



Deliverable D3.2 Profile Preparation



D.3.2 Profile preparation

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1 EXECUTIVE SUMMARY

The main goal of DATA4PT is to enable the implementation of the Delegated Regulation (DR) on Multimodal Travel Information Services (MMTIS) 2017/1926 and its amended version, 2024/490. One of the aspects that was decided as critical towards this goal, was to support CEN standardisation groups and in particular NeTEx (CEN/TS16614 series) and SIRI (EN and CEN/TS 15531 series), in advancing the specification of European Minimum Profiles that could address the requirements of the regulation.

Standards are by their nature, consensus documents, taking into account a wide range of requirement. A profile in standardisation world stands for a subset of such standard of which its scope is wide and covers many different aspects (use cases and user's requirements). The role of the profiles is quite important. They facilitate the implementation of a standard and improve the interoperability by focusing only on what is needed, filling the small gaps voluntarily left by the standard and considering the local context.

In this specific context, European Minimum Profiles for MMTIS DR aim to define the elements of the technical standards NeTEx and SIRI that cover the data categories required by the respective regulation and any additional aspect that will allow interoperability of the provided data through the National Access Points (NAPs) between the different EU countries.

In 2020, Passenger Information European Profile (EPIP) for static data was specified and published (CEN/TS 16614-4). This profile, based on NeTEx standard, is an essential first level of information needed to passenger information services. It excludes operational and fares information.

However, more data categories from those covered by EPIP are required by the regulation (initial and revised version). Therefore, with the leading role of DATA4PT experts' team, three more (3) profiles are specified to cover the need of exchanging the required: 1) accessibility data, 2) real-time (dynamic) data and 3) the data regarding fares.

The objective of this report is to describe how DATA4PT contributed to the CEN standardisation work of the three profiles, what was the applied methodology and present an outline of those profiles, guiding readers in their exploration of the full documentation of those three profiles.

List of partners

Partner's name	Acronym	Country
Union internationale des transports publics	UITP	Belgium
Information technology for Public Transport,	ITXPT	Belgium
Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie	BMK	Austria
Ministry of the sea, transport and Infrastructure	MMPİ	Croatia
Centrum dopravního výzkumu, v. v. i.,	CDV	Czech Republic
Trafikstyrelsen (Danish Civil Aviation and Railway Authority),	TBST	Denmark
Direction générale des infrastructures, des transports et de la mer	DGITM	France
Ministero delle Infrastrutture e dei Trasporti	MIT	Italy
Instituto Da Mobilidade E Dos Transportes, I.P.,	IMT	Portugal
Republika Slovenija, Ministrstvo za Infrastrukturo	MZI	Slovenia
Trafikverket (Swedish Transport Administration	STA	Sweden

Abbreviations and Acronyms

NeTEx	Network Timetable Exchange
SIRI	Service interface for real-time information
CEN	European Committee for Standardization
MMTIS	Multimodal Travel Information Systems
DR	Delegated Regulation
TRANSMODEL	Public Transport Reference Data Model
EPIP	European Passenger Information Profile
EPIAP	European Passenger Information Accessibility Profile
EPIP-RT	European Passenger Information Profile for Real Time data

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INTRODUCTION

The main goal of DATA4PT is to enable the implementation of the Delegated Regulation (DR) on Multimodal Travel Information Services (MMTIS) 2017/1926 and its revised version, 2024/490. One of the aspects that was decided as critical towards this goal, was to support CEN standardisation groups of Transmodel (NeTEx and SIRI standards) in advancing the specification of European Minimum Profiles that could address the requirements of the regulation.

Standards are by their nature, consensus documents, considering a wide range of requirement. A profile in standardisation world stands for a subset of such standard of which its scope is wide and covers many different aspects (use cases and user’s requirements). The role of the profiles is quite important. They facilitate the implementation of a standard and improve the interoperability by focusing only on what is needed depending on the business case, filling the small gaps voluntarily left by the standard and considering the local context.

The profiles could be applied on different levels of influence. For example, a profile of the full standard can be decided in Public Transport Authority (PTA) level (or regional level) in order to enable interoperability and optimize coordination and management of the different public transport operators and system providers at regional level. A profile could be decided in country level to allow the exchange of information between operators and authorities which operate in national level. National profiles enable the integration of mobility offers in a national level, giving the possibilities for integrated passengers services like interregional journey planners and ticketing distribution systems.

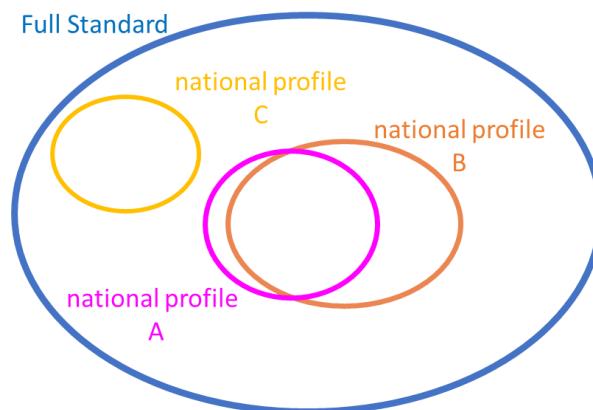


Figure 1: The concept of profiles in the national level. The “landscape” without the existence of European profiles. In case A and B there are overlaps in the functional scope while C covers another functional scope.

The harmonization of the interpretation and the implementation of a standard at regional or national level, through the profiles, is very important as the biggest proportion of transportation work takes place in regional or national level.

However, the higher vision of European strategies in facilitating seamless and multimodal mobility between countries requires harmonization at the European level. The specification of European profiles aims to support this level of harmonization, and to facilitate the development of integrated, multimodal passenger services between neighboring countries and beyond.

In particular, in European (EU) profiles the scope is to define the minimum set of elements of the full standard that address the common use cases in a given functional scope from most of the countries in Europe and can be used for the exchange of information with stakeholders outside their borders. Then the interpretation of the data can be straight forward without .

