Deliverable D3.3

Report on the experts' team actions

(M54)

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Deliverable 3.3- Report on the experts' team actions (2022-2024)

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EXECUTIVE SUMMARY

In the framework of DATA4PT tasks, a team of experts provided a multidimensional support to different types of stakeholders (policy makers and authorities, developers, technical staff, and managers). This report details all the activities that took place during the last two years and a half (2,5) of the project (2022-2024), following the first report issued in 2022 regarding activities run in the years 2020-2021[2].

The experts' team is the backbone of the project providing technical expertise in activities organised under six main domains:

- **Technical support**
- **Standards update**
- **External exchanges**
- **FAQ, guidelines, examples**
- **Tools**
- **Dissemination & training**

In this last period of the project, the experts contributed or led activities such as the Transmodel and NeTEx standards update, the definition of the EU Minimum Profiles for Accessibility data (NeTEx), for Real Time Passenger Information data (SIRI - EPIP) and for Fares data (NeTEx). They also supported the external liaisons with other standardisation activities (relevant to TAP TSI), projects (like NAPCORE, DeployEMDS) and associations (like Mobility Data and MaaS Alliance).

Very important was the contribution of the experts' team through the delivery of training (workshops, video-tutorials) and the technical support in general replying to questions and requests received by Public Transport Authorities, Operators, IT suppliers, National Access Points Operators, partners or not of the project, and other relevant stakeholders. Through these activities, the knowledge regarding the standards and the way to implement them led to new implementations (Porto, Copenhagen, Vienna, Melbourne and more) and the development of services based on the NeTEx and SIRI standardised data (National ticket distribution service in Sweden, MaaS pilot applications in Italy). In the framework of dissemination, the experts also contributed to the consolidation of the websites relevant to Transmodel, NeTEx, SIRI, OpRa and helped feeding them with updated documentation (guidance and FAQs). In the domain of tools, the experts provided their technical expertise in investigating the possibilities for future evolution of the NeTEx validator and the conditions for developing the SIRI validator.

[2] The report is available in DATA4PT website.

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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	MMPI	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 Infrastructture e dei Transporti	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

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Abbreviations and Acronyms

CEN	European Committee for Standardisation
DR	Delegated Regulation
MMTIS	Multimodal Travel Information Services
MS	Member State(s)
NAP	National Access Point
NeTEx	Network Timetable Exchange
PTA	Public Transport Authorities
PTO	Public transport Operators
SaaS	Software as a Service
SIRI	Service interface for real-time information
Transmodel	Public Transport Reference Data Model

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1 INTRODUCTION

DATA4PT Programme Support Action, adopts a multidimensional approach to support the implementation and further development of EU public transport standards. One important dimension focuses on the provision of constant and direct support to current and potential users of the standards Transmodel, NeTEx, SIRI but also to managers and decision makers. This support refers to the provision of replies and guidance to requesters' regarding technical issues, legislative framework, requirements for new implementations, but also to requests for customized training, provision of supportive material and guidelines, updates of the standards.

The support is provided by a team of experts (detailed in 1.1), who have long experience in defining and implementing the standards. The team consists of experts mainly coming from the standardisation groups TC278-WG3 SG4, 7 and 9. During the first year of the project, a core team of experts was formed, while during the second year more experts were engaged to contribute to specific tasks. During the last years of the project an effort was made to create a network of experts that could also provide sustainable and efficient support, after the end of the project.

As in the first period of the project, the activities in this second period also were grouped under six main pillars. The included tasks were adapted to reply the needs raised during this specific period (2022-2024).

The 6 pillars were formed as follows:

- **Technical support**: *Technical support* activity was run as in the first period, providing a service similar to "helpdesk" where received questions and requests got addressed. The management and the dispatching of the the solutions and/or suggestions was managed by ITxPT.
- **Standards update**: *Standards updates* activity referred to the contribution or leadership of the standardisation groups Transmodel and NeTEx, following the results of the proposal of standards updates which occurred during the first period of the project. Under this pillar were also considered the activities of the experts' in the definition of EU profiles and standards comparison (mappings).
- **External exchanges**: *External exchanges* activity coordinated and created liaisons with any other initiative, project and organization involved in Public Transport data standards development and implementation. During this period main liaison was built between NAPCORE, where the DATA4PT provided their expertise. Moreover, liaisons with Mobility Data, MaaS Alliance, TAP TSI group were continued.
- **FAQ, guidelines, examples:** *FAQ, guidelines, examples* activity included the preparation of guidelines, FAQs and examples based on requests that are relevant to a wider group of stakeholders and the dispatched solutions, suggestions, conclusions. This activity run also during this period with the same logic.
- **Tools:** *Tools* activity included guidance and advice by the experts in the development of the NeTEx data validator (Greenlight) as well as the provision of technical expertise towards the investigation of future possibilities for the validator and the development of additional tools.
- **Dissemination & training**: *Dissemination & training* activity embraced the delivery of workshops, webinars, training material or media (such as video tutorials) and the coordination of websites (Transmodel, NeTEx, SIRI, DATA4PT website and wiki page, github).

The management of the experts' team, including the advising of subtasks to be included, was supported by ITxPT based on experts' suggestions and the needs raised by the partners of the project and the other entities or persons requesting support.

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In the following paragraphs, the above-mentioned activities and sub-activities are described in details, focusing on final outputs and outcomes of the experts' team as a whole, presenting also the results of the previous period.

1.1 THE EXPERTS' TEAM

Members of Core team

The six experts listed in the table 2 below come from various countries and have been selected to lead each of the six activities of the team. They mainly come from the standardisation groups (TC278-WG3 SG4, 7, and 9) and assist ITxPT in managing each activity by defining sub-activities, deliverables, and relevant deadlines.

Table 1 Experts' Core team

Activity	Expert (nationality)
Technical support	Christophe Duquesne (FR)
Standard update	Nick Knowles (UK)
External exchanges	Kasia Bourée (FR)
FAQ, guidelines, examples	Ulf Bjersing (SE)
Tools	Stefan de Konink (NL)
Dissemination & teaching	Fabrizio Arneodo (IT)

Extended Team

The extended team completes the Core team with three other experts, listed in the table 2 below.

Table 2 Extended team

Organization	Expert (nationality)
SBB	Matthias Gunter (CH)
ENTUR	Brede Dammen (NO)
CS-Group	Thierry Henault (FR)

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2 TECHNICAL SUPPORT

Main objective of technical support is to collect, understand, manage and reply to requests related to the functional scope and the implementation of the standards, the maintenance of technical artefacts and the creation of examples, but as well as the MMTIS delegated regulation and its deployment. The activity was an umbrella for different tasks and deliverables of the project. It was a continuous action, which took place throughout the duration of DATA4PT. The main channel of receiving requests was the DATA4PT website and the dedicated form, putting in place a helpdesk for data producers (such as mobility services operators, authorities and their suppliers) and NAP operators. Besides the website, several questions were also collected by direct email to the technical manager (ITxPT) and the experts' team or other partners of the project (UITP and MS), as result of the communication regarding DATA4PT role. Due to different dissemination activities, stakeholders recognised DATA4PT partners as main points of contact for questions regarding EU standards for multimodal data.

In terms of process, all requests received from different channels were forwarded to a dedicated platform (basecamp) that enabled to form of a collaborative answer or solution by all involved experts. The requests are listed in an online spread where main details, like type of request, information on the requestor and assignment, are stored.

Table 3 Global picture of received requests for any type of technical support per reporting period (Annex II with detail list of request).

	Requests received during 2020-2021 (1st reporting period)	**Requests received during 2022-2024 (2nd reporting period)**	**Total**
All types	44	67	111
% of received requests per type of stakeholders			
PTAs and PTOs	27%	73%	23%
NAP Operators	38%	63%	12%
IT Suppliers	24%	76%	58%
Other (students, project representatives etc.)	50%	50%	6%
% of received requests per topic			
NeTEx	44%	56%	54%
SIRI	20%	80%	20%
Other (Transmodel in general, MMTIS DR etc.)	31%	69%	26%

Since the initialization of this service, eighty-five (85) requests were received and managed, of which the fifty three (53) were received during the reporting period in question (2022-2024). Most of the received requests (58%) come from IT suppliers, developers and consultants that support either NAP operators or PTAs and

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PTOs in implementing the standards while 23% of the requesters are directly persons representing PTAs and PTOs. The requests from NAP operators (both partners and non-partners of the project) amounts to 14%. There were also questions or clarifications asked by other kind of stakeholders, like students working on mobility data and tools development (6% of the requests). In general, the 40% of the received requests originated by the Member States (MS) partners and observers of the project and their stakeholders involved in the pilot implementation. Most of this kind of requests were collected during the period 2022-2024 (27% of questions). In terms of most frequently asked topics, 54% concerns NeTEx from different perspective (questions regarding its functional scope, the documentation, the technical artefacts – examples and XSD – , the model and how to represent different data structures, the available tools including the Greenlight validator). Questions were concerning also SIRI (up to 20%), with similar perspective like NeTEx while there was also a 26% of the requests with more general view on the Transmodel functional scope and model, on the MMTIS DR requirements, and the relations of the standards with GTFS.

Some of the received technical questions and requests had a higher impact leading to small projects under this umbrella of activity. During the first period of experts' team activity (2020-2021) two specific actions took place: the checks of sample of provided by the MS partners and the definition of Italian NeTEx profile[3]. The importance of checking with an expert the datasets was very fruitful for the data creators and the NAP operators. On the one hand it allowed the data providers to improve their datasets and to better understand the NeTEx standard before the Greenlight validator got in place. It helped also NAP operators in assessing the published datasets and better understanding of their quality. The definition of Italian profile was also a very important activity as it helped defining a methodology for other national profiles and paved the way for further evolution in the period 2022-2024 with 1 extension of Italian profile and the specification of SIR Italian profile.

Table 4 Outputs of this activity based on requests which required longer support

Output of Technical Support 2020-2021 (before Greenlight development)	**Output of Technical Support 2022- (half) 2024**
NeTEx Dataset checking before the development of the tool	NeTEx Italian profile (level 3 and 4)
NeTEx Italian profile (level 1 and 2)	SIRI Italian profile
	Review of Concept Paper: "The Future of Interoperable Data Standard", Belgian Public Transport Operators (BMC)

Actually, during this period (2022-2024), the experts reviewed and provided guidelines to the Italian partner with the aim to extend the scope of the NeTEx Italian profile towards the fares data and new/alternative modes[4] related data. Also, they supported Italian partner to specify the SIRI profile for real-time data based on the EU

[3] Details on the activities of 2020-2021 and the achieved results are available in deliverable D.3.3 Report on the experts' team actions (https://data4pt-project.eu/wp-content/uploads/2022/04/Data4PT_D3.3_Report-on-the-experts-team-actions_v2.0.pdf).

[4] New modes include vehicle sharing, vehicle pooling, on demand transport etc.

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profile (which was under development). This activity had an impact in different ways. In the first place, it supported the implementation of the Italian Project "MaaS for Italy". It provided the necessary tools for the stakeholders enabling the provision of interoperable data through the NAP and in general the harmonising the data available through the NAP and dedicated to the MaaS applications. The contributions by the experts team prepared the ground for EU minimum fares profile and potentially for the future NeTEx and SIRI profiles regarding new modes. In the following paragraphs they are described the results of this activity.

2.1 NeTEx Italian profile definition – Level 2 and 3

The NeTEx Italian Profile is built in five (5) levels and addresses the following use cases:

- Passenger Information profile (level 1)
- Contracts profile (level 2 – incremental)
- Fares (level 3)
- Alternative (or new) modes (level 4)
- Accessibility Use Cases (level 5)

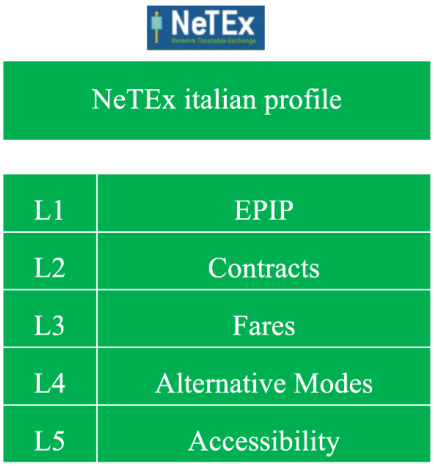

Figure 1 Italian NeTEx profile functional scope

The first level in based completely on European Passenger Information Profile (EPIP- prTS 16614-Profile while also it was considered the under development EPIAP (European Passenger Information Accessibility Profile). Use cases considered are the following:

- provision of operativity calendars and timetables
- provision of network topology and routes
- provision of transport operators
- provision of access nodes to stop places
- provision of Contract / Journey Accounting (with operator roles)
- provision of Stop Points Facilities (ticketing, accessibility, safety, etc.)
- provision of Vehicle Equipment (lift/ramps, wheelchair etc)

The existence of Italian NeTEx profile contributed to the creation of an interoperable architecture for data sharing to the Italian NAP and enabled the used of NAP data for MaaS application.

