID status and rules of ticket use.
3. **Analysis of procedures of tariff adoption**

   The analysis is performed per transport mode and transport operator (who, when, how, tariff validity period …).
4. **Analysis of ticket sale amounts**

   The analysis is performed per transport mode and transport operator and ticket type.
5. **Analysis of financing of integrated tariff revenue cost and rules of ticket revenue sharing**

   The analysis is performed if integration is already implemented on the part of the cross-border integration area.

References

1. International railway tariffs: PRIFIS (PRIce and Fare Information Storage)

   https://uic.org/projects/prifis

APPENDIX

A2.S2-T1

ToC of integrated tariff model proposal

Contents

To outline To step

APPENDIX

A2.S3-T1

ToC of integrated tariff ticket products proposal

Contents

To outline To step

1. **Available integrated ticket products**

   Definition of integrated ticket types: time validity, personal (status) discount, ID requirement, special discount, quantity discount – carnet).

2. **Price list**

   Definition of zone or distance (combined) integrated tariff scale per each time-validity ticket type (full price).

3. **Rules of integrated ticket use**

   Definition of integrated tariff validity rules, integration ticket expiry dates, integration ticket geographical scope, transport operators accepting the integrated ticket, integrated ticket manipulation. Rules differ per ticket type if needed.

4. **Publication of integrated tariff products and price list (where, who, how)**

APPENDIX

A2.S4-T1

ToC of financing and ticket revenue clearing model proposal

Contents

To outline To step

1. **Analysis of existing financing of transport services:**
   - Description of financing model (gross, net)
   - Method of public co-financing calculation
   - Reporting of ticket sale and performed transport services
   - Ticket sale commission
   - Financial flow
2. **Proposal of integrated tariff financing model**

   The proposal includes the calculation formula and rules for co-financing of difference between income of integrated ticket and non-integrated ticket revenue (calculation of co-financing amount, financer and share per financer).
3. **Proposal of a revenue sharing (clearing) model**

   Model includes calculation formula and rules for distribution of eligible ticket revenue (flat rates, ticket use, sale commission, sale amount) among the participating operators.
4. **Financial flow proposal**

   The proposal includes rules for balancing of eligible ticket revenue, co-financing and ticket sale: who, to whom, amount, when; model of clearing report.
5. **Analysis (simulation) of ticket revenue**

   The analysis is prepared per transport operator in line with the financing model of integrated ticket.

APPENDIX

A2.S5-T1

ToC of integrated tariff management model proposal

Contents

To outline To step

1. **Analysis of existing tariff management systems in the cross-border area**
   - Entities
   - Organization
   - Tariff management rules
   - Authorities
   - Financing of management
   - Reporting
2. **Analysis and definition of the cross-border integrated transport system**

   Analysis includes organisation of the entire integrated system: entities, relations, authorities, integration level.
3. **Proposal of integrated tariff management organisational structure:**

   The proposal defined the most appropriate management structure for the implementation of overall cross-border integrated transport system according to the extent of integrated tariff management and existing tariff management systems in cross-border area:
   - Organizational structure (establishment of new entity, authorisation of the existing entity, etc.)
   - Competence of the entity
   - Personnel structure and responsibilities
   - The entity establishment and operation financing (estimation of costs, source of funding, financial flow)

APPENDIX

A2.S5-T2

Regulative act regulating integrated tariff model, integrated products and integrated tariff management

Guidelines

To outline To step

Parties included into the tariff integration should sign or adopt regulative rules to formalise integrated tariff management model and adopt the integrated tariff model and ticket products according to these rules.

