ACTIVITY REPORT 2023

ITxPT
INFORMATION TECHNOLOGY
for PUBLIC TRANSPORT

Standard-based Mobility IT

The non-profit association ITxPT enables an open architecture, data accessibility, and interoperability between IT systems.
The members of ITxPT develop the IT architecture for public transport and other mobility services together, based on standards and best practices. The specification is publicly available on the ITxPT website.
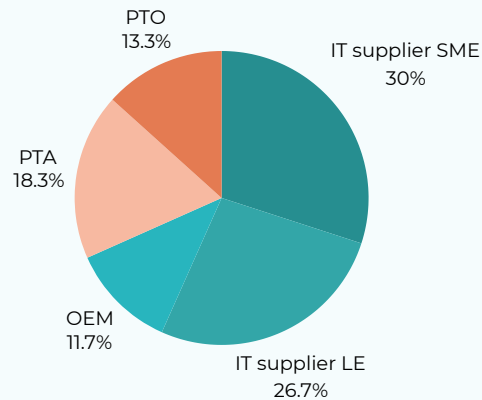
ITxPT
INFORMATION TECHNOLOGY
for PUBLIC TRANSPORT

2023 in numbers

Members from the whole world

In 2023, ITxPT counted 163 members and partner associations from 26 countries. With that, ITxPT is an essential factor in Mobility IT standardization, working to facilitate standardized data and develop innovative open IT solutions.
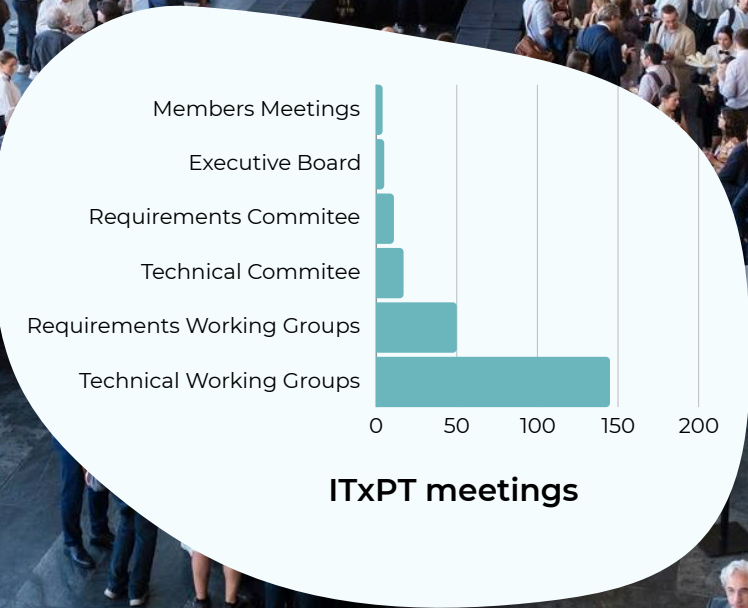
A third of the ITxPT Strategic and Principal members are Public Transport Authorities and Operators

PTO 13.3%

IT supplier SME 30%

PTA 18.3%

OEM 11.7%

IT supplier LE 26.7%

Meetings and activities

With over 225 working meetings and activities in 2023, the ITxPT collaborative community was highly active in developing new specifications, including the release of the Sequoia package. This update featured improvements in electric vehicle data, multi-GNSS constellation, and multi-language support.

Members Meetings
Executive Board
Requirements Commitee
Technical Commitee
Requirements Working Groups
Technical Working Groups

0   50   100   150   200

ITxPT meetings

IT✗PT Label deliveries

The ITxPT label proves that a device has passed the ITxPT compliance tests in the ITxPT laboratory and meets specifications. This label simplifies the tender process for both buyers and sellers.

