



22nd
ITS World Congress

Bordeaux, France

5 to 9 October

2015

Transmodel NeTEx - EPTIS

TOWARDS INTELLIGENT MOBILITY
Better use of space

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A European Standard for Modelling and Exchanging Fares

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NeTEX

a CEN exchange protocol

CEN / TC278

Road Transport & Traffic Telematic

Plenary

Chair:



WG1, *Electronic Fee Collection*



WG3, *Public Transport*



WG4, *Traffic and Traveller Information*



WG5, *Traffic Management*

WG7, *Geographic Road Data*



WG8, *Road Traffic Data*

WG9, *Dedicated Short Range Communications*



WG10, *Human-Machine Interfaces*



WG12, *AutoVehicle and Equipment Ident*



WG13, *Architecture & Terminology*



WG14, *Recovery of Stolen Vehicles*



WG15, *eSaftey*

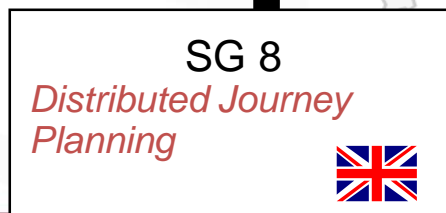
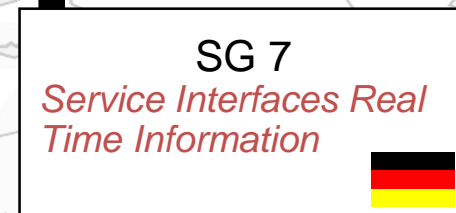
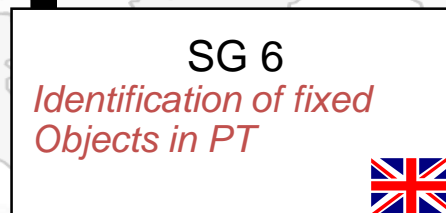
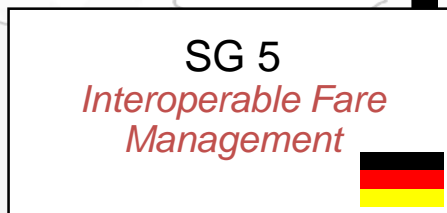
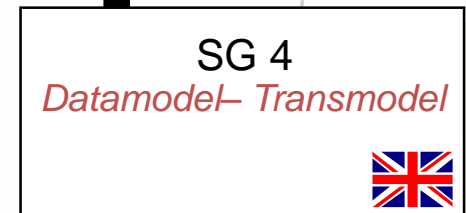
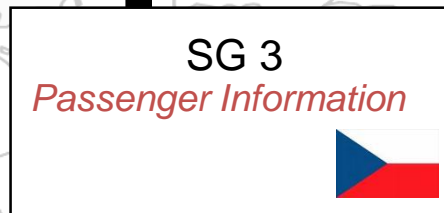
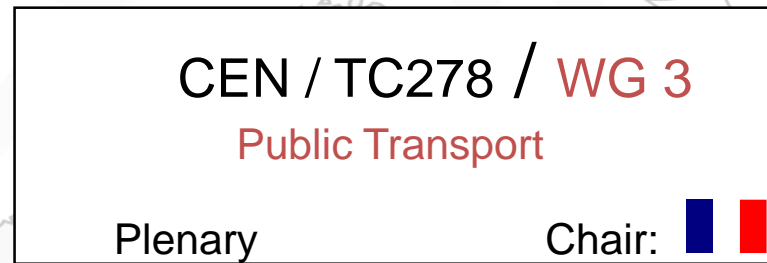