APPENDIX

A3.S1-T1

ToC of report on current situation of cross-border transport area ticketing systems

Contents

To outline To step

1. **Inventory of ticketing system per transport operators - columns:**
   - Name of operator
   - Transport mode (bus, railway, ...)
   - Territorial scope of operation (city, regional, national)
   - Type of transport contract (concession, PS, commercial activity)
   - Number of border area lines1 (Appendix: List of itineraries and timetables of transport lines)
   - Number of cross-border lines2 (Appendix: List of itineraries and timetables of transport lines)
   - Number of operating vehicles on border and cross-border area
   - On-board ticket sale (define ticket type)
   - Ticket mediums (types (paper, smart phone, e-card, bank card, personal token) and amount)
   - Ticket record mode (printed text, bar code, RFID, NFC, Bluetooth)
   - Ticket sale equipment (location on the vehicle – amount per vehicle)
   - Ticket on-board validation equipment (amount per vehicle)
   - Type of on-board validation (CI, CICO)
   - Ticket on-board validation model (ticket-based/account-based)
   - Number of ticket controllers
2. **Analysis of ticket and medium pre-boarding operations – columns:**
   - Pre-sale network in border and cross-border area:
     - › Name of sale network organizer
     - › Sale point name and address
     - › Type of sale point (counters, AVM)
     - › Number of POS per location
     - › Sale of ticket products (define type)
     - › Sale of e-card (YES/NO)
     - › R/W Devices (Paper, RFID, barcode, Bluetooth, NFC)
     - › Ticket sale equipment (amount per sale point location)

[1] Border area line: an itinerary of the line has stops in the border area but no stop across the border.

[2] Cross-border area line: an itinerary of the line has stops in the border area as well as in the area across the border.

To outline To step

- › Post-sale operations (YES/NO)

- Pre-boarding ticket validation:
  - › Location of validator (station/platform/stop name)
  - › Name of validator owner
  - › Number of validators per location
  - › Type of validation (CI, CICO)
  - › Validation model (ticket-based/account-based)

3. **Analysis of transport network – columns:**
   - Name of transport network manager
   - Transport mode (bus, railway, ...)
   - Stations (amount)
   - Platforms (amount)
   - Stops (amount)

References

1. Multimodal electronic ticket Ljubljana – Trieste (CONNECT2CE PA6): Promotional video https://www.youtube.com/watch?v=uEJ3SWpxRxs
2. Multimodal electronic ticket Ljubljana – Trieste (CONNECT2CE PA6): Timetable and ticket purchase portal https://eshop.sz.si/c2c/en
3. Integrated public transport ticketing in Slovenia – country-wide https://www.eltis.org/discover/news/slovenia-launches-integrated-public-transport-nation-wide

APPENDIX

A3.S2-T1

ToC of concept of the cross-border integrated ticketing system

Contents

To outline To step

1. **Definition of integrated ticketing lines network**

   Definition of cross-border area, transport types: inter-urban, urban, transport modes and operators.

2. **Definition of integrated ticketing products (integrated tariff scheme),**

3. **Price policy**

   Definition of procedures and authorised entities for price assignment and changes.

4. **Co-financial policy**

   Definition of procedures and financial shares to recover discrepancy between income and costs of integrated ticketing system.

5. **Revenue clearing policy**

   Definition of procedures and methodology of integrated ticket revenue sharing.

6. **Relation between urban – inter-urban transport operators participation in the system**

   Definition of rules of use of integrated ticket on the inter-urban transport vehicles operating at the urban transport area.

APPENDIX

A3.S3-T1

ToC of technical solution

Contents

To outline To step

1. **Definition of concept of ticketing systems integration**
   - Upgrade of existing electronic ticketing systems of transport operators
   - Replacement of existing ticketing systems with a new one
   - Specification of links to external entities (transport authority, local communities, …)
   - Equipment verification procedures
   - Level of data integration (central data storage and reporting/view for transport operators or data storage at operators and reporting to the central database)
   - Data update of central database (on-line data transfer or periodic/sporadic)
   - Identification of applied technology (data interfaces, R/W terminals, cloud, client server, …),
   - Information system security and data protection
   - Scheme of technical solution
2. **Functional requirements**
   - Ticket processes, system administration, system maintenance, data statistics, reporting, financial clearing, …
   - User interfaces
   - Data exchange schemes
   - Users access rights
3. **Hardware specification**
   - Point of sale: counters, automatic vending machines, on board
   - Ticket validation devices
   - Ticket inspection devices
   - Back office systems
   - Quantities of equipment (components)

