



## Transmodel implementation Case studies

**Webinar**

**12 April 2021**

Ulf Bjersing, DATA4PT expert

Data4PT has received funding from the European Union's DG for Mobility and Transport under grant agreement No MOVE/B4/SUB/2019-104/CEF/PSA/SI2.821136





# Transmodel implementation

## Historic



Bus

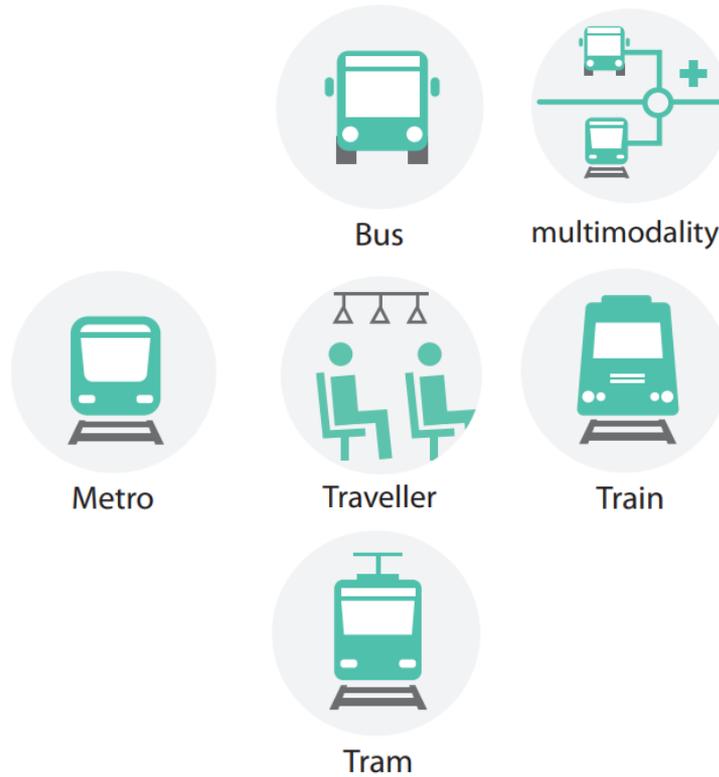


Traveller



# Transmodel implementation

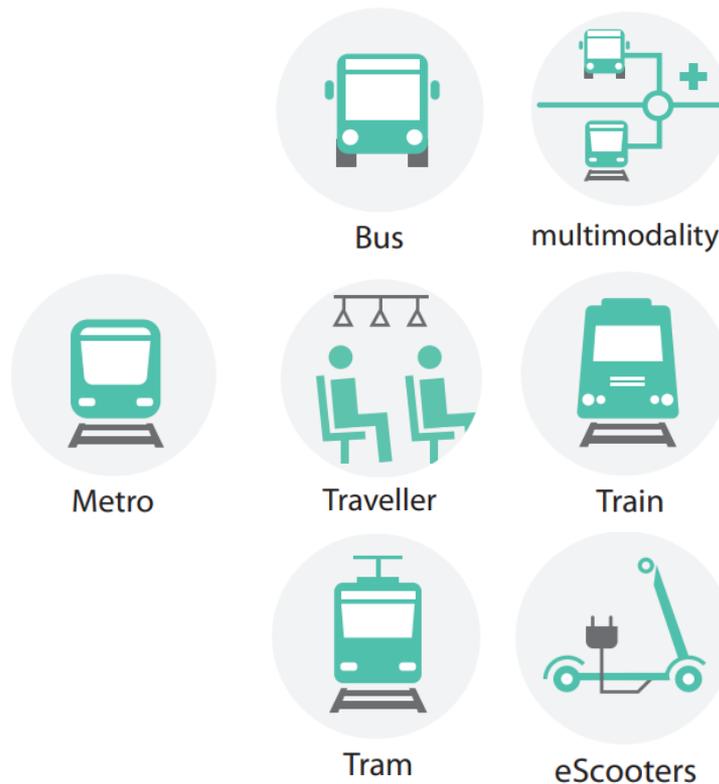
Extended scope over time





# Transmodel implementation

Living with change





# Transmodel implementation

## Integration of information – extended expectations



Data



Bus



multimodality



Metro



Traveller



Train



Interoperability



Tram

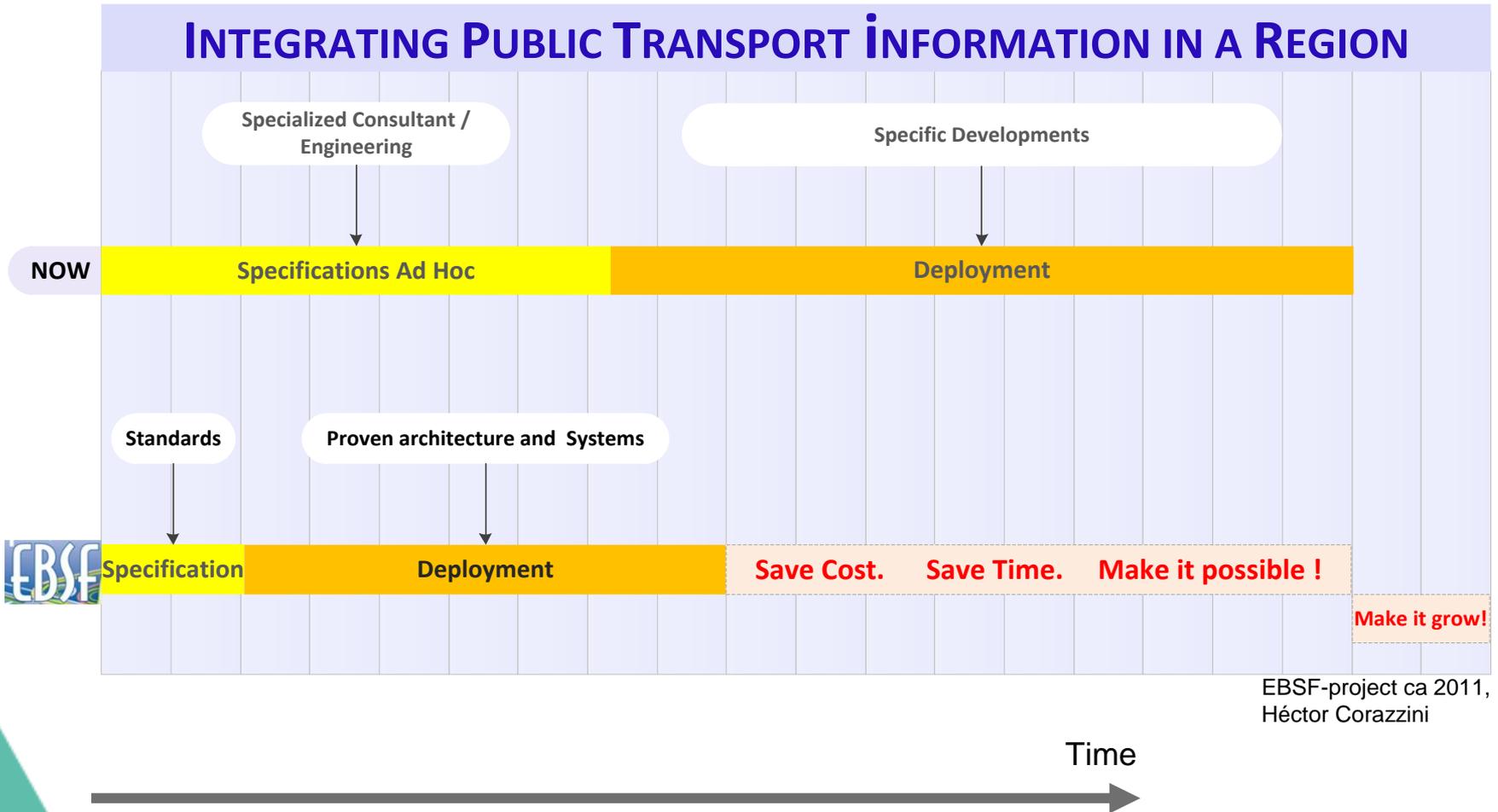


eScooters



# Transmodel implementation

## Using standards to avoid ad-hoc extensions



EBSF-project ca 2011,  
Héctor Corazzini



# Transmodel used in EBSF 2 project



## Field test at Transport for London

**NeTEx and SIRI profiles** were developed and tested as part of the European Bus System of the Future 2 project in cooperation with partners from different countries.



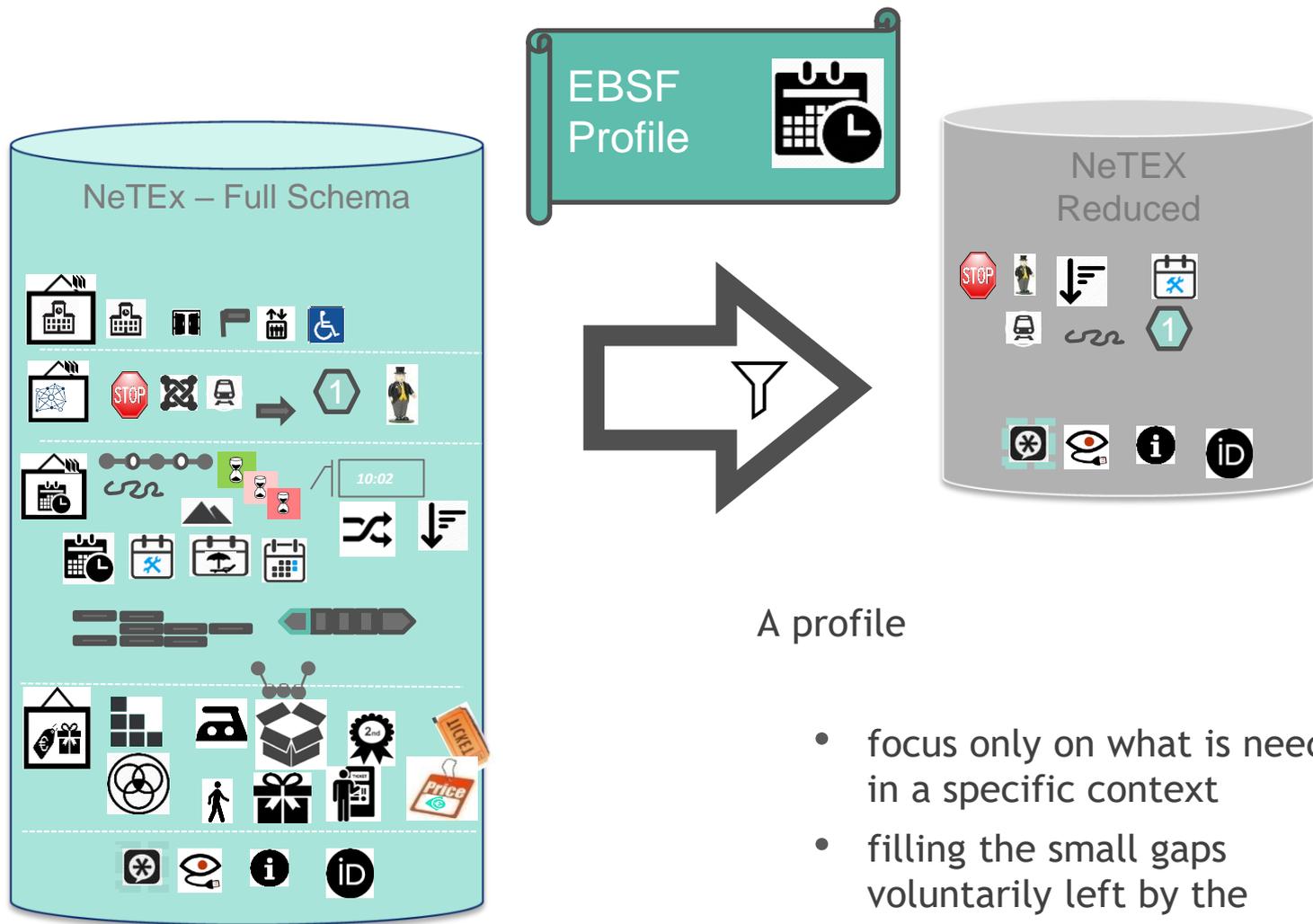
# Profiles - reminder

## A profile

- focus only on what is needed in a specific context
- filling the small gaps voluntarily left by the standard