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Better use of space

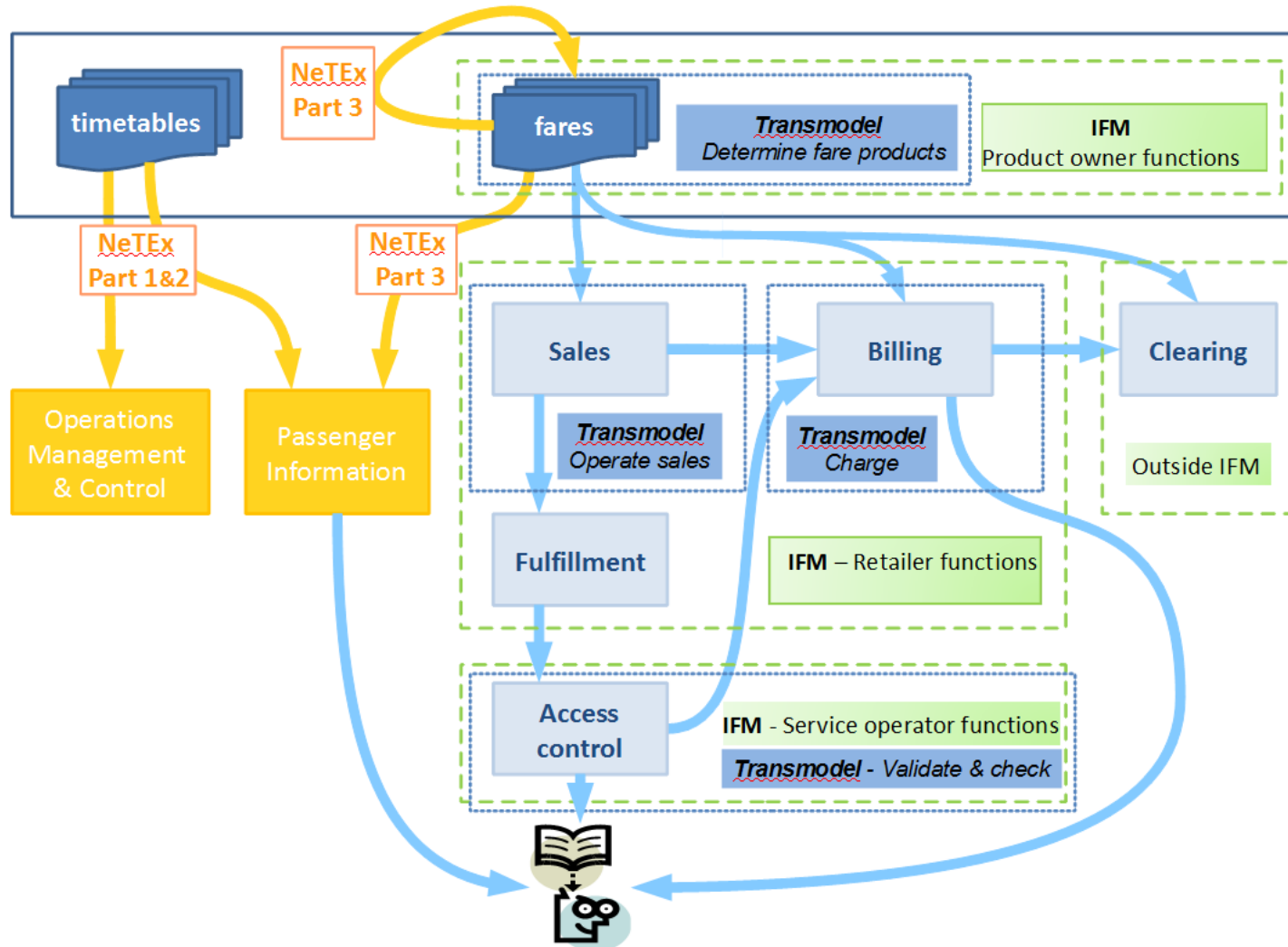
NeTEX

a CEN exchange protocol



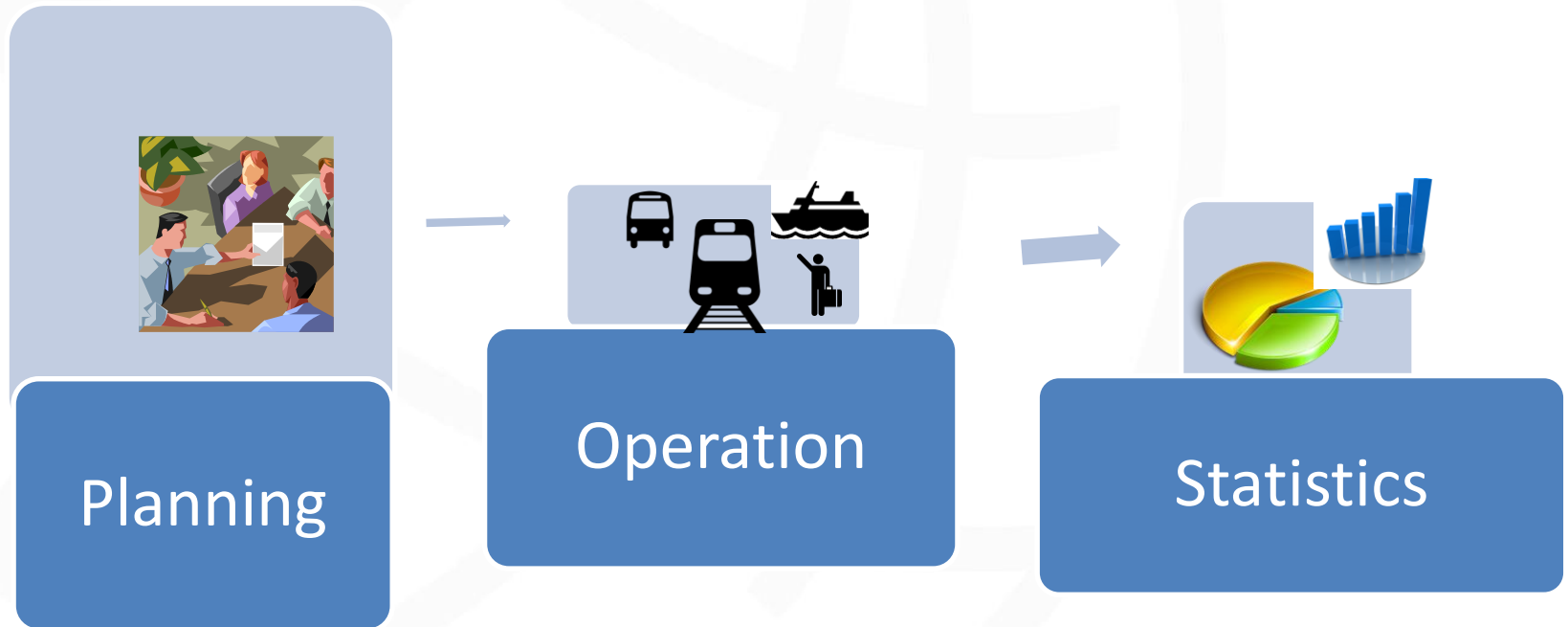
INTELLIGENT MOBILITY
Better use of space

Netex Part3 - Boundaries

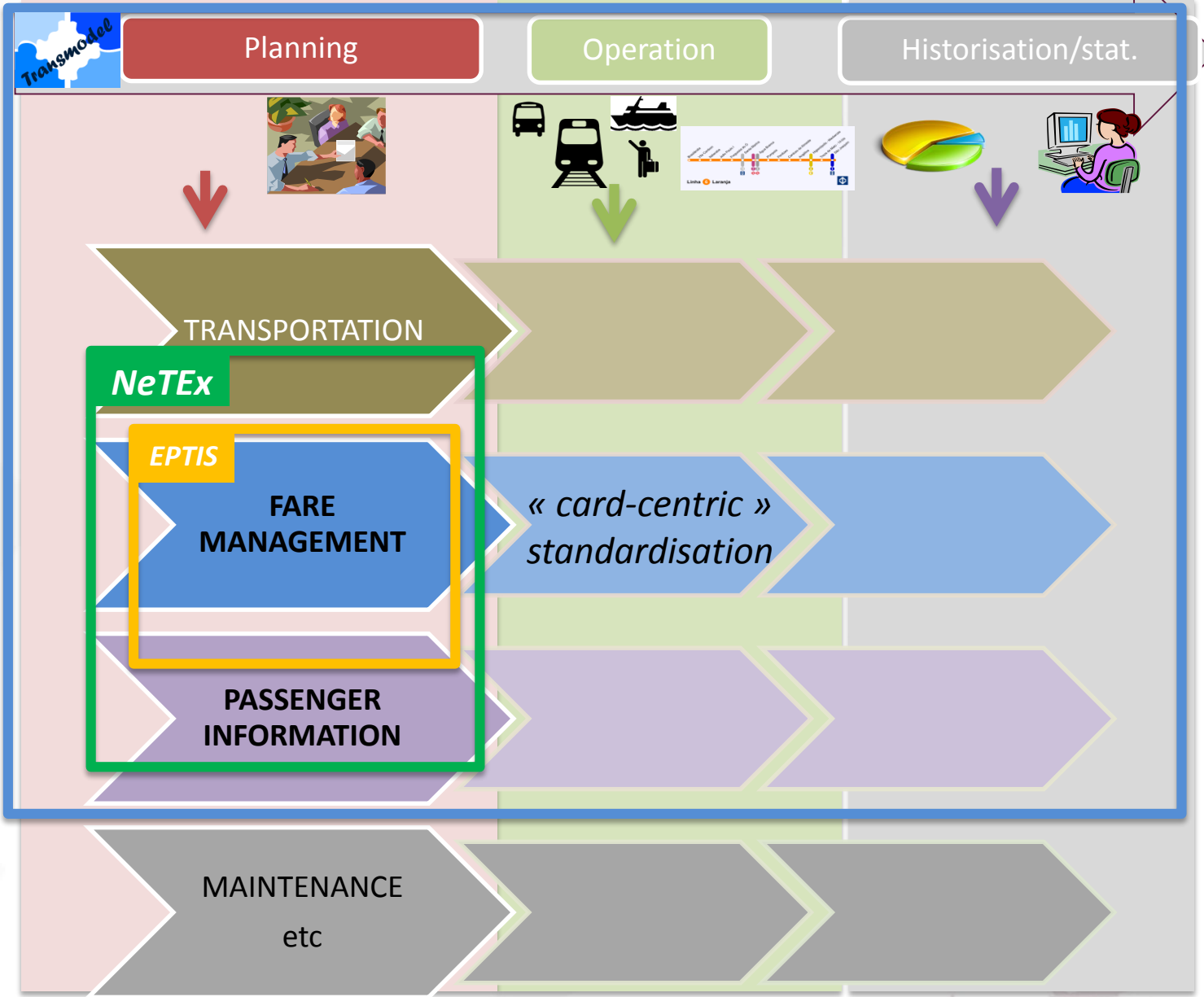
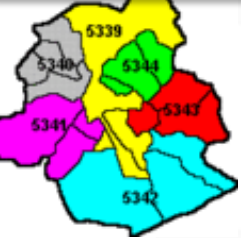
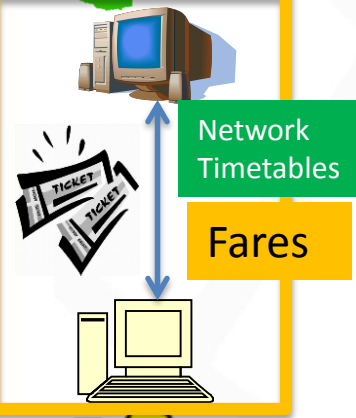


- NeTEx
 - What is it ?
 - New CEN standard for XML Public Transport data exchange - for Passenger Information (timetables + fares)
 - Approach: Model Driven Design
 - Transmodel UML → Physical UML → XML
 - Who are active participants?
 - Austria, Germany, France, Hungary, Italy, Netherlands, Sweden, Switzerland, ERA/UIC, UK,
 - Timescales
 - Three phases: Part 1 : Part 2: Part 3: 2014
 - Inputs
 - CEN: Transmodel, IFOPT
 - National: VDV 452, TransXChange, Trident /Choutte, UIC ++
 - Deliverables
 - CEN specification document,
 - NeTEx XML schema as reusable packages
 - XML Examples
 - National Mapping tables