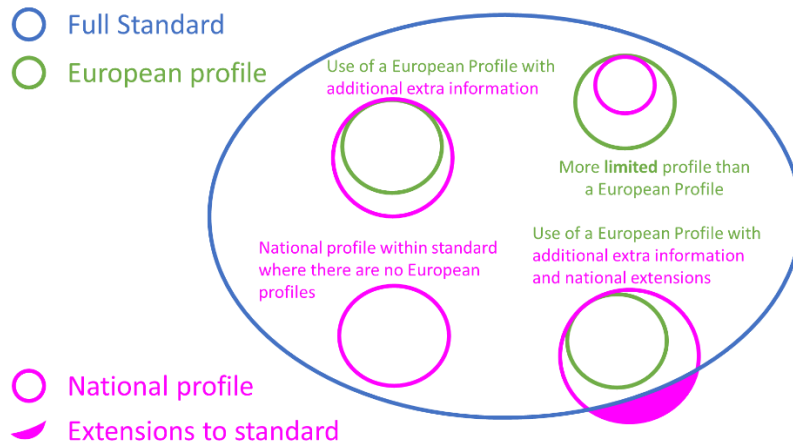


Figure 2: The potential relationship of the EU profiles and the national profiles.

The EU profiles may also be used as the basis for the specification of national or regional profiles, if this was decided at national or regional level. Building the national profiles based on the EU ones maintains interoperability with the rest of the stakeholders, probably with minimum adaptations.

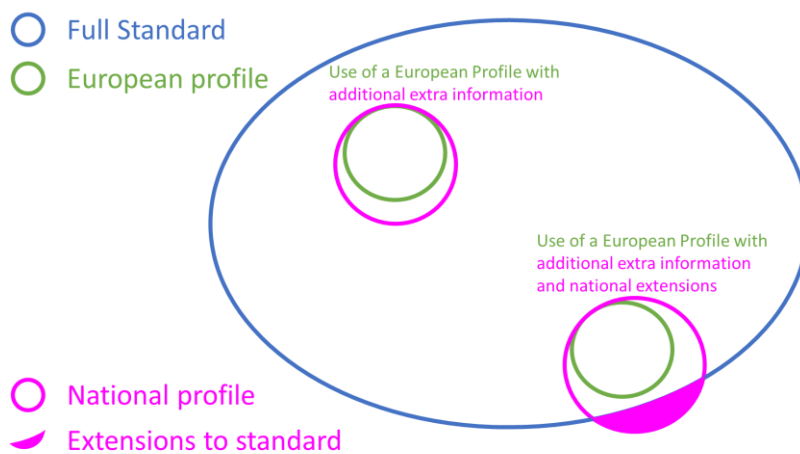


Figure 3: National profiles when based on the EU minimum ones.

In the context of European Minimum Profiles for the implementation of MMTIS DR, the focus is turned into two CEN technical standards: NeTeX and SIRI, made to support respectively the exchange of static (planned) and dynamic (real-time) data that feed multimodal mobility operational and passengers information systems.

For this purpose the European minimum profiles of NeTeX and SIRI aim to cover primarily the data categories required by the respective regulation and any additional aspect that will allow interoperability of the provided data through the National Access Points (NAPs) between the different EU countries.

In 2020, European Passenger Information European Profile (EPIP) was specified and published (CEN/TS 16614-4) and is created as a subset of the full NeTeX technical standard.

This profile, based on NeTEx standard, is an essential first level of information needed to passenger information services and it includes timetables and other relevant data planned (like network description)). It excludes operational and fares information.

To reply to MMTIS requirements, three main data categories were identified as priorities to complement EPIP:

- a. the **real time data** (“dynamic” data based on MMTIS DR terminology) needed to feed a passenger information system like estimated arrival time at stops/stations, disruptions etc.,
- b. the data that describe the accessibility facilities available in the vehicles and in public transport stations or at the stops (accessibility data based on MMTIS DR terminology),
- c. the data regarding fares as requested by the MMTIS DR. These data categories for planned (static) data concern NeTEx technical standard, while for real time data concern SIRI technical standard.

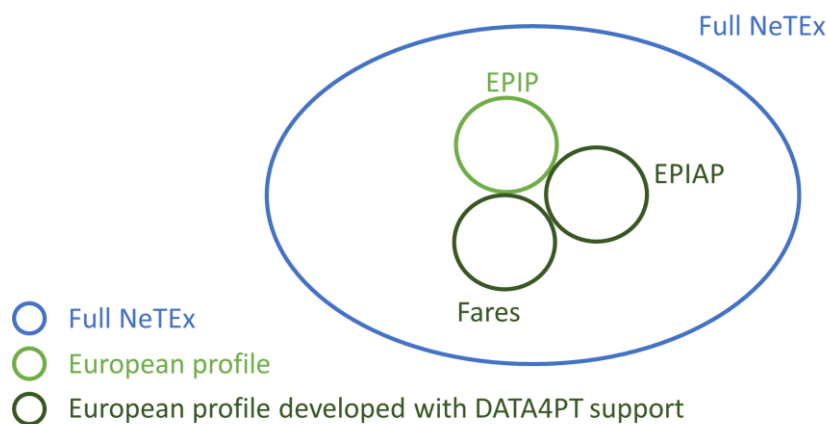


Figure 4: European minimum profiles for static (planned) data NeTEx. EPIP has existed since 2017. EPIAP is delivered and approved by CEN in 2024. “Fares” profile under progress.

DATA4PT role in this activity was to spark and/or accelerate the technical work with this regard and to facilitate the review and approval process until this technical work become an official CEN standard. In this respect, DATA4PT contributes by identifying and supporting, both in the management and financially, the work of the leaders of the working groups and potentially the contributors whenever was needed. It also supports the leaders to their liaison with CEN for the official procedures.

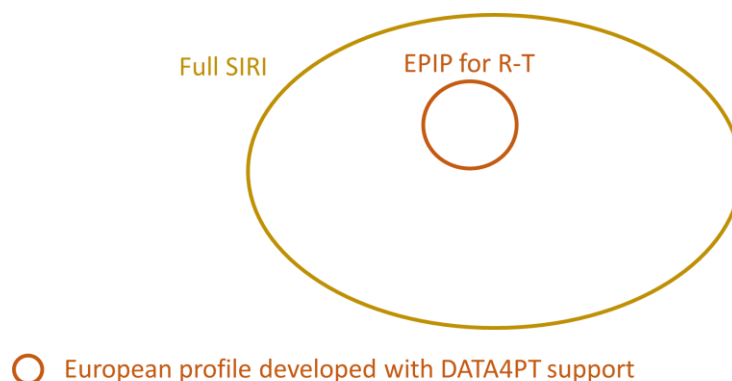


Figure 5: European minimum profiles for dynamic (real-time) data SIRI.