# Profiles - reminder



A profile

- focus only on what is needed in a specific context
- filling the small gaps voluntarily left by the standard



# EBSF 2 NeTEx Profile



Planned data:  
Network  
Timetables  
Vehicle Schedules

NeTEx (EBSF 2) Producer 1.0 - Interface Specification Approved

Author: Ulf Bjersing  
Document Identity: IS-PT/1/NETEX\_EBSF2/PRODUCER/1

Date: 2016-06-23  
Revision: PA6

35(45)

		(This element will always be included in EBSF2 profile 2 deliveries.)
<ul style="list-style-type: none"> <li><u>TimeDemandTypeRef</u></li> </ul>	1:1	<p>A reference to the applied TIME DEMAND TYPE for this DEAD RUN</p> <p>A TIME DEMAND TYPE is an indicator of traffic conditions or other factors that may affect vehicle run or wait times.</p> <p>The contained ref-attribute represents a synthetic TIME DEMAND TYPE based on analyzing and enumerating the different timings used for complete JOURNEY PATTERNS.</p> <p>Eg. TT_118</p> <p>Note that the TIME DEMAND TYPE enumerations are not synchronized across different JOURNEY PATTERNS.</p>
Calls	1:1	Ordered collection of the CALLs included in this SERVICE JOURNEY.
<ul style="list-style-type: none"> <li>Call</li> </ul>	2:m	<p>A CALL provides assembled data related to the visit to a POINT IN JOURNEY PATTERN, such as Arrival and Departure times, in an un-ambiguous manner without having to analyze TIME DEMAND TYPEs or combine run and wait times.</p> <p>See details below.</p>

3.5.2.3 Calls (in SERVICE JOURNEY)

Container for the ordered collection of CALLs included in a SERVICE JOURNEY.

Elements		Description
<u>ScheduledStopPointRef</u>	1:1	<p>Reference to the POINT IN JOURNEY PATTERN that this CALL applies to.</p> <p>For POINTs IN JOURNEY PATTERN that are listed as SCHEDULED STOP POINTs the contained Ref-attribute has the same value as the Id of the associated SCHEDULED STOP POINT in the SITE FRAME and is on the form <code>Id:stopPointIdx:Stop Point Idx</code></p> <p>Eg. <code>Id:stopPointIdx:3215</code></p>