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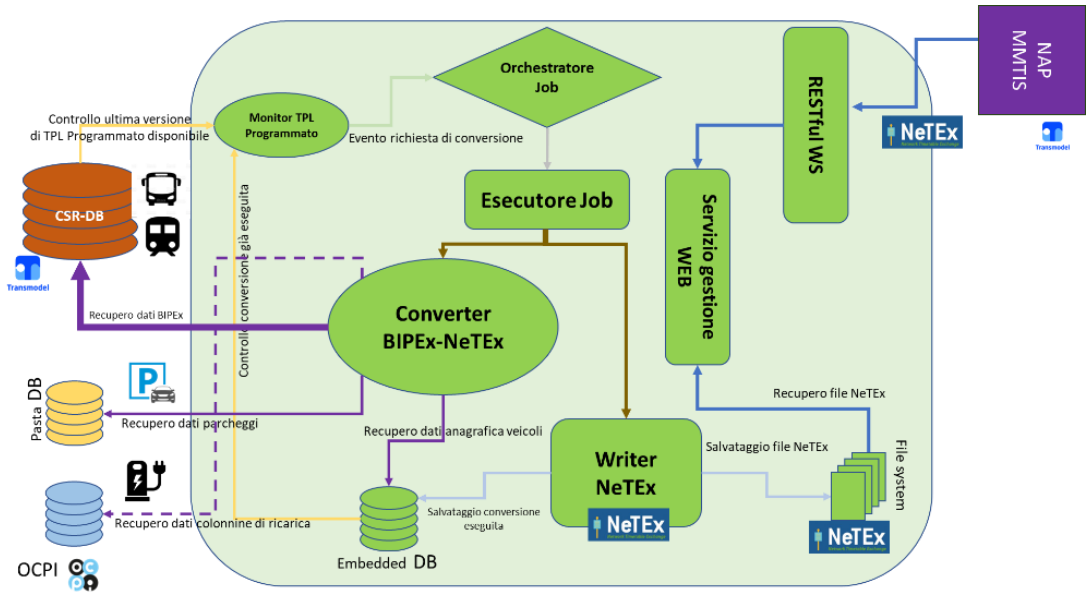

Figure 2 Deployment of Italian NeTEx Profile in data production pipeline. Architecture in regional level (RAP) for planned data (static)

2.2 SIRI ITALIAN PROFILE DEFINITION

For the exchange of mobility data in real-time with Italian National Access Point (NAP), a SIRI Profile has been defined. The SIRI protocol covers 8 functional services, but for the definition of the SIRI Italian profile the following have been taken into account, considering national stakeholders needs and experts' team recommendations:

- SIRI-VM Vehicle monitoring service: to exchange of the PT vehicle position in real-time (XSD siri_vehicleMonitoring_service.xsd);
- SIRI-ET Estimated Timetable service: to exchange of the actual PT service Timetable in real-time (XSD siri_estimatedTimetable_service.xsd);
- SIRI-SX Situation Exchange service: to exchange events that can impact the current PT service in real-time (XSD siri_situationExchange_service.xsd);
- SIRI-FM Feature Monitoring service: to exchange information about infrastructure status in real-time (XSD siri_facilityMonitoring_service.xsd).

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Figure 3 SIRI Italian profile functional scope.

Italian profile on SIRI data was also formed based on the EU Minimum Passenger Information Profile on Real time data (EPIP-RT). [5]

With SIRI Italian profile, it is possible to exchange real- time data between different data consumers and therefore supported again the implementation of the MaaS platform for the national project "MaaS for Italy".

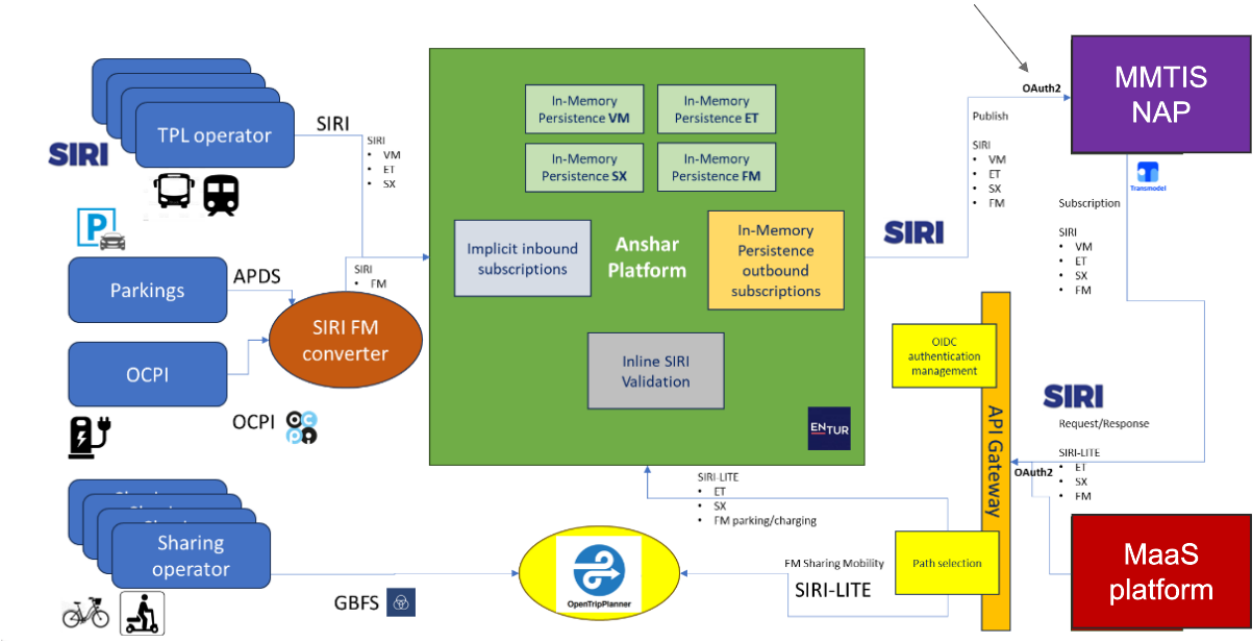

Figure 4 Architecture in regional level (RAP) for real-time (dynamic data)

[5] Under approval process while Italian profiles work was started.

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This complete set of profiles allowed to Italy to harmonise the exchange protocols between different mobility providers and to enhance the awareness at national level about the EU standards potential. They created an interoperable environment in national level with potential to support also interoperability across EU.

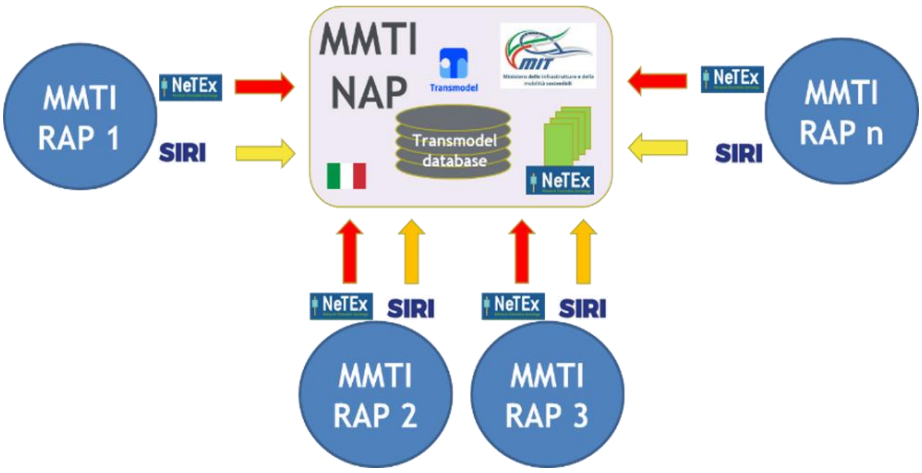

Figure 5 Overall architecture of NAP for MMTIS in Italy (national level), where NeTEx and SIRI protocol is used for data exchange. RAP: Regional Access points.

2.3 Review of Concept Paper from Belgian Stakeholders

Another significant request supported by DATA4PT experts' team was the review and the guidance of the Belgian operators in drafting a concept paper regarding "The future of interoperable data standards" in Belgium. The objective of the paper was to enable the Belgian Public Transport Operators to understand the context, challenges and opportunities of choosing a common data standard to improve the intermodal travel experience in Belgium and meet European obligations regarding the publication of mobility data.

In the scope of this paper was all data needed to ensure a smooth intermodal experience for the travellers in Belgium like network typology, planned and live timetables and disruptions, fares, accessibility, shared mobility modes. This paper did not focus on data needed for internal use only.

Through this paper the writer aims to give guidelines regarding implementation of the EU CEN standards, to explain the concept of the profiles and present the ones of EU level while also presenting three different scenarios of action. Experts' team supported this work by reviewing the elements regarding Transmodel based standards and the profiles derived from NeTEx and SIRI to ensure that information shared is accurate and precise. They also provided with guidance on how to implement the standards and which scenario could be of great benefit.

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3 STANDARDS UPDATE

Standards update activity focused mainly on the evolution of the standards, and the specification of NeTEx and SIRI profiles[6]. With this activity, there was an opportunity to report back to CEN TC278 WG3 the feedback from the implementation of the standards based on users' experience. Moreover, this activity encompasses the provision of minimum EU profiles with the aim to facilitate the adoption in national level. The outputs of this activity contribute to the deliverable *D.3.4. Standards update proposal* and *D.3.2. Profile preparation.*

Under this activity, the following sub-activities were identified for the second period:

i. The finalization of the mapping between NeTEx/SIRI and GTFS and the review of mapping between NeTEx/SIRI and GBFS. The mapping should be understood as a comparison at high level (model level) and technical level (attributes/elements). Through standards mappings, effective boundaries and overlaps between standards can be established, the integration of data from different data sets is enabled and automated data conversion tools to exchange data between different formats can be specified. In this context, a mapping (comparison) also contributes to the *tools* activity and helps identify advantages and opportunities for the evolution of the standards.
ii. Finalisation of UIC timetables mapping. It continued in the Task group 2 of CEN TC278/TC9X/UIC/UITP/EC/S2R.
iii. The finalisation of the deliverable *D.3.4. Standards update proposal*
iv. The contribution to Transmodel and NeTEx update working groups. DATA4PT experts provided input, participating in the meetings and leading the work in some cases. They also contributed in drafting examples and make the update of the data model and XSD.
v. The finalization of NeTEx Accessibility Profile (EPIAP), and SIRI Minimum profile (EPIP-RT) and the preparation of NeTEx EU Fares profile. This work is extensively described in a separate deliverable (D.3.2 Profile preparation). The organisation of relevant WGs or the participation in already existing WGs regarding this subject was part of this sub-activity.

Table 5 Overview of sub-activities under the activity "Standards Update"

Output of Standards Update for 2020-2021 (before Greenlight development)	**Output of Standards Update 2022- (half) 2024**
Mapping between Transmodel and OSDM	Finalisation of UIC timetables mapping. It continued in the Task group 2 of CEN TC278/TC9X/UIC/UITP/EC/S2R
Preparation work for NeTEx Accessibility Profile (EPIAP)	European Passenger Information Accessibility Profile (EPIAP) finalisation and support for CEN approval process

[6] A profile facilitates the implementation of a standard, improves interoperability, by focusing only on what is needed filling the small gaps voluntarily left by the standard taking into account the local context. A profile focus only on what is needed in a specific context filling the small gaps voluntarily left by the standard.

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Preparation work for SIRI EPIP Profile (EPIP-RT)	SIRI EU minimum profile finalisation and support approval process
Preparation work for SIRI Control Actions	SIRI Control Actions
GTFS mapping first version	GTFS mapping version June 2024
	NeTEx Fares EU minimum profile (finalisation expected after the end of the project)

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4 EXTERNAL EXCHANGES

Key objective of the activity was to collect information on related projects and to disseminate information on Transmodel/NeTEx/SIRI. *External liaisons* actions have drawn attention on the overlaps and compatibility checks with other standards. In some cases, DATA4PT provided help to carry out this check in view of the elaboration of conversion tools. The final goal of this activity was to enable as much as possible harmonisation and alignment between the standards. It also aimed to ensure EU standards for Multimodality (Transmodel ecosystem) gain visibility and give credibility to the work done so far by CEN, creating a counterweight to standardisation lobbies.

During the first years of the project, external exchanges activity contributed by creating liaisons and work together with other standardisation entities and projects dealing with multimodal data exchange actions and projects to ensure consistency and alignment between stakeholders. Experts' team highlighted the existing overlaps between the EU CEN standards and with other standards in use and raised awareness on possible interoperability problems in the future by the use of different data formats by also informing CEN and DG MOVE for possible risks. Due to this finding and action taken, a dedicated working group on Multimodal Data Standards was established in NAPCORE to allow cooperation between CEN standards and coordinate NAP operators in regard to MMTIS DR implementation. Experts' team contributed to concept papers and guidance documents to address technical topics raised by the exchange with the other associations and standardization bodies.

The first and more direct liaison is the one with **CEN TC278 WG3** (Transmodel/NeTEx/SIRI) and concerns the follow up of change requests and the contribution to the updates of Transmodel UML and respective XSDs of NeTEx and SIRI, in coordination with *standards update* activity. In the framework of the CEN working group, a new work item about Transmodel Part 10 was created for the revision of alternative modes extension. The result of this last action is the publication of EN12896-10 (as a replacement of CEN TS 17413:2019).

Another important link has been created with **CEN TC278 WG8,** in charge of the development of DATEX II standard. The scope of this working group was the parking data model and parking data publication. The aim of DATA4PT was to coordinate this work with Transmodel to avoid overlaps. Until the end of 2021 the only cooperation with the Parking model developers has been launched at ISO level (ISO TC204 WG19). With ISO, a few alignments have been achieved. However, the ISO group ignored the agreements met previously with the Transmodel group as regards the alignment of the Parking layout structure and did not take into account the previously agreed harmonised model. At the same time CEN TC278 WG8 announced the uptake of the ISO model (i.e. without the parts harmonised with Transmodel). As a conclusion, any further work of harmonisation has been stopped and further alignment tasks have been shifted to the NAPCORE project.

At international level, DATA4PT experts' team connected with ISO relevant working groups and associations such as MobilityData (the organisation in charge of GTFS/GBFS specifications) and MaaS Alliance, as one of the actors of multimodal ecosystem.

In more details, the ISO working groups relevant to DATA4PT scope are **ISO TC204 WG8** (Public transport and Emergency), that deals i.a. with the railML data exchange format (a railway data exchange format in conceptual, strategic and tactical processes leading to the annual timetable). and **ISO TC204 WG19** (Mobility Integration) that performs standardisation work focused on MaaS, Fares, Parking, Vulnerable Road Users, Data Governance.

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Concerning ISO TC204 WG8, DATA4PT participation resulted in the mapping between Transmodel and RailML[7] (timetable part) published in ISO TS 4398 (Intelligent transport systems — Guided transportation service planning data exchange).
In regard to ISO TC204 WG19, it was identified that further analysis of gaps and overlaps for Fares and MaaS was needed.

MobilityData association supports the implementation, the maintenance and evolution of GTFS specifications and the complementary GTFS-RT, GBFS etc. As these data formats are widely used in public transport, DATA4PT collaborated with MobilityData in the framework of Transmodel webinar to enable stakeholders understand the differences between NeTEx, SIRI and GTFS. Collaboration was also established for the mapping works between NeTEx part 5 for alternative modes and GBFS for bike-sharing.

With MaaS Alliance, a liaison was created in the occasion of a working group run by MaaS Alliance on MaaS related standards. DATA4PT experts contributed to the production of a White Paper that presents the available standards, specifications and formats which enable the implementation of data exchanges in MaaS scheme.