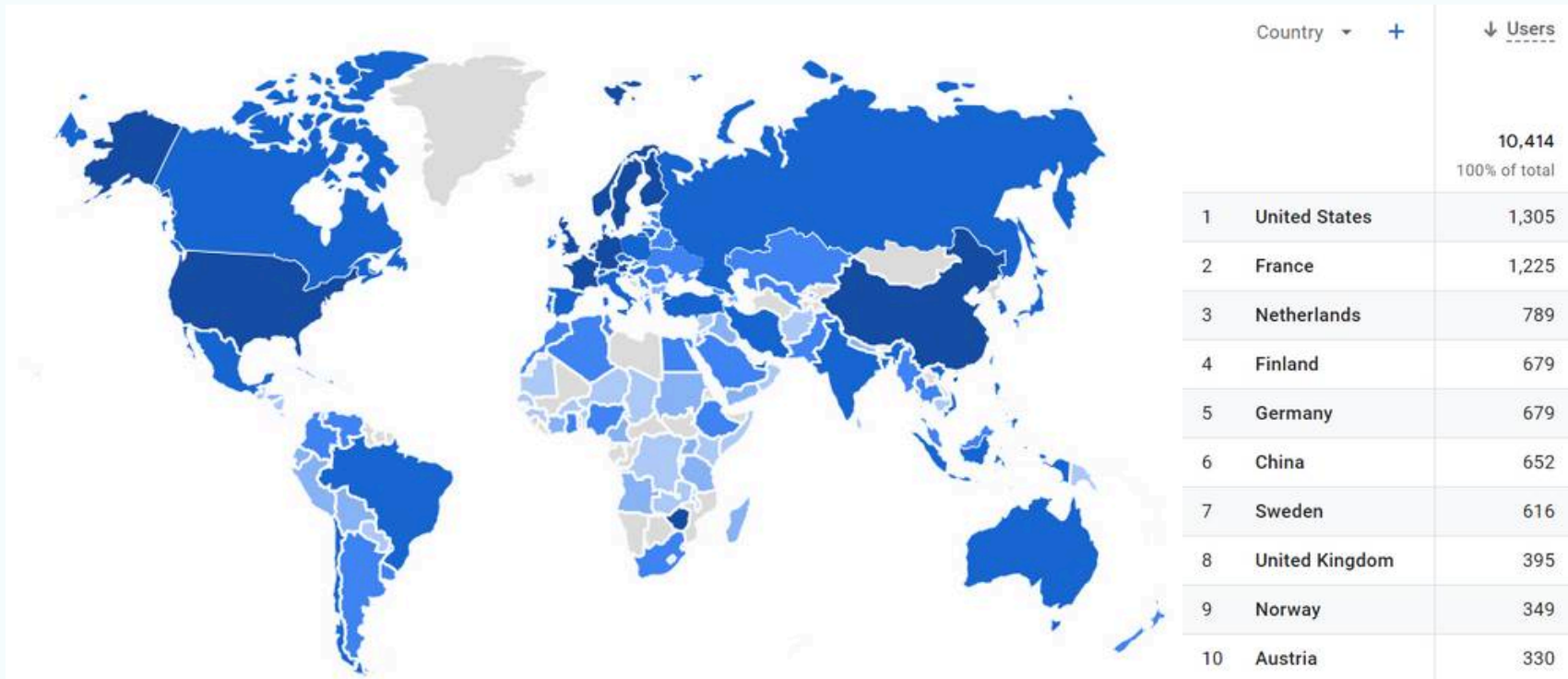**The granted labels are listed in the ITxPT online catalogue.**
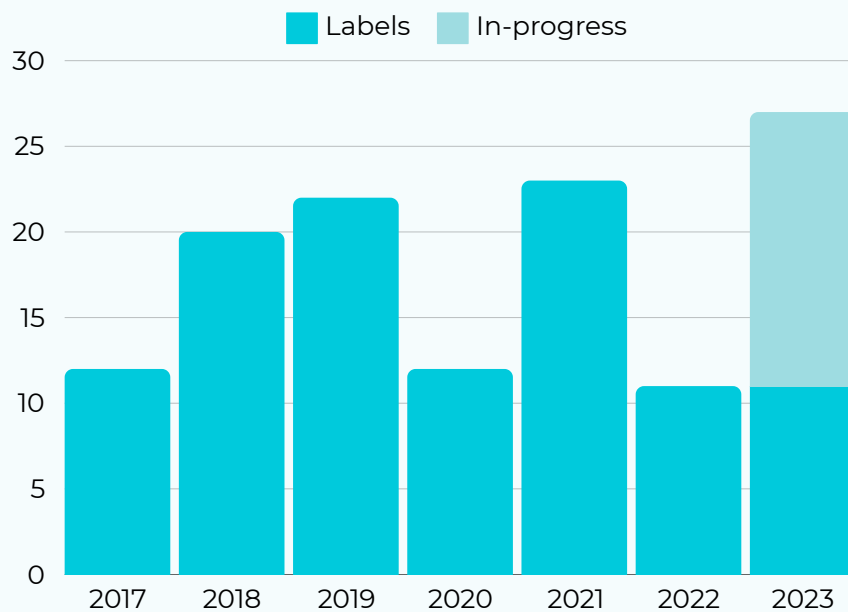
Labels growth

ITxPT knowledge center - Wiki

Anyone can register an account in the ITxPT documentation center and find the **ITxPT technical specifications**, the detailed **labeling process**, and other information about the association. ITxPT members have access to complementary information depending on their level of membership.

Country ▾ +	↓ Users
	10,414
	100% of total
1 United States	1,305
2 France	1,225
3 Netherlands	789
4 Finland	679
5 Germany	679
6 China	652
7 Sweden	616
8 United Kingdom	395
9 Norway	349
10 Austria	330

Wiki users are spread worldwide and include authorities, operators, vehicle manufacturers, IT suppliers, academics...

857 new registered users in 2023

10K active users in 2023

4m average engagement time

A word from the **Secretary General**

ANDERS SELLING
ITxPT Secretary General

2023 is the seventh year for ITxPT as an association and the year has taken several steps forward.

Taking the steps towards 3.0, supporting broker-based architecture – review and complement of the current specifications. Great opportunity to collaborate, building a knowledge foundation. Better grip on a datacentric architecture, what it means in a pragmatic architecture based on broker data distribution.