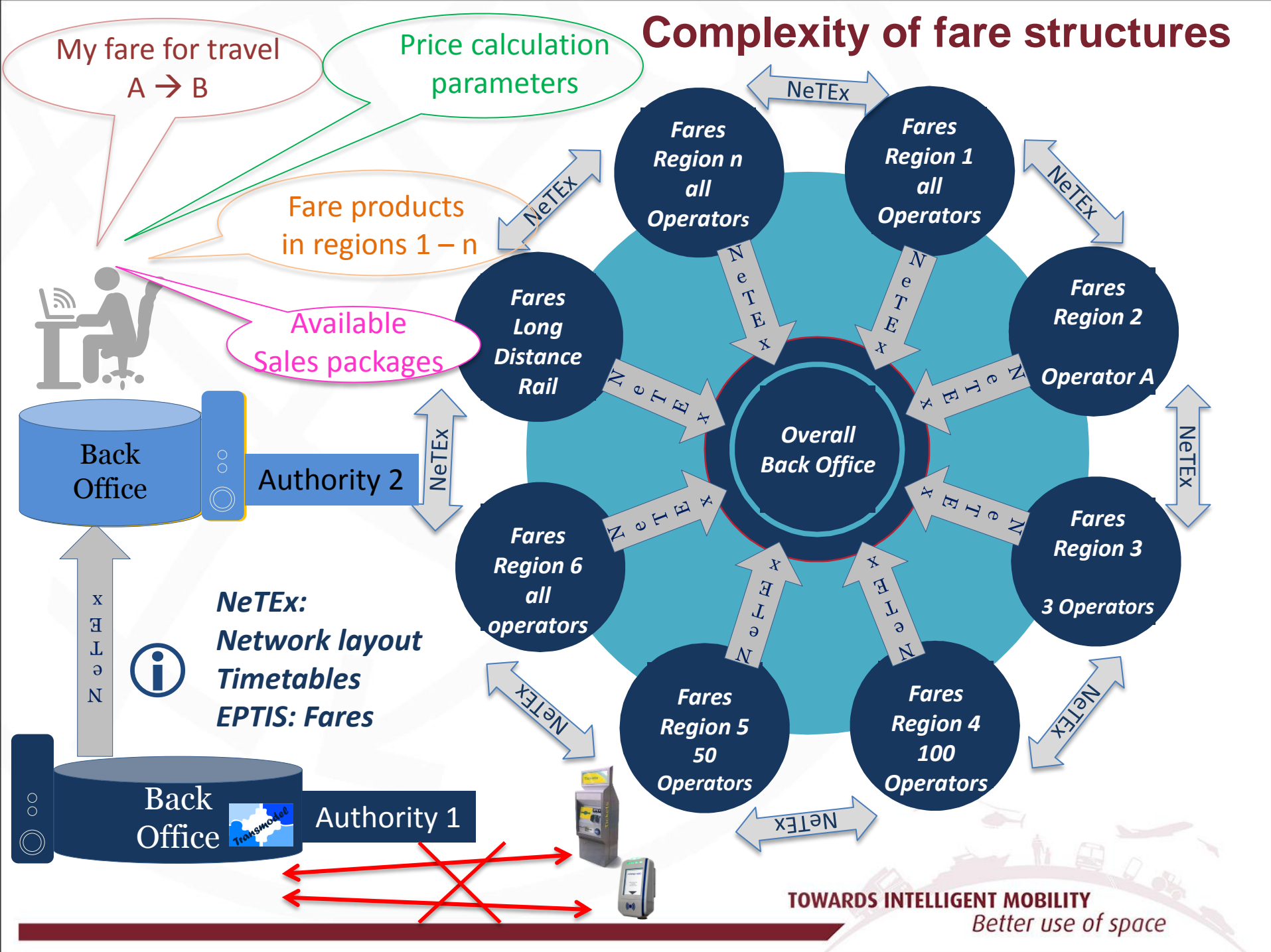
The Context



Transmodel NeTEx And EPTIS Context



Complexity of fare structures



Main Fare Management Processes & Data

CONCEPTUAL
MODEL(UML)
Implementation
independent



Access
rights

- Fare policy / fare structure:
- space-, time-based...access rights
- validity and usage rules
- *bus trip zone 1 to 3, metro trip 3 zones*

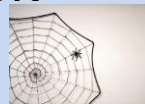
Physical Model (UML)
For XML



Fare
Products

- Marketable combinations of access rights
- validity & usage limiting parameters
- media & charging methods
- *metro trip 3 zones followed by bus trip 2 zones without interchange during 1h30*
- *(paper or electronic card)*

IMPLEMENTATION
MODEL
(XML)

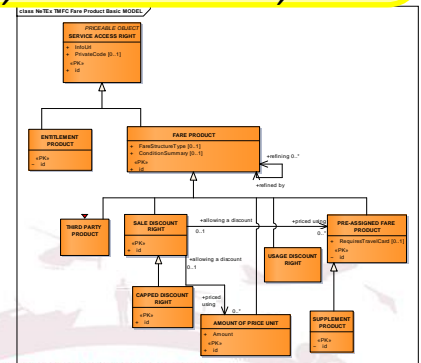


Sales
packages

- Sales:
- sales packages
- distribution channels & contracts
- *single ticket, carnet of 10, electronic card,...*