# Transmodel used in EBSF 2 project (1)



Bespoke  
planned data





# Transmodel used in EBSF 2 project (2)



Bespoke planned data



Planned data:  
Network Timetables  
Vehicle Schedules



Bus



Bus



Bus



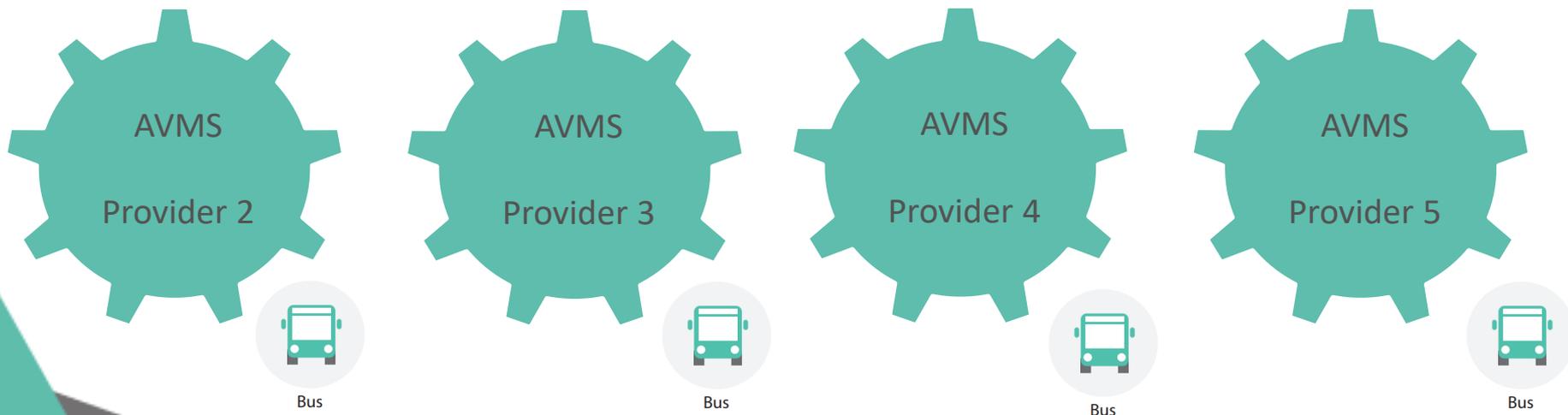
Bus



# Transmodel used in EBSF 2 project (3)

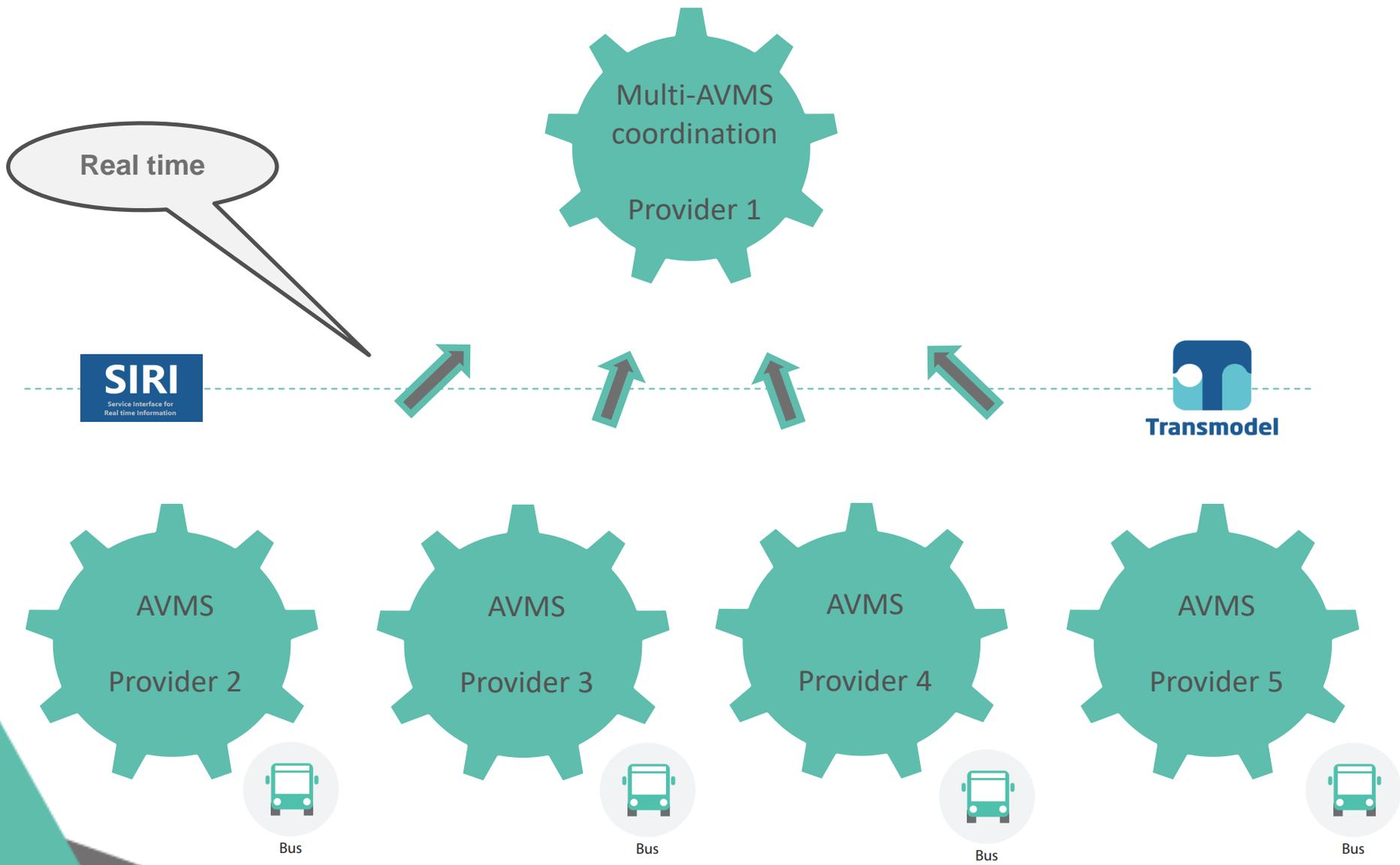


AVMS = Automatic Vehicle Monitoring Service



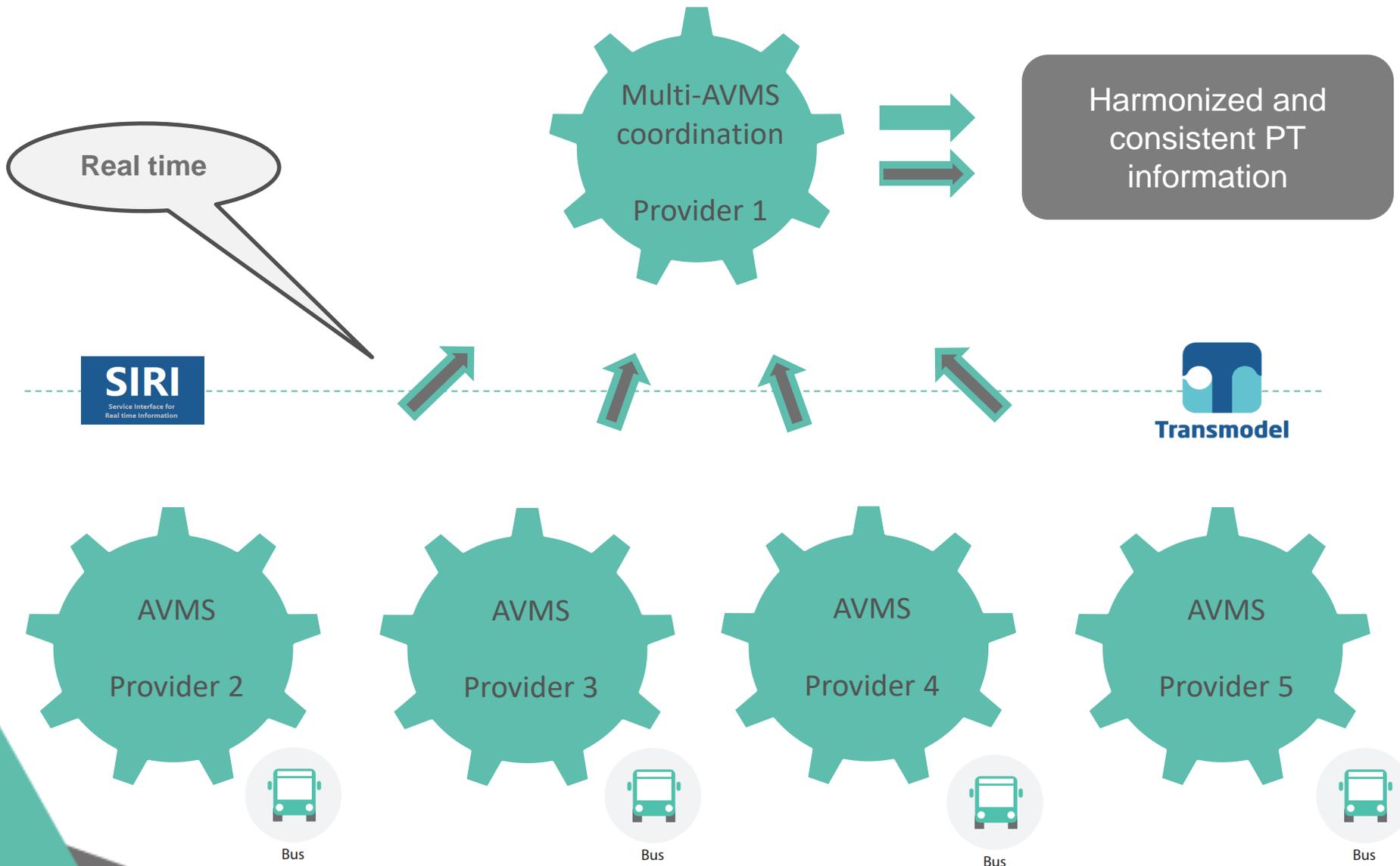


# Transmodel used in EBSF 2 project (4)





# Transmodel used in EBSF 2 project (5)





# Transmodel implementation – on many levels

- Within an organisation
- Within a region
- Within a country
- Across Europe



# Transmodel implementation in Sweden

## Separation of concern and integration of data (region)

**Stops**

- Reference
- Name
- Location

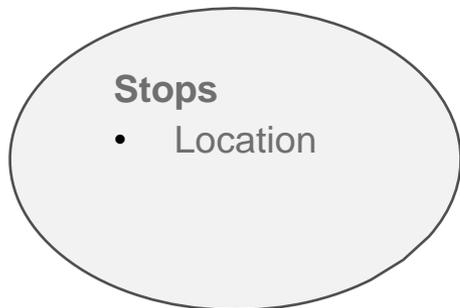


Public Transport  
Authority



# Transmodel implementation in Sweden

## Separation of concern and integration of data (region)



Public Transport  
Authority

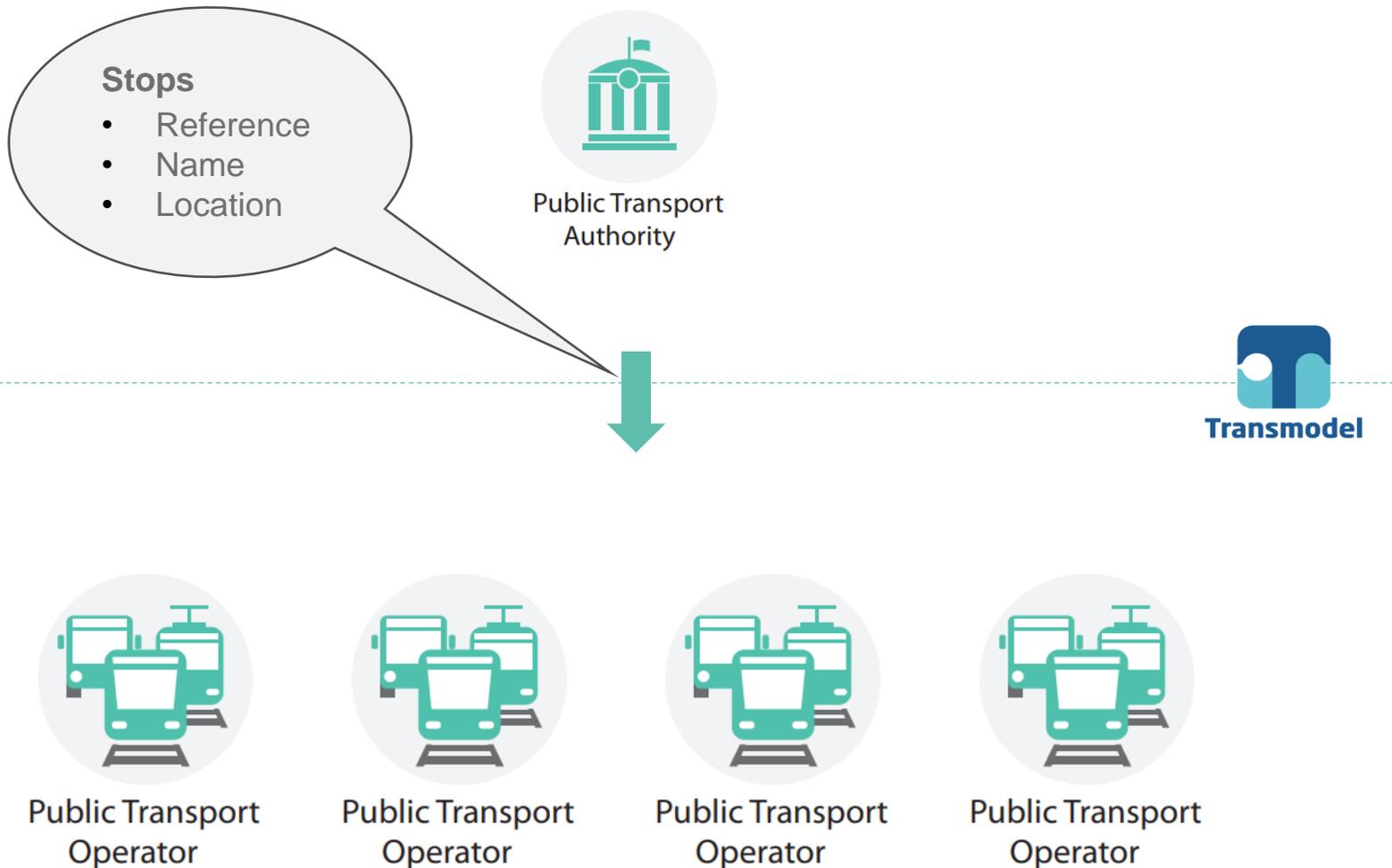


Public Transport  
Operator



# Transmodel implementation in Sweden

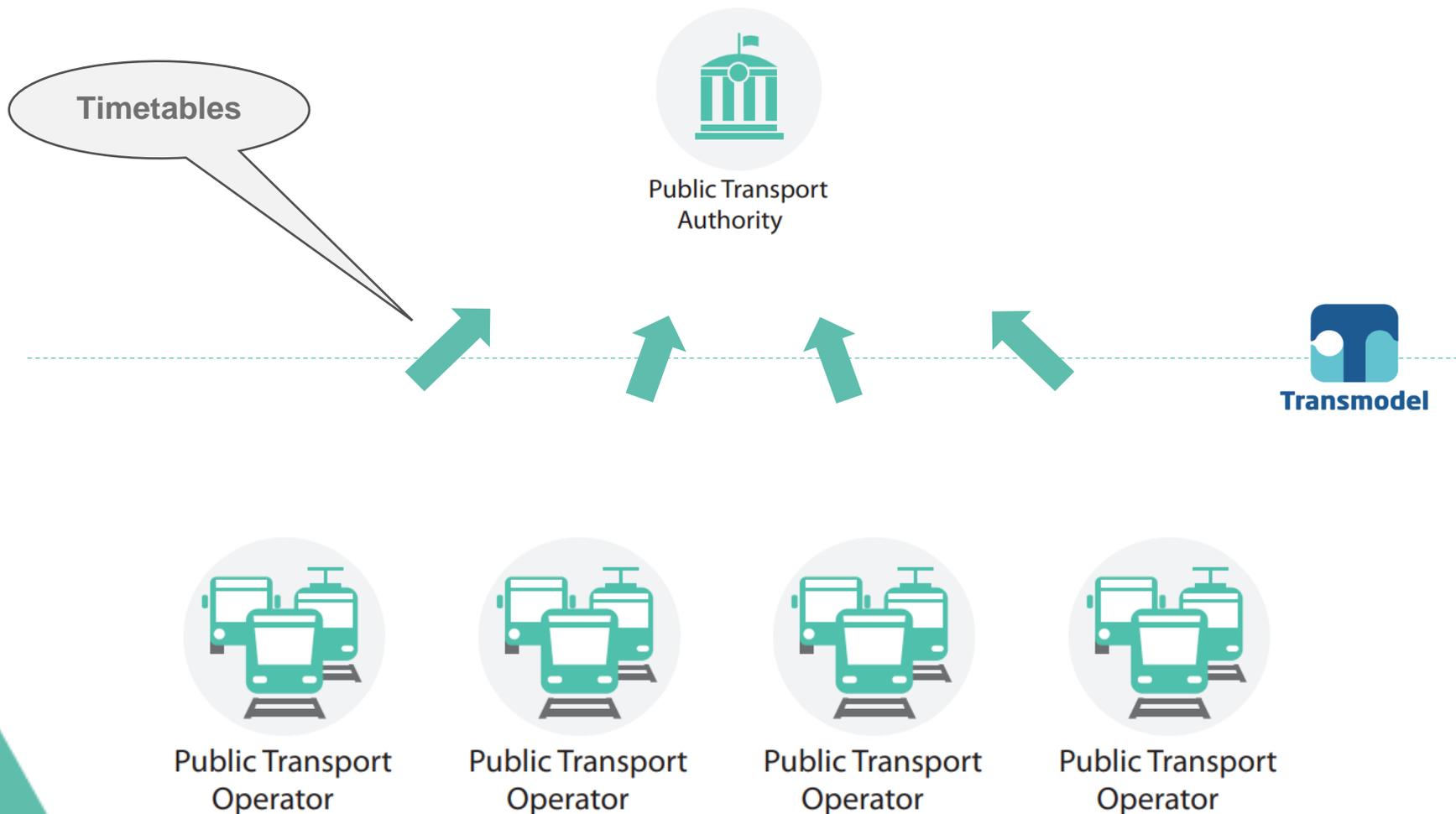
## Separation of concern and integration of data (region)





# Transmodel implementation in Sweden

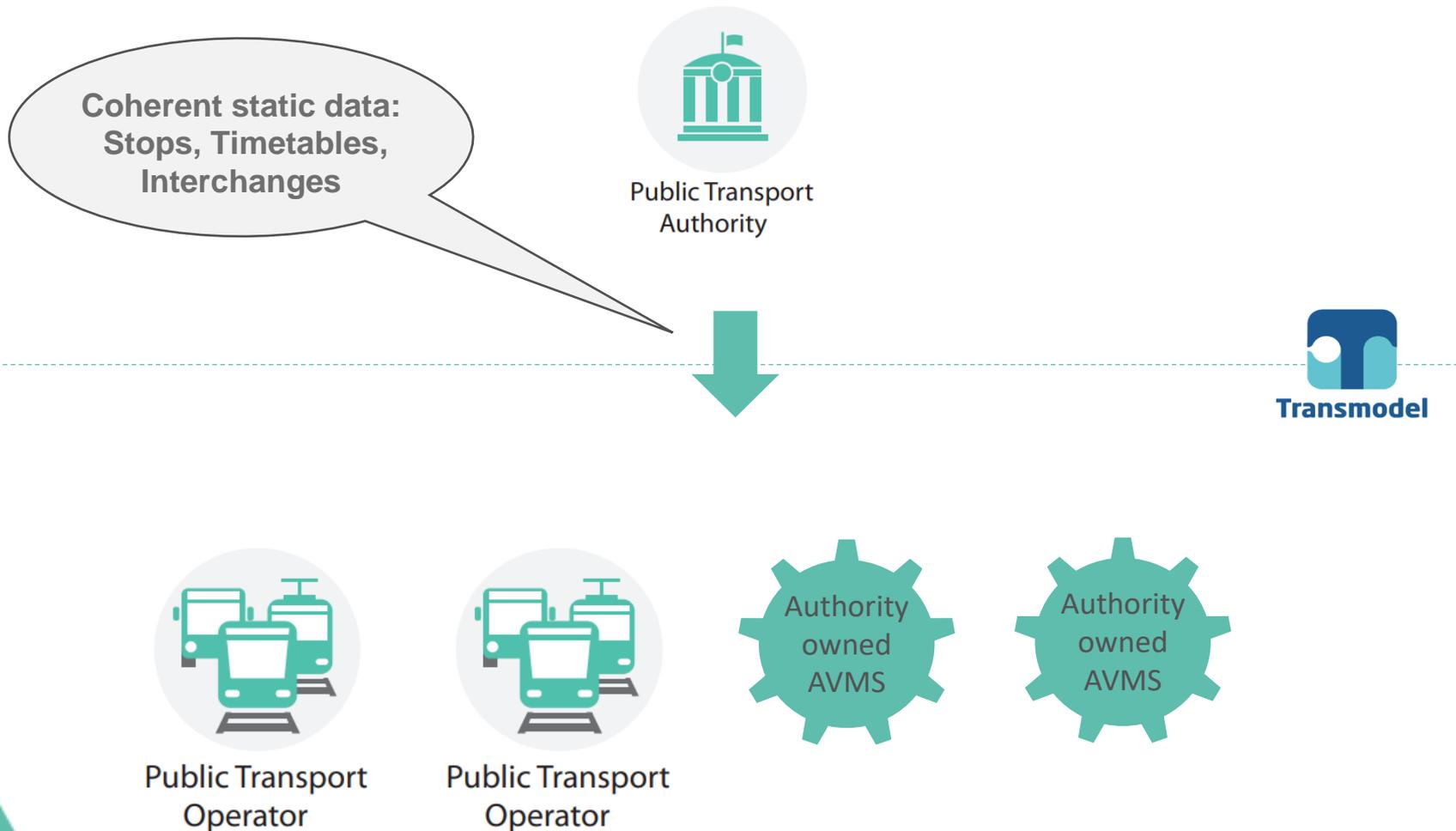
## Separation of concern and integration of data (region)