Table **6** Overview of external liaisons built or continued during 2022-2024

Liaison and scope	Type of action taken by DATA4PT	Frequency of meetings	Summary of results
CEN TC278 WG3 Transmodel NeTEx SIRI	Follow up meetings and lead revision - management of change requests. Summarise and prioritise updates of UML, XSD.	every 2-4 weeks	- Alternative Modes extension revision. - New Work Item scope defined for Transmodel Part10. - Production of Transmodel Part 10 model and documentation. - Mapping and harmonisation of the Transmodel/Open Journey Planner Trip Model - Alignement Transmodel/NeTEx for a range of functional extensions (in particular necessary for booking, such as deckplans)
CEN TC278 WG8 DATEX II – Parking data	Follow up meetings and report to DATA4PT results/outcomes	According to DATEX workplan	- Create a link between the CEN group and ISO relevant group (ISO TC204 WG19). - Alignment of existing overlapping data standards and effort to avoid future overlapping developments. Contribution through NAPCORE project.
ISO TC204 WG19 MaaS Fares Parking	Participation in meetings Study of ISO documentation	2 – 3 per semester	- Fares, Parking, MaaS are identified as relevant to Transmodel - An analysis of gaps and overlaps is proposed to take place. - Production of a scope related to the harmonisation of data structures and terminology as regards fares in a multi-

[7] Renamed to RailDax for the ISO context

			operator, multi-modal mobility environement (conventional public transport, alternative modes, parking, toll) - Co-leadership of and contribution to ISO TR 7874-1 "Mobility Integration—Product rules for mobility services— Part 1: Framework"
Mobility Data GTFS upgrade GBFS	Collaborate in mapping and dissemination/training events.	Every month	- Mapping between Transmodel/NeTEx Part5 and GBFS.
MaaS Alliance Standards WG	Participation in meetings Co-authoring relevant white papers	Every two weeks	- Creation of MaaS White Paper - ("Mobility Data Spaces and MaaS") - Explaining usage of Transmodel ecosystem for MaaS
NAPCORE	Contributing in Data Dictionary deliverable and to the Guidance document for booking API		- Mapping between NeTEx and TOMP API - Correspondance of MMTIS DR data categories to Transmodel terms (elements).

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5 FAQ, GUIDELINES, EXAMPLES

This activity *"FAQ, guidelines and examples"* encompasses several sub-tasks, such as to:

- Set-up, maintain and update DATA4PT wiki page and knowledge base on DATA4PT website. DATA4PT website is dedicated to host all kind of information delivered and produced by the project, but also to be a communication channel with the wider audience, to publish news, articles, deliverables of the project and communication material in general. DATA4PT wiki page is chosen as the main repository where mostly technical information will be included, maintained and updated continuously, allowing also collaborative work between users such as DATA4PT experts. Links to the wiki page are available on the website, for redirecting the visitors to the right "space" based on the type of information they are looking for.
- Assess available material on different channels and relevant websites (Transmodel, NeTEx etc.) and add content to knowledge base; The assessment of available material is necessary in order to avoid overlaps and repetitions. *Dissemination and training* activity, also supports by coordinating and linking the several websites where material about Transmodel ecosystem is shared.
- Monitor the technical support requests and document those incoming questions that are of general interest and can be added to FAQ.
- Prepare guidelines and examples on different topics based on the users' needs. to technical support and project's dissemination actions.

5.1 FAQs

During 2020-2021, the DATA4PT team completed various administrative tasks, such as creating a website and wiki page, and developed a range of supportive materials, including FAQs, guidelines, examples, and inventories. These resources were inspired by the team's technical support activities, external exchanges, and updates to standards. The FAQs, prompted by technical inquiries and stakeholder interactions, were organized into six categories: General questions, Technical questions, NeTEx, SIRI, Transmodel, and Opra. However, currently, the FAQs are available under General questions, Technical questions, and NeTEx. General questions address queries about DATA4PT outputs and EU standards, Technical questions cater to developers and users of data standards, and NeTEx questions focus on functional scope, usage, and implementation aspects without technical details.

After this first work some FAQs were completed and reformulated after the feedback of the experts.

Between 2022 and 2024, different FAQs were prepared and published on the different website link to DATA4PT, depending on the topics. On the NeTEx website, there is the NeTEx FAQ related to general questions around NeTEx. On Transmodel website there is a FAQ submenu with 4 different categories, "General" with all the generic question about Transmodel, "Documentation" where there is all information about where the different documents, presentations. "User" related FAQs that focus on who can use Transmodel and how, and "Model Structure" that aboard the way the model is build. On the DATA4PT wiki there are 4 FAQs, a technical one for NeTEx, SIRI, and Transmodel. And a general one around DATA4PT and NeTEx.

This material will be reorganized with the publication of the new Transmodel website that will consolidate all the generic FAQs of the different standards and maintain the technical questions on the DATA4PT wiki. The choice of wiki page for technical questions will facilitate the users to navigate into the different FAQs.

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Table 7 Number of FAQs during 2022-2024

Topic of FAQs	During 2022-2024
NeTEx	39
SIRI	2
TRANSMODEL	35

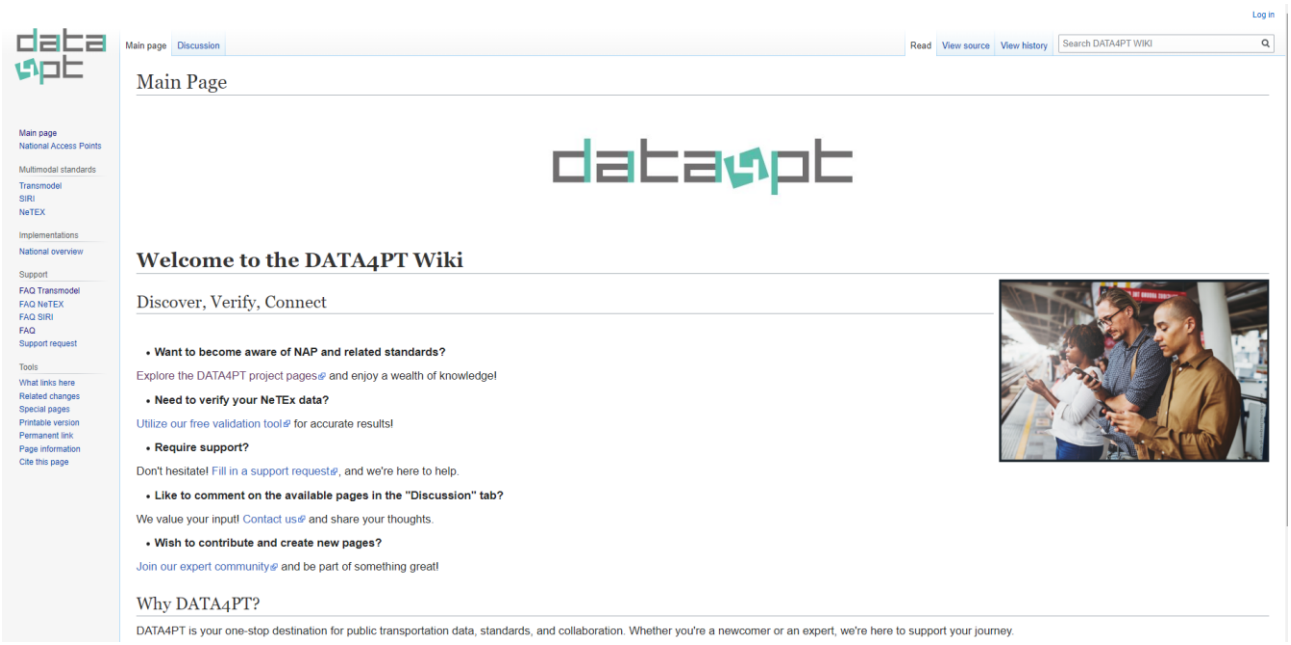

Figure 6 DATA4PT Wiki page

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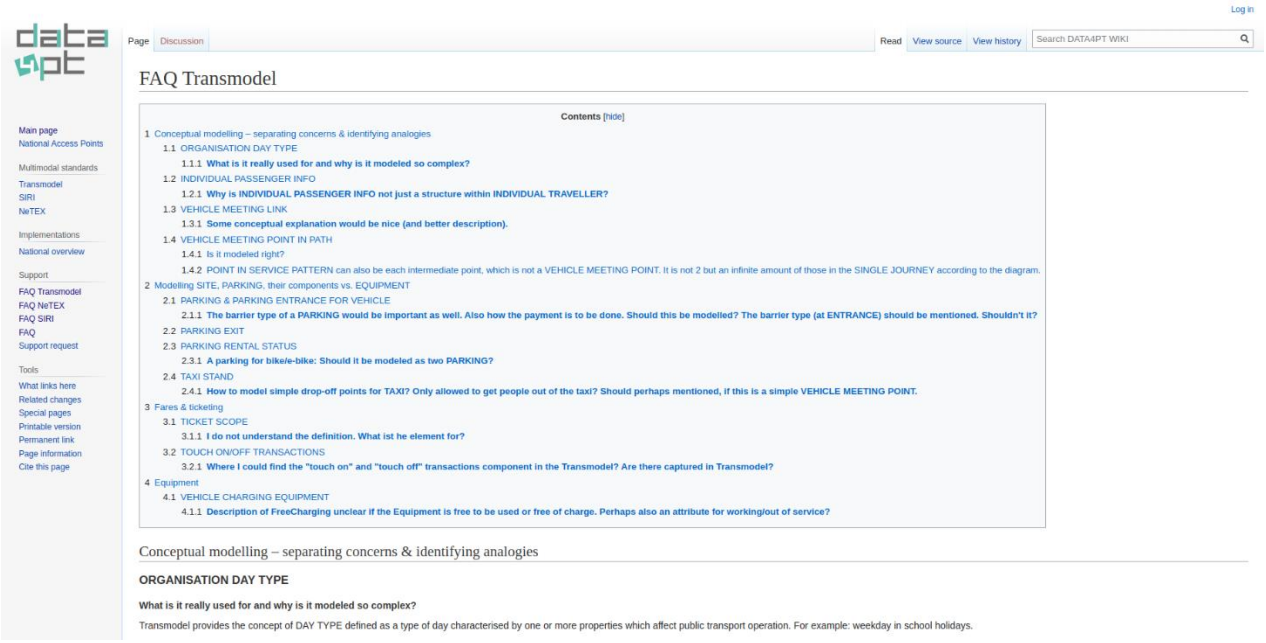

Figure 7 Transmodel FAQ from DATA4PT Wiki

5.2 GUIDELINES

The guidelines provided by the experts team were another very important output of their contribution. During 2020-2021, the focus was given on data comparison metholodogy, on national profiles guidance through the creation of profile inventory for NeTEx and SIRI existing profiles and on providing technical documentation for EPIP implementation. During 2022-2024, besides the update of the previous deliverables when needed, a guidance document for National Access Points deployment was drafted by the experts' team.

Table 8 Overview of sub-activities under "FAQ, Guidelines, Examples" activity

Outputs During 2020-2021	**Outputs during 2022-2024**
Guidelines on how to compare data standards and data formats (mapping methodology	Guidance paper for National Access Points Implementation
Profiles inventory of NeTEx and SIRI	Profiles inventory update
Technical artefacts (XSD) of European Passenger Information Profile (EPIP) and supportive documentation (including examples)	

5.2.1 GUIDANCE PAPER FOR NATIONAL ACCESS POINTS IMPLEMENTATION

This paper proposes some best practices for national access points to follow for a better implementation of MMTIS Delegated regulation (EU/2024/490, amending EU/2017/1926). National Access Points need to focus on the data consumers and to simplify their life. Only big, homogenized, integrated data sets are of interest. Quality assurance needs to be part of all NAP. NAP needs to think beyond local level and specific mobility mode. Integration from all perspectives (from city or region up to EU and worldwide, from one mobility mode

to full inter-modality). As the goal is more sustainable mobility in the long run (financially, environmentally, socially) complete and inclusive data standards to support all chain of data exchange from operations to end user/passenger are the main tool for this. The paper presents main reasons why interoperability is not yet achieved, and national access points need to move forward to achieve its goals (goals as set by the regulation. It provides recommendations on how to overcome these issues and build a common implementation approach of the regulations across EU for multimodal mobility services advancement. The target group is the NAP implementers and operators and the organisations regulating them in their country.

Expected outcome of this paper is the following:

- Consumers can access the relevant data from all NAP for free and also the integration cost need to be affordable. If the correct implementation of an interface costs 20'000 EUR per country, it si not worthwhile for most data consumers. It is clear that there are very complex interfaces, that incur some cost. But at least the burden of data integration and adaption of the interface to different NAP can be reduced to almost zero.
- Homogenise the usage of NeTEx/SIRI/GTFS/GBFS and the like.
- Make seamless cross-border mobility services and passenger information systems viable.
- Provide all necessary data on the national level.

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6 TOOLS

During the first period of the project, *Tools* activity was composed by tasks such as the benchmarking of available tools that support the implementation of Transmodel based standards. It also contributed to identification of specifications for the development of validation tools and the validation methodology.

In the second period of the project experts' team activity was focused on sharing feedback and giving recommendations and guidance for the improvement of the NeTEx data validator Greenlight until its final release. In the further steps, they provided technical expertise in investigating the evolution of the Greenlight validator or the creation of additional one towards SIRI data.

Table 9 Overview of sub-activities under activity "Tools"

Outputs 2020-2021	**Outputs 2022-2024**
Tools benchmarking	Extended validation rules list - recommendations to Greenlight
Validation tool requirements, specifications and KPIs	Analysis of Greenlight against other NeTEx tool (ENTUR)
NeTEx- light: the reduced XSD that supports C# code generation tools	Performance tests and Investigation of the development of an interface between Greenlight and National Access Points
	Investigation of SIRI validator requirements

In total eight (7) activities were carried out during the whole project period, where DATAPT experts team contributed actively in coordination and with the contribution of ITxPT.

As a reminder, during the period 2020-2021 experts' team together with ITxPT managed a range of different activities that can be divided in 4 parts:

1) Tools Benchmarking

DATA4PT experts, in collaboration with Member States partners, collected and updated information on tools enabling NeTEx and SIRI implementation. NeTEx tools are categorized into five groups: format conversion, data validation, language bindings/software aids, editing/management/visualization, and planning systems. SIRI tools are categorized into conversion/connectors and CAD/AVL producers. Details are available on the DATA4PT wiki page.