Methodology

Fulfilment & Payment
Control & Validation
Billing & Clearing

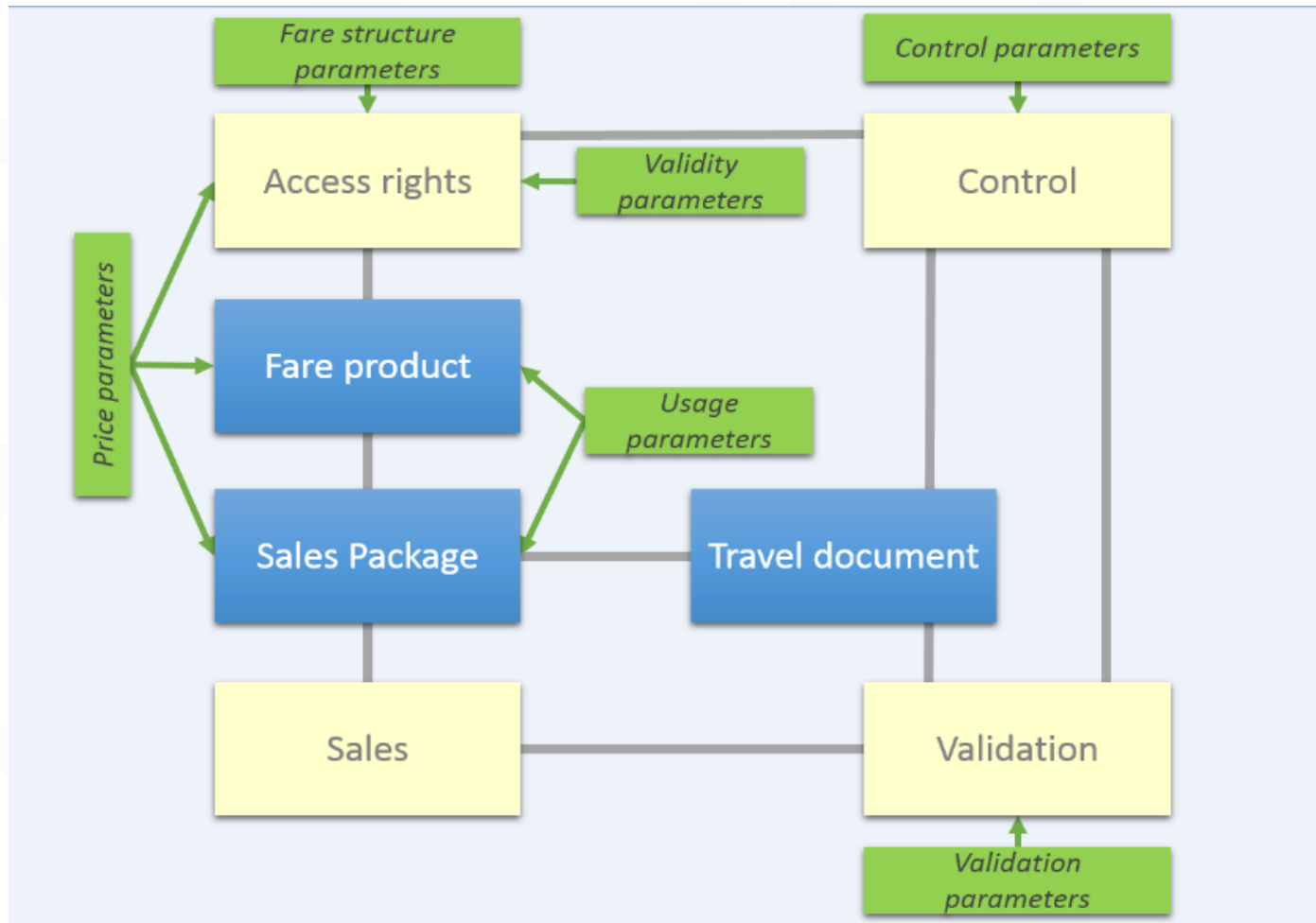


TOWARDS INTELLIGENT MOBILITY

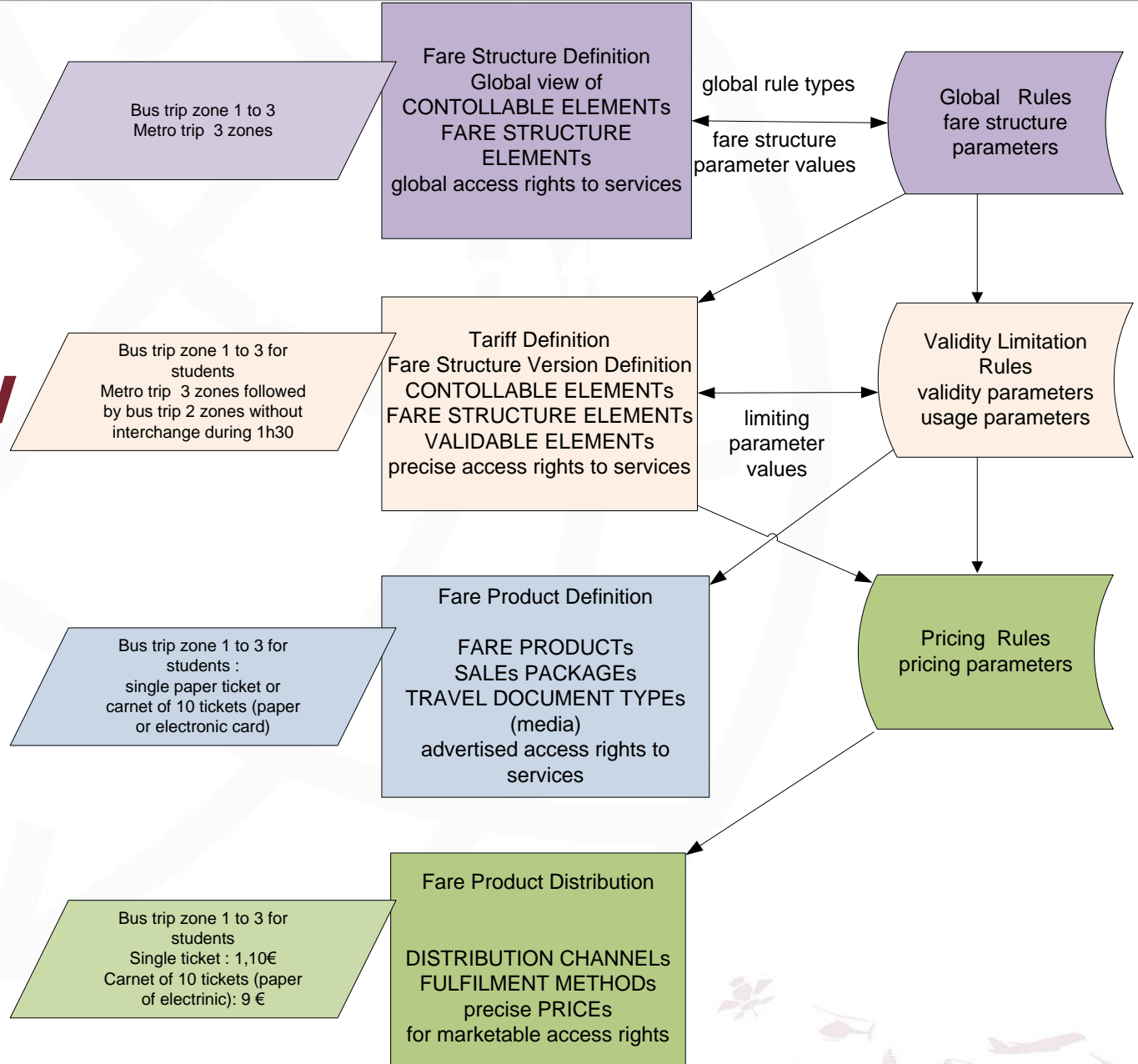
Better use of space

Processes

Data & Parameters



Data Model Overview



NeTEx

Key points

- CEN standards:
 - Transmodel (conceptual)
 - NeTEx – SIRI (implementation)
- NeTEx;
 - Server-to-Server Services and exchange mechanism for public transport
 - Focused on AVMS and Passenger Information System but with no use limitation
 - Defines an independent communication layer shared by SIRI and NeTEx
 - Tool box, well designed for gradual implementation
 - It is not a Magic Staff ... only an exchange standard !

NeTEX

Key points

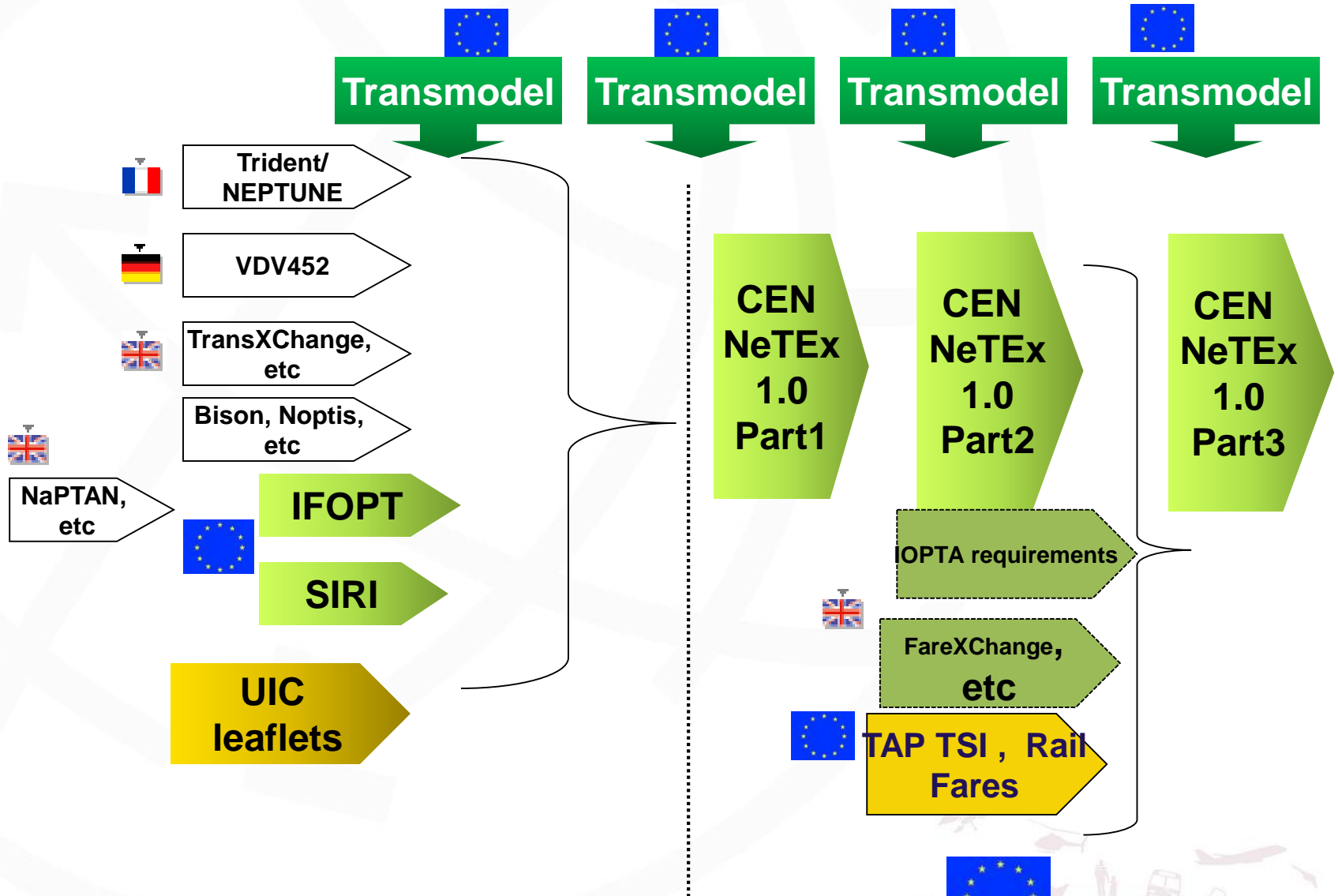
- **Common underlying standards**
 - Transmodel : main data model
 - IFOPT : stop place model
 - SIRI : same communication layer
 - On the technical side : XML, XSD, GML, WGS84, WS-Soap-WSDL-PubSub (Web Service enabled)
- **Inputs**
 - VDV 452, TransXChange, Rail CIF, Trident /NEPTUNE, BISON, NOPTIS, UIC