In the next paragraphs (1.1, 1.2) the focus is given on describing the adopted methodology which applies in all profiles regardless functional scope. The aim of this paragraph is to inform the stakeholders and potentially

to inspire them in the definition of local, regional or national profiles. In Chapter 2, it is presented the outline of those profiles with the objective to guide the readers in their exploration of the full documentation of those three profiles.

The profiles as subsets of the full standards also follow the same technology. In the case of NeTEx and SIRI the technology used is XML schema.

In particular, NeTEx and SIRI uses W3C XML schema, a very well- established mainstream technology for describing data sets. W3C schemas are used to describe documents for many of the most commonly exchanged data sets (HTML, Microsoft Office, etc) globally. Although relatively verbose compared to unvalidated formats (such as csv or JSON), it has a number of important advantages for the long-term management of complex data sets.

- Data quality: The schema provides a detailed description of the expected content which can be used to perform many basic validity checks for data quality and referential integrity automatically.
- Flexibility: The self-describing nature of schema documents makes possible to build applications that use data selectively, for many different purposes, and to evolve the schema without breaking backwards compatibility.
- Machine-readable- the self-describing format can be used to automate most of the legwork of implementation, building parser bindings that present the data to a program interface in a ready to use form.
- Widespread adoption: there are a wide range of tools and many people with the necessary technology skill sets to draw on. [1]

It is really important that the datasets built according to the EU Minimum Profiles not only apply the functional scope but also the selected format/technology. Then in addition the data could be made available in other formats as well, with the aim of complementing the existing XML data files.

1.1 METHODOLOGY

The specification of the profiles followed a three steps approach:

1. Preparation

The first step includes the preparation of the group and the definition of the high-level functional scope. During this step, input regarding the needs from the stakeholders is collected. Input was received from the regulators of MMTIS DR, from MS partners of the project, from other users of the technical support and from experts' team as also receivers of feedback from the users of the standards and from the other experts of the standardisation groups. The first analysis of this input was carried out in a workshop where experts from the standardisation groups participate in order to specify in more details the scope of work and to define a leader. The leader could be either already member of DATA4PT experts' team or not. If the second case, he/she was embraced with the aim to contribute to technical support service in general and to extend experts' team. The leader was defined based on the area of his/her expertise and experience as well as based on his/her availability. DATA4PT role was to support leaders in the administration of the workshops (provide shared working space – like sharepoint and basecamp - , host the online meetings, send invitations to participants, provide meeting minutes etc.). The leader is assigned to lead the discussions, to organise the group of contributors, to draft the necessary documentation together with the contributors and to support the official review and approval process.

2. Elaboration

The second phase which is the most important one includes the elaboration of the technical work. The work was carried out through regular workshops between the contributors. At this stage also additional contributors from other ecosystems were invited to participate to add input in sharing experience from other relevant specifications (GTFS, TAP TSI, RTIG ²and other depending on the scope). The technical work included the review and identification of common elements between the existing national profiles, the identification of additional use cases that were not covered so far by existing national profiles, the mapping with the data categories required by the MMTIS DR and the existing EPIP profile to make sure that the additional profiles are complementary to it and there are no overlaps or gaps (in respect to the selected functional scope and the requirements from the regulation).

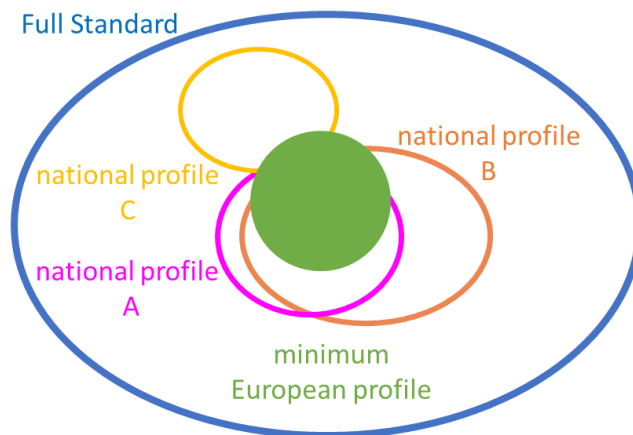


Figure 6: EU minimum profiles use the existing national profiles as input in order to identify the common “space” and add use cases that address the needs of most countries in accordance with the requirements from EU regulations.

The MMTIS DR is indeed one of the main input so the profiles become a useful tool for the implementation of the regulations. However, it is very important that profiles include all the necessary data to fulfill the passenger information use cases and need to ensure the cardinality of the data. Data that might be flagged as mandatory in a profile (cardinality 1:1, 1:*) might not be required in the regulation. This is due to the fact that what is flagged as mandatory in a profile (cardinality 1:1, 1:*) is a technical concept and the data required in the DR depends on the availability of the data in the systems. Moreover, in the DRs the availability of the data categories it is linked to a deadline, while for the actual implementation on the profile the focus is on the usability and relation between the data needed regardless of a specific timeline which is more related to what the operational systems support or not.

During this phase the following documentation was produced:

² GTFS : Google based specifications, TAP TSI :Railway relevant regulation, RTIG : Standardisation organisation from UK.

- The New Work Items Proposals. These documents describe the main objectives and scope of each activity and comply with the CEN templates and requirements. These are necessary document for the initialisation of the official review and approval process of CEN. DATA4PT organisations supported the communication with CEN. These documents are obsolete after the development of the Technical Standards Specification.
- The Technical Standards Specification. These correspond to the main deliverables of the work and will compose the technical standard. These documents go under review and approval by the 34 CEN members including the MS registered in national standardisation bodies. These documents are made available by the national standardisation bodies of each country or by other distributing platforms.
- The examples and potentially the XML schemas. These documents, so called technical artifacts, are based on XML technology and aim to support the users in the implementation phase. These documents do not make part of the official CEN documentation and they are available through GitHub in the corresponding channels³.

3. Review and publication

The third phase concerns the official CEN process of reviewing and approving the technical standard by representatives of the MS, members of CEN. In this phase, the role of DATA4PT is to submit, follow- up and re-activate the group of contributors to make the requested updates through the review process.

1.2 WORKPLAN

The technical work (step 1 and 2) of European Passenger Information **Accessibility Profile for planned (static) data NeTEx**, was initiated in **July 2021 and finalised in June 2022**. In total, 13 meetings were held and 20 specialists in the field of standardization contributed from the following countries: Switzerland (leader), Austria, France, Germany, Netherlands, Sweden, UK. The specialists are affiliated with different kind of entities like Public Transport Operators and Authorities (SBB, Arge ÖVV), other standardization bodies (ERA, RTIG, French standardization body), IT suppliers and passenger services providers. The profile was officially **approved in March 2024** (step 3) through the official CEN procedure with positive votes from 15 National Members. The identification number of the technical standard is *TS 16614-6 Public transport - Network and timetable exchange (NeTEx) - Part 6 European Accessibility Profile*.