The analysis revealed that most conversion tools support only a single profile, limiting cross-border use, and no tools address holistic conformity validation for European-wide data exchange. NeTEx programming tools are limited and mostly Java-based, with inadequate support for C#. DATA4PT validation tools should support multiple programming languages to foster competition and innovation, similar to GTFS. Processing large XML datasets poses challenges, with Norway's workaround of splitting content bypassing standard validation methods.

2) Validation Tools Requirements (2020-2021)

Experts defined requirements for validation tools, including syntax and constraint validation, performance considerations, reporting, and content validation (basics, timetable, stop model, optimizations, EPIP specifics). These ensure dataset consistency with the NeTEx XML schema. Results are documented in deliverable D2.4.

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3) NeTEx-light

NeTEx-light, a reduced XSD schema, was developed to facilitate C# code generation, representing a subset of the full NeTEx Schema. It is available on the DATA4PT wiki, GitHub, and website, aiding C# application development.

As for the period 2022-2024, these previous outputs were used to pursue new activities directly link to them or as complementary actions.

1) Extended list of validation rules

This work was launched during the first period of experts' activities with updates, additions and further reviews during the second period (2022-2024). The list of validation rules was based on existing work from France. Based on this list, the experts' team developed and analysed the rules to adapt to a more generic framework and not only to national profile specific.

In total 142 rules were identified in those 25 were relevant for the national profile, 30 were relevant for the EPIP profile and 87 were relevant for all profile. The expert team prioritisation was done based on 3 principles: the importance of the rule, the effort needed to implement it and their relevance with the NeTEx full profile and not with specific profile. This work is very important as opening the ground for further development and for the personalisation of the tool, by creating a set of rules by users.

During the development of the tool, 15 of these rules were implemented as a first step and 6 were XML based.

2) Analysis against another NeTEx tool

The comparison of the Greenlight validator against other NeTEx tools was one of the activities carried out with experts' team support, with the aim to support potential users in choosing the best tool for them but also to identify future possibilities for enhancement for the tool.

The analysis against another tool was focused on the NeTEx tool from ENTUR, ANTU. The results of this analysis are summarised as follows:

- The first main difference is the target and approach of the tool, ANTU is designed to validate only Nordic profile, where Greenlight aims at customization that will let different profile use the tool. ANTU is a tool to be used in a bigger process and to put in the pipeline of production. Greenlight aims more at an easy User Interface, targeted for end user directly, or for an easier development and dissemination of European Passenger Information profile (EPIP).

These two differences have a direct impact on the technological choice of each validator, that we can see in this table.

Table *10* Comparison between ANTU and Greenlight

Item	**ANTU**	**Greenlight**
Files handling	Separation of NeTEx dataset into several smaller files + one file that cross-references others Can handle large files	Entire NeTEx feeds Is focused on handling individual files
Rules library	On GitHub with: - General rules	On GitHub with:

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	- Specific for Norway (10-15 additional rules, based on practical cases)	- Implemented rules as of today
Coding language	Java (both software & rules) Xpath for XML queries (rules only)	Go (software) Javascript (rules only) Xpath for XML queries (rules only)
Competence needed	Need some good programming skills to use to it full extend	Only need to know how to use javascript to be able to master it. (You can also have no code knowledge and use the web interface)

There was also a difference in the set of rules offered by both tools, as we can see here with the number of rules specific to each and the common one.

Table 11 Difference of ruleset between ANTU and Greenlight

Data4PT proposed ruleset – total number	ANTU – implemented ruleset- total number	Common
142	147	29 (out of them 6 are related to EPIP)

As a general conclusion, Data4PT potential enhancement of tool will add value to users who want to be compliant with those rules, and does not impact the same scope as ANTU, which is focalised on the Nordic Profile. Even if some rules are still similar for both it represents less than 21% of them.

3) Performance check and investigation of a development of an interface between Greenlight and the National Access Point (NAP)

The main objective of this performance tests was to evaluate the performance for time and computing power needed to validate large amounts of files, to see if the tool could be easily adapted to be used as an interface for NAP.

These series of tests were realized on a docker container, which could use 8 cores of the CPU and 2.5 Go of RAM. The datasets used were the NeTEx datasets available on the French NAP on the 22 of March 2024 which represent 115 files, and from the Italian NAP on the 11 of April which represent 21 files.

Result for the duration of validation on the French files:

Table 12 Performance test on the French NAP files duration result

	Test FR 1	Test FR 2	Test FR 3	Test FR 4	Test FR 5	Average
TOTAL (s)	8361	6506	6938	10791	8166	8152.4
TOTAL (min)	139.35	108.43	115.63	179.85	136.10	135.87
Max (s)	2407	1257	1229	2455	1364	1535

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Max (min)	40.117	20.95	20.483	40.917	22.733	25.583
Average (s)	72.704	56.574	60.330	93.835	71.009	70.890
Median (s)	27	28	27	28	28	27.8

Result for the performance:

Table 13 Performance test on the French NAP files computing power result

	AVERAGE		MAX	
	PROC	RAM	PROC	RAM
MAX	1600.13%	1949.08	4415.95%	2258.94
Average	230.30%	759.55	240.62%	874.61
Median	100.17%	608.76	100.19%	783.70

Result for the duration of validation on the Italian files:

Table 14 Performance test on the Italian NAP files duration result

	Test IT 1	Test IT 2	Test IT 3	Test IT 4	Test IT 5	Average
TOTAL (s)	5541	8442	5551	3868	2016	5083.6
TOTAL (min)	92.35	140.70	92.52	64.47	33.60	84.73
Max (s)	1059	2807	1082	1665	399	851
Max (min)	17.65	46.783	18.033	27.75	6.65	14.183
Average (s)	263.857	402	264.333	184.190	96	242.076
Median (s)	153	58	149	31	38	113.4

Result for the performance:

Table 15 Performance test on the Italian NAP files computing power result

	AVERAGE		MAX	
	PROC	RAM	PROC	RAM
MAX	17894.27%	2070.32	41527.63%	2274.30
Average	466.33%	1463.72	692.83%	1663.30
Median	327.54%	1821.90	508.93%	2131.97

Based on the results, the performance of the tool is better and more stable with zip files, likes the ones from the French NAP than inserting directly XML files, like the ones from the Italian NAP. We can also see that with this setup the results are fine, with an average of 2h15min for all the NeTEx files available on the French NAP and 1h24min for the Italian ones. And for a single file the longest time needed was 40 minutes which is a quite important time but compare to the size of the file of 105Mo for a zip file containing more than 3Go of files.

The needs of the NAP were defined thanks to the participation of the French NAP in our process of analysis. Their needs specific to the validator are mainly focused on a "profile as a code" approach, this means that they

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want to be able to customize the rules specifically to each user profile and being able to easily update them. More than that they have specific hardware needs as they do not always need computing power available but more on specific timing, because that is one of the main costs of such a tool.

In summary, the performance tests confirm that the Greenlight interface is capable of handling large data sets efficiently and is adaptable to the needs of the NAP. However, optimization for validation, report generation and the ability to customize validation rules with more ease are crucial for meeting the specific requirements of different NAP.

4) Investigation of SIRI validator

Considering the positive feedback regarding NeTEx validator from users, a new possible activity has been thought to be buit: a SIRI validator. SIRI datasets are close to the NeTEx ones, as they also are XML however they have difference due to the nature of the data they include (real time vs. planned). The best way to develop a validator should consider XSD model as well. Already some tools are created by some NAPs (Swedish, Norwegian, French).

The French NAP began integrating SIRI (Service Interface for Real-Time Information) by leveraging the EnRoute template from Postman. They developed the SIRI querier tool, now available online (SIRI Querier), to facilitate SIRI requests. They also initiated a repository of SIRI datasets for testing. These efforts help determine service usage, though they do not provide detailed service information.

The integration faced several challenges:

- Resource Gaps: A lack of comprehensive data flows and tutorials made the learning process challenging. Specifications alone were insufficient.
- Inconsistencies: Differences in script acceptance among requesters made access to requester references proble atic.
- Geolocation Data: The absence of longitude and latitude in point discovery hindered spatial analysis.
- Data Flow Access: Gaining access to necessary data flows was difficult, with no clear solution for increasing availability.
- Standard Conflicts: There were contradictions between open data standards and the requirements for operating a SIRI server.

To advance the project, the following are essential:

- Public Data Flows: Ensure data flows are publicly available.
- Promotion and Guidance: Advocate for data publication and provide practical tutorials and examples, potentially via GitHub.
- Simplified Demonstrations: Aim for demonstration simplicity akin to GTFS, to facilitate understanding and showcase integrations effectively.

In summary, while progress has been made in building tools and foundational systems, addressing resource, access, and standardization issues is crucial for continued advancement. There is a real role for a European project such as DATA4PT to act on this by facilitating the access of information that will allow the potential development of a validator.

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7 DISSEMINATION & TRAINING

The dissemination and training activity where experts' team got involved focuses on the organisation of activities such as workshops, e-courses and webinars, but also conferences where technical aspects of the standards are presented. This activity also encompassed the preparation of the communication and training material, as well as the coordination of all websites relevant to EU standards (i.e. Transmodel, NeTEx). It is reminded that *external exchanges* activity contributes indirectly to project dissemination as well. In the following paragraphs, we present the tasks that took place under this activity during 2022-2024, including a short reminder of the activities carried out in previous period, besides dissemination made through *external exchanges*.

During the first period of the project, experts' team participated in the first organised Stakeholders' Forum (5/11/2020) to reply to main questions already collected so far. Experts discussed several topics, mainly explaining the different aspects to be considered for the successful standards implementation, and the way DATA4PT approaches those aspects. Some of them are the close relation and coordination with CEN, other organisations working on similar areas, and other sectors under the spectrum of multimodality. Moreover, the development of minimum EU profiles is considered as a basis for the creation of national profiles and will establish a common interpretation and usage of standards. In this respect, it was highlighted that a standard needs a whole framework to be available for widespread use. It was emphasised that the Transmodel family of standards have a strong future potential, as they have a uniform model. The DATA4PT project and its experts helped everyone involved in the project to overcome the technical complexity ' feeling' posed by a very capable, permissive and extensive API called NeTEx, without oversimplifying it. Finally, standards implementation is not only a technical matter, but it also consists of a cultural change, where companies, Public Administrations and final users are available to share data. EU ITS Directive 2010/40 and related Delegated Acts pave the way to this direction. [8]

Moreover, during this period we organised the DATA4PT training programme based on the feedback of the experts and the MS partners which highlighted the topics of interest: Key elements of NeTEx and profiles; Key elements of SIRI and profiles; Introduction on Transmodel.

However during 2022-2024 more topics have been identified and relevant webinars but also video tutorials were prepared.

This activity also encompassed the contribution of experts' team in:

- consolidation of Transmodel related websites,
- the update of NeTEx and SIRI Github.

[8] More details about the Stakeholders forum are available in the D.3.3 Report on Experts' team actions https://data4pt-project.eu/wp-content/uploads/2022/04/Data4PT_D3.3_Report-on-the-experts-team-actions_v2.0.pdf

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Regarding GitHub update, the work was mainly about the "readme" files both in NeTEx and SIRI repository. This update was needed to allow a better understanding of what information was available and how it can be used, with some explanation of the structure of the GitHub and a quick tutorial to start using the standards (NeTEx and SIRI) and adapt them to different needs. Also, the creation of wikis directly on GitHub and dedicated to go deeper in the utilization of those two standards.

The experts' team also participated very actively providing technical expertise in the following workshops:

- Workshops on differences between GTFS and NeTEx
- Workshop on Transmodel and GTFS, organised by Mobility Data in Valencia, 2023

Finally, several experts participated as panelists in international events sharing Transmodel knowledge:

- 2022 POLIS Annual Conference
- 2022 – 06 Montreal - Mobility Data Summit.

7.1 CONSOLIDATION OF TRANSMODEL, NETEX, SIRI, OPRA WEBSITES

The consolidation of Transmodel, NeTEx, SIRI, OpRA websites activity has for objectives to provide more visibility to the Transmodel ecosystem and make it easier to handle in its entirety. The solution chosen by the different parties was to unify the content of the various websites into two main websites:

- the new Transmodel website that will contain all the basics information concerning Transmodel and the related implementation standards;
- the DATA4PT wiki will contain the technical aspects of these standards, with particular implementations.

To do so, a first step was to agree on a plan for this website and what it will contain. The following menu has been agreed upon.

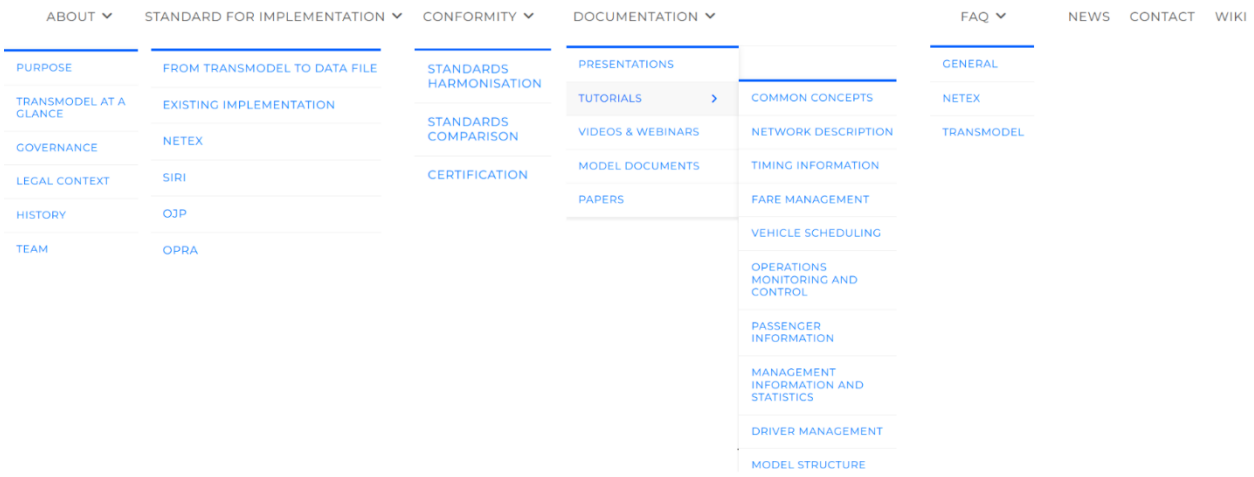

Figure 8 Complete menu of new Transmodel website

The "ABOUT" tab has for objective to give an overview of Transmodel ecosystem and the context in which it was created and is developed.