- **Taking the steps towards how to structure the specifications**, through continuous improvement aiming at:
  - user friendliness and clarification of the specifications,
    - focus on needs to support the PTA/O decisions and technical integration through clear definition of standardised requirements
    - ensure that suppliers have a clear and shared understanding of the technical expectations of an ITxPT architecture and their role within it
  - initiation of professional authoring and structuring of technical specifications designed collaboratively.
- **Taking the steps towards a larger scope of data supporting mobility**, that started from buses and now expanding to modes, showing the relevance of data sharing from vehicles to NAP, travelers, all users of travel data. ITxPT has become a respected stakeholder endorsing responsibility for technical work in projects funded by the European Commission.
- **Interest/demand of the market** : 22 members exhibiting in UITP Summit, increased inquiries from both Asia and North America – demonstrated by the Strategic membership of PTA such as Land Transport Authority Singapore (LTA) and Capitol Corridor Joint Power Authority (CCJPA). NTA (Ireland). Now starting a specific PTA plan to offer additional services.
- **Taking the steps to enhance resources to support laboratory activities**, enabling increased number of compliance labels in the ITxPT catalogue.

ITxPT is growing and developing in many ways. Our vision as an enabler for the digitalization of mobility is confirmed through ITxPT's **adaptation to many modes of transport**, support for more and more use cases, and **data sharing for stakeholders** both delivering and using mobility services. Our association is also growing in terms of **collaborations** with other associations, authorities, and stakeholders, where ITxPT is gaining **credibility as a trusted partner**.

2024 will be a year of taking **further steps** in establishing ITxPT in the mobility sector through, for example, delivering specification updates for broker architectures and further use cases, finalizing Data4PT, finding a solution to support mobility data for the National Access Points on behalf of the European Commission, and further developing the collaborative network in Europe, as well as from China in the east to the USA and Canada in the west.

ITxPT - a strategic choice

In a world with continually accelerating **IT evolution**, it is beneficial to become a strategic or principal member of ITxPT and join the **world-leading mobility actors** in developing the future of mobility IT. In all areas of mobility and smart city solutions, there is a need for **sharing standardized data between systems and services**, which the ITxPT specifications support.

Access to data – a strategic necessity

Innovative PTAs have expressed that access to their data is critical to their operations and competitive advantage. **Interoperable systems with data in a standardized format enable direct access to all data** – something proprietary solutions do not provide.

Tenders - streamlined procurement

The ITxPT Specification reduces the time and costs of specifying IT systems during tenders. With the standard-based ITxPT specifications as basic requirements for a tender, **the buyer and the supplier can focus on specific services and requirements** without wasting time on specifying basic IT functionalities.
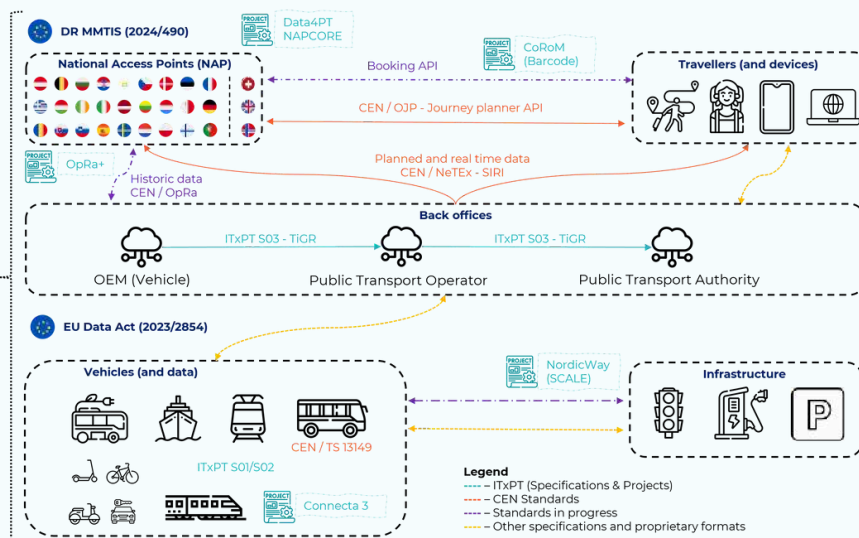
Strategic benefits of ITxPT