# Transmodel implementation in Sweden

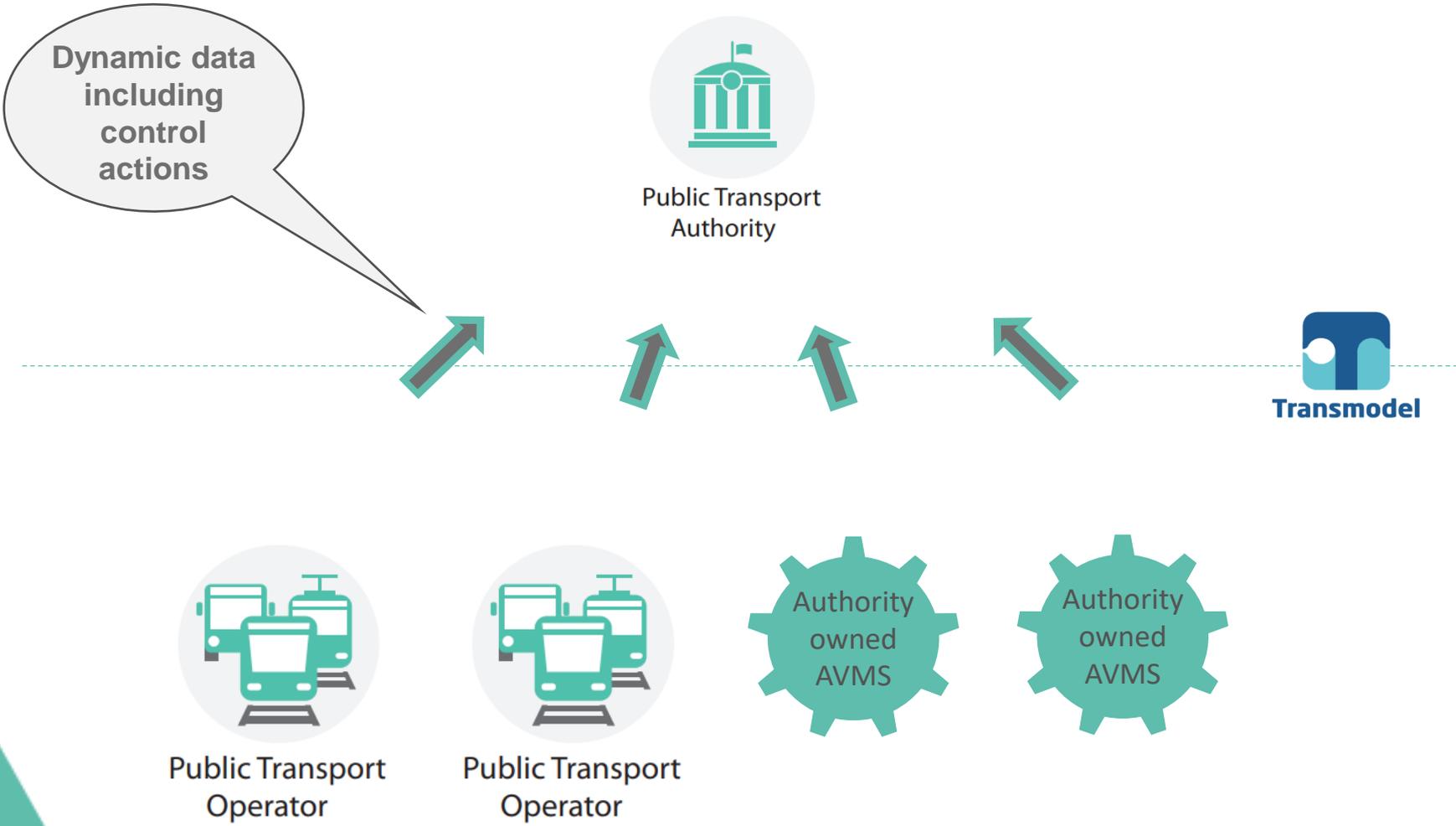
## Separation of concern and integration of data (region)





# Transmodel implementation in Sweden

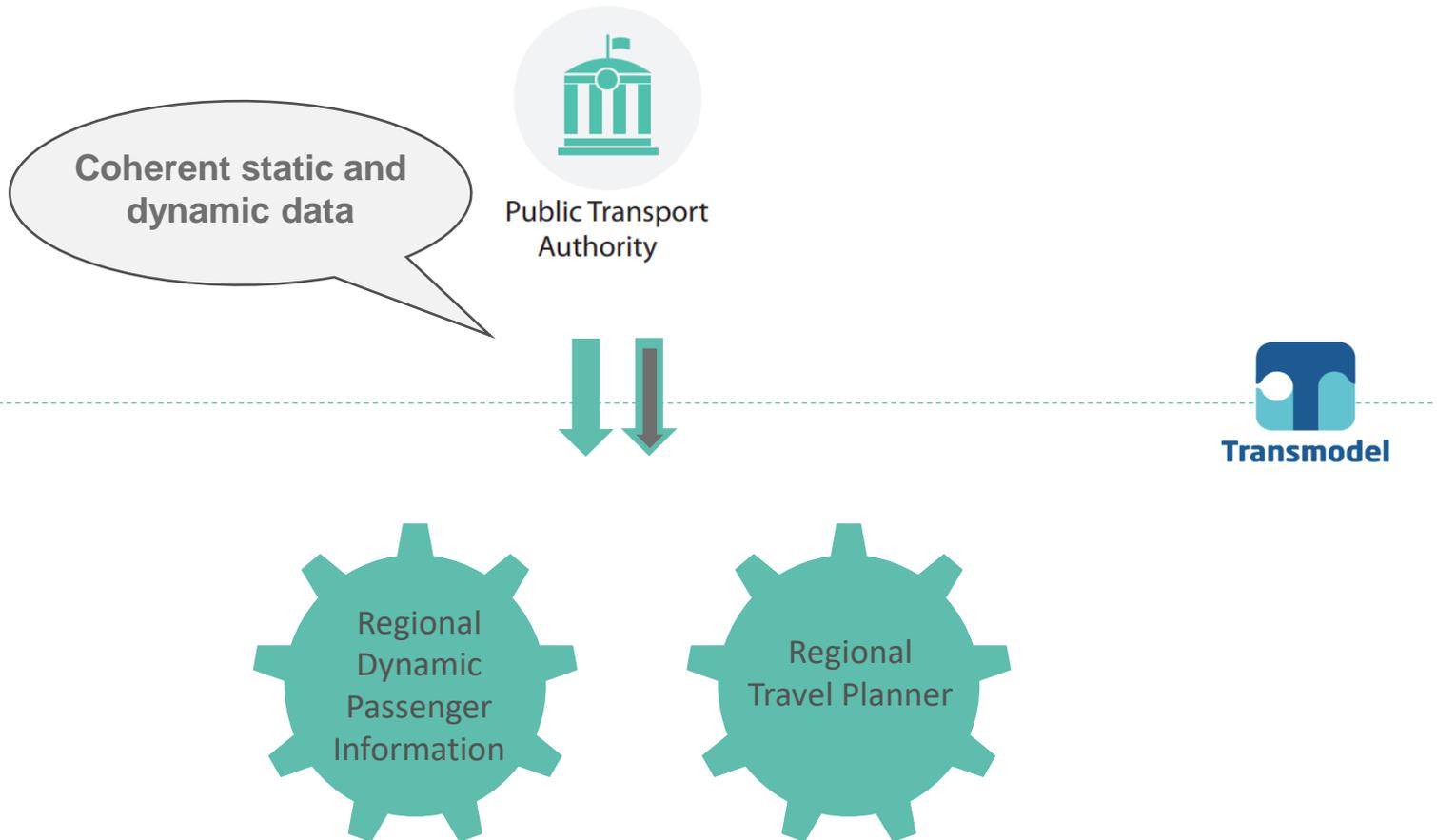
## Separation of concern and integration of data (region)





# Transmodel implementation in Sweden

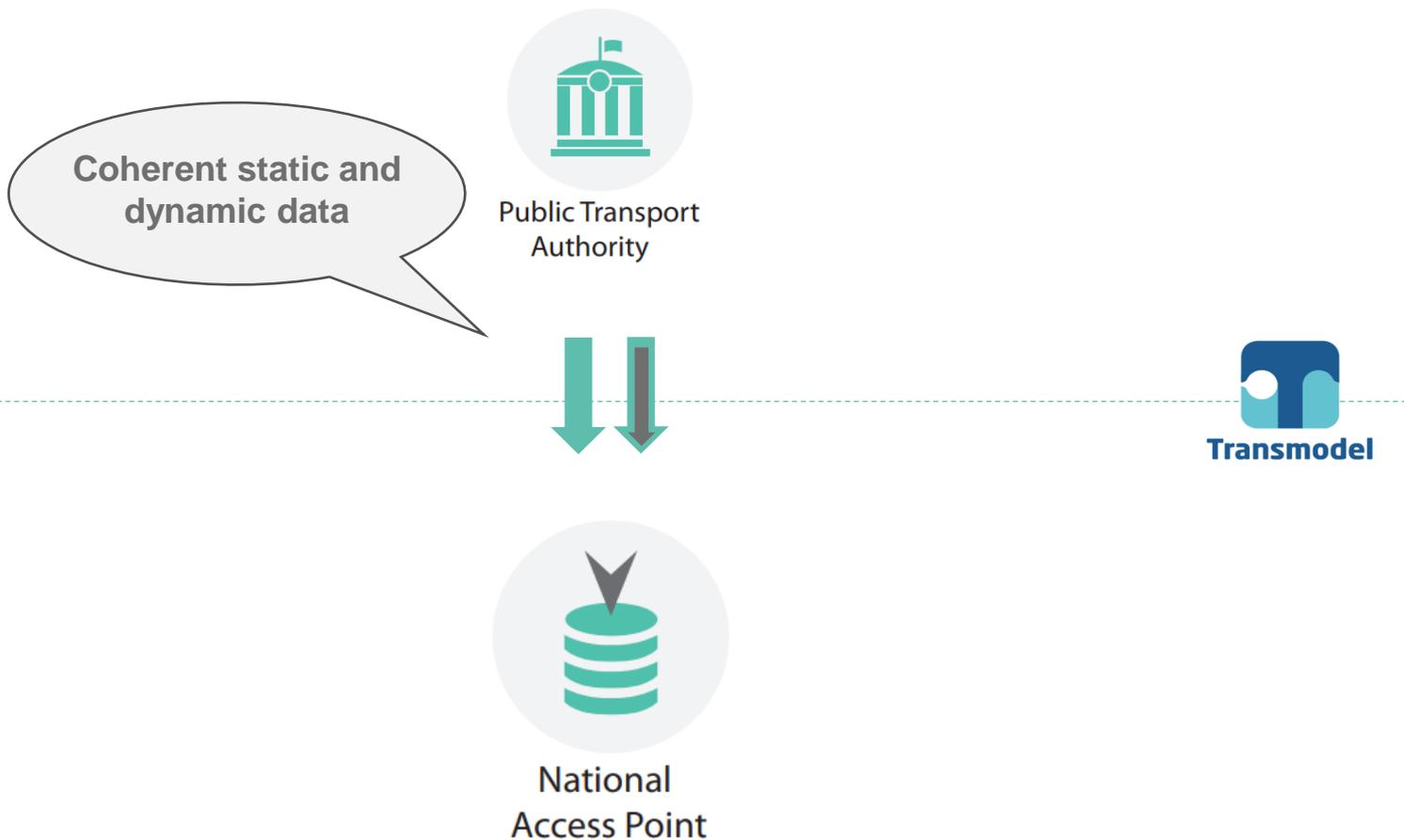
## Separation of concern and integration of data (region)