The "STANDARD FOR IMPLEMENTATION" tab gives an overview of the different standards and how they interact in Transmodel, with examples of real implementations.

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The "CONFORMITY" tab gives more legal context, information about the ecosystem around Transmodel, and mapping with the other standard.

The "DOCUMENTATION" tab will be the documentation centre that are currently spread over the different websites (including available videos).

The "FAQ" is here to help the user with the general information about Transmodel and other standards, while the more specific questions will be answered on the DATA4PT wiki.

The "NEWS" will present all the latest news regarding the standards and their implementation.

The "CONTACT" tab contains a simple contact form.

The wiki will be accessed with the "WIKI" tab.

After making this plan, the content had to be written. It was decided to first transfer all the content of the various website to a mock-up where it could be reviewed by the experts, to decide which one should be kept as it is, updated or deleted. Some new pages needed to be created from scratch by the experts as well as the links between the different previously existing websites.

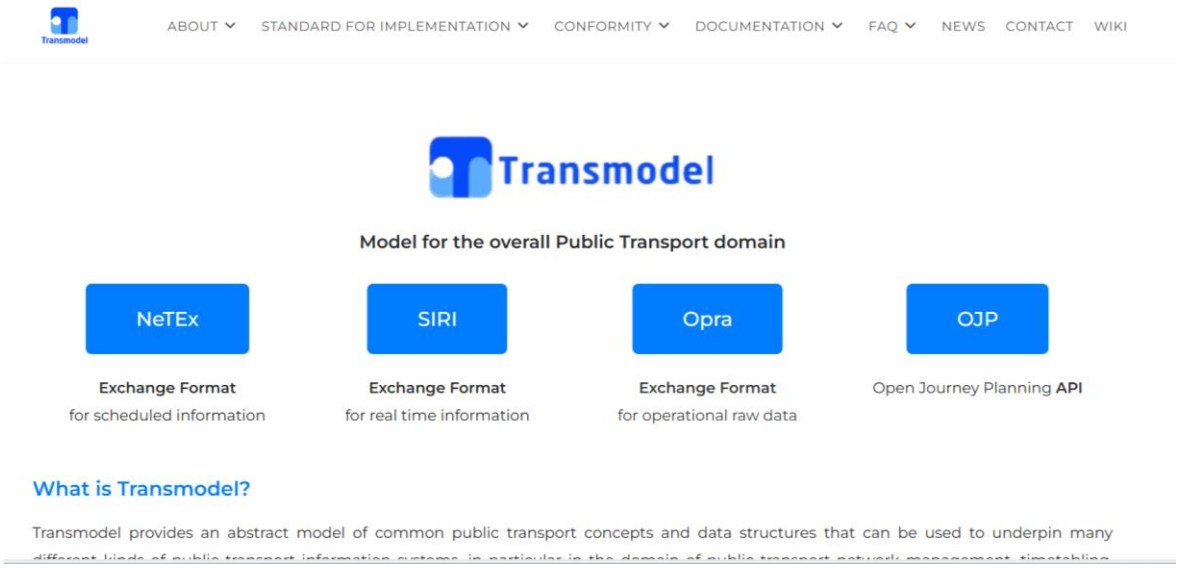

Figure 9 Homepage for new Transmodel Website

For example, the content of the page "Standards comparison" was made by the expert Kasia Bourée to explain how the mapping between different standards works and which mapping already exists.

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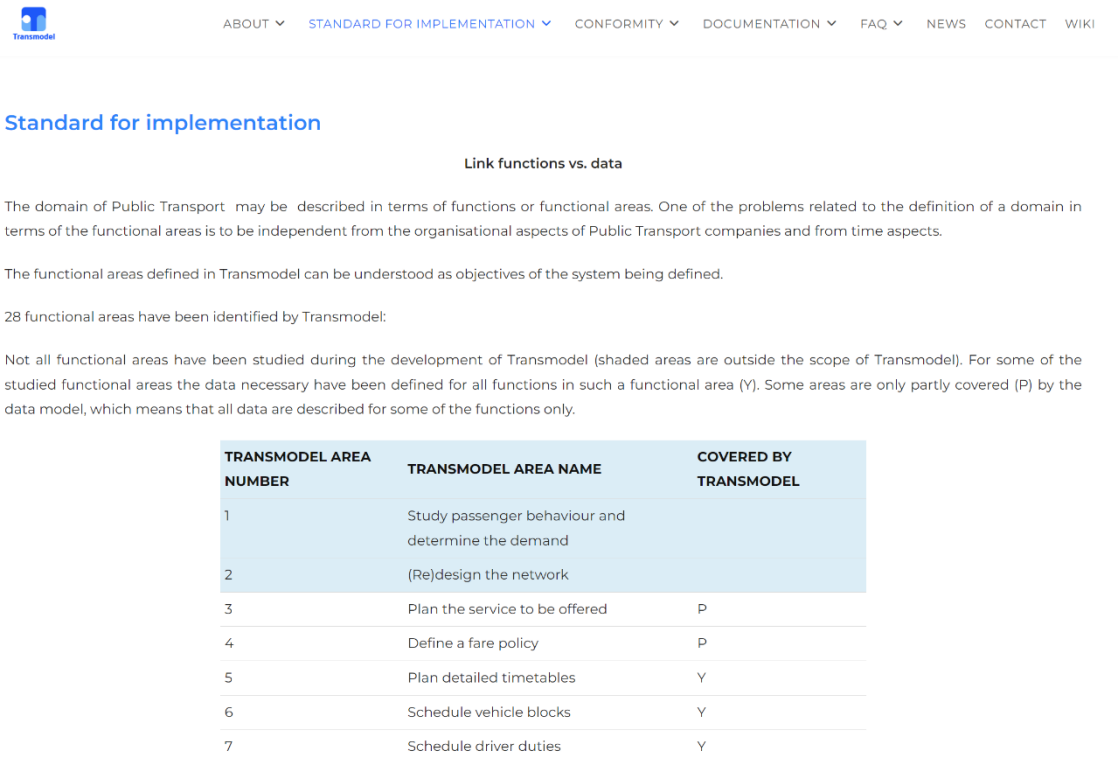

ABOUT STANDARD FOR IMPLEMENTATION CONFORMITY DOCUMENTATION FAQ NEWS CONTACT WIKI

Standard for implementation

Link functions vs. data

The domain of Public Transport may be described in terms of functions or functional areas. One of the problems related to the definition of a domain in terms of the functional areas is to be independent from the organisational aspects of Public Transport companies and from time aspects.

The functional areas defined in Transmodel can be understood as objectives of the system being defined.

28 functional areas have been identified by Transmodel:

Not all functional areas have been studied during the development of Transmodel (shaded areas are outside the scope of Transmodel). For some of the studied functional areas the data necessary have been defined for all functions in such a functional area (Y). Some areas are only partly covered (P) by the data model, which means that all data are described for some of the functions only.

TRANSMODEL AREA NUMBER	TRANSMODEL AREA NAME	COVERED BY TRANSMODEL
1	Study passenger behaviour and determine the demand	
2	(Re)design the network	
3	Plan the service to be offered	P
4	Define a fare policy	P
5	Plan detailed timetables	Y
6	Schedule vehicle blocks	Y
7	Schedule driver duties	Y

Figure 10 Example of page (Standards for implementation).

For the standards part of the website, it was decided that the purpose of these pages was to give a first introduction with the basis of each standard (NeTEx, SIRI, OpRa, and OJP) and their interaction inside of Transmodel. To go deeper into the subject the knowledge will be available on the DATA4PT wiki, where it will be also possible to find the different implementations of each member state that has implemented Transmodel completely or only partially.

We then made links between the website and the wiki, as for example with the local integration on the NeTEx page:

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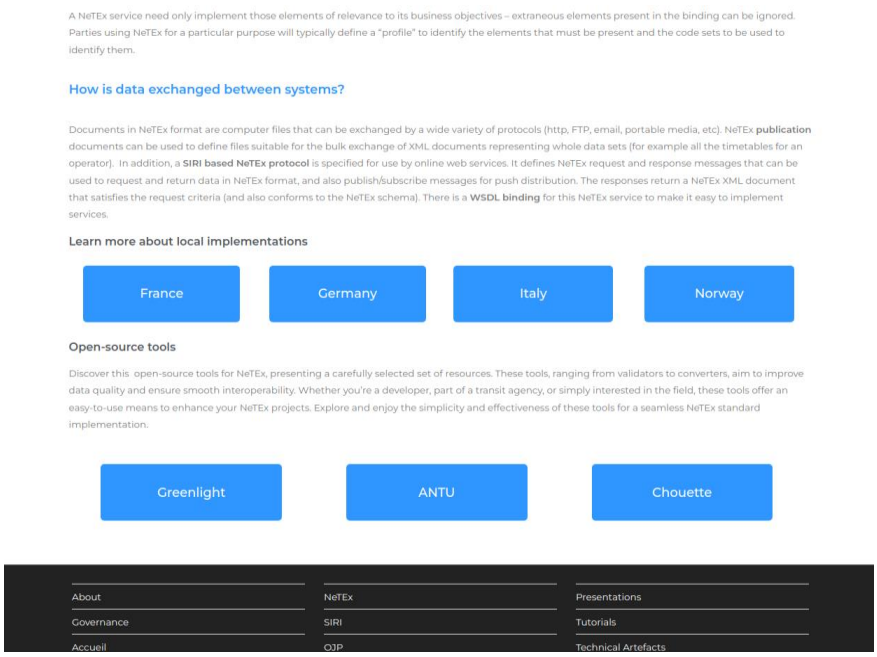

Figure 11 Example of link (NeTEx page).

7.2 WEBINARS

The organisation and animation of webinar is an important activity in the dissemination of the DATA4PT project. After the 3 first webinar between 2020 and 2021 and seeing their success, it was decided to organise two more for the period 2022-2024.

The subjects of the 3 first webinars hold between 2020 and 2021 were Transmodel, SIRI and NeTEx. The first one was addressed to all kinds of stakeholders, and the two others were more technical that explain the type of organizations that were represented.

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Table 16 Registration by category of organisation for Webinar between 2020-2021

Type of organisation represented by registered persons	Registrations for Transmodel	Registrations for SIRI	Registrations for NeTEx
PTA	56	20	30
PTO	40	10	18
IT suppliers	87	62	48
Infrastructure	5	9	1
Consultant	11	7	12
Association	21	7	12
Academic	7	0	3
Individuals	11	7	2
Total	238	122	128

The first webinar set the bases by providing a comprehensive overview of public transport data exchange standardization, including key aspects of Transmodel, NeTEx, and SIRI, as well as addressing the differences between these standards and their interoperability with GTFS, GBFS, and GTFS-RT. The second part delved into Transmodel specifically, discussing its model-driven design, objectives, structure, upcoming updates, and case studies of its implementation.

The two others were more focused on the specificity of NeTEx and SIRI standards and how to implement them.

On the geographical side, the users were mainly from Europe but also from Asia. There was a strong interest from Western Europe and Nordic countries.

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Table 17 Registration by country for Webinar between 2020-2021

Country	Registrations for Transmodel	Registrations for SIRI	Registrations for NeTEx
Austria	7	3	4
Belgium	13	6	12
Canada	7	0	0
Chile	0	0	1
China	2	0	0
Croatia	3	0	1
Cyprus	2	0	0
Czech Republic	3	3	3
Denmark	7	6	4
Estonia	1	2	1
Finland	7	1	7
France	49	32	24
Germany	4	5	5
Hungary	0	2	0
Indonesia	1	0	2
Ireland	0	0	3
Italy	30	7	15
Japan	3	3	1
Latvia	2	0	0
Luxemburg	2	0	3
Netherlands	6	5	2
Norway	6	3	2
Poland	1	0	0
Portugal	22	17	23
Romania	1	0	0
Singapore	2	0	0
Slovakia	0	3	4
Slovenia	6	0	0
Spain	8	8	5
Sweden	16	5	5
Switzerland	7	2	0
Turkey	2	0	0
United Kingdom	6	8	1
TOTAL	221	113	127

https://data4pt-project.eu/knowledge-database/training-material/

After these introductive webinars and their success two others were held during the next period, in 2022.

The first one was held on the 24th of November 2022 and was facilitaded by the DATA4PT experts Christophe Duquesne, Kasia Bourée, Nick Knowles and from ITxPT Anastasia Founta. It was focused on the integration

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of alternative transport modes into multimodal journey planning using the NeTEx and SIRI standards. It gathered over 233 people with most coming from PTA/PTO. More than that there are 271 views on the recording of the webinar

The second webinar was held on the 6th of December 2022 and was facilitated by DATA4PT experts, Petter Kvarnfors, Nick Knowles, Stefan de Konink and from ITxPT Anastasia Founta and Emmanuel de Verdalle. The purpose was to present the validation tool that has been developed, Greenlight. It gathered 122 people from different organization but mainly IT Supplier. More than that there are 316 views on the recording of the webinar

The registration was less important for the second meeting as it is a technical tool dedicated to implementation of NeTEx and it is more centralized around a specific topic than the first webinar.

Table 18 Registration by category of organisation for Webinar between 2022-2024

Type of organisation represented by registered persons	Registrations for NeTEx and SIRI for New Modes	Registrations for NeTEx Validation tool
PTA	73	20
PTO	30	17
IT suppliers	75	31
Vehicle Manufacturer	4	0
Infrastructure	3	4
Consultant	8	10
Association	23	10
Academic	15	5
Individuals	2	0
Total	233	122

As for geographical repartition, the first meeting had attendee from all around the world, where the second meeting was mainly composed of European countries that are stakeholder in the DATA4PT project.

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Table 19 Registration by country for Webinar between 2022-2024

Country	Registrations for NeTEx and SIRI for New Modes	Registrations for NeTEx Validation tool
Australia	10	0
Austria	4	3
Belgium	12	5
Brazil	2	1
Canada	1	2
Croatia	4	0
Cyprus	2	0
Czech Republic	4	0
Denmark	7	8
Estonia	1	1
Finland	5	2
France	38	18
Germany	6	7
Greece	1	1
Ireland	3	0
Italy	39	14
Luxembourg	2	0
Netherlands	6	0
Norway	11	2
Portugal	39	22
Romania	1	1
Singapore	5	0
Slovakia	1	3
Slovenia	3	0
Spain	10	0
Sweden	6	9
Switzerland	5	1
United Kingdom	6	3
TOTAL	228	104

The first webinar started with an overview of the standards and the proceeded to discuss about the following topics:

- Alternative Modes Integration:
  - NeTEx Part 5: Specifications for services like electric buses and bike-sharing.
  - Ensures seamless journeys by providing data on availability, locations, and booking.
- Data Formats:
  - Structured trip details including access, connection, and main travel segments.
  - Supports booking, fare estimation, and online payments.
- Implementation:
  - Providers publish services in NeTEx format for journey planners.