NeTEX

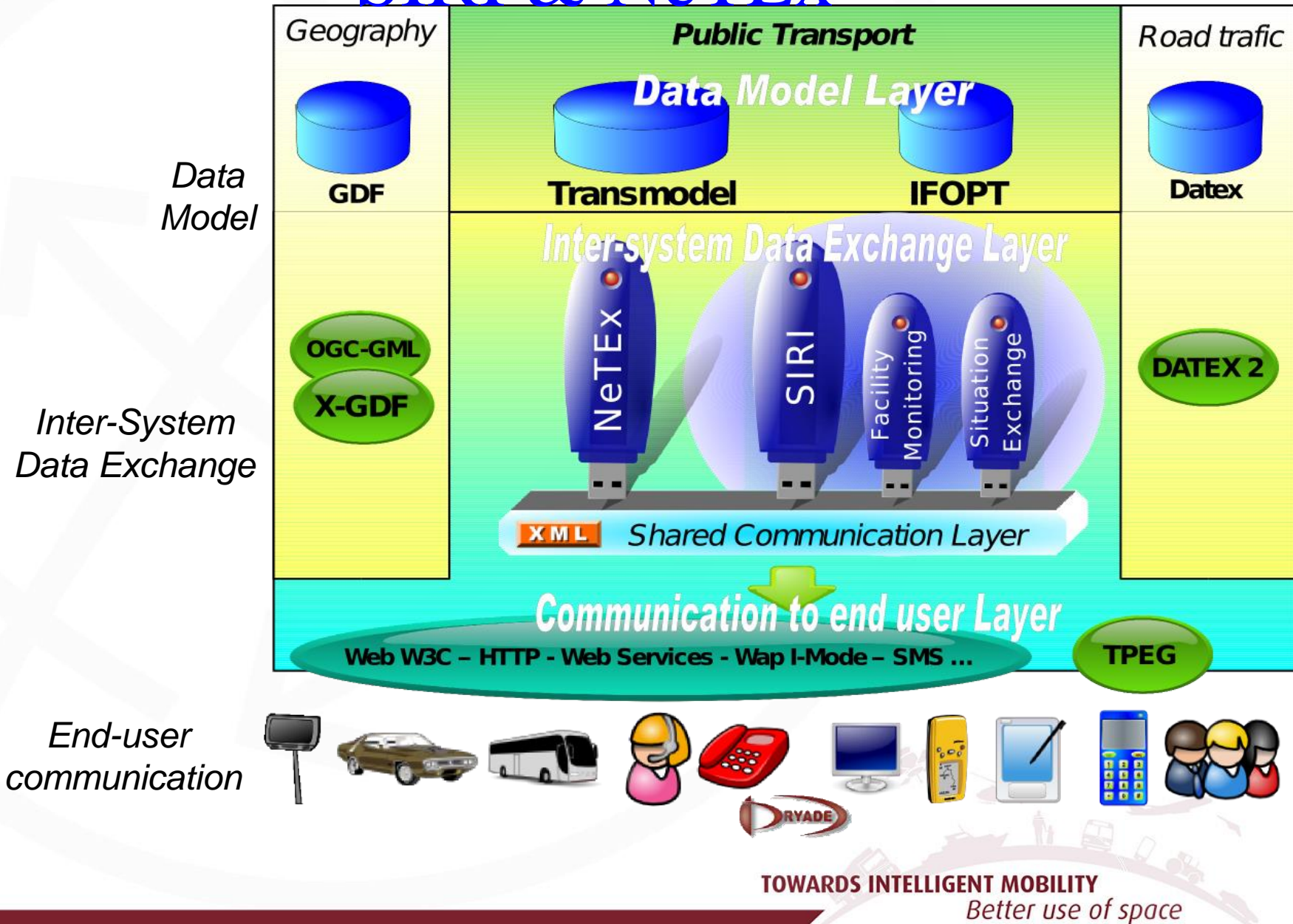
Key points

- European Level design
 - Germany
 - Austria
 - France
 - UK
 - Sweden
 - Netherland
 - Switzerland
 - Hungary
 - Italy
- And rail organisations
 - UIC
 - ERA

NeTEx Stages



SIRI & NeTEx



Business Drivers

- **Reducing costs**
 - Shared Markets, Tool base, reusable components
 - Common specifications for procurement and implementation
 - Makes data costs viable for new functions
- **Managing Complexity**
 - Simplified, uniform solutions
 - Harnesses European wide know-how & best practice
- **Increasing Capability**
 - Enables advanced function
 - Large scale coverage, multimodal
 - More powerful representations & functions
 - Interoperability,

Political Drivers

- Sustainability / Green
 - Encourage use of PT
 - Make use of PT capacity efficient (ITS)
- Harmonisation
 - Free flow of data and system use between regions
 - Open markets and tendering
- Passenger rights
 - Objective timely information
 - Accessibility

NeTEx Scope

- Reference (scheduled) data exchange (Network, Timetables and Fares)
- Focuses on objects and information required for **passenger information** and **exchange between transit scheduling systems and AVMS**

NeTEx

Part 1 : Public transport network topology

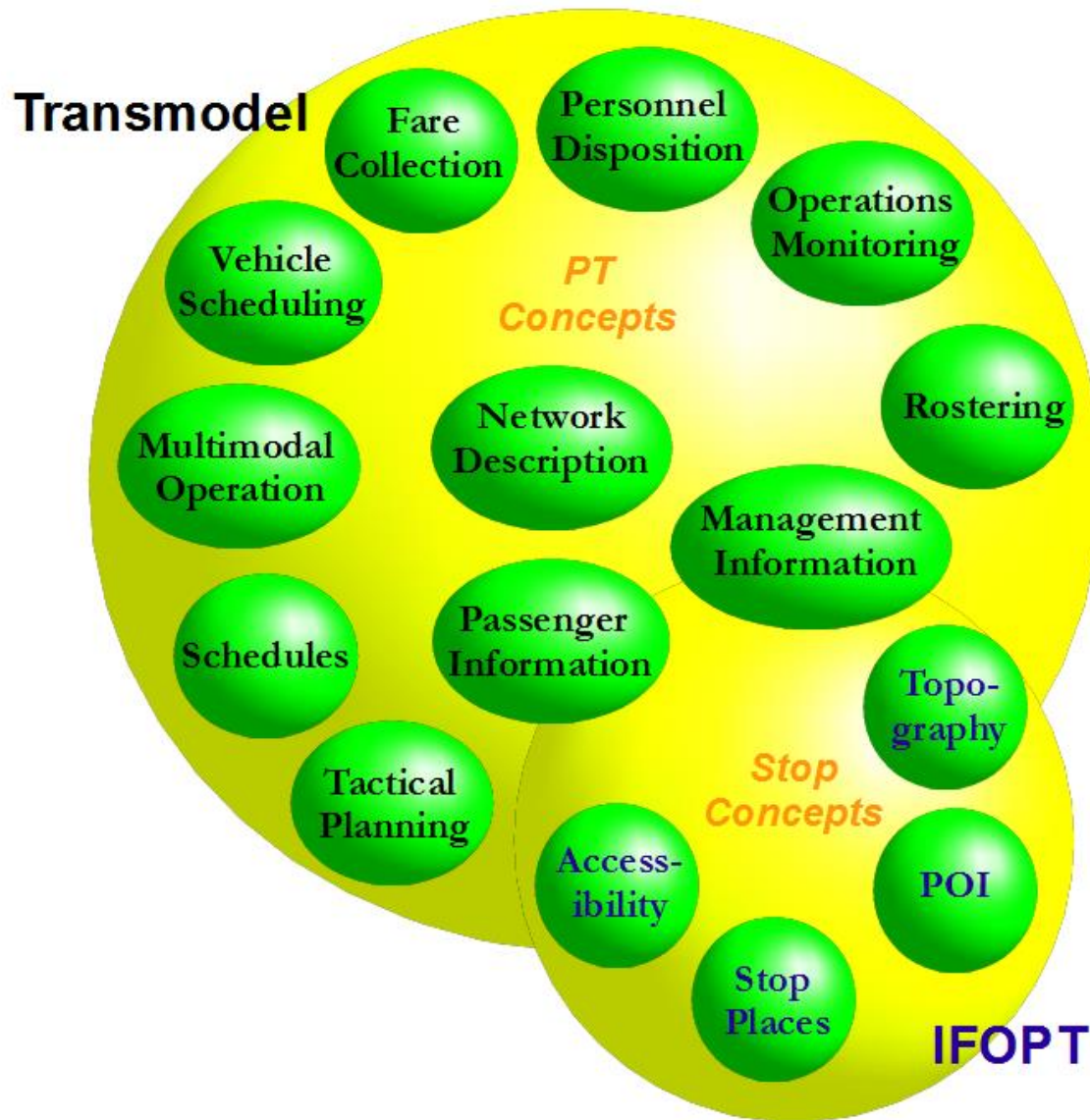
- routes, lines, route points, stop places and their components, stop points, navigation paths and other places linked to the PT network and relevant for passenger information, stop place equipment and services, network version, administrative information, etc.) .
- **Part 2 : Scheduled Timetables** (service patterns, service journeys, timetabled passing times, day types, timetable versions, mobility issues):
 - **Basic Data** (shared): journey patterns, journey times, service patterns, operating days, interchanges, etc.
 - **Passenger information** specific objects: trip patterns, trip duration (for journey planning), passing times, places, etc.
 - Data used specifically in the **exchanges between the scheduling and AVMS** (additional scheduled data, such as blocks and related concepts)
 - **Data used in and/or defined by the AVMS**, data linked to vehicle **equipment** and necessary for passenger information systems (mainly for SIRI).