# Transmodel implementation in Sweden

## Separation of concern and integration of data





# Transmodel implementation in Sweden

## Separation of concern and integration of data



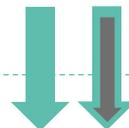
Public Transport Authority



Public Transport Authority



Public Transport Authority



National Access Point



# Transmodel implementation in Sweden

## Separation of concern and integration of data



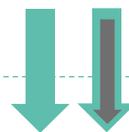
Public Transport Authority



Public Transport Authority



Public Transport Authority



Static and dynamic data



National Access Point





# Transmodel implementation in Sweden

## Separation of concern and integration of data



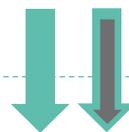
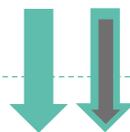
Public Transport Authority



Public Transport Authority



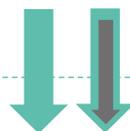
Public Transport Authority



Static and dynamic data



National Access Point



GTFS, GTFS-RT





# Transmodel implementation - European level

Supporting the provision of Union-wide multimodal travel information services

ITS Directive  
Delegated Regulation  
EU 2017/1926



Interoperability



multimodality



Data





# Transmodel implementation - European level

Supporting the provision of Union-wide multimodal travel information services

ITS Directive  
Delegated Regulation  
EU 2017/1926



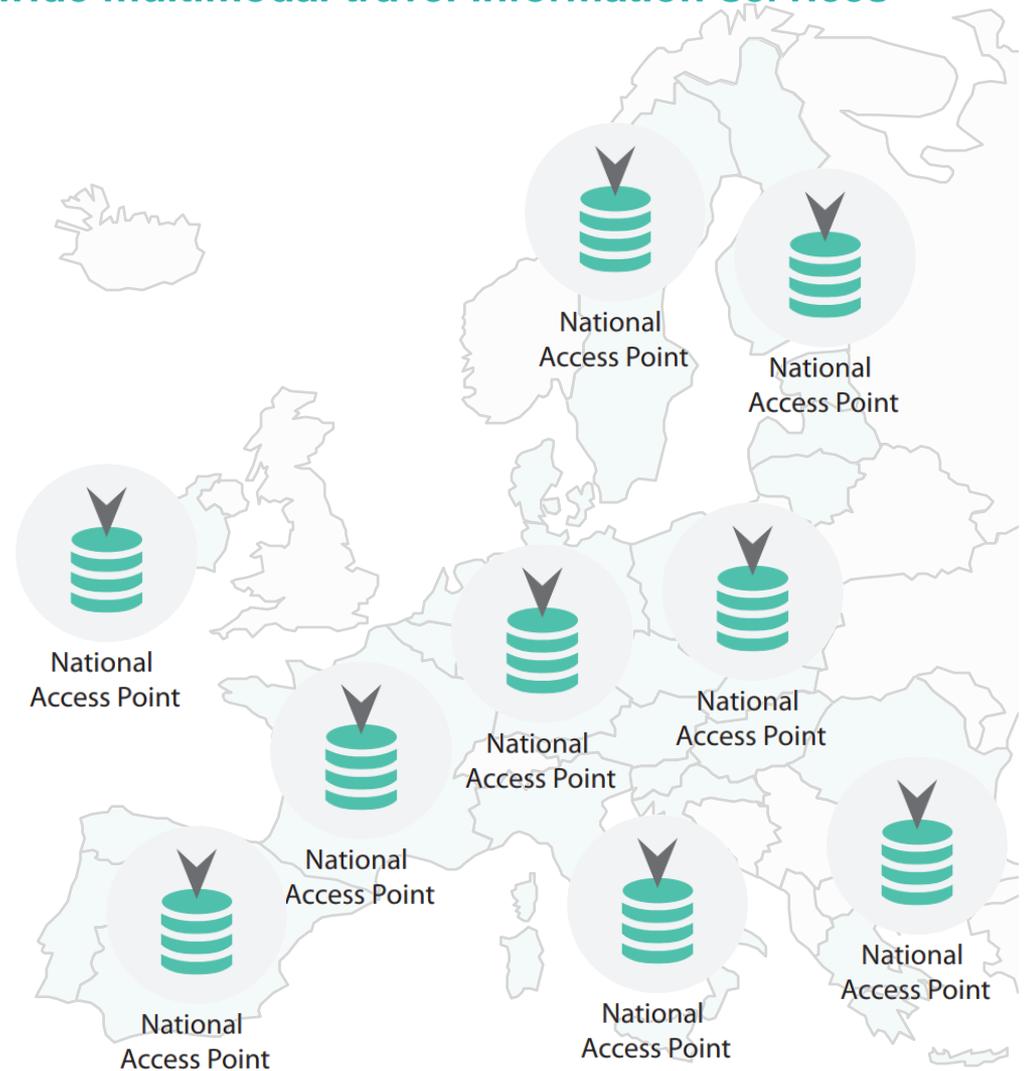
Interoperability



multimodality



Data



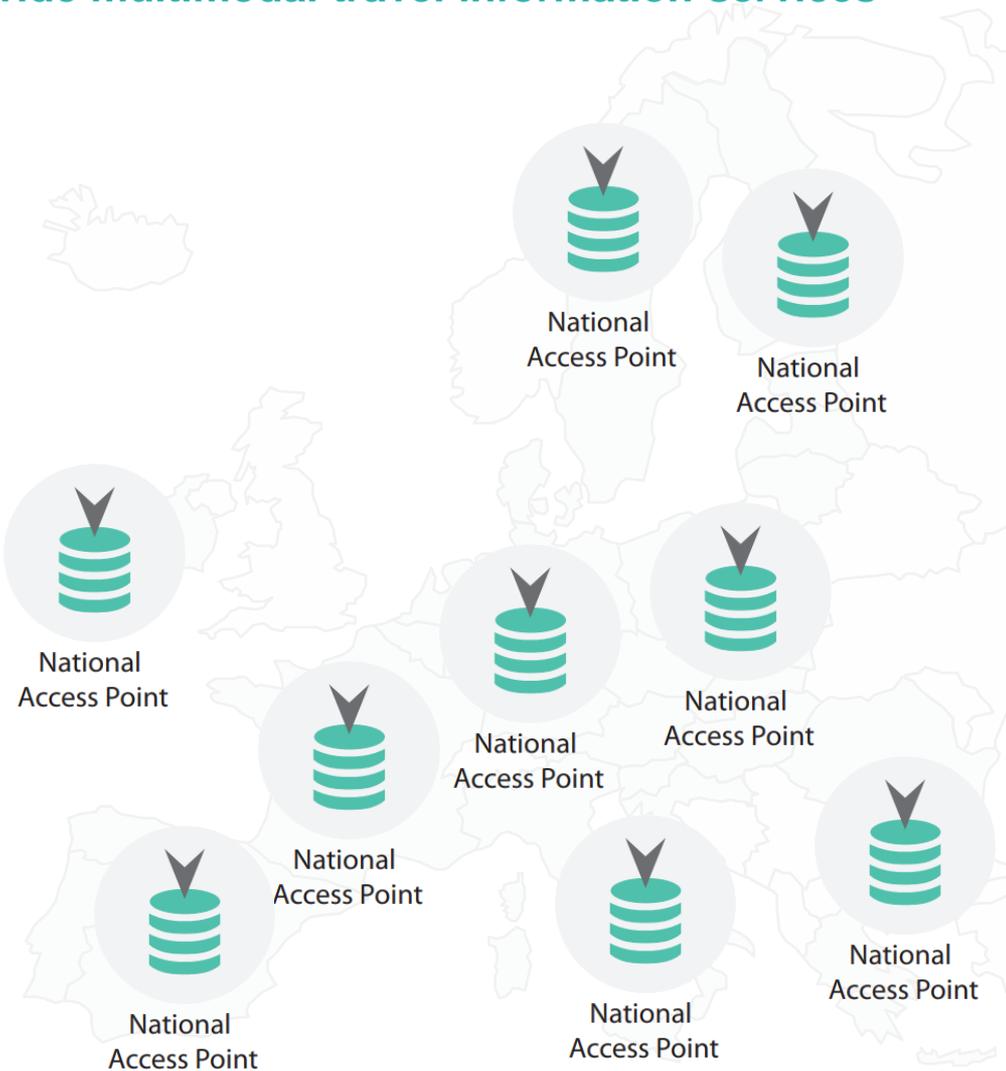


# Transmodel implementation - European level

Supporting the provision of Union-wide multimodal travel information services

ITS Directive  
Delegated Regulation  
EU 2017/1926

static scheduled data in the national access point should use  
**NeTEx CEN/TS 16614**  
based on the underlying conceptual data reference model  
**Transmodel EN 12896**





# Transmodel implementation - European level

Supporting the provision of Union-wide multimodal travel information services

ITS Directive  
Delegated Regulation  
EU 2017/1926

static scheduled data in the national access point should use  
**NeTEx CEN/TS 16614**  
based on the underlying conceptual data reference model  
**Transmodel EN 12896**