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    - Schemas generate code for database connectivity.
- Interoperability:
    - Compatible with standards like GBFS and TAP TSI.
    - Profiles help tailor NeTEx for specific uses and regions.
- Case Studies:
    - Examples include integrating bike-sharing and ride-sharing with conventional public transport.

During this webinar the two main parts of the tool were presented (the web interface and the terminal version), with an introduction to DATA4PT and then to the NeTEx validator. The expert presented Greenlight with more details, as regards:

- The Development Process, he:
    - Introduced the iterative process of rule development,
    - Discussed compiling useful rules from the European profile,
    - Highlighted prioritization based on value and complexity,
    - Explained the implementation process in the validator.
- The Validation Rules, he:
    - Explored a range of validation rules derived from the Transmodel conceptual model,
    - Covered logical progression of journey attributes, correct positioning, and consistency checks.
- The Parameterized Rules, he:
    - Discussed the flexibility of parameterized rules,
    - Enabled customization based on mode or network specifics.
- The Profile-Specific Rules, he:
    - Presented rules specific to certain profiles,
    - Ensured adherence to required identifier code spaces and preferred organization of elements.
- Some Real-life Examples, he:
    - Provided real-life examples of validation issues encountered in NeTEx files,
    - Emphasized the importance of thorough validation for data accuracy.
- The Customization, he:
    - Empowered users to customize the Green Light Validator,
    - Allowed addition of own profiles and rules to suit specific validation needs.

For more detail on the webinars, the Powerpoint presentations used, and the recordings can be found on the DATA4PT website.

These two webinars allowed us to disseminate new information about NeTEx and SIRI, but also officially release a tool that has been used a lot during the period between 2022 and 2024, with around 100 validations done each month.

These webinars have gathered in total 842 people, from 36 different countries. Most of them were from EU but it is quite interesting to see an interest from all around the world. The major interest was from the IT suppliers but it can still be noted that different types of stakeholders have taken part, and that there was a general interest from the Public Transport industry.

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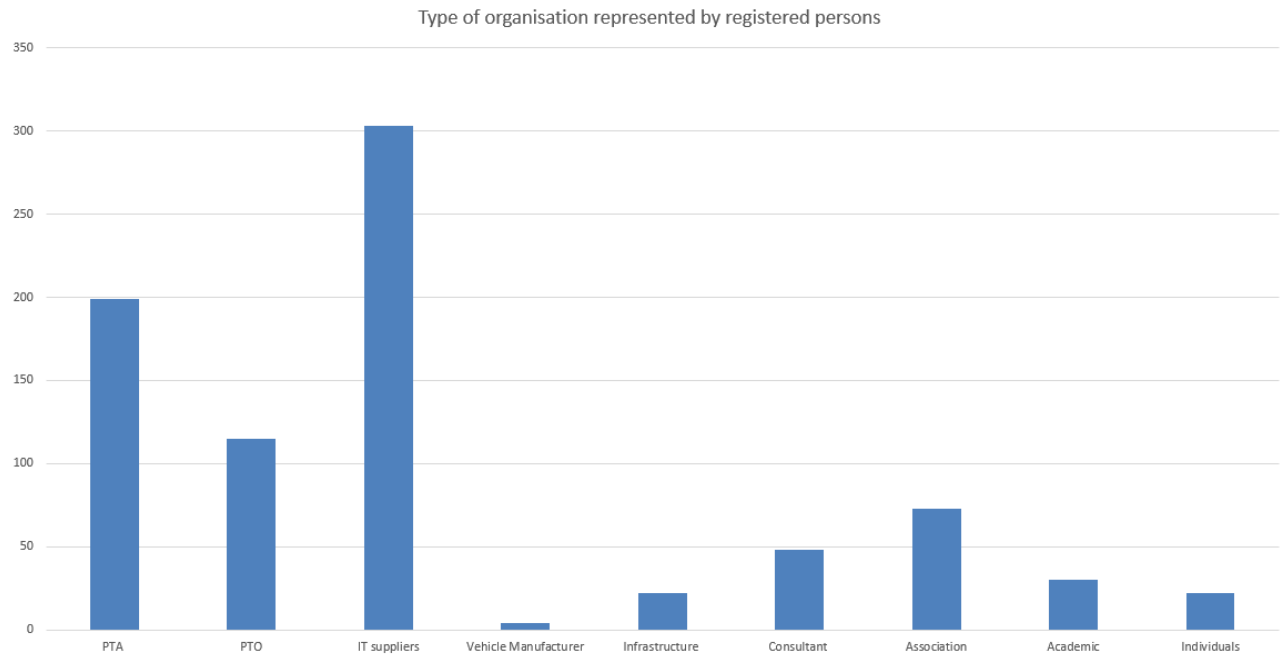

Figure 12 Type of organisation represented during all the webinars

7.3 VIDEO TUTORIAL

As regards the training, a new activity was performed by providing a series of video tutorials. Three of them are hosted on the ITxPT youtube channel while an additional one is hosted by openOV youtube channel. In total 4 tutorials concerning the NeTEx and SIRI standards have been shared.

The first tutorial published on the 7th of March 2023 and narrated by the expert Christophe Duquesne is an introduction to NeTEx. In this video the goal was to act as a common basic knowledge for the future videos and for the NeTEx user. It concerns the different modes of transportation covered, the scope, the domains of application, the place of NeTEx in the Transmodel ecosystem, and some more technical points such as the life cycle of the data, the format, and the profiles. This tutorial is the most viewed with 1056 views on the 31st of May 2024.

The second one published on the 10th of April 2023 and narrated by Stefan De Konink focused on more technical aspects of how to create NeTEx datasets using python programming language. In particular, this video contains a bit of background of the NeTEx standard to exchange public transport network and timetables and how to get started in Python and become a developer with public transport knowledge.

The third tutorial published the 3rd of April 2024 and narrated by Christophe Duquesne focused on how to use NeTEx and SIRI in public transport operation. The objective was to explain the simplicity of the use of NeTEx and SIRI and the benefits for all the organisations which have adopted them. The tutorial presented the following: (i) the scope of the standards, the ecosystem, (ii) the fact that NeTEx and SIRI were useful beyond the domain of passenger information for the domain of service operations, (iii) the possible information flows of a NeTEx/SIRI user, (iv) the importance of a single exchange protocol. This tutorial has 355 views on the 31st of May 2024.

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The fourth tutorial published on the 30th of April 2024 and narrated by the expert Thierry Hénault focused on the benefits of SIRI, in particular for the travellers. The objective of this tutorial was to explain that SIRI was beneficial not only for the organisation which has adopted it, but also on the passengers. The tutorial provided a reminder of the objectives of SIRI and demonstrated (through an example of a multimodal travel experience) the benefit of having a common standard such as SIRI. This tutorial has 65 views on the 31st of May 2024.

These tutorials constitute a first step for anyone willing to have a quick introduction to the Transmodel ecosystem, they are quick and easy to understand. The fact that they are accessible for everyone and done with the only purpose of teaching helped to give a better understanding of NeTEx and SIRI. To be noted that the first tutorial allowed the reach of 1056 person which is a fast and easy way to disseminate information about Transmodel.

7.4 PARTICIPATION IN WORKSHOPS AND CONFERENCES

As presented in this report (but also in the previous one (D.3.3 M24)), the knowledge and expertise of experts was leveraged at different levels: in creating supportive material, in promoting harmonisation and collaborations, in delivering training etc. In this respect, experts participated very actively in workshops and conferences with the aim to promote the adoption of Transmodel standards and DATA4PT project results and outputs. Their participation was always appreciated and very impactful for the attendees. During 2020-2021, the experte supported the consortium to kick-off stakeholders fora and to trigger interest for the project replying to key questions from mobility actors. Also in the first period, the focus was given on local events to promote the word at the level of PTAs and PTOs of specific country that was showing interest.

In the second period (2022-2024), a wider range of participation was unfolded. It follows the reference to the most important events with high impact.

1. Workshop on differences between GTFS and NeTEx. This workshop was open to all the stakeholders involved in the project as partners, implementing bodies, collaborators of pilot sites of the implementation of DATA4PT ouputs. This workshop was very important as there was a lot of confusion between the role of GTFS and NeTEx and SIRI standards. This workshop triggered stakeholders in looking more in depth on their use cases and choose the format that better corresponds to their needs and helped them understand better the different contexts and also the relationship between the GTFS specifications and Transmodel in general. This workshop also triggered more interest from external stakeholders.

- Workshop on Transmodel and GTFS, organised by Mobility Data in Valencia, 2023. The participation of DATA4PT expert in this workshop where the attendees were mainly representing data consuming systems (like passenger information applications), was a good opportunity to raise awareness in another group of stakeholders and to convey a common message with Mobility Data to overcome misunderstandings about the usage of each format.

2. Mobility Data Summit in June 2022 in Montreal was the opportunity to spread worldwide the EU standardisation work and benefits in international environment beyond European regulatory context. The participation of DATA4PT expert at this event as a panelist in panel discussion accompanied by short presentation, revealed the interest of Montreal PTA in implementing NeTEx and SIRI in addition to the other formats already used to allow interoperability and enrichment of data sharing for passenger information systems.
3. POLIS Annual Conference, in December 2022. In this conference, the participation of a DATA4PT expert in the panel session was aiming at of the dissemination of the MMTIS Delegated Regulation and the requirements in the exchange of standardised datasets to another target group of stakeholders which are not directly involved in the data sharing ecosystem with a significant responsibility in

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procuring mobility systems (local authorities such as municipalities, regions, cities). DATA4PT activity was also presented by triggering the creation of a new liaison.

During this period the experts participated in an online workshop with Portuguese PTAs, they participated in the Stakeholders' Forum #2 in Brussels, and in other meetings held by the created liaisons. More analysis of this kind of events is included in in *D.5.3 for M54* and *in D.4.4. Best practice exchange outcomes.*

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CONCLUSIONS

The role of the experts' team throughout the project was very significant and critical for the success of the project. Actually, it was the backbone of all activities of the project creating the technical content and providing solutions to raised questions and issues. Their activity was very impactful on the partners of the project, resulting in adoption of the standards and the deployment of the MMTIS DR as much as possible, based on the EU requirements and expectations up to the end of the project, preparing also the way for the next steps in the same directions. Besides the partners of the project, mobility data providers and consumers benefitted by their long experience and deep knowledge on the field of public transportation and standardization. Moreover, the leading characteristics and undoubtable expertise gave credibility and visibility to the project and the involved parties, facilitating the communication and dissemination effort. The maintenance and further increase of experts' network, organized in a solid team is perceived as one of the successful choices to be continued in the future. It is worth to mention that with the opportunity of all these activities, new experts were recruited to extend the network and to benefit from the more experienced ones, however still more incentives should be given to public transport specialists to attract their interest in standardization work and to continue the impactful work already done by the existing group of Transmodel experts.

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ANNEXES

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ANNEX I: FULL LIST OF THE VALIDATION RULES

No	Description	Functional Area	Applies to	How it is implemented *	Severity (10=high. 50=low)	Development status
1	The versions of NeTEx schema being used should be specified	Common	All usages	code	10	
2	All objects are uniquely identified	Common	All usages	xmlschema	10	XmlValidator
3	The PublicationRequest element in the header should be populated	Common	All usages	code	40	
4	Any Topics mentioned in the Header must be present in the Delivery	Common	EPIP	code	40	
5	All frames should have a default CODE SPACE declared	Common	All usages	code	10	
6	All elements (except CODESPACE) should have a version attribute.	Common	All usages	xmlschema	10	XmlValidator
7	The order number on elements in sequences of child elements should be unique	Common	All usages	code	30	
8	Any local reference should correspond to an object declared elsewhere in the same document.	Common	All usages	xmlschema	10	XmlValidator
9	The versions of the profile being used should be specified	Common	All usages	code	20	
10	The version number of each VERSION FRAME should be populated with a number	Common	All usages	code	20	
11	All CODE SPACE prefixes used in identifiers should be declared with a CODE SPACE on the frame.	Common	Profile specific	code	10	
12	The format of element identifiers should follow any rules specific to the profile	Common	EPIP	code	40	
13	Date ranges of elements in the frame must lie between date ranges of the VALIDITY CONDITION on the VERSION FRAME	Common Content	All usages	code	20	

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14	The FrameDefaults of a VERSION FRAME should have values appropriate to the content	Common	Profile specific	code	30	Completed
15	Only the specialisation of VERSION FRAME (RESORCE FRAME, SITE FRAME, SERVICE FRAME, SERVICE FRAME< TIMETABLE FRAME, and SERVICE CALENDAR FRAME) appropriate to the profile should be used	Common	EPIP	code	40	
16	A TYPE OF FRAME is specified on each VERSION FRAME. and corresponds to one of those required by the profile	Common	EPIP	code	30	
17	An OPERATOR must be declared for each SERVIOCE JOURNEY	Timetable	All usages	code	20	
18	The same object type should only be present in a single frame type	Common	EPIP	code	30	
19	Ordered sequences of child elements shall be serialized in sequence in the accordance with the ascending value of their order attribute -	Common	All usages	code	30	
20	Single instances of ancillary and child elements should be declared inline as part of an object.	Common	Profile specific	code	40	
21	Elements should not be repeated unnecessarily as separate instances.	Common	Profile specific	code	40	
22	NOTICes should be declared locally	Common	Profile specific	code	40	
23	On a VALIDITY CONDITION. ToDate must not be later than FromDate on any date range	Common Content	All usages	code	20	
24	On a VERSION FRAME. ToDate must not be later than FromDate on any date range.	Common Content	All usages	code	10	