NeTEx

- **Part 3 : Fare Information**

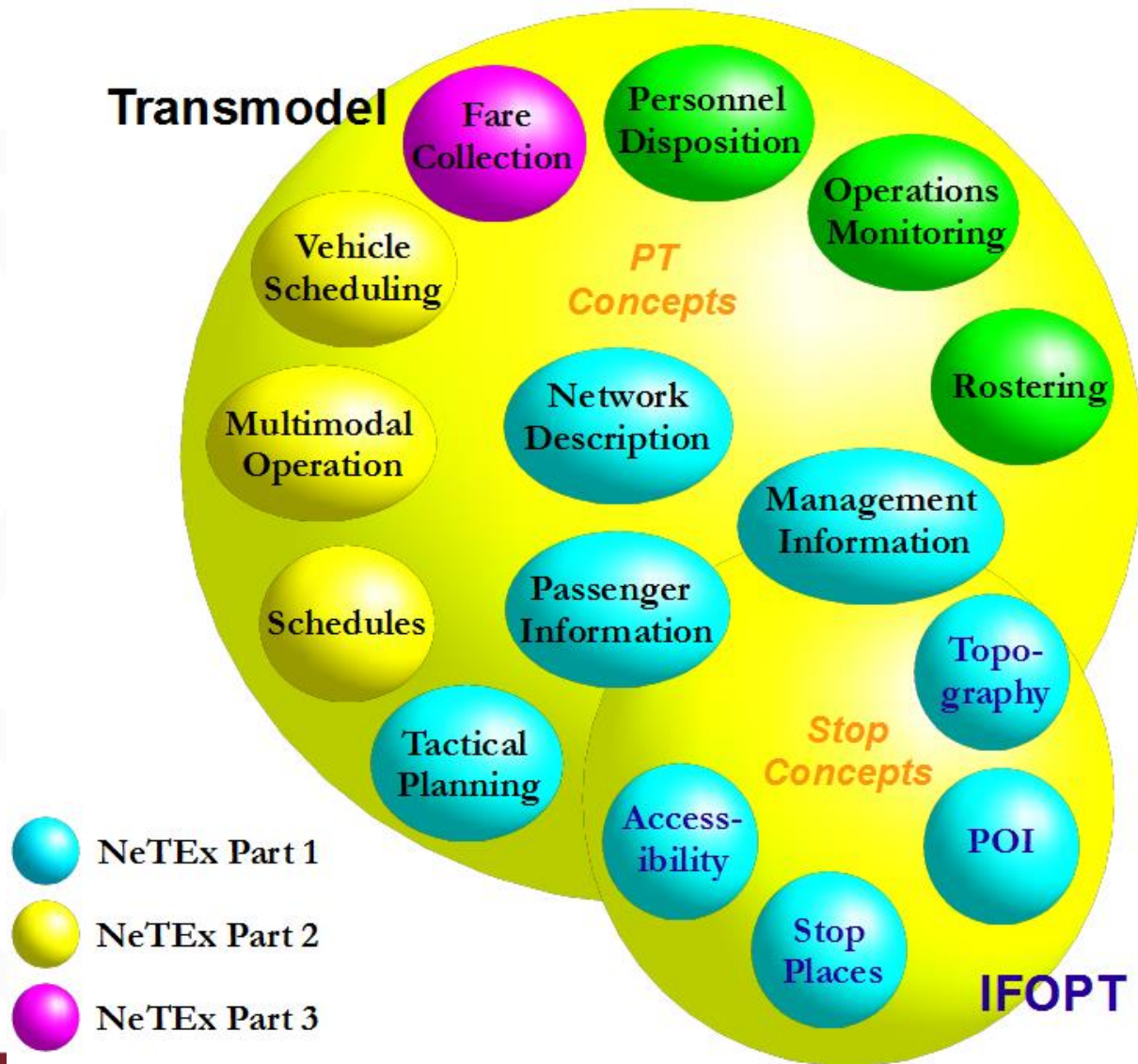
- multimodal information systems providing planned passenger information
- planned tariff information exchanged between passenger information service providers, passenger information service providers and product owners (i.e. authorities, etc.) and between product owners
- **Includes**
 - Different Tariff Structures (Spatial, Time based, Yield managed)
 - Fare Pricing Parameters
- **Excludes**
 - management of fare product and applications
 - certification, registration and identification
 - purchasing and fulfillment
 - (price calculation)
- **Provide inputs for ERA–TAP/TSI open points to be solved by 2012**
 - Technical document on the process and the information used for it in respect of tariff data intended for domestic sales (TAP-TSI 4.2.2.1)
 - Standard for the exchange of fare information in the context of connection with other modes of transport (TAP-TSI 4.2.22)