Dynamic data in the national access point should use  
**SIRI CEN/TS 15531**



National Access Point



National Access Point



National Access Point



National Access Point



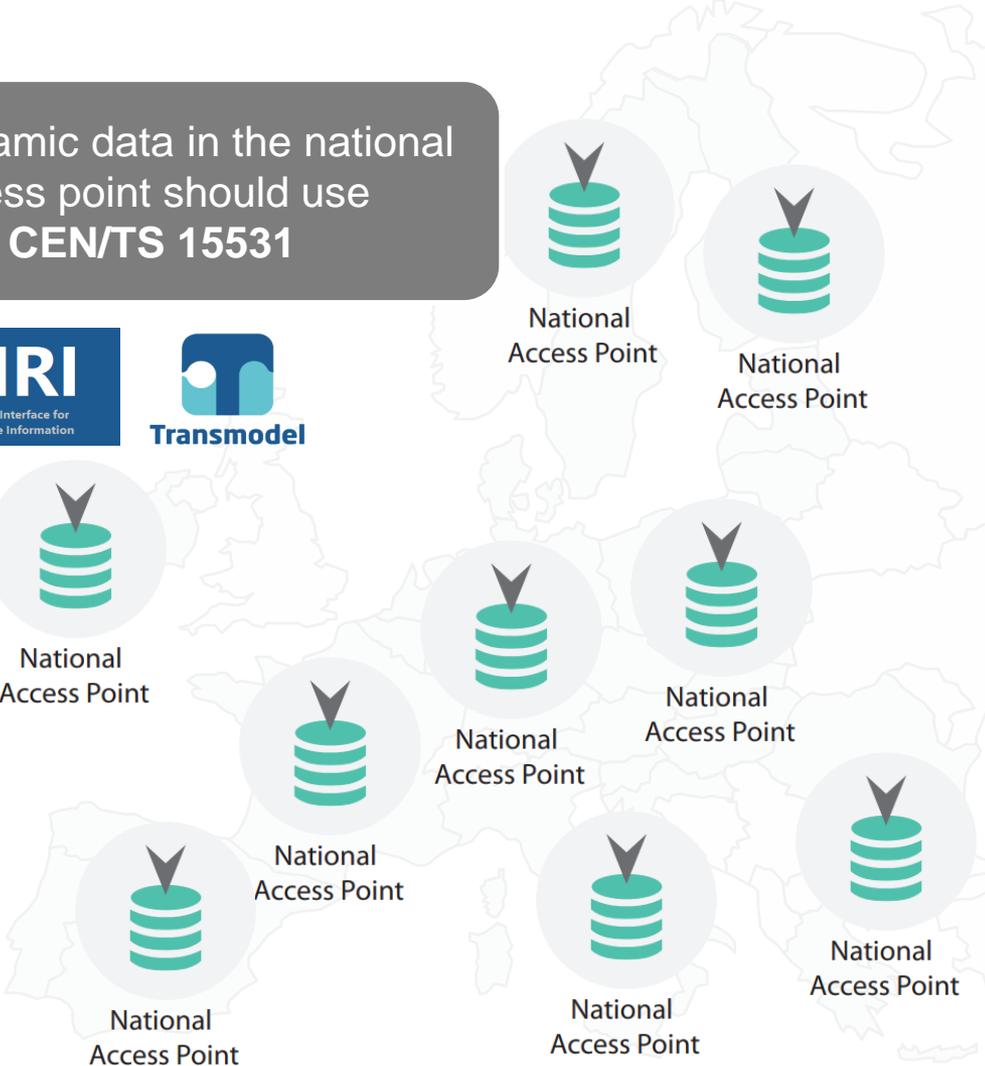
National Access Point



National Access Point



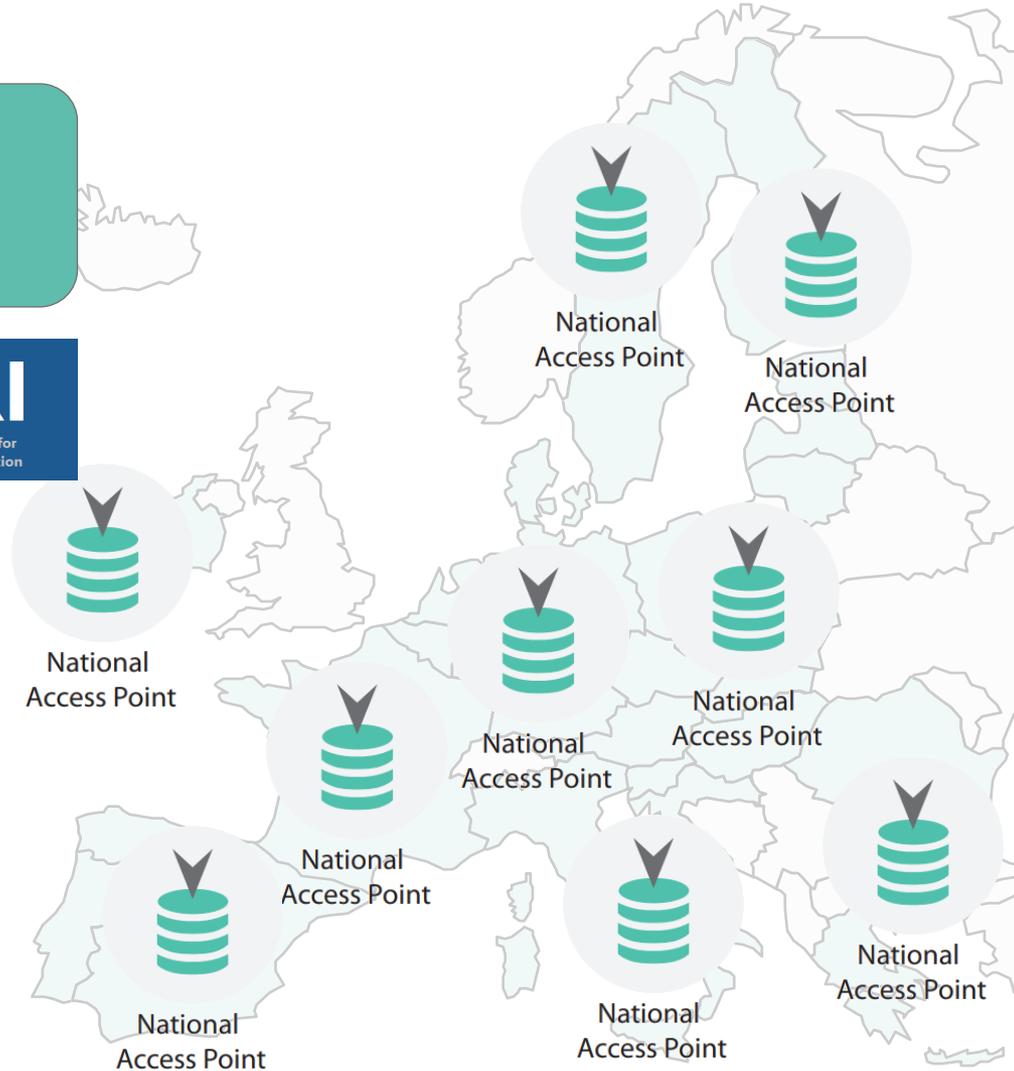
National Access Point





# Transmodel implementation - European level

ITS Directive  
Delegated Regulation  
EU 2017/1926





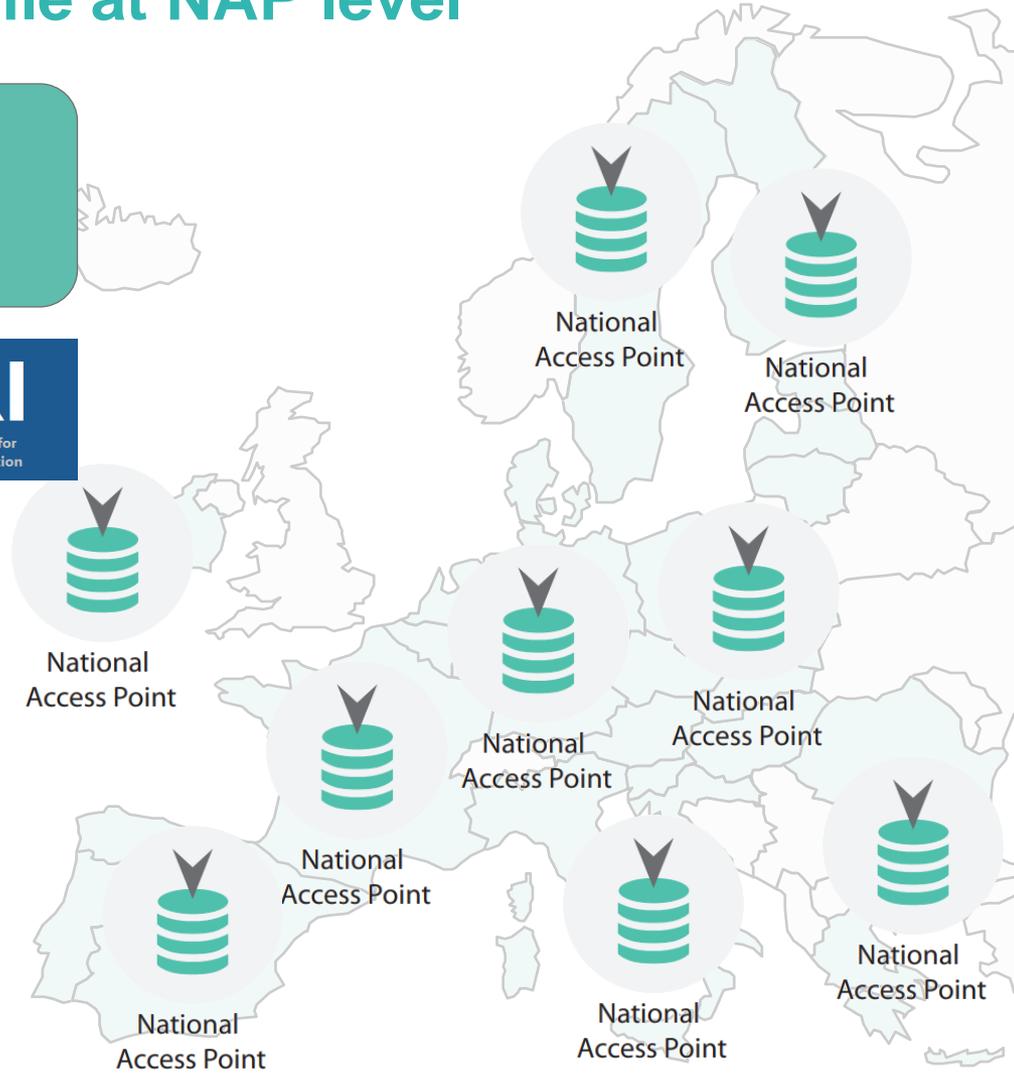
# Transmodel implementation - European level

## Common minimum profile at NAP level

ITS Directive  
Delegated Regulation  
EU 2017/1926



European Passenger  
Information Profile





# European Passenger Information Profile

## -Common minimum profile at NAP level

European Passenger  
Information Profile





# Transmodel implementation in Norway



# Transmodel implementation in Norway (1)

- Stop Place**
- Reference
  - Name
  - Location



National  
Access Point





# Transmodel implementation in Norway (1)

**Stop Place**

- Reference
- Name
- Location

National Access Point



National Access Point



Public Transport Authority



Public Transport Authority



Public Transport Authority



Public Transport Authority



Public Transport Operator



Public Transport Operator



Public Transport Operator



Public Transport Operator



Public Transport Operator



Public Transport Operator



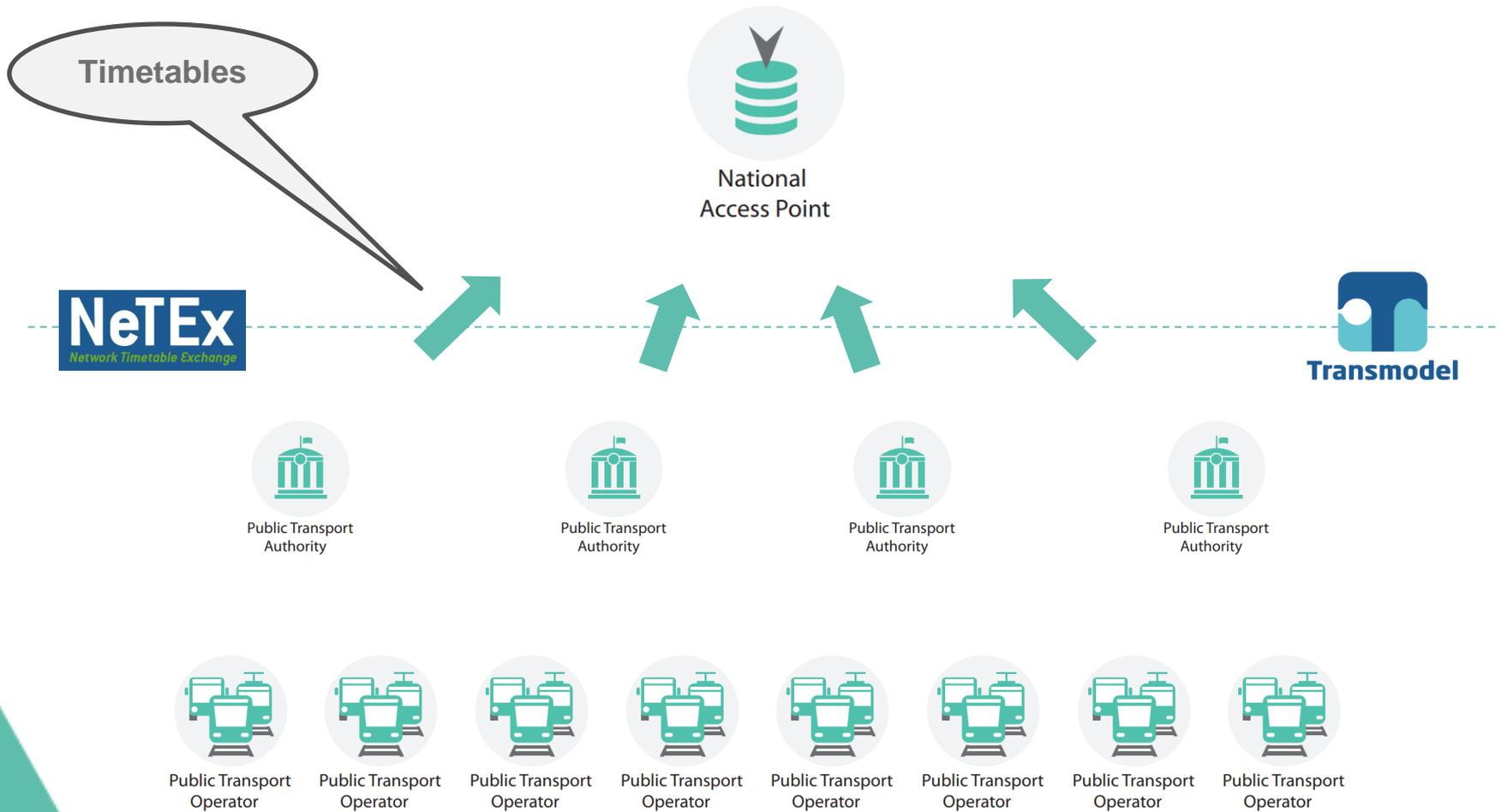
Public Transport Operator



Public Transport Operator



# Transmodel implementation in Norway (2)





# Nordic NeTEx Profile

## Nordic NeTEx Profile

The screenshot shows a web browser window displaying the Nordic NeTEx Profile documentation. The browser address bar shows the URL: <https://enturas.atlassian.net/wiki/spaces/PUBLIC/pages/728760393/timetable>. The page title is "Interchange".