To outline To step

4. **Software specification**
    - Terminal user and system applications (sale, validation, inspection, …)
    - Back office user (transport data, timetable, distance tables, scheduler, route planner, ticket sales support, …) and system applications (DBMS, server operational system, …)
    - Licensing

References

1. UIC APP for controlling UIC Ticket Barcode: project UIC 2016/PA/518
   https://uic.org/projects/uic-control-app-370
   https://www.sparkrail.org/Lists/Records/DispForm.aspx?ID=25180
2. UIC technical solutions to facilitate international passenger traffic
   https://www.unece.org/fileadmin/DAM/trans/doc/2016/sc2/ECE-TRANS-SC.2-2016-Pres01e.pdf
3. International Rail Ticket for Home Printing: UIC Leaflet 918-3
   https://www.shop-etf.com/en/catalog/product/view/_ignore_category/1/id/3343/s/international-rail-ticket-for-home-printing/
4. Layout for electronically issued transport documents on secured paper – Rail Combined Ticket 2 (RCT2) and Rail Credit Card Sized Ticket (RCCST): UIC Leaflet 918-2
   https://www.shop-etf.com/en/layout-for-electronically-issued-transport-documents-on-secured-paper-rail-combined-ticket-2-rct2-and-rail-credit-card-sized-ticket-rccst
5. Data exchange for ticket check and after sales operations with electronic information (barcodes, other security certificates): UIC Leaflet 918-4
   https://www.shop-etf.com/en/data-exchange-for-ticket-check-and-after-sales-operations-with-electronic-information-barcodes-other-security-certificates
6. 2D barcode: AZTEC Barcode
   https://en.wikipedia.org/wiki/Aztec_Code

7. Smart Card Standards and Specifications
https://www.securetechalliance.org/smart-cards-intro-standards/
8. Identification card systems - Surface transport applications - Interoperable Public Transport Applications – Framework: CSN EN 15320
https://www.en-standard.eu/csn-en-15320-identification-card-systems-surface-transport-applications-interoperable-public-transport-applications-framework/
9. Integrated railway timetables: MERITS (Multiple East-West Railways Integrated Timetable Storage)
https://uic.org/passenger/passenger-services-group/article/merits-database

A3.S4-T1

ToC of project cost calculation

Contents

To outline To step

Project cost calculation is based on:

- software (user applications, system software, portal solution, …),
- hardware (equipment quantity),
- project development and management activities (internal and external services),
- maintenance services,
- operational costs (mobile data, power, software service and hardware lease, license, …) and
- integrated ticketing management (business expenses of the manager).

APPENDIX

A3.S5-T1

ToC of Rules of ticketing system use for end users

Contents

To outline To step

The rules define how a passenger uses functionalities of integrated ticketing system:

1. **Definition of integrated products**
   - Ticket types (time and geographical validity)
   - Ticket media
   - Ticket use processes
2. **Sale of integrated products**
3. **Integrated ticket validation processes**
4. **Integrated ticket control process**
5. **Supporting services**
   - Claims
   - Complaints
   - Damages
6. **Passenger information and support**
7. **Personal data protection**

APPENDIX

A3.S6-T1

ToC of General rules of cross-border integrated ticketing system for transport operators

Contents

To outline To step

The rules define how to operate integrated ticketing system by integrated ticketing system manager, transport operators, ticket sales agencies and controllers.