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25	ToDate must not be later than FromDate on other date ranges	Common Content	All usages	code	20	
26	A SERVICE JOURNEY have at least one DAY TYPE	Timetable	All usages	code	20	
27	If the URL field is filled. the validity of the URL must be checked and must resolved	Common Content	All usages	code	40	
28	Check valid ISO codes for lang etc.	Common Content	All usages	xmlschema	20	XmlValidator
29	Check valid ISO codes for Country. etc.	Common Content	All usages	code	30	
30	A coordinate system should be specified for spatial coordinates	Common Content	All usages	code	20	
31	WGS84 is the preferred coordinate system	Common Content	EPIP	code	40	
32	A POINT should normally have spatial coordinates specified.	Common Content	All usages	code	40	
33	A ZONE should normally have at least a centroid point specified.	Common Content	Profile specific	code	40	
34	Every STOP PLACE has a Name or ShortName attibute	Stop	All usages	code	20	Completed
35	Every STOP PLACE has a StopPlaceType attribute with correct value	Stop	All usages	code	30	Completed
36	All stop identifiers (QUAY. all STOP PLACEs. GROUPs OF STOP PLACEs and ACCESS) must comply with the profile codification	Stop	EPIP	code	30	Completed
37	A responsible OPERATOR must be declared for each STOP PLACE(Can be defaulted from frame)	Stop	All usages	code	30	

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38	Any STOP PLACE that is declared should be referenced by a STOP ASSIGNMENT	Stop	Profile specific	code	50	Completed
39	STOP PLACES should be organised hierarchically so as to separate the modes.	Stop	EPIP	code	30	
40	A Monomodal STOP PLACE should only have QUAYS of a single mode	Stop	EPIP	code	30	
41	SCHEDULED STOP POINT must be assigned to a STOP PLACE	Stop	EPIP	code	50	Completed
42	MODE of a QUAY of a monomodal STOP PLACE should match the STOP PLACE	Stop	EPIP	code	40	
43	Multimodal STOP PLACE and should contain at two different monomodal STOP PLACEs of different MODes	Stop	EPIP	code	40	
44	GROUP OF STOP PLACEs should contain only STOP PLACEs	Stop	All usages	code	40	
45	Name of a QUAY should not repeat those of the STOP PLACE	Stop	EPIP	code	40	
46	Successive DayOffset+PassingTimes for the POINTs IN JOURNEY Pattern or CALLS of a Journey must not decrease. N	Timetable	All usages	code	20	Completed
47	SCHEDULED STOP POINT must have the same mode as the assigned STOP PLACE	Stop	All usages	code	30	
48	SCHEDULED STOP POINT must have similar spatial coordinates to those of the assigned STOP PLACE	Stop	All usages	code	30	Completed
49	If a SCHEDULED STOP POINT is assigned to a STOP PLACE the type of stop should be consistent on both. And also on any QUAY	Stop	All usages	code	30	
50	Location Is Unreasonable For QUAY	Stop	All usages	code	30	
51	Location Is Unreasonable For STOP POINT	Stop	All usages	code	30	

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52	Distance Between QUAY and STOP PLACE too long	Stop	All usages	code	30	Completed
53	Check if there are any nearby, very similar locations of the same EntityType	Stop	All usages	code	40	
54	Distance between SCHEDULED STOP POINTS at a CONNECTION is plausible	Stop	All usages	code	30	
55	The location of QUAY and SCHEDULED STOP POINT should be within reasonable distance of the location or surface of STOP PLACE	Stop	All usages	code	30	Completed
56	Every TOPOGRAPHIC PLACE has a Name	Stop	All usages	code	40	
57	Type of TOPOGRAPHIC LOCATIONS	Stop	EPIP	code	40	
58	PostalRegion attribute on ADDRESS element	Stop	Profile specific	code	40	
59	Hierarchy of TOPOGRAPHIC LOCATIONS	Stop	All usages	code	40	
60	Management of STOP PLACE's additionalTopographicPlaces (belonging to several municipalities)	Stop	Profile specific	code	40	
61	Membership of a SITE by a SITE COMPONENT.	Stop	All usages	code	40	
62	The members of a CONSTRAINT ZONE are SCHEDULED STOP POINTs	Stop	All usages	code	40	
63	A ROUTING CONSTRAINT ZONE must be defined either by Stop or by a boundary	Stop	All usages	code	20	
64	A ROUTING CONSTRAINT ZONE must specify the nature of its use.	Stop	All usages	code	40	
65	Each LINE should have a different name and a different public code	Timetable	All usages	code	20	
66	All references should include an explicit version on the reference.	Common	All usages	code	30	

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67	TransportSubmode must be a part of the TransportMode	Timetable	All usages	code	30	
68	The TypeOfLineRef must meet the profile requirements	Timetable	Profile specific	code	40	
69	MODE and SUBMODE of a LINE must be consistent with stops and journeys	Timetable	All usages	code	30	
70	A LINE must have at least one ROUTE	Timetable	Profile specific	code	30	
71	The "inverse" of the SERVICE PATTERN must match the approximate reverse of sequence	Timetable	All usages	code	40	
72	A substitution SERVICE JOURNEY must reference a SERVICE JOURNEY that it is replacing	Timetable	All usages	code	40	
73	If no RouteRef is available in a SERVICE JOURNEY. a RouteView with LineRef must be available	Timetable	EPIP	code	30	
74	Check that there is at least one LINE in any GROUP OF LINEs	Timetable	All usages	code	30	
75	The main line of a GROUP OF LINEs must be part of the group	Timetable	All usages	code	30	
76	Colour used for each separate LINE should be distinct	Timetable	All usages	code	40	
77	A LINE must have one or more ROUTE instances	Timetable	Profile specific	code	40	Completed
78	A ROUTE must be referenced by a SERVICE JOURNEY PATTERN directly or indirectly.	Timetable	Profile specific	code	40	
79	The MODE of a GROUP OF LINEs NETWORK must be consistent with that of the individual LINEs	Timetable	All usages	code	30	
80	A primary SERVICE JOURNEY shall have at least one SERVICE PATTTERN, and/or have a list of CALLs	Timetable	All usages	code	20	
81	A ROUTE must have one or more SERVICE PATTERNs that use it.	Timetable	Profile specific	code	50	

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82	Types of Frame in use: (EU_PI_COMMON. PI_PI_STOP. EU_PI_NETWORK. EU_PI_TIMETABLE. EU_PI_CALENDAR. EU_PI_LINE_OFFER. EU_PI_NETWORK_OFFER. EU_PI_STOP_OFFER. EU_PI_METADATA)	Common	EPIP	code	30	
83	A SCHEDULED STOP POINT must have an instantiated Name field	Stop	All usages	code	30	Completed
84	SERVICE JOURNEY PATTERN must contain POINTS IN JOURNEY PATTERN	Timetable	All usages	code	40	
85	The TransportMode and TransportSubmode of the Journey must respect the choices of the profile	Timetable	All usages	code	30	
86	JOURNEY PATTERNs of SERVICE JOURNEYs shall only include S POINTS IN JOURNEY PATTERN that reference SHCEDULED STOP POINTs	Timetable	EPIP	xmlschema	10	XmlValidator
87	Every LINE must have an OPERATOR	Timetable	All usages	code	30	
88	Every SERVICE JOURNEY should be referenced either by a GROUP OF SERVICEs or by a SERVICE JOURNEY INTERCHANGE or by an INTERCHANGE RULE.	Timetable	Profile specific	code	40	
89	DESTINATION DISPLAYs should always have at least one "FrontText"	Timetable	Profile specific	code	40	
90	DESTINATION DISPLAY VARIANTs always have at least one "FrontText"	Timetable	Profile specific	code	40	
91	Check if the Journey PATTERN matches any associated ROUTE	Timetable	All usages	code	40	
92	A SERVICE JOURNEY must reference a SERVICE PATTERN.	Timetable	EPIP	code	30	

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93	TEMPLATE SERVICE JOURNEYs must have an associated frequency or rhythm	Timetable	All usages	code	20	
94	A DAY TYPE must have sufficient PropertiesOfDay to characterise it	Timetable	EPIP	code	30	
95	RHYTHMICAL JOUREY GROUP should not be used in EPIP	Timetable	EPIP	code	20	
96	Days without scheduled SERVICE JOURNEYs for a Line must raise a warning	Timetable	All usages	code	30	
97	Validity period of the SERVICE JOURNEYs must fall within the validity period of the VERSION FRAME	Timetable	All usages	code	20	
98	The validity of the timetable must be at least N days.	Timetable	Profile specific	code	40	
99	Every POINT IN JOURNEY POINT In a JOURNEY PATTERN used by a JOURNEY must have an PASSING TIME with arrival and departure time (except for the first and last stop)	Timetable	Profile specific	code	20	Completed
100	There should be a time specified on each CALL of a SERVICE JOURNET	Timetable	EPIP and timetable profiles	code	30	
101	A SERVICE JOURNEY PATTERN must have a minimum of two Points	Timetable	All usages	xmlschema	30	XmlValidator
102	Consistency of schedules: schedules at the earliest and at the latest	Timetable	All usages	code	20	
103	Successive timing between stops should be consistent with specified durations from TIMING LINKs t	Timetable	All usages	code	20	
104	PASSING TIMEs for successive POINT IN JORUNEY PATTERNS must result in a plausible speed for the MODE and VEHICLE TYPE	Timetable	All usages	code	30	

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105	The duration of a SERVICE JORUNEY Journey should be consistent with the timings and distances.	Timetable	All usages	code	30	
106	Shared JOURNEY PARTs must be independent of any specific SERVICE JORUNEY	Timetable	Profile specific	code	40	
107	Each JOURNEY PART should be coherent with the SERVICE PATTERN of the SERVICE JOURNEY	Timetable	All usages	code	20	
108	Timings of each JOURNEY PART should be coherent with the times of the SERVICE JOURNEY	Timetable	All usages	code	10	
109	JOURNEY PART is coherent with the parent JOURNEY	Timetable	All usages	code	20	
110	JOURNEY PART COUPLEs should be consistent with JOURNEY PARTs	Timetable	All usages	code	20	
111	Distance between SCHEDULED STOP POINTS in JOURNEY PATTERN is plausible	Timetable	All usages	code	30	
112	If the DESTINATION DISPLAY is flagged as changing at a point, then the new DESTINATION DISPLAY must be present.	Timetable	All usages	code	40	
113	Specific VEHICLE TYPE capabilities should be populated (e.g. wheelchair)	Timetable	Profile specific	code	40	
114	For a HEADWAY JOURNEY GROUa frequency must be specified	Timetable	All usages	code	20	
115	End of Period of cadences for JOURNEY FREQUENCY GROUP must be specified	Timetable	All usages	code	20	
116	TEMPLATE SERVICE JOURNEY must have an appropriate type attribute	Timetable	EPIP	code	20	
117	Reference usage for HEADWAY JOURNEY GROUP and RHYTHMICAL JOURNEY GROUP should be declared in frame and not inline	Timetable	EPIP	code	30	

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118	JOURNEY FREQUENCY GROUP must contain more than one SERVICE JOURNEY	Timetable	Profile specific	code	30	
119	Consistency of the return route	Timetable	All usages	code	20	
120	LINE and ROUTE should be linked consistently	Timetable	Profile specific	code	20	
121	A TRANSFER must have a transfer time	Timetable	All usages	code	30	
122	NOTICE ASSIGNMENTS are only related to TIMETABLEs. SERVICE JOURNEYs. POINTs IN JOURNEYPATTERN. SERVICE JOURNEY INTERCHANGEs	Timetable	EPIP	code	40	
123	Transit times should be specified on DEFAULT CONNECTIONs and SITE CONNECTIONs..	Timetable	All usages	code	40	
124	Transit times should be specified on CONNECTIONs.	Timetable	All usages	code	40	
125	Checking the type of transfer	Timetable	EPIP	code	30	
126	Reasonable walking speed - Consistency between duration and distance of a CONNECTION / TRANSFER	Timetable	All usages	code	20	
127	Check if the SERVICE JOURNEY INTERCHANGE transfer distance is reasonable	Timetable	All usages	code	30	
128	Duration of interchanges between SERVICE JOURNEYS	Timetable	All usages	code	30	
129	FLEXIBLE SERVICEA should be characterised by a FlexibleServiceType. This should be coherent with the LINE type.	Timetable	All usages	code	30	
130	CLASS of USE on PASSENGER CAPACITY should be restricted to subset of possible values.	Timetable	EPIP	code	40	
131	FLEXIBLE SERVICEs using point standing for a zone should have the required ZONE.	Timetable	All usages	code	30	
132	Order of TRAIN COMPONENTs	Timetable	All usages	code	20	

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133	FLEXIBLE SERVICEs using stopping areas require a zone containing stops.	Timetable	All usages	code	40	
134	CLASS of USE on TRAIN ELEMENT should be restricted to subset of possible values.	Timetable	[EPIP]	code	30	
135	FLEXIBLE SERVICE should be coherent with any frequency interval	Timetable	All usages	code	20	
136	Use specific instances for FLEXIBLE SERVICE PROPERTies for each FLEXIBL SERVICE	Timetable	EPIP	code	30	
137	The URL of the schematic plan must be valid	Timetable	All usages	code	40	
138	Check objects in SCHEMATIC MAPs	Timetable	All usages	code	40	
139	Specific BOOKING ARRANGEMENTs must be given	Timetable	[EPIP]	code	30	
140	A Type of Vehicle must be named	Timetable	Profile specific	code	30	
141	Any SCHEDULED STOP POINT that is declared should be used. i.e. referenced by an assignment or POINT IN PATTERN etc.	Timetable	EPIP and timetable profiles	code	40	Completed
142	A SERVICE JOURNEY instances that have a similar DIRECTION and DAY TYPE and JOURNEY PATTERN should be grouped with a GROUP OF SERVICEs	Timetable	Profile specific	code	30	

*You can find out more about the coding on the DATA4PT Github.