**Interchange**

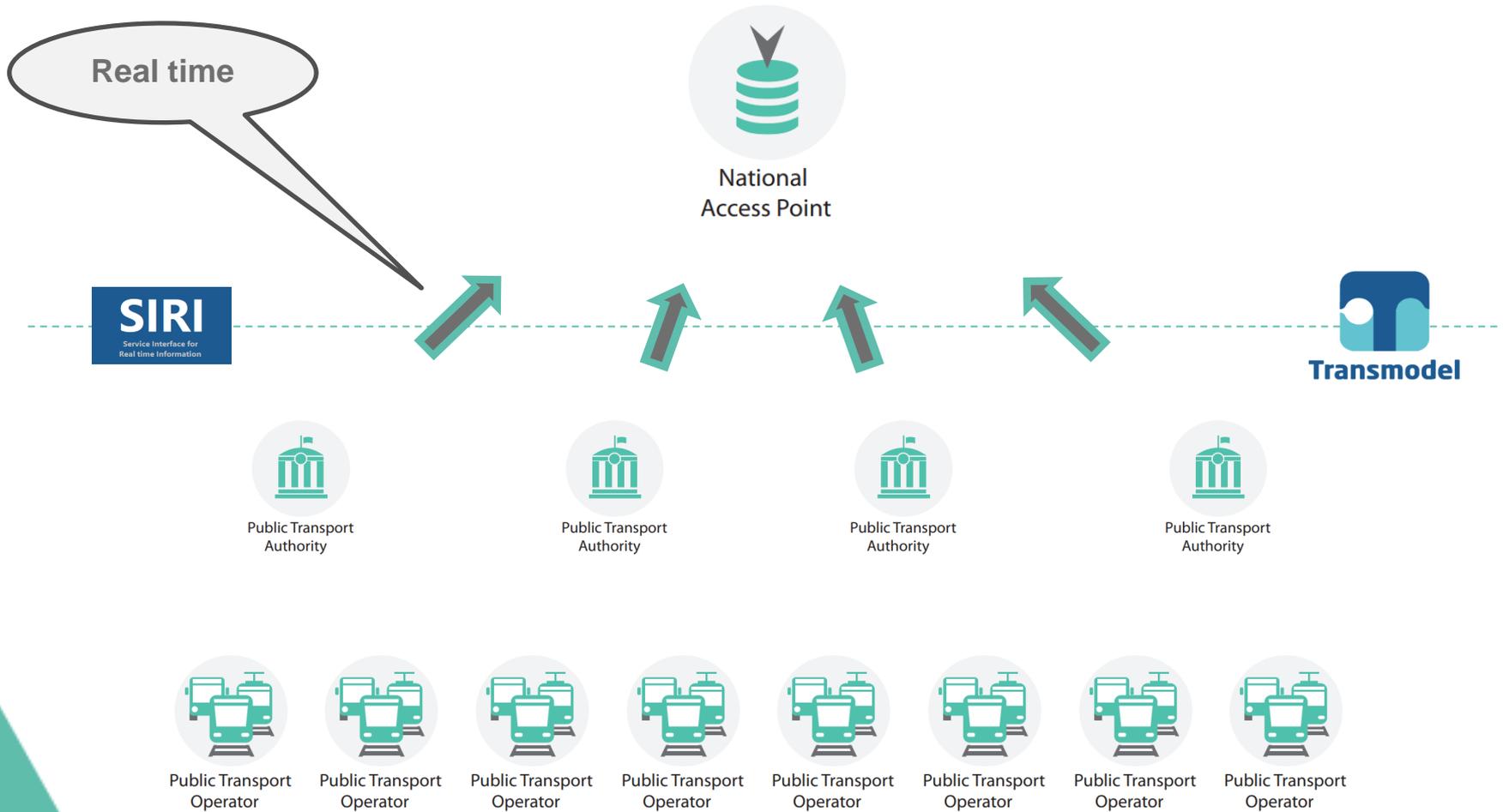
An abstract type which describes planned possibilities for passengers to transfer between *ServiceJourneys* on the same or (usually) nearby stops, with a description of when/if a vehicle will wait for another arriving vehicle.

See definition under [General information](#)

Interchange < <i>DataManagedObject</i>			
Name	Type	Cardinality	Description
Priority	xsd:integer	0: 1	Weighted prioritization of transfers, e.g. when there are multiple possible interchange locations along a journey, or when there is a need to mark a location as inappropriate for interchanges: <ul style="list-style-type: none"><li>• -1 (interchanges not allowed. Corresponds to: <i>noInterchange</i>)</li><li>• 0 (<i>null</i>, standard interchange value. Corresponds to: <i>interchangeAllowed</i>)</li><li>• 1 (recommended interchange location to be weighted higher in the journey planner. [<i>timed</i> according to stated <i>MaximumWaitTime</i>]. Corresponds to: <i>recommendedInterchange</i>)</li><li>• 2 (preferred interchange to be weighted with maximum preference by the journey planner. Corresponds to: <i>preferredInterchange</i>)</li></ul>



# Transmodel implementation in Norway (3)





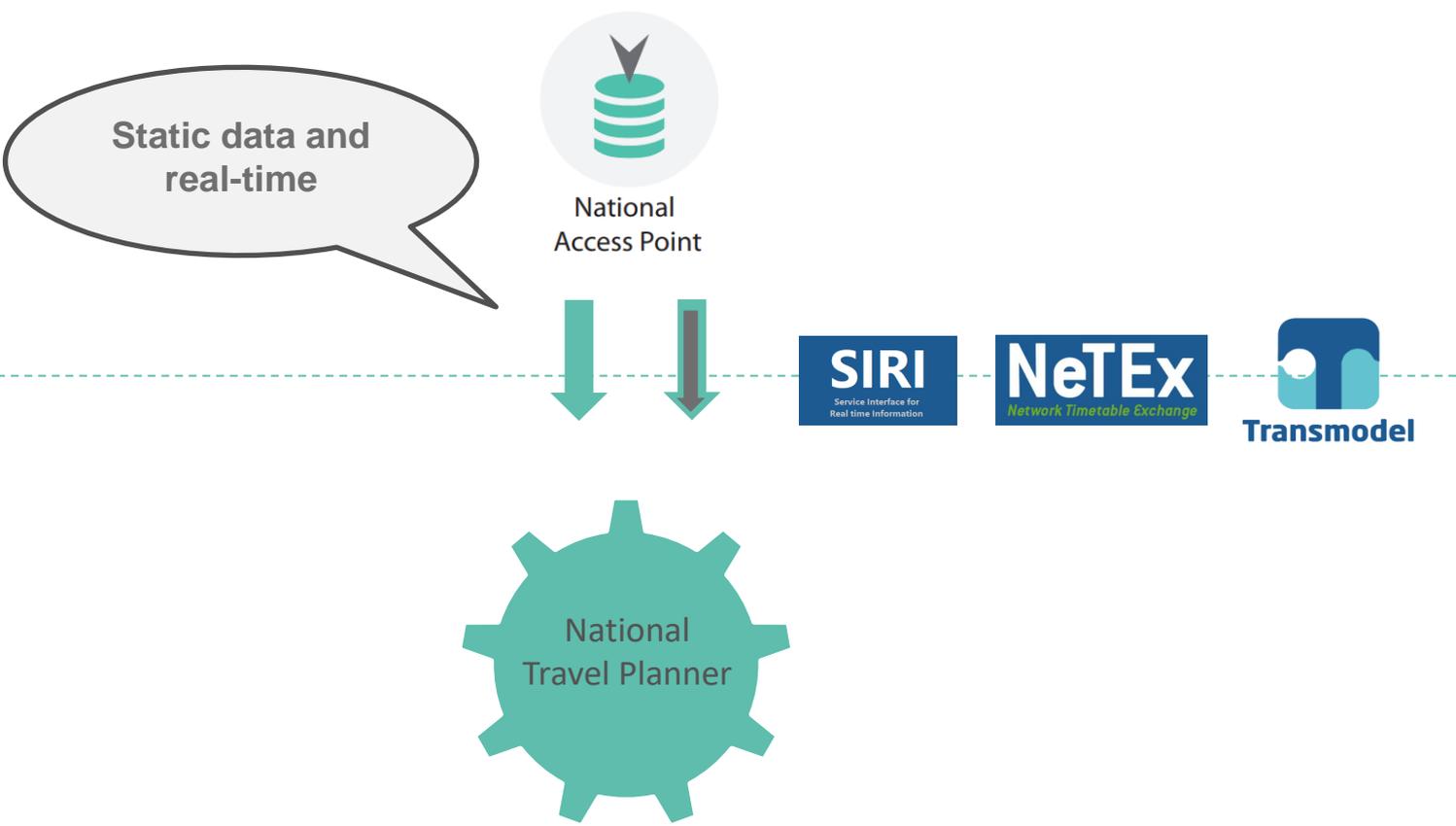
# Norwegian SIRI Profile

The screenshot shows a web browser window with the URL `enturas.atlassian.net/wiki/spaces/PUBLIC/pages/637370420/Norwegian+SIRI+profile`. The browser's address bar and tabs are visible at the top. The main content is a table titled "EstimatedVehicleJourney". The table has four columns: "Name", "Type", "Cardinality", and "Description". The table lists several elements and their properties, including "LineRef", "DirectionRef", "FramedVehicleJourneyRef", "EstimatedVehicleJourneyCode", "ExtraJourney", "Cancellation", and "JourneyPatternRef".