1. **Definition of terms of integrated products issue**
2. **Definition of integrated products sale (sales channels)**
3. **Equipment and implementation of ticket validations**
4. **Equipment and implementation of integrated ticket inspection**
5. **Implementation of supporting services**
   - Claims
   - Complaints
   - Damages
   - Blocking/de-blocking of ticket use
6. **Reporting on ticket processes and statistics**
7. **Implementation of passenger support**

APPENDIX

A3.S6-T2

ToC of Description of operating of the cross-border integrated ticketing system for integrated ticketing authority (ITA)

Contents

To outline To step

APPENDIX

A3.S7-T1

ToC of Technical standard of cross border ticketing system

Contents

To outline To step

APPENDIX

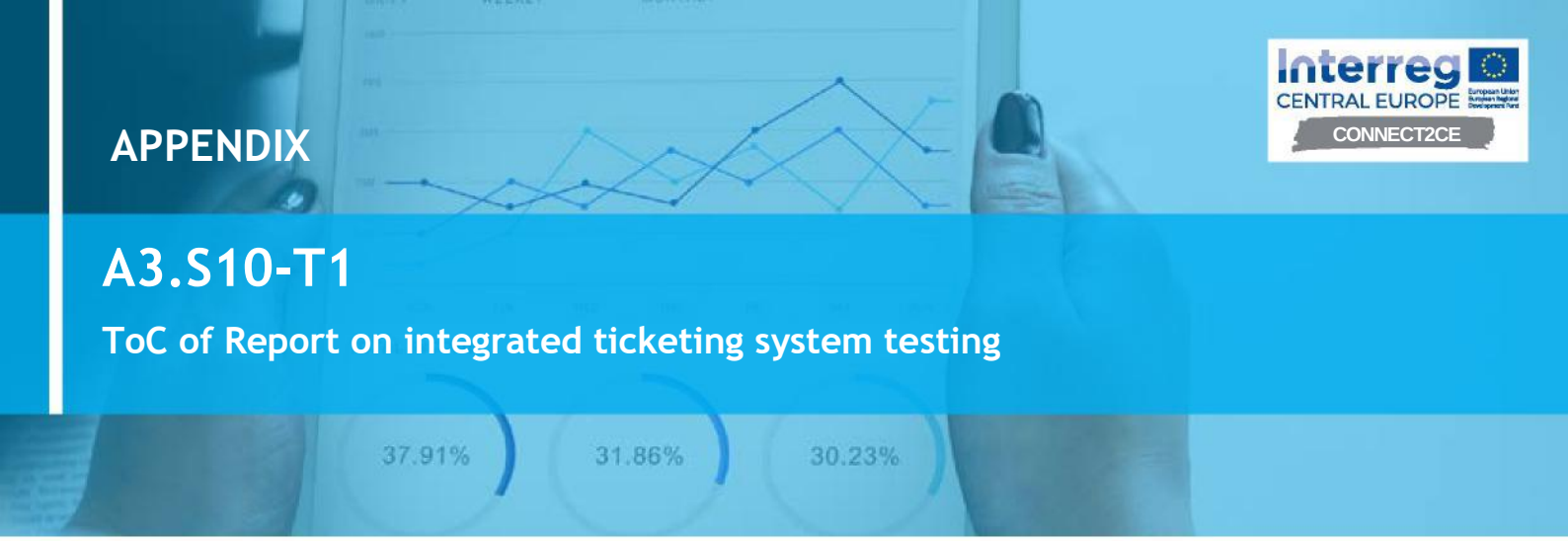
A3.S8-T2

Items list of list of new terminal equipment inventory

Contents

To outline To step

1. **Datasheet including aggregated information:**
    - Users (transport operators, ITA, ticket sale agencies, …)
    - List of equipment types included in the system(ticket reader, computer, validation devices, …) – specify amount of items
    - Total amount of items per equipment type
2. **Datasheet including list of all parts, items of equipment per type**
    - Serial number
    - User
    - Date of delivery, date of start of operation, …



APPENDIX

A3.S10-T1

ToC of Report on integrated ticketing system testing

Contents

To outline To step

1. **Scope of system testing:**

   Definition of transport lines, transport operators, vehicles, equipment, users-passengers, ticket types, etc.

2. **Training of personnel**
3. **Promotion activities for passengers**
4. **Evaluation of integrated ticketing system operation (functionalities, system operations)**
5. **Proposal for system changes and upgrades**