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ANNEX II: TECHNICAL SUPPORT REQUESTS

Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
1	Agenda WS TC278 - Rail	10/05/20	External user	Experts' network	Governmental	Other	Functional and scope
2a	generate c# from siri.xsd	17/09/20	External user	SIRI Developers/ Christophe	Transport tool developer	SIRI	XSD/WSDL
3	Question par rapport au dernier comité	23/09/20	External user	Experts' network	Transport tool developer	SIRI	
4	Fares data	28/09/20	External user	NeTEx website support	Other	NeTEx	Functional and scope
5	Data standards for CarSharing	06/10/20	External user	Experts' network	Data Producer	NeTEx	Functional and scope
6	European Investment Bank - Study on Data - Interview	15/10/20	External user	Experts' network	Governmental	Legal and politics	Functional and scope
7	Italian NeTEx Profile definition / 1st advice from DAT4PT experts	19/10/20	MS partner	Experts' network	Authority	NeTEx	Development and Tools
8	TR: ITxPT / DATA4PT: iBus2 requirements on interoperability - SIRI part 5	19/10/20	MS observer	Experts' network	Authority	SIRI	Functional and scope

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
9	TR: NeTEx part 3 vs. OSDM (nTM) - Technical aspects	16/10/20	MS observer	Experts' network	Authority	NeTEx	
10	TR: NeTEx part 3 vs. OSDM (nTM) - External exchanges	16/10/20	MS observer	Experts' network	Authority	NeTEx	Development and Tools
11	Support request: Use some of your pictures, pictograms, graphs, schemes	26/10/20	MS partner	Transmodel website	Governmental	Other	Other
12a	SIRI Gestion des actes de régulation + Control actions	06/11/20	External user	Experts' network	Data Consumer	SIRI	XSD/WSDL
12b	SIRI Gestion des actes de régulation +Internationalisation	06/11/20	External user	Experts' network	Transport tool developer	Transmodel	XSD/WSDL
13	(NeTEx - CEN Working Group TC278/WG3/SG9) Targetted Infolinks	06/11/20	External user	Experts' network	Transport tool developer	NeTEx	XSD/WSDL
14	Validation of datasets from Porto (AMP)	11/01/21	MS pilot	DATA4PT website		NeTEx	Request for specific support - Validation

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
15	SIRI training and support to T-L	09/02/21	External user	ITxPT network	Authority	SIRI	Request for specific support
16	Fare tables in NeTEx	15/02/21	External user	DATA4PT website	Data Producer	NeTEx	Development and Tools
17	Reduced NeTEx schema example related question	23/02/21	MS partner	DATA4PT website	Authority	NeTEx	XSD/WSDL
18	GTFS vs NeTEx	03/03/21	External user	ITxPT network	Authority	NeTEx	Functional and scope
19	AGIR training	22/03/21	External user	DATA4PT website	Association de transport	Transmodel	Request for specific support
20	SIRI overview and profile	30/03/21	MS partner	DATA4PT website	Authority	SIRI	Functional and scope
21	Italian NAP - NeTEx profile	30/03/21	MS partner	DATA4PT website	Authority	NeTEx	Development and Tools
22	What's the official way to model composition?	26/04/21	MS observer	DATA4PT website	Transport tool developer	Transmodel	Model and UML

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
23	Last servicejourney in SIRI ET	04/05/21	MS observer	DATA4PT website	Transport tool developer	SIRI	XSD/WSDL
24	General support and collaboration request	19/05/21	External user	DATA4PT website	Data Producer	Transmodel	Request for specific support
25	Information regarding the DATA4PT tools and their scope	02/06/21	MS pilot	DATA4PT website	Data Consumer	Other	Functional and scope
26	Italian datasets validation	09/06/21	MS partner	DATA4PT website	Authority	NeTEx	Request for specific support
27	Availability of NeTEx xsd / xmi	07/07/21	External user	DATA4PT website	Transport tool developer	NeTEx	Request for specific support
28	Validation of Austrian datasets	30/09/2021	MS partner	DATA4PT website	Authority	NeTEx	Request for specific support - Validation
29	Implementation exemple of the "MultilingualString" in NeTex	02/09/21	External user	DATA4PT website	Transport tool developer	Transmodel	Request for specific support
30	How to provide air fares data in NAP	12/09/21	External user	UITP member	Authority	NeTEx	Functional and scope

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
31	Portuguese public transport services registration platform - service status in NeTEx	16/09/21	MS partner	ITxPT network	Authority	NeTEx	Model and UML
32	Java classes from NeTEx XSD	28/09/21	External user	DATA4PT website	Transport tool developer	NeTEx	XSD/WSDL
33	Generating .net code from NeTEx-XSD (2nd solution)	01/10/21	External user	github	Other	NeTEx	XSD/WSDL
34	Generating .net code from NeTEx-XSD (one solution)	01/10/21	External user	github		NeTEx	XSD/WSDL
35	[NeTEx-CEN/NeTEx] Import NeTEx_wsProducer-Document.wsdl (#72)	01/10/21	External user	github	Other	NeTEx	XSD/WSDL
36	Validation of Croatian datasets	14/10/21	MS partner	DATA4PT website	Authority	NeTEx	Request for specific support - Validation
37	Grand Est Training and data checking	28/10/21	MS pilot	DATA4PT website	Authority	NeTEx	Request for specific support - Validation
38	UIC NeTEx / Merits converter	10/11/21	MS observer	ITxPT network	Authority	NeTEx	Development and Tools
39	How to code the PurposeOfGrouping	30/11/21	External user	DATA4PT website	Transport tool developer	NeTEx	XSD/WSDL

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
40	ServiceJourneyPattern for on-demand transport trips	09/12/21	External user	DATA4PT website	Transport tool developer	NeTEx	XSD/WSDL
41	Validation of datasets from Lisbon (AMP)	11/12/21	MS pilot	DATA4PT website		NeTEx	Request for specific support - Validation
42	Taxi services, rent of vehicles (with or without driver), parking areas data in NeTEx	11/12/21	MS observer	DATA4PT website	Authority	NeTEx	Development and Tools
43	the use of existing tools	22/12/21	External user	DATA4PT website	Data Consumer	NeTEx	Development and Tools
44	Spanish ministry seeks for clarifications about NeTEx new modes and more	25/01/22		DATA4PT website	Governmental	NeTEx & SIRI	Validation tool
45	General question about SIRI - Patial coverage of the info SIRI uses	07/03/22	External user	DATA4PT website	Transport tool developer	SIRI	
46	Examples of parking services	17/03/22		DATA4PT website	Governmental	NeTEx	
47	Train station representation in NeTEx	18/03/22	External user	DATA4PT website	Transport tool developer	Transmodel	Model and UML
48	PassengerStopAssignment in French profile	12/04/22	French mobility IT company	DATA4PT website	Data Producer	NeTEx	Functional and scope
49	General implementation of SIRI and ITxPT	25/04/22		ITxPT network		Transmodel	Implementation

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
50	SIRI GetStopMonitoring - returning all stops	09/05/22	Not sure	DATA4PT website	Governmental	SIRI	XSD/WSDL
51	VehicleJourneyStopAssignmentsInFrame & java classes	09/05/22	External user	DATA4PT website	Data Producer	NeTEx	XSD/WSDL
52	Questions from Portugal	31/05/22		ITxPT network		NeTEx	Implementation
53	Different levels of stops	08/06/22	External user	DATA4PT website	Transport tool developer	NeTEx	XSD/WSDL
54	Are"StopCancellation","JourneyOrdering","OnlyIfSignedOn" represented in SIRI	09/06/22	External user	DATA4PT website	Data Producer	SIRI	Functional and scope
55	KeyValue use to express different network codes...	28/06/22	External user	ITxPT network	Transport tool developer	NeTEx	datasets validation
56	NETEX French timetables	28/06/22	External user	CEN portal	Data producer (?)	NeTEx	Journey pattern
57	Customised NeTEx webinars on accessibility for French ministry in french	09/07/22	MS partner	ITxPT network	Governmental	NeTEx	Training

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
58	Is it possible to get documentation on the European profile of the SIRI-ET datase	09/07/22	MS pilot	UITP member	Consumer but also responsiible to provide data to NAP	SIRI	Functional and scope
59	Touch on/ off transactions components in Transmodel	17/07/22	External user	DATA4PT website	Authority	Transmodel	Fares and money transactions
60	I would like to know how to convert GTFS to NeTEx for a project in cyprus with any tool or from scratch	29/07/22	External user	DATA4PT website	Other	NeTEx - SIRI	Development and Tools
61	Differentiate a basic JourneyPattern from re-routings due to planned deviations	18/08/22	External user	DATA4PT website	Data Producer	NeTEx	Functional and scope
62	NeTEx UML	16/09/22	External user	DATA4PT website	Data Producer	NeTEx	Model and UML
63	NeTEx routes and journey patterns	01/11/22	Observer	DATA4PT website	Data Producer	NeTEx	Model and UML

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
64	Implementation in France-from a beginner withb NeTEx	26/11/22		DATA4PT website		NeTEx	Implementation
65	How to express several things with NeTEx	07/12/22		DATA4PT website		NeTEx	Specification documents
66	NeTEx RouteLink unique or not ?	06/01/23	External user	DATA4PT website	Transport tool developer	NeTEx	Model and UML
67	Availability of SIRI-ET EU profile	10/01/23	External user	DATA4PT website	Transport tool developer	SIRI profile	
68	Training on NeTEx - SIRI -Transmodel for start-up project in Bulgaria	20/01/23	I work on my own project aiming to improve the PT in Bulgaria	DATA4PT website	Data Producer	NeTEx	training
69	SIRI functional scope	23/01/23	MS partner	DATA4PT website	Data Producer	SIRI	Functional and scope

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
70	Best practice xml for NeTEx network	14/02/23	Observer	DATA4PT website	Transport tool developer	NeTEx	Functional and scope
71	Explanation of NeTEx part 3.	16/02/23	External user	DATA4PT website	Transport tool developer	NeTEx	Training
72	Private initiative to create a database/service in Bulgaria	20/02/23		DATA4PT website		Transmodel	Training
73	SIRI real-time data compared to AMQP	27/02/23	MS partner	DATA4PT website	Governmental	SIRI	
74	NeTEx without quai description is acceptable?	05/03/23	We are using NETEX French Profil and promote this Data format	DATA4PT website	Data Repositotry	NeTEx	Functional and scope
75	SIRI implementation in Denmark	05/03/23		DATA4PT website		SIRI	Implementation

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
76	NeTEx codification, trigram for normal and flexible line	08/03/23	MS partner	DATA4PT website	Data Consumer	NeTEx	Implementation
77	NeTEx unique scheduledStopPointID	08/03/23	MS partner	DATA4PT website	Data Consumer	NeTEx	Functional and scope
78	Parking Data in NAP	08/03/23		DATA4PT website		NeTEx	Implementation
79	Version of Transmodel without EAP (like VSDX) - Transmodel UML is paid?	13/03/23	External user	DATA4PT website	Data Consumer	Transmodel	Use of existing tools
80	GBFS into SIRI FM	25/04/23	External user	DATA4PT website	Transport tool developer	SIRI	Model and UML
81	ScheduledStopPoint per stopPoint or stopArea with Chouette tool	02/05/23	MS partner	DATA4PT website	Data Producer	Chouette tool	Functional and scope

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
82	Accessibility facilities	31/05/23		DATA4PT website	Authority	NeTEx	
83	GTFS description of a train ride from Breda (NL), ETD to Antwerp (BE), ETA and price	11/07/23	External user	ITxPT network	Other	NeTEx	Request for specific support
84	Transmodel physical model	20/07/23	External user	DATA4PT website	Data Producer	NeTEx	Development and Tools
85	Deadline to be compliant to Transmodel regulations	20/07/23	External user	DATA4PT website	Software	Transmodel	Development and Tools
86	NETEX Framework and NETEX-GTFS Converter	01/08/23	MS pilot	ITxPT network	Authority	NeTEx	Functional and scope
87	Request from TML (Lisbon metropolitan area)	03/08/23		ITxPT network		NeTEx	

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
88	Fares modelling:dynamic change of tariffs	17/08/23	External user	DATA4PT website	Transport tool developer	NeTEx	Model and UML
89	NeTEx implementation for new modes in Vienna	18/08/23	MS partner	DATA4PT website	Authority	NeTEx new modes	Request for specific support
90	SIRI profile	25/08/23	Danish Civil Aviation and Railway Authority	DATA4PT website	Authority	SIRI profile	
91	Student asking how a company can pass from GTFS to NeTEx	07/09/23	External user	DATA4PT website	Student searching for information	NeTEx	Implementation
92	SIRI EstimatedTimetable : difference between world and french documentation	11/09/23	External user	DATA4PT website	Transport tool developer	SIRI	Model and UML
93	SIRI - overlap de journées d'exploitation (FR)	20/09/23		DATA4PT website		SIRI	

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
94	SIRI documents part 3 (+1,2,4 & 5)	28/09/23	Delivering data to the Danish NAP	DATA4PT website	Data Producer	SIRI	Specification documents
95	Small operator starting from scratch	28/09/23	Associated member of ITxPT	DATA4PT website	PTO	NeTEx	Use of existing tools
96	Examples for hail and ride section	29/09/23	MS pilot	DATA4PT website	Data Producer	NeTEx	XSD/WSDL
97	how to manage codespaces - unique identifiers for PTOs in Portugal	04/10/23	MS partner	DATA4PT website	Authority	NeTEx	Model and UML
98	Small new modes operators asking for tutorials for dummies	16/10/23		DATA4PT website		NeTEx	
99	SIRI ET modelling	30/10/23	Observer	github	Data Producer	SIRI	Model and UML

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
100	Are there aggregated data in French NAP	02/11/23		DATA4PT website		NeTEx	
101	Review Australian NeTEx and SIRI profiles	20/11/23		DATA4PT website		NeTEx	
102	NeTEx static data API how to do it	24/11/23		DATA4PT website		NeTEx	
104	Trouble using Italian NAP data - error with OpenTripPlanner	12/12/23	External user	DATA4PT website	Transport tool developer	NeTEx	XSD/WSDL
105	Question from Belgian stakeholder	09/01/24		DATA4PT website		NeTEx & SIRI	
106	Want to be part of work to develop relevant standards	23/01/24	Observer	ITxPT network	Authority		Model and UML

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Ticket number	Title	Date received	Interaction with DATA4PT consortium	Channel	Type of actor	Topic	Domain
107	Right implementation following NeTEx normalization	14/02/24	Observer	ITxPT network	Data Consumer	NeTEx	XSD/WSDL
108	"Rental with driver" data exchange (Italy)	15/04/24		DATA4PT website		NeTEx	
109	Problem with downloading old .eap format - release a new version	23/04/24	External user	DATA4PT website	Data Producer	Transmodel	Standards review and updates
110	Request to get more info about Transmodel	29/05/24	Not clear	DATA4PT website	Data Consumer	Transmodel	Training
111	NeTEx validation tool not available	18/06/24	External user	DATA4PT website	Transport tool developer	NeTEx	Use of existing tools

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