Respectively, the technical work (step 1 and 2) of European Passenger Information **Profile for real time (dynamic) data SIRI**, was initiated some months later, in **October 2021 and was carried out until October 2022**. In total, 10 meetings were held and more than 10 experts in the field of standardization contributed from the following countries: Norway (leader), France, Italy, Germany, Netherlands, Sweden, Switzerland, UK. The specialists are affiliated with entities like Public Transport Operators, Authorities, National standardization bodies, (ENTUR, SBB, Italian NSB, VDV, French NSB⁴), other standardization bodies (RTIG, VDV), IT

³ GitHub repository for NeTEx-CEN: <https://github.com/NeTEx-CEN/NeTEx>. GitHub repository for SIRI-CEN: <https://github.com/SIRI-CEN>.

⁴ NBS: National Standardization body.

suppliers and passenger services providers. The profile was approved in June 2024⁵ through the official CEN procedure with positive votes from 15 National Members and on negative vote from one MS. The identification number of the technical standard is *TS 15531-7 Service Interface for Real Time Information (SIRI) - Part 7: Passenger Real-Time Information European Profile*.

Profile	Start of technical work	End of technical Work	Approval from CEN process	Leader
<i>TS 16614-6</i> <i>Public transport - Network and timetable exchange</i> (NeTEx) - Part 6 European Accessibility Profile	07/2021	06/2022	March 2024	Matthias Günter (SBB – Switzerland)
<i>TS 15531-7</i> <i>Service Interface for Real Time Information</i> (SIRI) - Part 7: Passenger Real-Time Information European Profile.	10/2021	10/2022	June 2024	Kristian Syversen (ENTUR- Norway)
Public transport — Network and Timetable Exchange (NeTEx)— Fare Information European Profile	01/2023	06/2024	In progress	Nick Knowles (DATA4PT- UK)

The work of the third profile regarding Fares NeTEx static (planned) data, was launched with two preparation online workshops in January 2023 and concluded in June 2024, after 13 meetings. In total more than 13 experts in the field of standardization in contributed from the following countries and entities: France, Norway, Germany, Italy, Switzerland, ERA -Europa⁶, Mobility Data Association⁷, UITP⁸. The leader was assigned from the core DATA4PT experts' team. The official review and approval process will be initiated during summer 2024 with expected final vote in summer 2025.

⁵ Note that discussions led to a new vote procedure due to received feedback from. Next approval is expected in 2025.

⁶ [ERA, the European Union Agency for Railways](#)

⁷ [Mobility Data Association](#)

⁸ [UITP, the International Association of Public Transport](#)

2 EUROPEAN PASSENGER INFORMATION ACCESSIBILITY PROFILE (NeTeX) ^[1]⁹

The European Passenger Information Accessibility Profile (EPIAP CEN/TS 16614-6) focuses on the information relevant to feed the necessary accessibility passenger information services and excludes operational and fares information. It is based directly on EPIP (CEN/TS 16614-4).

This European Passenger Information Accessibility Profile (EPIAP) for NeTeX is for exchanging passenger information; it describes how to extend EPIP (the European Passenger Information Profile) with additional information (including a minimal set) to feed the necessary accessibility passenger information services in a European wide and multimodal context. EPIAP especially formulates a mandatory minimal implementation that needs to be filled in by everybody to deliver the necessary information for an assessment of the accessibility of site(s), vehicles and on vehicle-site interaction for impaired persons. The minimal level allows an assessment and contains the information to produce PRM TSI if necessary. It will also cover what the current legislation usually warrants. It then describes how additional information must be provided if an organisation decides to provide it (e.g. the information of the full DELFI+ standard in Germany).

EPIP does not reflect part 5 (New Modes) yet. However, EPIAP takes it into account. EPIP will have to be adapted accordingly.

For EPIAP to be of use, the EC needs to declare the minimal level of EPIAP as mandatory.

In this Chapter, the aim is to give a short overview of the functional scope (use cases) that are covered by the EPIAP and help the potential users of the standard to understand its scope and how it addresses to their needs. The full information of the use cases and of course technical details are described in the respective official documentation CEN/TS 16614-6.

2.1 FUNCTIONAL SCOPE OF EPIAP

The EPIAP use cases concern the level of accessibility during the entire passenger journey/ trip (i.e., along the trip chain). The planning and selection of individual stages within the journey need to be based on knowledge about the accessibility of individual transport services, as well as the physical transfer to subsequent transport services, from the departure of the passenger at the origin (i.e., residential area) to the destination (i.e., work/school or tourist destination).

Therefore, the use cases which are considered for the accessibility profile of static (planned) data are split into three (3) categories:

1. Procedures to access transport services
 - a. Procedures to book and purchase transport services

⁹ CENTS 16614-6. More details about NeTeX technical standard are available [here](#).

- b. Procedures to book accessibility assistance services
 - c. Information on passenger rights
 - d. Information on services for persons with disabilities and reduced mobility
2. Information on transport stations/stops:
- a. Locations of destinations and transport stations/stops
 - b. Accessibility of destinations and transport stations/stops
 - c. Layout and location of facilities in transport stations (including emergency services)
 - d. Accessibility of services within transport stations
3. Information on transport services:
- a. Travel and route options
 - b. Accessibility of travel and route options (for each segment)
 - c. Real-time transport schedules and disruptions
 - d. Location and accessibility of platforms (also for specific locations on the platform)
 - e. Ticket conditions and prices
 - f. Integration with booking and purchasing of travel tickets or assistance services

2.1.1 CORRESPONDING USE CASES FOR REAL-TIME DATA

The existence of smartphones allows to passengers to plan their trip “on-the go”, from their current position to the destination of choice. Regarding real-time information, the following use-cases are identified:

- Information on transport services:
 - o Real-time provision of transport schedules and disruptions
 - o Support route planning in case of disruptions (similar to information and booking/purchase in the pre-trip stage)
- Personal navigation
 - o Real-time navigation instructions, including current location (towards destinations, next platform or accessibility services)

Data supplied in the NeTEx EPIP format forms the basis for enabling both the pre-trip and on-trip functionalities. This profile describes an unambiguous interpretation of accessibility based on EPIP.