Improved efficiency:
Standardization facilitates **interoperability** between different systems and operators, reducing integration costs and enabling seamless data exchange.
Common data standards and interfaces eliminate the need for custom solutions, lowering development and maintenance expenses.
Enhanced customer experience:
Standardized systems and data formats enable **seamless travel experiences** across multiple modes of transport and different operators.
Consistent information presentation and ticketing systems improve user-friendliness for passengers.
Facilitated innovation and competition:
Open standards promote competition by allowing **new players to enter the market** without being locked into proprietary systems.
Interoperability encourages innovation by enabling the **integration of new technologies and services** with existing systems.
Increased sustainability and environmental benefits:
Standardized systems can optimize routes, schedules, and resource allocation, leading to **reduced emissions and energy consumption**.
Improved travel experiences and accessibility may **encourage modal shifts towards public transport**, further reducing environmental impact.
Costs saving:
Investment versus long-term savings. Invest in an architecture that will make systems sustainable in the future and more efficient today.
Future opportunities and challenges:
Address emerging trends (e.g., mobility-as-a-service, autonomous vehicles) and the importance of standardization in enabling **seamless integration and scalability**.
Address potential challenges, such as change management, legacy system integration, and the need for **ongoing collaboration among stakeholders**.
**Established standards-based approach:**
Be based on **Public Transport European standards (Transmodel ecosystem)**, means having a strong foundation for ITxPT to support end-to-end interoperability from vehicles to travelers. **CEN standards** are recognized as formal standards by the European Commission, making part of delegated regulations on mobility data. Stable governance process of CEN gives **credibility** and ensures **sustainability of ITxPT specifications**.

The ITxPT process

The ITxPT association uniquely provides a forum for **all public transport stakeholders** to address key topics such as interoperability, data-centric architecture, data mining, electric vehicles, IoT, MQTT, smart industry, MaaS, new transport modes, data exchange, and protocols.

Strategic and Principal members can participate in the **Requirements and Technical Committees**, along with their associated Working Groups. The governance of the ITxPT association by the ITxPT Executive Board is equitably balanced, with equal representation from Public Transport Authorities/Operators and the Industry.
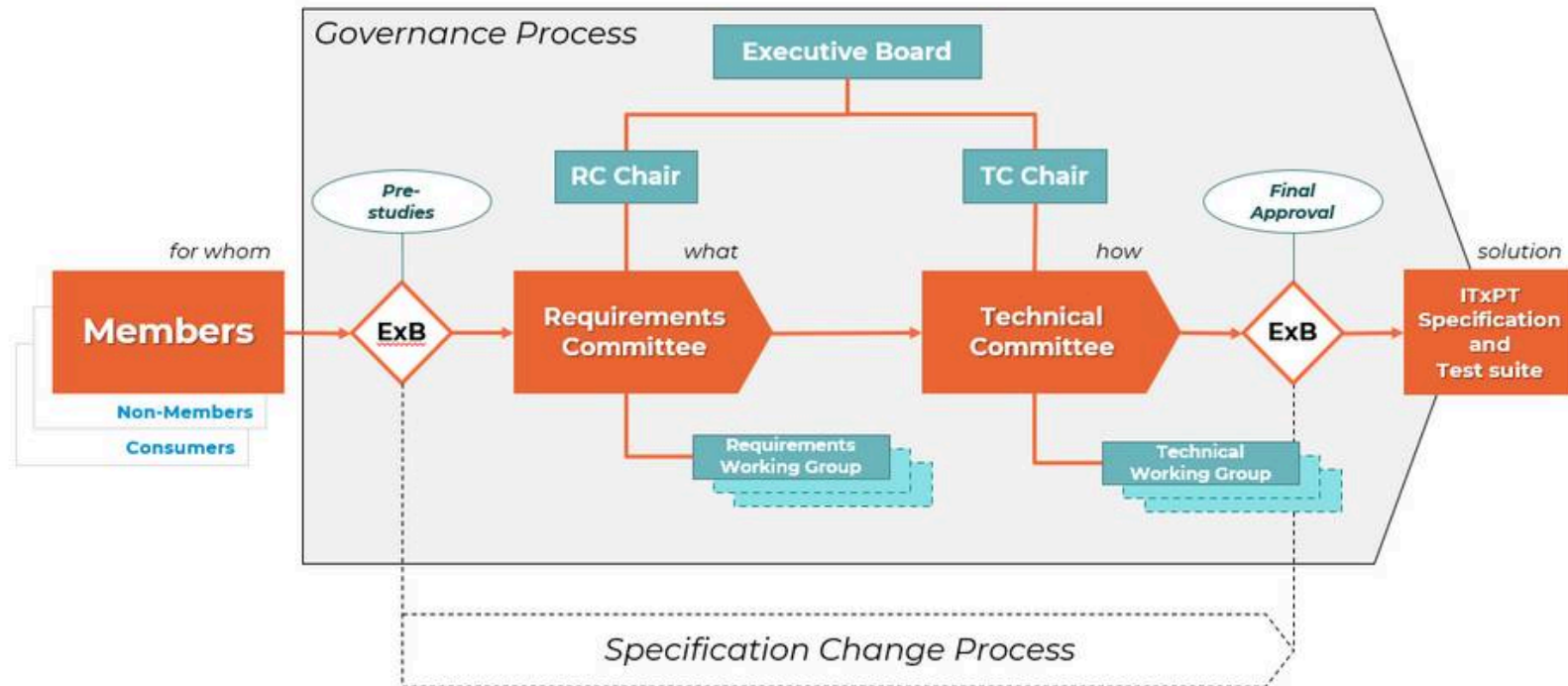
The Collaborative Community

Collaboration between members is the heart of the ITxPT operation, with committees and working groups composed of members carrying out the work. The ITxPT Office supports and leads the processes extending beyond the members.

How do we work ?