NeTEx



ABILITY
or use of space

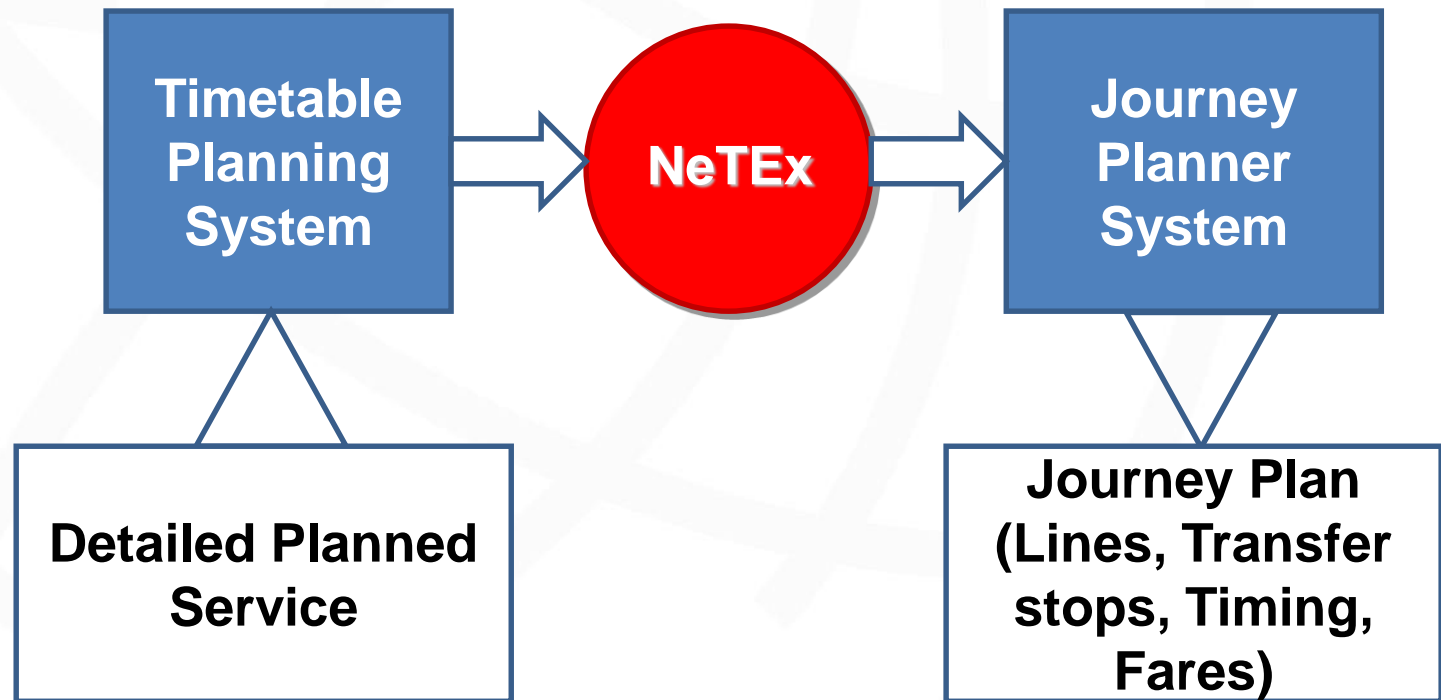
NeTEx



ILITY
use of space

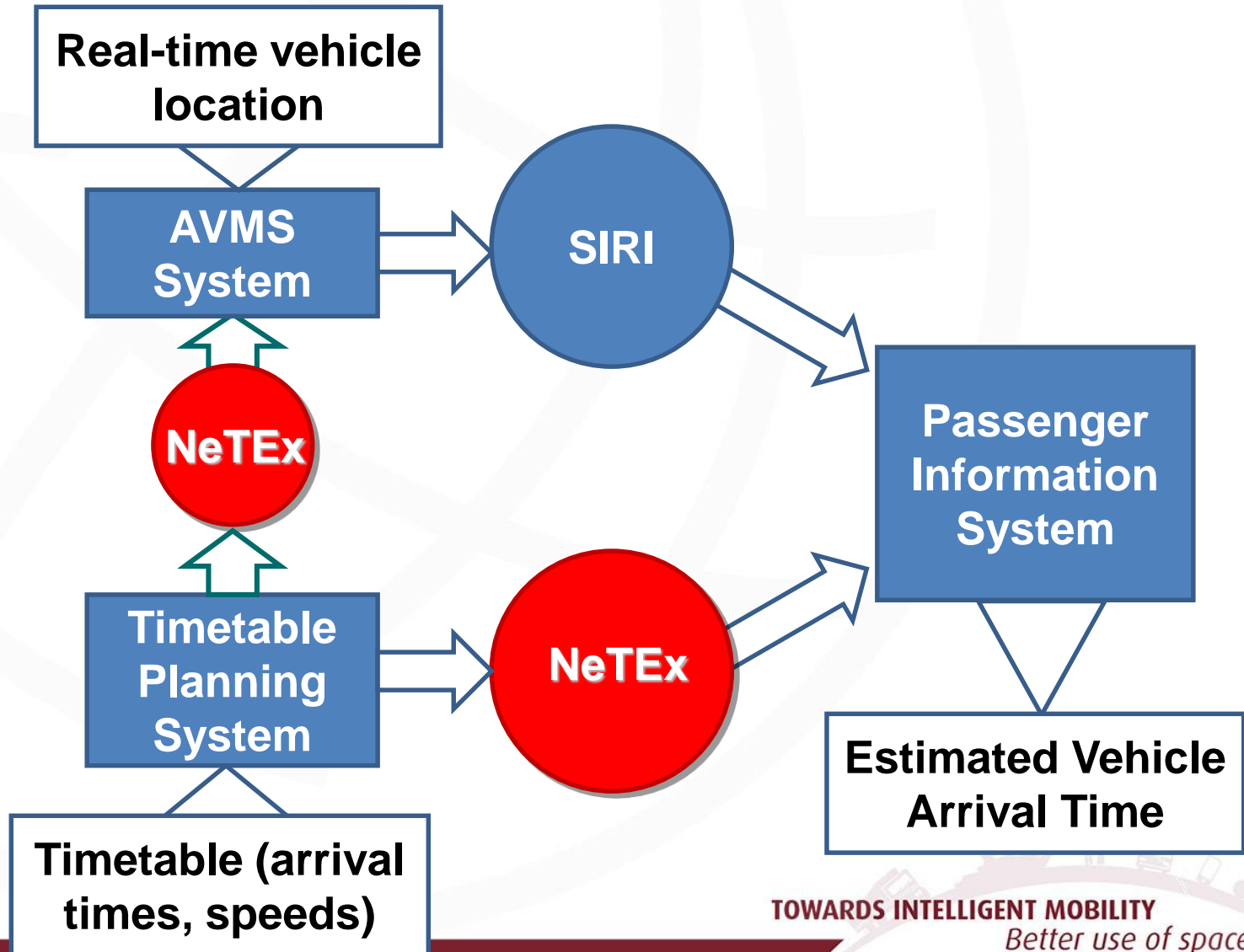
NeTEx

Use case examples



NeTEx

Use case examples

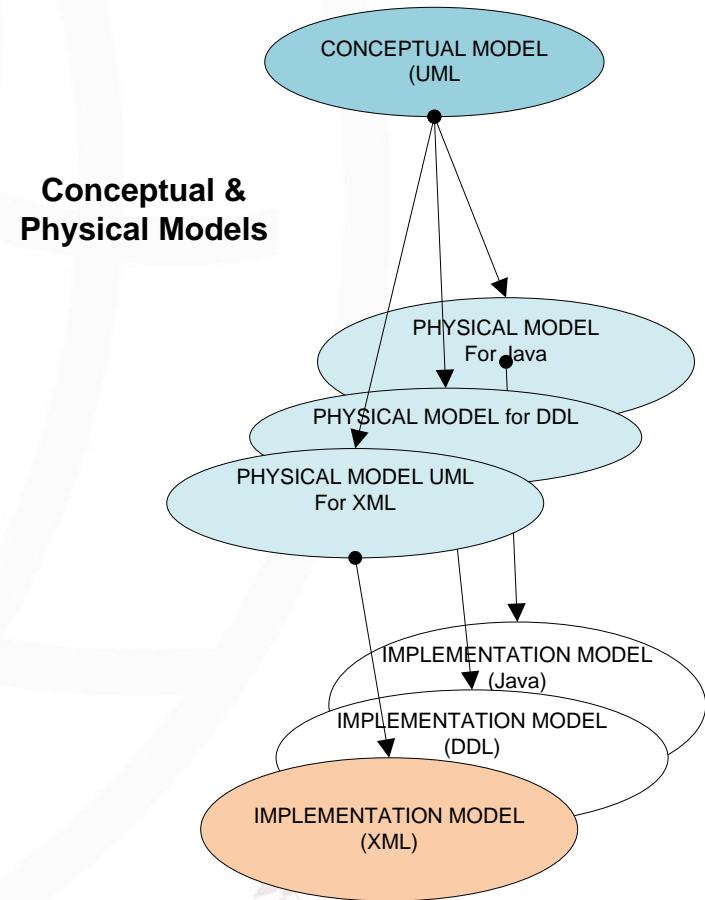


NeTEx Method

- **Model Driven Design**
 - Use cases
 - Clear Separation of concerns
 - High Level documentation
 - Traceability across design levels
- **Example based validation**
 - Ensure real data & Conditions covered
 - All major European national data sets
- **Engineered**
 - Modularised
 - Linear dependencies

NeTE_x Method

- Conceptual model is implementation independent
 - Transmodel + IFOPT
- Conceptual model may have multiple physical models for different target implementations.
 - NeteX XML Physical design as UML
- Implementation is derived from physical model
 - NeTEX XML Schema