Collecting detailed data from stations and stops to meet the information needs of travelers with disabilities requires a substantial effort. The starting point with regard to available data differs greatly between the different Member States. NeTEx offers a framework to collect data at different levels of detail.

This concept is also used in EPIAP, which gives an entry-level for all Member States to include accessibility in travel information.

2.1.2 USER GROUPS

Passengers with reduced mobility is a collective name for different user groups. Each of these user groups has different needs for a journey to be accessible. For example, an assisted wheelchair could use a route that involved a single step and the use of doors. An unassisted wheelchair would not. A path between an entrance and a stop that is accessible for a person in a wheelchair might not be suitable for a visually impaired person.

For this reason the following assumptions apply to the user groups.

- There are different types of disability: physical, sensory and cognitive:
 - Physically impaired people mainly have special requirements regarding obstacles and hindrances on their way (e.g., wheelchair accessibility).
 - Sensory impaired people mainly have special requirements to be able to find their way, in particular by relying on additional sensory information (e.g., tactile guidance, colored steps, audible signals).
 - Cognitively impaired people mainly have special requirements for easy access to information and easy to understand information and guidance (e.g. how to change trains).
- Within the disability types there are different user groups with different needs.
- There are overlaps between the needs of user groups.
- Improved accessibility services in transportation in most cases benefit everyone.

User needs and user stories can always be assigned to a user group. The following table shows the user groups within their type of disability and a selection of relevant needs for this user group.

Table 1. User groups with special needs in public transport (Source: CEN TS 16614-6)

Type	User group	Relevant needs (selection)
physical	Person in a wheelchair	Wheelchair accessible routes (paths, ramp, elevator, automatic doors), accessible stops, accessible vehicles
	Person in a wheelchair (motorised)	Wheelchair accessible routes (paths, ramp, elevator, automatic doors), accessible stops, accessible vehicles, entrance restrictions
	Person in a wheelchair with assistance	Stair-free routes (paths with or without single steps, ramp, elevator), accessible stops, low floor vehicles
	Person with walking disability (with aids like rollator)	Step free routes (paths, ramp, elevator), accessible stops, low floor vehicles, seating
	Person with walking disability, elderly, illness	Step free routes (paths, ramp, elevator), low floor vehicles, seating
	Temporary impaired Person (stroller, baggage)	Step free routes (paths, ramp, elevator), low floor vehicles, storage
	sensory	Visually impaired person
Hearing impaired person		Visual information

	Balance impaired person	Handrails and grabrails
cognitive		
	Mentally impaired person	Special drivers' trainings
	Intellectually impaired person	Special drivers' trainings, easy understandable information, easy ticketing

2.1.3 USE CASES FROM NETEX PART 1

For the definition of the EPIAP, use cases from NeTEx part 1 have been taken and complemented with accessibility aspects in this profile. The source of those is always Transmodel (EN 12896 Parts 1-9). Main actors of those use cases are Public Transport (PT) authorities, operators, providers of passenger information systems, and data aggregating systems. The detailed presentation and the detailed link with NeTEx Part 1 element are available in the official documentation CEN TS 16614-6.

Table 2. Use cases extracted from NeTEx Part 1 with relevance to accessibility (Source: CEN TS 16614-6)

Use case	NeTEx contribution
Planning and understanding the coverage of an area or region by public transport. In order to plan the adequate accessibility on the PT service within a region, a detailed model of actual coverage is needed.	NeTEx allows for describing the availability and accessibility of stop places and stop points as well as the PT service offer within a region.
Planning trips through the network, including detailed transfer times and detailed guidance for making an interchange between two services over a connection/interchange. Trips may be made by passengers on foot, on a bicycle, in a car or using a combination, for example park and ride or kiss and ride. The stop model should support journey planning of intermodal journeys.	<p>Journeys for NeTEx part 2</p> <p>Connection and interchange times are part of NeTEx part 1.</p> <p>NeTEx only supports guidance information if it is inside a Stop place (not on the road network, etc.)</p> <p>The link of Stop Places (or components) to the road has to be taken into account</p> <p>Guidance information may be attached to the access path links.</p>
Planning journeys through the network, including detailed connection/interchange times, under different constraints for mobility restricted users. As a refinement to previous use case, in planning a multi-leg trip through a network, a journey planner may additionally take into account the accessibility requirements and different transfer times needed for different types of users, with different walk speeds or other needs, in particular for impaired mobility accessibility.	<p>Providing enough information to support the needs of mobility restricted users is of importance for NeTEx.</p> <p>Stops places, Equipment, accessibility on path links.</p> <p>Journey accessibility has to be taken into account in part 3. This comprises the assignment of timetabled trips to vehicle attributes (e.g., low-floor, lift-equipped vehicles).</p>
<p>Distributed assignment of responsibility for data management. Each data object should have:</p> <ul style="list-style-type: none"> -Operational responsibility. -Owner (legal owner of the data who holds the copyright). 	NeTEx provides means to define ownership of data objects so that it becomes clear who is responsible to maintain the data. It also provides unique object identifiers that allow mapping of object references across system boundaries.

<p>-Data Provider (Organization which runs the producer of the data).</p> <p>-Administrator (Organization which is responsible for the content of the data).</p> <p>-“Data System”: Name Space in which identifiers are unique.</p>	
<p>Temporary change in stop availability. Systems shall allow for the temporary change of stop availability or accessibility, through the addition or closing of stops or the reassigning of scheduled stop points from one physical location to another, the moving of stops, or by alterations to accessibility. Typically such changes are planned in advance and can be distributed with a validity condition along with other updates to the stop data.</p>	<p>NeTEx provides enough support for temporary changes to stops such that current and up-to-date timetables can be exchanged to reflect the correct situation.</p> <p>Support for advising passengers about what the impact to public transport will be and how they could avoid potential disruptions is likely to be applied in the following two typical situations:</p> <p>During preparation of a trip, e.g. by using a trip planner: NeTEx objects can optionally refer to a SIRI-SX structure as part of the NeTEx data delivery to provide situation related cause / effect information.</p> <p>During travelling, however, the provision of this cause / effect information is the task of the operational SIRI interfaces.</p>

2.2 USE CASES FROM THE EU REGULATION

One of the main objectives of the EPIAP is to address the use cases required by the Delegated Regulation (DR) EU 2017/1926 of 31 May 2017. In the following tables, they are listed the use cases from the DR that are relevant to EPIAP, divided into two categories: Trip planning and place information.