We work in a straightforward and **open collaboration**. The small ITxPT team and the Executive Board support a community of members working together to develop new and existing **ITxPT specifications**. With continuous improvement and iteration of the specifications based on customer needs, the specifications created are always highly relevant.

Committees drive specification development

The ITxPT Collaborative Community drives the specification development through two committees.
- The **Requirements Committee** collects and **defines customer needs**.
- The **Technical Committee** turns the requirements into **specifications**.

Collaboration beyond ITxPT members

Building on the extension of ITxPT community beyond its members, the year 2023 was very fruitful for partnerships building with several Memorandum of Understanding signed.

To support and expand the impact of our standardization work, we built relationships with:
- **VDV**, which will support all our members working in the DACH region and make sure ITxPT specifications is interoperable and relevant to all,
- **MobilityData**, which aims to provide a better interoperability between the EU standards for multimodal mobility data exchange NeTEx and SIRI and the industry specifications GBFS and GTFS.

To foster interoperability in our work and build bridges between our members and other stakeholders from the multimodal mobility sector, we can count on our latest partners:
- **MaaS Alliance**, which will make sure that standards and specifications are leveraged when sustainable mobility solutions are built for travellers.
- **Cycling Industries Europe**, which will allow us to include further cycling into public transport.
- **Smart Ticketing Alliance**, which will help build seamless mobility for all regardless of pre-existing and future technical choices.

As ITxPT keeps on seeing these partnerships as an important way to expand the work for the standardization of IT systems for multimodal mobility offers, we will strengthen these partnerships in the upcoming years as long as building new ones.

Requirements Committee achievements

Functional Requirements on 4 different topics

Requirements Committee members worked collaboratively in dedicated workshops, leading to the delivery of use cases and functional requirements.

- **Cyber-security**

Cyber-security has been prioritized by the RC community as essential to **ensure the benefits of the ITxPT open architecture** while **minimizing risks**. The functional requirements and use cases developed form the basis for **creating guidelines and technical requirements** for future enhancements of ITxPT specifications.

- **Heavy rail hardware interface**

The Working Group RWG01 delivered functional requirements that aim to **support the update of S01** ITxPT Technical Specification to address HeavyRail specific needs.

- **Demand Responsive Transport**

The identified requirements and use cases focus on the data types and functions required for **booking**, **operation** and **monitoring** of Demand Responsive Services with the aim to lead to the respective enhancement of ITxPT specifications.

- **Multimodal Integrated Ticketing**

The use cases and requirements focus on the data types and functions required to **support interfaces related to ticket validation** realized both by on-board equipment or through back-office systems.

Investigation of Signal Traffic Light Priority topic

Requirements Committee mission also concerns the identification of new topics that can be part of ITxPT roadmap.

In 2023, RC members investigated existing and planned approaches to **Signal Traffic Light Priority**. They identified the involved ITS systems, the interfaces between them, and the standards and technologies supporting these interfaces.

The results of the pre-study highlighted the lack of a list of use cases and requirements related to Signal Traffic Light Priority interfaces from the perspective of Public Transport operations. RC will consider in next years to work on creating a list of such use-cases with the aim to support Public Transport stakeholders to communicate their needs to traffic management stakeholders and support their effort in standardization.

Technical Committee achievements

ITxPT Dictionary

ITxPT has published the first release of its Dictionary, now available to the public in the Documentation Center in a searchable online format.

Based on Transmodel, reference standard for pubic transport concepts, this dictionary serves as a valuable **reference** for developers of ITxPT specifications and anyone involved in implementing compliant systems. It provides clear, standards-compliant definitions of **all terms used in the specifications**.

Additionally, ITxPT has expanded and strengthened its relationships with other bodies responsible for defining standards and regulations within the public transport domain.

PIS Pre-study

The Passenger Information System (PIS) working group has published a Technical Pre-study, accessible online to Strategic and Principal members here.

This pre-study provides a comprehensive technical analysis of the entire **passenger information domain**, covering the creation, monitoring, and management of information content from deployment to onboard and ground-based systems and devices. Following the completion of the pre-study, the working group, with the goal of developing suitable technical specifications, decided to initially focus on the final stages of this chain. This includes how information can be effectively conveyed to a wide range of display and audio devices to maximize ITxPT's aim of promoting interoperability.

Broker-based architecture

A strategic direction for a broker-based architecture has been agreed by the Technical Committee to underpins all future Technical Specifications.

Responding to member requests, ITxPT outlined plans to evolve architecture and processes towards a more **data-centric approach**. This initiative involves developing a **broker-based architecture**, with MQTT selected as the preferred mechanism following agreement by the TC. In November, a proposal for an **MQTT-based Inventory Service** was presented.

By year-end, it became evident that several other technical working groups *(TWG07 - Logon, TWG09 - AVMS2, TWG03 - APC2 POC, TWG06 - PIS)* had advanced to a stage where a detailed and unified approach to MQTT topic structure and payload definitions was necessary. As a result, a series of workshops addressing these needs was scheduled for early 2024.