EstimatedVehicleJourney			Description	
Name	Type	Cardinality	Description	
element	LineRef	xsd:NMTOKEN	1: 1	Reference to the Line in question (ID to the corresponding object in the timetable data)
element	DirectionRef	xsd:NMTOKEN	1: 1	Direction reference. <i>Please note that the field is implemented as mandatory, but is not used as a free standing data type in the Norwegian SIRI profile. If it is not used, this value can be set to 0 (zero).</i>
(choice) element	FramedVehicleJourneyRef	FramedVehicleJourneyRefStructure	1: 1	Reference with date to VehicleJourney in question (ID to the corresponding object in the timetable data). Un-affected replacement departures must be given a new codespace-unique ID. For example: <code>RUT:VehicleJourney:51-108833-11872056-00</code>
	EstimatedVehicleJourneyCode	xsd:NMTOKEN		
(choice) element	ExtraJourney	xsd:boolean	0: 1	The VehicleJourney in question is a replacement departure. <i>Must be 'true' if it is a replacement departure.</i> Used when the VehicleJourney in question is cancelled.
	Cancellation	xsd:boolean		<i>Set to 'true' only if the whole VehicleJourney is cancelled. When only parts of the VehicleJourney is cancelled: use <code>RedeCall</code> and/or <code>EstimatedCall</code>.</i>
element	JourneyPatternRef	xsd:NMTOKEN	0: 1	Reference to JourneyPattern in question (ID to the corresponding object in the timetable data)

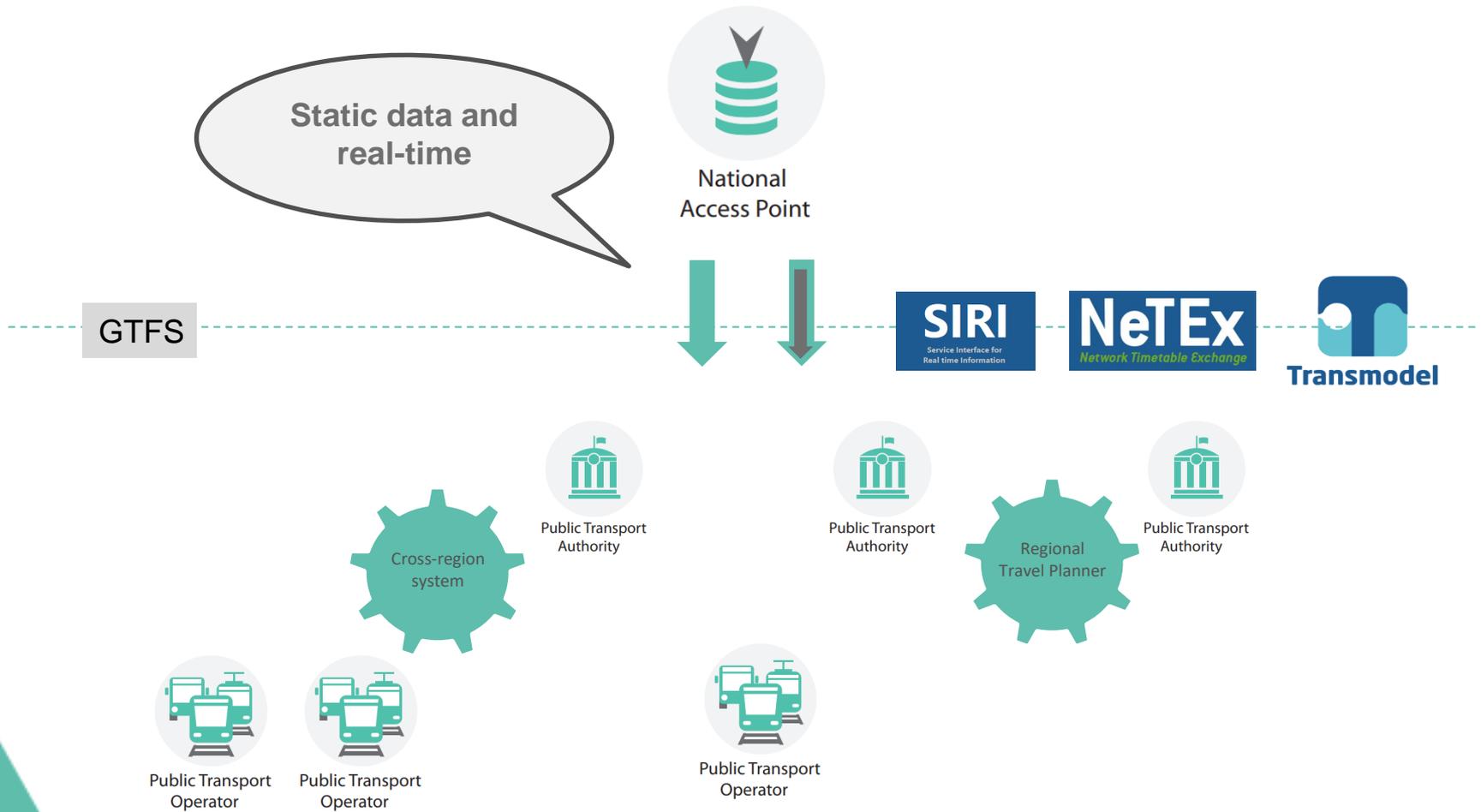


# Transmodel implementation in Norway (4)





# Transmodel implementation in Norway (5)





# Transmodel

A basis for future-proof public transport information



Data



Bus



multimodality



Metro



Traveller



Train



Interoperability



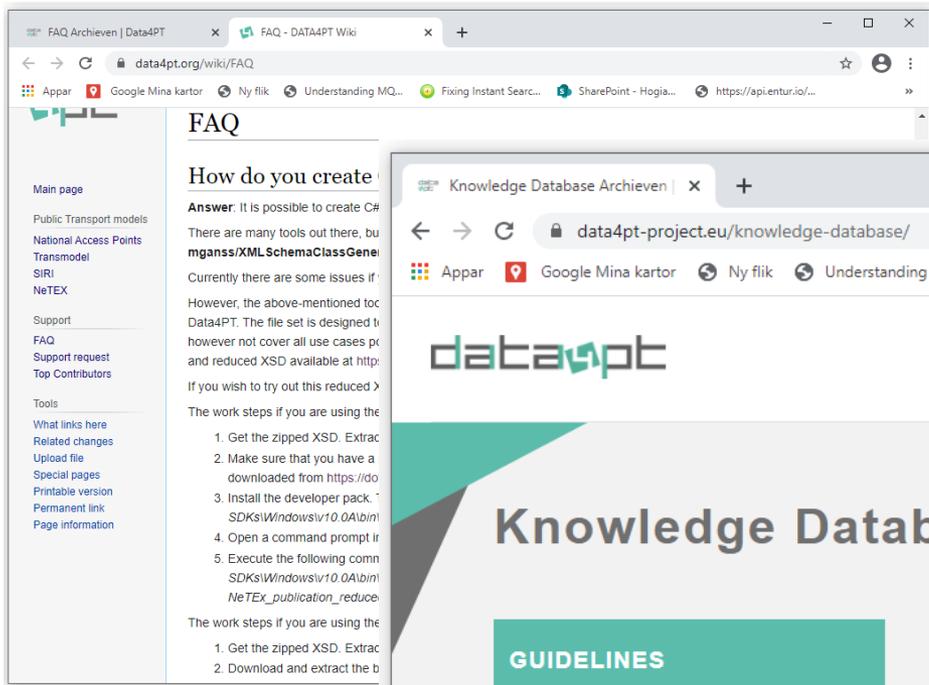
Tram



eScooters



# Data4PT website and WIKI...



FAQ

## How do you create

**Answer:** It is possible to create C#

There are many tools out there, but **mganss/XMLSchemaClassGene**

Currently there are some issues if:

However, the above-mentioned tool Data4PT. The file set is designed to however not cover all use cases and reduced XSD available at <http://>

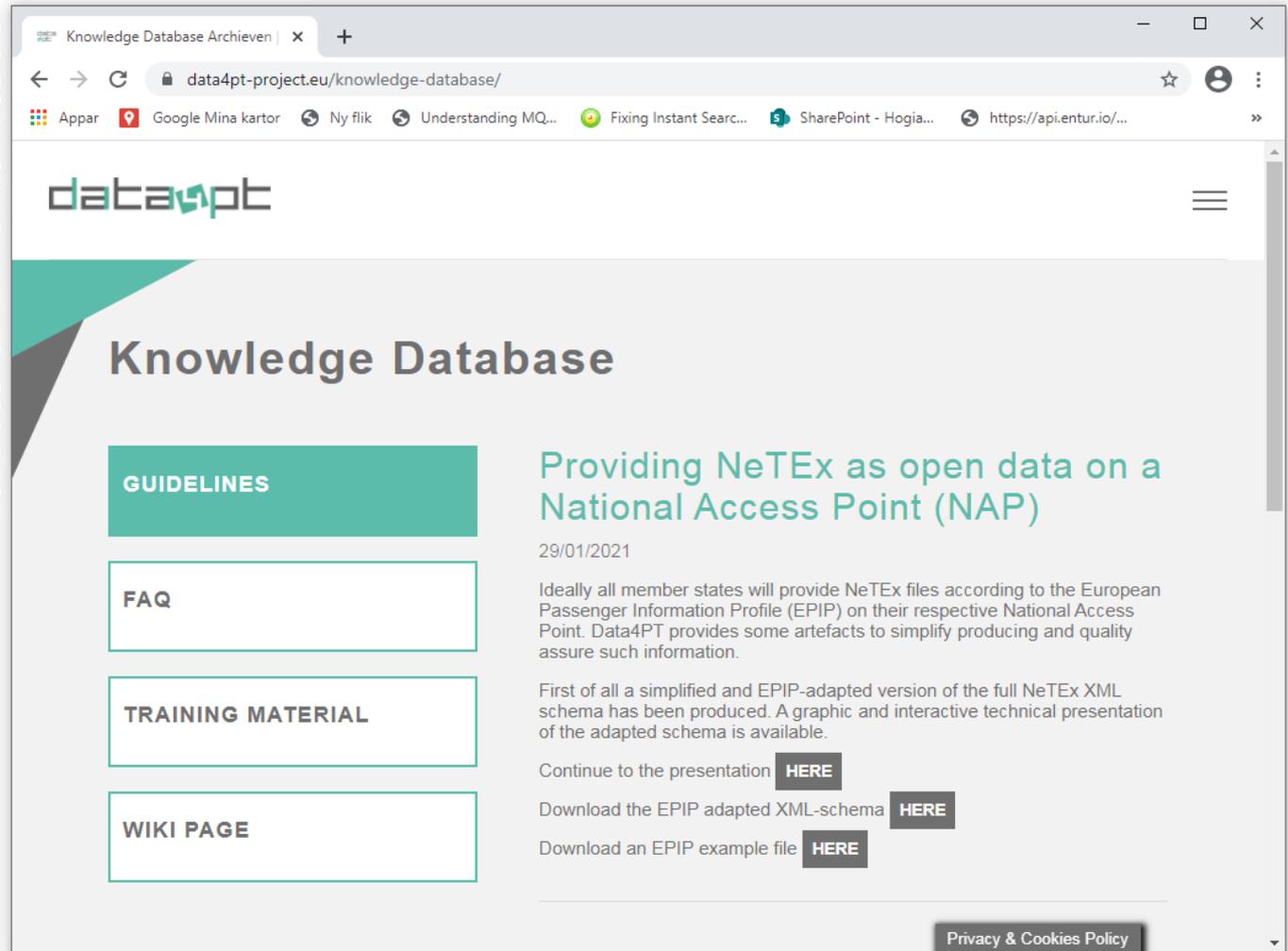
If you wish to try out this reduced >

The work steps if you are using the

1. Get the zipped XSD. Extract
2. Make sure that you have a downloaded from <https://do>
3. Install the developer pack. `SDKs\Windows\slv10.0A\bin\`
4. Open a command prompt in
5. Execute the following command `SDKs\Windows\slv10.0A\bin\NeTEX_publication_reduce`

The work steps if you are using the

1. Get the zipped XSD. Extract
2. Download and extract the b



Knowledge Database Archieven | x +

data4pt-project.eu/knowledge-database/

# data4pt

## Knowledge Database

- GUIDELINES**
- FAQ
- TRAINING MATERIAL
- WIKI PAGE

### Providing NeTeX as open data on a National Access Point (NAP)

29/01/2021

Ideally all member states will provide NeTeX files according to the European Passenger Information Profile (EPIP) on their respective National Access Point. Data4PT provides some artefacts to simplify producing and quality assure such information.

First of all a simplified and EPIP-adapted version of the full NeTeX XML schema has been produced. A graphic and interactive technical presentation of the adapted schema is available.

Continue to the presentation [HERE](#)

Download the EPIP adapted XML-schema [HERE](#)

Download an EPIP example file [HERE](#)

Privacy & Cookies Policy



**Thank you for your attention!**

[www.data4pt-project.eu/](http://www.data4pt-project.eu/)



@Data4PT

Data4PT has received funding from the European Union's DG for Mobility and Transport under grant agreement No MOVE/B4/SUB/2019-104/CEF/PSA/SI2.821136