Table 3: EU use cases for trip planning and accessibility

(Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R1926>).

Level	Category	Description	Minimal concept	Other concepts
1	Trip plan computation—scheduled modes transport	Stop facilities access nodes (including platform information, help desks/information points, ticket booths, lifts/stairs, entrances and exit locations)	FACILITIES STOP PLACE PASSENGER STOP ASSIGNMENT	EQUIPMENT
1	Trip plan computation—scheduled modes transport	Accessibility of access nodes, and paths within an interchange (such as existence of lifts, escalators)	FACILITIES STOP PLACE	EQUIPMENT NAVIGATION PATH
1	Trip plan computation—scheduled modes transport	Existence of assistance services (such as existence of on-site assistance)	FACILITIES STOP PLACE	LOCAL SERVICE

1	Trip plan computation — scheduled modes transport	Vehicles (low floor; wheelchair accessible.)	FACILITIES VEHICLE TYPE	EQUIPMENT
1	Trip plan computation — road transport (for personal modes)	Pedestrian network and accessibility facilities Note: Detailed topology is usually taken from a source like OSM.	n/a	NAVIGATION PATH
1	Passing times, trip plans and auxiliary information	Status of access node features (including dynamic platform information, operational lifts/escalators, closed entrances and exit locations — all scheduled modes)	(SIRI) Situation Exchange Facility Monitoring	
3	Detailed common standard and special fare query (all scheduled modes)	Passenger classes (classes of user such as adult, child, student, veteran, impaired access and qualifying conditions and classes of travel such as 1 st , 2 nd .)	ACCESS RIGHT PARAMETER ASSIGNMENT	
Special case	Parking REGULATION (EU) 2015/962 et REGULATION (EU) 2017/1926	Information on parking facilities (all modes) Note: EU regulation doesn't explicitly warrant accessibility information for parking facilities.	PARKING PARKING AREA PARKING BAY	EQUIPMENT NAVIGATION PATH

Table 4: EU use cases for place information and accessibility

(Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R1926>).

Level	Category	Description	Minimal concept	Other concepts
1	Location search (origin/destination)	Address identifiers (building number, street name, postcode)	Everything that inherits from ADDRESSABLE PLACE	ENTRANCE QUAI POI PARKING
1	Location search (origin/destination)	Topographic places (city, town, village, suburb, administrative unit)	TOPOGRAPHIC PLACE	
1	Location search (access nodes)	Identified access nodes (all scheduled modes)	STOP PLACE	QUAY SCHEDULED STOP POINT PASSENGER STOP ASSIGNMENT
1	Location search (access nodes)	Geometry/map layout structure of access nodes (all scheduled modes)	STOP PLACE	QUAY

1	Trip plan computation — scheduled modes transport	Stop facilities access nodes (including platform information, help desks/information points, ticket booths, lifts/stairs, entrances and exit locations)	STOP PLACE FACILITIES	EQUIPMENT
1	Trip plan computation — scheduled modes transport	Existence of assistance services (such as existence of on-site assistance)	STOP PLACE FACILITIES	LOCAL SERVICE

2.2.1 USE CASES FROM OTHER EU REGULATIONS

There are also other EU Regulations that require the exchange of accessibility data in public transport. These regulations are also considered in the EPIAP in order to allow harmonisation. These regulations are: the Commission Implementing Regulation (EU) 2019/772 of 16 May 2019 (PRM TSI) and the Commission Regulation (EU) 454/2011 (TAP TSI). The following table presents the extracted use cases.

Table 4 – Use cases for the PRM TSI and TAP TSI

#	Description	Regulation
1	The entity in charge of collecting accessibility data or the station manager publishes information on the accessibility of rail services	Recommendation concerning a revision of (EU) 454/20114 (TAP TSI)
2	the public shall be able to access information from a public website hosted by the European Union Agency for Railways	(EU) 2019/772
3	registered national authorities shall be able to retrieve all accessibility data that are relevant to the Member State	(EU) 2019/772
4	the Commission and the Agency shall be able to retrieve all accessibility data	(EU) 2019/772

3 PASSENGER REAL-TIME INFORMATION EUROPEAN PROFILE (SIRI) ^[2]¹⁰

The Passenger Real-Time Information European Profile focuses on information relevant to feed passenger information services fulfilling the expectation of the ITS Directive Delegated Regulation (EU-wide Multimodal Travel Information Services, Commission Delegated Regulation (EU) of 31.5.2017).

This technical specification makes part of the CEN/TS and EN 15531 series under the name Service Interface for Real Time Information (SIRI) (CEN/TS 15531-7) for exchanging real-time data for public transport and vehicles. SIRI development was a cooperative effort between France, Germany (Verband Deutscher Verkehrsunternehmen, VDV), Scandinavia and Great-Britain (UK Real Time Interest Group, RTIG). The standard is based on the reference data model Transmodel (EN12896 series) and contains a general model for real-time data and an XML Schema for its implementation.

SIRI is dedicated to the exchange of Real Time data, complementing NeTEx which is dedicated to the exchange of scheduled data. Both are based on Transmodel V6 (EN 12986 series). The SIRI format is used to update planned data with short term changes and deviations in the form of vehicle positions, estimated arrival times, and relevant textual messages. SIRI supports information exchange of relevance to public transport services for passenger information and AVMS systems.

European SIRI profile describes how and which parts of the wider format to use. The purpose of the profile is to clarify which events and data are expected to be included in a comprehensive data exchange and to make the implementation of common standards easier.

This profile is also designed to complement the NeTEx EPIP profile with real time information and is therefore named EPIP-RT: both profiles are well articulated and can be used seamlessly (at national level in NAPs - National Access Points- or at any local level where both scheduled and real time information are consistently provided).

In this Chapter, the aim is to give a short overview of the functional scope (use cases) that are covered by the EPIP- RT and help the potential users of the standard to understand its scope and how it addresses to their needs. The full information of the use cases and of course the technical details are described in the respective official documentation CEN/TS 15531-7.

¹⁰ CEN/TS 15531-7. More details about SIRI technical standard are available [here](#).