Members events at conferences

Taking advantage of the existing tradeshows, ITxPT has organized two **networking events** for its members in 2023. It gave the chance to all to reconnect in person, discuss new projects, and simply strengthen existing relationships.

- In June during the **UITP Global Summit 2023**, our members got the opportunity to meet with Public Transport Authorities and Operators.
- In October during **Busworld Europe**, an opprtunity to discover the details of our partnership with the Busworld Foundation.

Other events to mention include ITxPT participation as speakers in the Data-driven Urban Mobility in Europe, Autonomy Mobility World Online, POLIS Annual Conference, and the 3 living labs of the EU-funded project MobiDataLab.

Working together with members on exhibitions

In 2023, the ITxP team took part in a number of community support and awareness-raising events.

- The **UITP Global Summit** in Barcelona included a networking event, two tours of exhibiting members for Public Transport Authorities/Operators, visits to members' booths, and bilateral discussions.
- The **Urban Mobility Days**, organized by the European Commission, highlighted the Data4PT project several times as a key component of the European smart mobility strategy.
- At **Busworld Europe**, ITxPT was the main partner of the first edition of the Digital Mobility Solutions Conference, and the team visited several members' booths.
- During the **2nd NAPCORE Mobility Data Days**, the ITxPT team's expertise was featured in four sessions and widely recognized for its contributions to the deliverables of this large EU-funded project.
- At the **7th edition of ICT for Railways**, one of our ITxPT demonstrated how the ITxPT specifications can be adapted for heavy rail to avoid reinventing the wheel in standardizing on-board equipment and IT systems.

Implementation projects drive innovation

As a highly active collaborative community, we are leaders, key contributors, and participants in several projects on the EU and national level. We help to increase implementation of the ITxPT specifications and support standardization.

The added value of the projects on ITxPT community is high ! The projects feed ITxPT roadmap, raising new functional areas, and new services that ITxPT can offer. Moreover, projects give credibility to our association, placing ITxPT as the single technical expert for multimodal public transport systems in the mobility ecosystem. The projects are funded by the EU and other external sources.

ITxPT is the technical leader of the EU project Data4PT, funded by the EU funding instrument Connecting Europe Facility (CEF). The project aims to enable union-wide multimodal travel information services and contribute to a seamless door-to-door travel ecosystem across Europe that covers all mobility services.

Therefore, it supports EU Member States in deploying a set of harmonized European public data standards (Transmodel, NeTEx and SIRI) and the implementation of National Access Points, according to Delegated Regulation on Multimodal Travel Information Systems (MMTIS DR) This regulation concerns all stakeholders in the Public Transport ecosystem and it is very highly related to overall ITxPT mission.
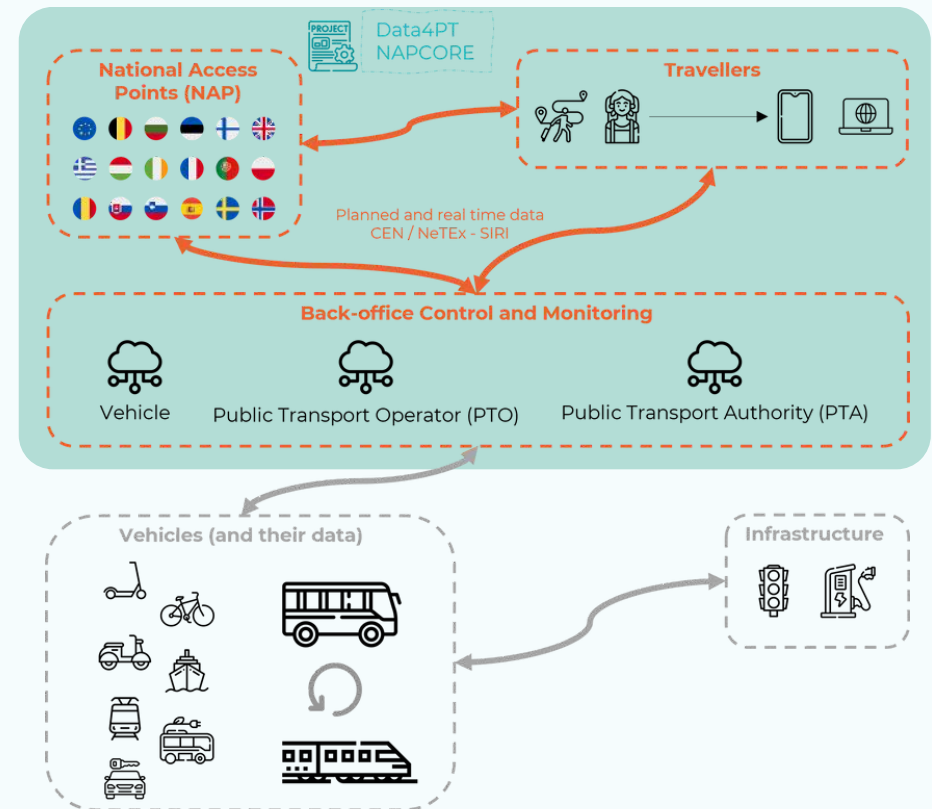
Updated release of Greenlight : the NeTEx files Validator

In 2022, the open-source tool for NeTEx datasets validation Greenlight was released for the first time to the public. This tool is addressed to both **data providers** and **data consumers** that want to ensure compliance of the data with EU technical standard NeTEx, but also to run consistency and plausibility checks, depending on their own conditions. This tool aims to contribute to the **interoperability goal** for public transport systems across EU.