3.1 SHORT OVERVIEW OF SERVICE INTERFACE FOR REAL TIME INFORMATION (SIRI)

SIRI defines a standardized communication layer with procedures and mechanisms for exchanging data by means of a format which is openly described to the public and in wide use around the world. The main advantages of it are :

- Well known interface Openness
- Scalability
- Flexible for particular needs
- Re-useability for architecture, infrastructure and services (cost-saving)
- Content independent from transfer protocols
- Standardised publication and message handling

The WebService (HTTP/SOAP with request/response) and WS-PubSub (WebSocket) technology also:

- Facilitates subscription based (asynchronous) publication over message protocols
- Supports common mechanisms for access control, versioning and error handling
- Allows configurable updating and filtering

3.2 FUNCTIONAL SCOPE OF EPIP-RT

The EPIP- RT includes first of all the reference data (reference data themselves need to be exchanged previously, typically using NeTEx: SIRI refers to them and adds real-time information), mainly from planned public transport exchanged over NeTEx according to the European Passenger Information Pro-file (EPIP): Lines, Routes, and VehicleJourneys with arrival and departure information, StopPlaces, including type and Quays, additional site and facility related information such as equipment.

Moreover, it includes information regarding:

- Connections and Transfers
- Data values
- Type of data stream/subscription
- Categorisation of messages and data
- Message receipts (when relevant)
- Filtering mechanisms
- Consolidation and forwarding of partner-data (including monitoring)
- Meaning of functions
- Usage of data fields Meanings
- Whether the field is mandatory or not

Technical specifications, local protocols, and their referential implementations are not included in the European SIRI profile. The same is true for access privileges, the technical details for data transfers, and the administration of data sources and users.

Details regarding the methods of data transfer should however be described in separate protocols, established and agreed upon between system managers, data providers and data users. This includes:

- User guides

- List of available services
- Access privileges
- Monitoring (uptime, technical disturbances, maintenance)

More info on utilisation of the European real-time data feeds, technical examples, real-time API documentation and a complete list of available data streams can be found at <https://data4pt.org/w/index.php?title=SIRI> and <https://www.siri-cen.eu>.

3.3 USE CASES FROM THE EU REGULATION

Table 5: EU use cases for dynamic travel and traffic data (real-time data)

(Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R1926>, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202400490, Napcore Data Dictionary).

Level	Category	Description	Minimal concept	Other concepts
1	Passing times, trip plans and auxiliary information	(i) disruptions, such as network closures and/or diversions, and when possible, the reason	OPERATIONAL EVENT	OPERATING DAY CONTROL ACTION SITE FACILITY DRIVER VEHICLE
1	Passing times, trip plans and auxiliary information	(ii) real-time status information, such as estimated departure and arrival times of services, delays, cancellations, guaranteed connections monitoring	PT SITUATION CONSEQUENCE	DELAYs PT SITUATION GENERAL CONSEQUENCE EASEMENT
1	Passing times, trip plans and auxiliary information	(iii) status of access node features (including dynamic platform information, operational lifts/escalators, closed entrances and exit locations) – for scheduled transport	MONITORED PLACE EQUIPMENT FACILITY MONITORED FACILITY CONDITION FACILITY STATUS	PLACE EQUIPMENT

4 FARE INFORMATION EUROPEAN PROFILE¹¹

The Fare Information European Profile is as well a profile in the NeTEx CEN/TS 16614 series. It focuses on information relevant for exchanging fare information to support trip planners and pricing engines.

The advent of mobile technology is transforming both the way fares are delivered, and the products that are offered for example with mobile apps, account-based ticketing with consumption-based capping. The profile includes capabilities to describe advanced electronic fares.

The overall NeTEx standard is dedicated to the exchange of scheduled data (network, timetable and fare information) and is based as the other profiles on Transmodel V6 (EN 12986) which sets out an extensive conceptual mode and describing many different functional areas of passenger information and transport operation in addition to fares.

The Fare Information Profile complements the European Passenger Information Profile (EPIP), so *Common framework* and *Network elements* that are already described in EPIP are not included. Moreover, it concerns only data relevant to feed passenger information service with fare information and it excludes operational and back office information.

4.1 FUNCTIONAL SCOPE EUROPEAN FARES PROFILE (EFP)

Typical use cases for the Fare Information Profile are:

- Provide fare products & fare prices as open data for third party use (in trip planners, and possibly fares engines)
- Describe available fare products and their eligibility conditions.
- Relate fare products to network and timetabled journeys so trip planners can compute fare products and fare prices for trips, show available products for an area, etc.
- Allow the separate exchange of prices from fare structures & products.
- Expose a justification of the fare (Distance, discounts etc)
- Support both machine readable & human readable representation of validity parameters needed to understand the access rights to travel granted and to control fares.
- Include information about how/where products can be bought
- Include fares valid for specific and multiple operators
- Provision of information about fare routes, zones and networks for maps and online visualisations.

The fare profile requires the:

- Use of some common NeTEx Framework features (NeTEx Part1), and EPIP
- Use of use some common NeTEx network andn journey components (NeTEx Part1 & NeTEx Part2), and EPIP

¹¹ Coming CEN/TS 16614-7.

- Use of the NeTEx Fare model (NeTEx Part3)

The profile aims to cover all transport modes (rail, metro, bus, tram, coach, ferry, bike/e-scooter, taxi)¹².

In more details, the profile contains:

- Fare structures: point-to-point, zonal, distance, unit stage and flat fares.
- Product types:
 - ✓ Trips single and return trips, carnets of trips,
 - ✓ Period Passes: time passes, day passes, carnets of day passes, season tickets
 - ✓ Supplement products: seat reservations, pets, bicycles, etc
 - ✓ User types: adult child, senior, concession, group, family, etc
- Anonymous and Account based ticketing
- Fare capping by period
 - ✓ Sales offers; Single products and product bundles
 - ✓ Materialisation: paper, smartcard, SMS and electronic
 - ✓ pricing: absolute, derived and dynamic prices
 - ✓ Information on sales and conditions
 - ✓ Distribution channels, fulfilment means, payment means
 - ✓ Exchange and refund conditions.

4.2 USE CASES FROM THE EU REGULATION

This profile has been designed to be as concise as possible and focus on commonly agreed needs to fulfil the Priority action A of ITS-Directive, and not on the union of all European needs.

This document sets a profile for use of the NeTEx schjema to described common European fares. The profile aims to cover basic fare data for commonly found fares, covering all modes of transport..

Table 6: EU use cases for fares static data.

(Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R1926>, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202400490).

Level	Category	Description	Minimal concept	Other concepts
2	(b) Information service	(i)Where and how to buy tickets for scheduled transport, including retail channels, fulfilment methods, payment methods	BOOKING ARRANGEMENTs DISTRIBUTION CHANNELS SALES OFFER PACKAGES	LINE MOBILITY SERVICE FARE PRODUCT

¹² It is not dedicated to air and ski related transport.