The basic check corresponds to **XSD validation** against the correct version of NeTEx full schema and the European Passenger Information Profile (EPIP) schema. The more advanced checks concern content wise rules, adapted to the profiles and having the possibility to configure values when needed. The tool is provided in **Command Line Interface** for more technical users and in **Web Interface** for high level users. To access the tool and stay updated visit DATA4PT website.

During 2023, Greenlight was updated to optimize performance for large NeTEx files, to add customization features, to address bugs and to improve documentation, based on users' feedback that was collected within this period. Throughout this process, almost 100 files bimonthly have been processed, only by most of them with significant errors in their initial state. The validator helped users identify and correct errors on the files.
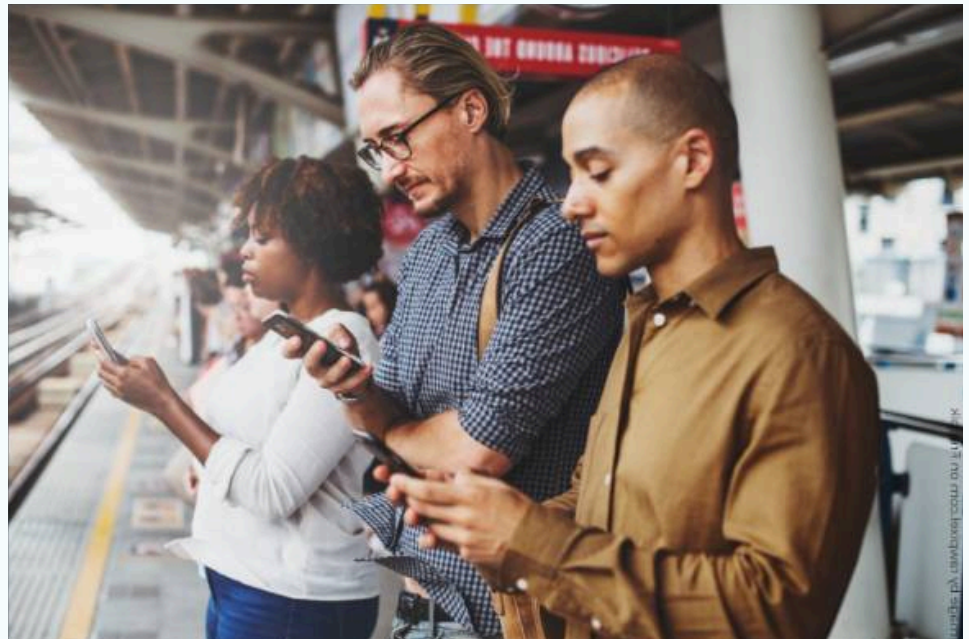
Video tutorials for NeTEx

In 2023, an initiative was sparked by Data4PT to create short videos explaining key aspects of the technical standards. The first video focused on NeTEx functional scope and main characteristics. 743 views during 10 months of streaming indicate the interest of stakeholders. More videos are in the pipeline to complement the webinars and written training material which are available already on DATA4PT website.

The Data4PT consortium has held stakeholders' workshops in national and EU level while also contributing to other events as panelists or facilitators. In UITP Summit of 2023 in Barcelona, we organized a panel session with main participants, Public Transport Authorities and Operators, highlighted the benefits and challenges of adopting EU standards and specifications in their operations. The panelists shared their experience with the attendees in an open discussion. The presentations are available in DATA4PT website. Three events where stakeholders could exchange good practices and get information about new trends and EU requirements. The stakeholders were also consulted on how to proceed in the deployment and could share their needs and feedback on how to improve and enhance current support.

NAPCORE

Introduction and Objectives
NAPCORE, the National Access Point Coordination Organisation for Europe, is a prominent European initiative involving 33 beneficiaries from 26 EU Member States and three associated partners. The main objective of NAPCORE is to coordinate and harmonise more than 30 mobility data platforms across Europe and to improve interoperability by establishing mobility data standards and recommendations for data exchange, content, access and availability within the mobility domain at a technical level.

Leadership and Focus Areas
ITxPT, as a recognised expert in public transport, leads Sub-Working Group 4.3, which focuses on multimodal data standards, with a specific emphasis on cycling, parking and rail. In 2023, the sub-working group continued the development of a guidance document on booking APIs to be implemented at national level, including how to interface with the National Access Points (NAPs).

Technical Contributions and Support
As active participants in other NAPCORE groups, we provide technical expertise on multimodal issues and support in the MMTIS Delegated Regulation. Our involvement extends to the development of a data dictionary for the MMTIS DR and the definition of a quality framework for multimodal datasets.

Stay Updated
For the latest updates on NAPCORE, please follow us on LinkedIn and YouTube.

ITxPT Laboratories and Services
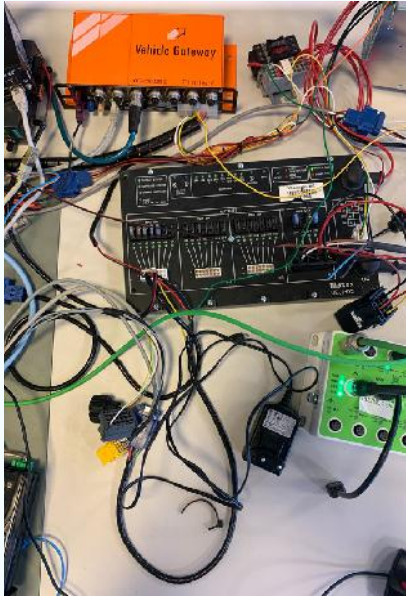
In 2023, significant changes occurred within our laboratory in Gothenburg (Sweden).

The former lab manager left in June, and we appreciate the significant contributions made and professional achievements. We introduced new methods and processes to ensure smooth operations.

Throughout 2023, the partnership with the Le Mans laboratory (in France) has significantly advanced, solidifying its key role in our labeling activities. Substantial progress has been achieved in refining processes, thereby ensuring a more seamless labeling procedure.

Substantial contributions to documentation and development were made thanks to an 8-month internship, laying the groundwork for our virtual bus project. This initiative aims to offer a service facilitating the verification and understanding of ITS interactions.

In October, we did welcome our our new lab manager, who brings extensive experience in automated testing and a test-driven approach, along with a robust background in the automotive industry and embedded systems.

ITxPT members 2023

4PT	EGIS	LUMINATOR	SNCF
ACKSYS	EQUANS	LUMIPLAN	SOLARIS BUS
ACTIA	EUROTECH S.P.A.	MAESTRONIC	ST ENGINEERING
ADIBUS	EXPLEO	MAGNETIC NORTH	STA
ADLINK	FARA	MAN TRUCK & BUS	STIB
AESYS	FLOWBIRD	METATRONIX	STRATIO
ALCOM ELECTRONICS	FOURC	MLC ITS EUSKADI	STREAMAX
ARRIVA	GAIA	MOXA	SWARCO
ARRIVA TRAINS	GIRO	MOVIA	TAIT COMMUNICATIONS
ASSTRA	GMV	MULTIQ	TELESTE
ATB TRONDHEIM	TONGDA	NTA IRELAND	TELEXIS
ATRON	GVB	NAVOCAP	TELIA
AXENTIA	HANOVER DISPLAYS	NBMS - SNCB	TENIX
AXIS COMMUNICATIONS	HELLA AGLAIA	NEC	TEQ
BEIJER ELECTRONICS	HIKVISION	NETMODULE	THOREB
BELDEN GROUP	HITACHI ENERGY	NEWFLYER	TIDE
BLUEBUS	HITACHI EUROPE	NOBINA	TISSEO COLLECTIVITÉS
BUS EIREANN	HIVEMQ	NORDLAND CITY COUNCIL	TP DE LA RÉGION LAUSANNOISE
BUSTEC	HOGIA	NORLED	TPG
BYD	HOSTMOBILITY	OBSERVIT	TRANSDEV
CAF	HSL HELSINKI	ORING	TRANSPORT FOR LONDON
CCJPA	ICOMERA	OWASYS	TRAPEZE
CARD4B	INDRA SISTEMAS	OXYFI	TRIMET PORTLAND OREGON
CECCLI	INFODEV	PARKWAY AUTONOMOUS	TRIONA
CIBEST	INIT	PILOTFISH	TRONTEQ
CISCO	INTRAFFIC	PLL	UITP
CLEVER DEVICES	ISR CORP	PSI SOFTWARE	UNIBUSS
CONDUENT	ITO WORLD LTD	QBUZZ NL	VASTTRAFIK
CONNECT BUS	IVECO FRANCE	R2P	VDS RAIL
CONSAT	IVU TRAFFIC TECHNOLOGIES	RATP	VIX TECHNOLOGY
CRADLEPOINT	JOURNEO	REGION STOCKHOLM	VOLVO BUSES
CS GROUP	KENTKART	RIDANGO	VONTAS
CUBIC	KEOLIS	RTM MARSEILLE	VY BUSS
DAIMLER BUS	KOLLEKTIVTRAFIKKFORENINGEN	RUTER	WAVECOM
DAHUA	TRANSPORT NORWAY	SAFETY VISION	WESTERMO
DATIK	KONTRON	SAFRA	XIAMEN LENZ
DE LIJN	LANTECH	SCANIA	XIMEDES
DIGI	LECIP	SKANETRAFIKEN	XOVIS
DRESEARCH	LEONARDO	SKANTECH	YES EU
DTI	LTA SINGAPORE	SKYSS HORDALAND AUTHORITY	ZF OPENMATICS

ITXPT

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for PUBLIC TRANSPORT

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