		(ii) where and how to pay for parking, including retail channels, fulfilment methods, payment methods	ONLINE SERVICE TICKETING EQUIPMENT RETAIL DEVICES EQUIPMENT POSITION EQUIPMENT POSITION TICKETING EQUIPMENT	FULFILMENT METHOD DISTRIBUTION ASSIGNMENT TYPE OF TICKETING TYPE OF PAYMENT METHOD VEHICLE MODE TICKET SCOPE
2	(c) auxiliary information – for scheduled transport and transport on demand where relevant	(i) basic common standard fares: — fare network data (fare zones/stops and fare stages), — standard fare structures (point to point including daily and weekly fares, zonal fares, flat fares);	TARIFF ZONE FARE ZONE FARE SECTION DISTANCE MATRIX ELEMENTS GEOGRAPHIC INTERVALS TIME INTERVALS QUALITY STRUCTURE FACTORS GENERIC PARAMETER	ZONE JOURNEY PATTERN POINTS IN JOURNEY
2	(c) auxiliary information – for scheduled transport and transport on demand where relevant	(ii) vehicle facilities, including classes of carriage, on-board Wi-Fi, capacity and access conditions for bicycles.	CLASS OF USE FACILITIES ACCOMMODATION SERVICE FACILITY SET EQUIPMENT or LOCAL SERVICE DECK PLANS PASSENGER SPACES	SITE or SERVICE PASSENGER INFORMATION EQUIPMENT. ACTUAL VEHICLE EQUIPMENT
3	(a) detailed common standard and special fare query – for scheduled transport and transport on demand where relevant	(i) passenger classes (classes of passenger such as adult, child, senior, student, military/veteran, passenger with disability and passenger with reduced mobility, and qualifying conditions, and classes of travel);	USER PROFILE COMMERCIAL PROFILE FARE CLASS	

3	(a) detailed common standard and special fare query – for scheduled transport and transport on demand where relevant	(ii) common fare products (access rights such as zone/point-to-point including daily and weekly tickets/single/ return, eligibility of access, basic usage conditions such as validity period/operator/time of travel/interchanging, standard point-to-point fares prices for different point-to-point pairs including daily and weekly fares/zonal fare prices/flat fare prices);	FARE PRODUCT ENTITLEMENT PRODUCT TEMPORAL VALIDITY PARAMETERS SCOPING VALIDITY PARAMETERS USAGE PARAMETERS PRICING RULE	PRE-ASSIGNED FARE PRODUCT AMOUNT OF PRICE UNIT SALE DISCOUNT RIGHT
3	(a) detailed common standard and special fare query – for scheduled transport and transport on demand where relevant	(iii) special fare products (offers with additional special conditions such as promotional fares, group fares, season passes, aggregated products combining different products, and add-on products such as parking and travel, minimum stay);	USAGE PARAMETERS VALIDABLE ELEMENT FARE STRUCTURE ELEMENTS SALES OFFER PACKAGES Price MODEL PRICE GROUPS PRICING RULE	RESIDENTIAL QUALIFICATION COMPANION GROUP TICKET TYPE OF TRAVEL DOCUMENT
3	(a) detailed common standard and special fare query – for scheduled transport and transport on demand where relevant	(iv) basic commercial conditions such as refunding, replacing, exchanging or transferring;	USAGE PARAMETERS BOOKING POLICY ELIGIBILITY CHANGE POLICY REBATING RESERVATION MOMENT FARE EASEMENT	TRANSFERABILITY RESELLING REFUNDING EXCHANGING REPLACING PURCHASE WINDOW RESERVING CANCELLING PASSENGERS
3	(a) detailed common standard and special fare query – for scheduled transport and transport on demand where relevant	(v) basic booking conditions such as purchase windows, validity periods, routing restrictions zonal sequence fares, minimum stay;	SCOPING VALIDITY PARAMETERS ROUTING VALIDITY PARAMETERS VALIDITY PARAMETERS	FARE PRODUCT or a SALES OFFER PACKAGE.

			USAGE PARAMETERS	
3	b) information service – for transport on demand: how to book demand-responsive transport services, including retail channels, fulfilment methods, payment methods		SERVICE BOOKING ARRANGEMENTS (see also above)	

Table 7: EU use cases for fares dynamic data.

(Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R1926>, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202400490).

Level	Category	Description	Minimal concept	Other concepts
2	(a) information service on parking tariffs – for transport on demand and personal transport		INFORMATION-003: Provide fare information for on-line trip queries. ? INFORMATION-004: Provide fare information for price optimisation for on-line trip queries.	

CONCLUSIONS

The specification of European Minimum profiles are key tools to ensure interoperability across Europe but also to support national initiatives to comply with the Delegated Regulation 1926/2017 and 490/2024 and to promote the adoption of EU standards NeTEx and SIRI. The implementation of the standards in a harmonised way both in national and international level allows the optimisation of data exchange which is needed to increase the efficiency of the public transport operations and to improve the quality of passenger information systems. However, to achieve this objective, the preparation of the EU minimum profiles should follow a methodology that analyses the existing profiles, collects contributions from specialists with experience and expertise in EU Transmodel standards both in their development but also in their implementation and take into account the EU Regulations, but also other relevant specifications that could be aspirations for the EU context.

National profiles and regional profiles should be based on EU ones to enable cross border interoperability and to facilitate the implementation of the relevant Regulations, without conversions or transformations that will increase the risk of downgrading the quality of the data. EU profiles can be seen as useful tools to facilitate the adoption of the standards in regional and national level.

Based on the DATA4PT experience, the technical work requires approximately one year work while CEN review and approval process requires an additional one year. These timelines should be taken into account for the best planning and to respond in the best way to requests received by the stakeholders.

REFERENCES-SOURCES

1. Part 6 European Passenger Information Accessibility Profile – EPIAP (CEN/TS 16614-6:2024) draft version.
2. Part 7 European Real Time Passenger SIRI Information Profile (CEN/TS 15531-7:2024) draft version.
3. Upcoming Part 7 CEN/TS 16614-7- Fares profile draft report.
4. <https://transmodel-cen.eu/>
5. <https://github.com/NeTEx-CEN/NeTEx>
6. <https://github.com/SIRI-CEN>
7. <https://data4pt-project.eu/>