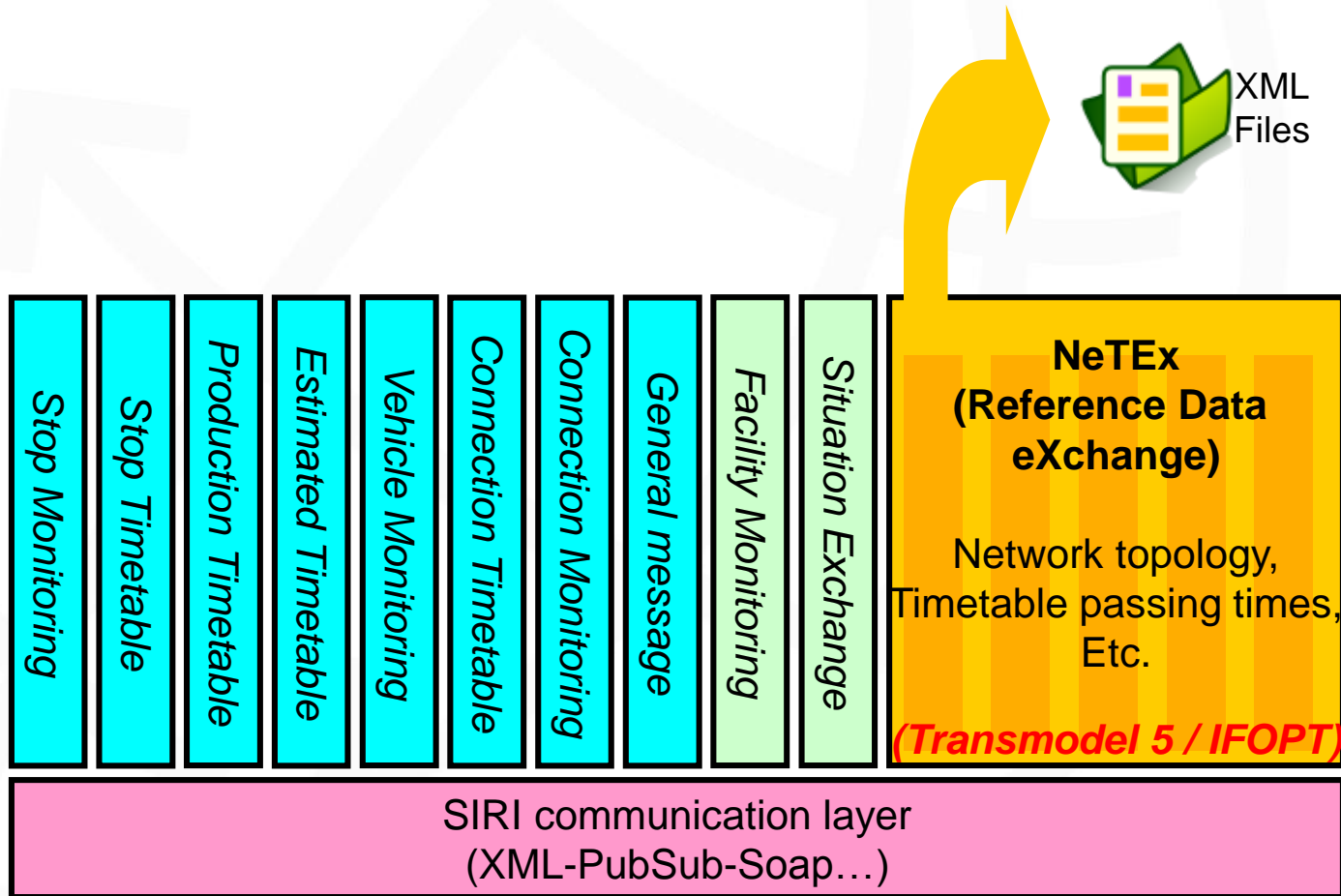
Communication Layer

- Separation of Concerns
 - Communication layer is separate
 - Independent of Functional Message Content
- Web Service architecture: HTTP/SOAP...
 - Based on new Web services standard WS-PubSub, etc (W3C)
 - Robust, scalable, architecture for Real-Time
 - Tunable for efficient deployment

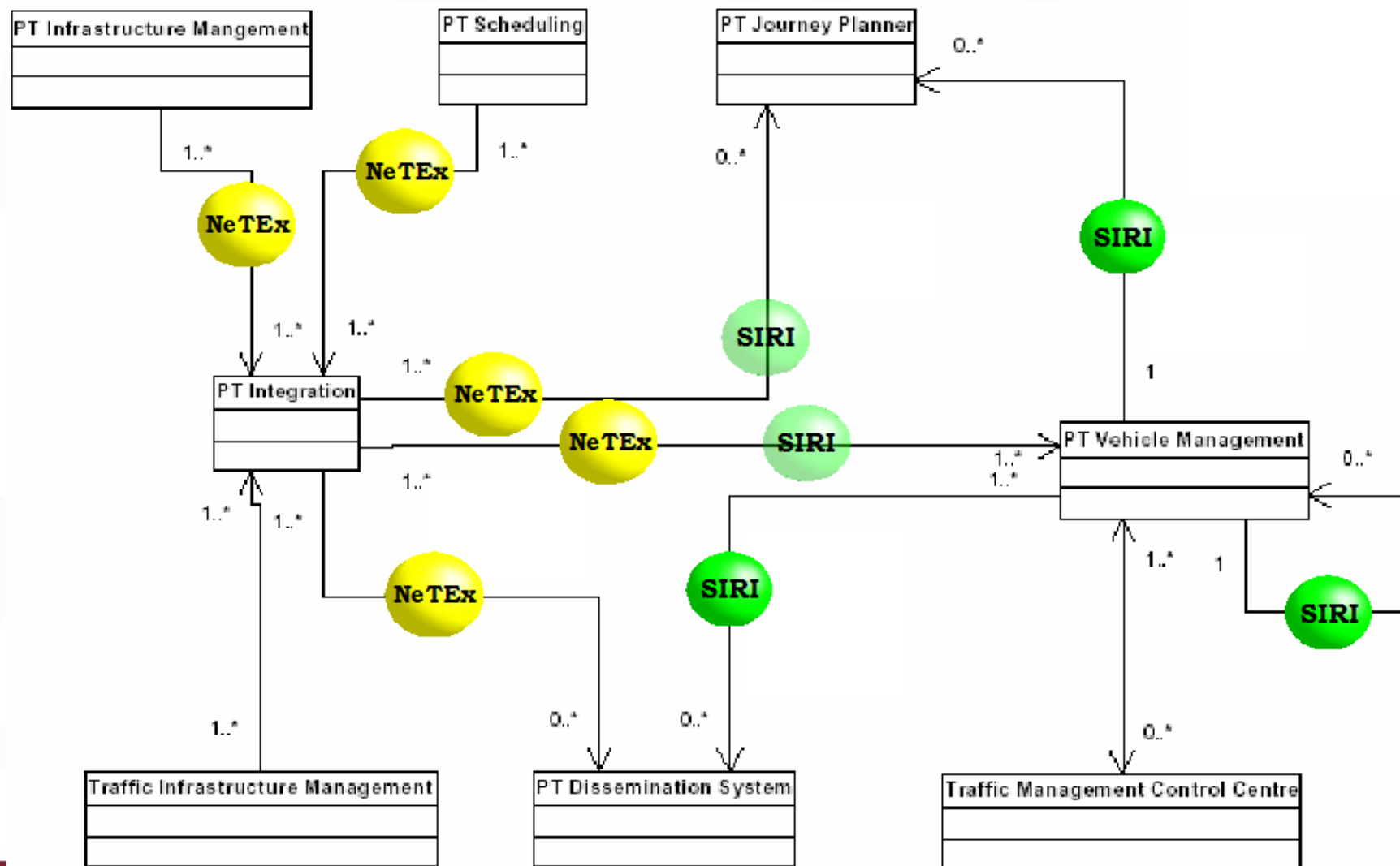
Communication Layer

- General Functions Common to all SIRI/NeTEx Service Types
 - Subscription Management
 - Bulk exchange (*NeTEx*)
 - Recovery & Restart
 - Access Controls – who is allowed to access
 - Versioning – allows distributed upgrades
 - Discovery – which systems have which data/service
- NeTEx also define frames for consistent data set manipulations
- Some Capabilities are Optional

NeTEx and SIRI

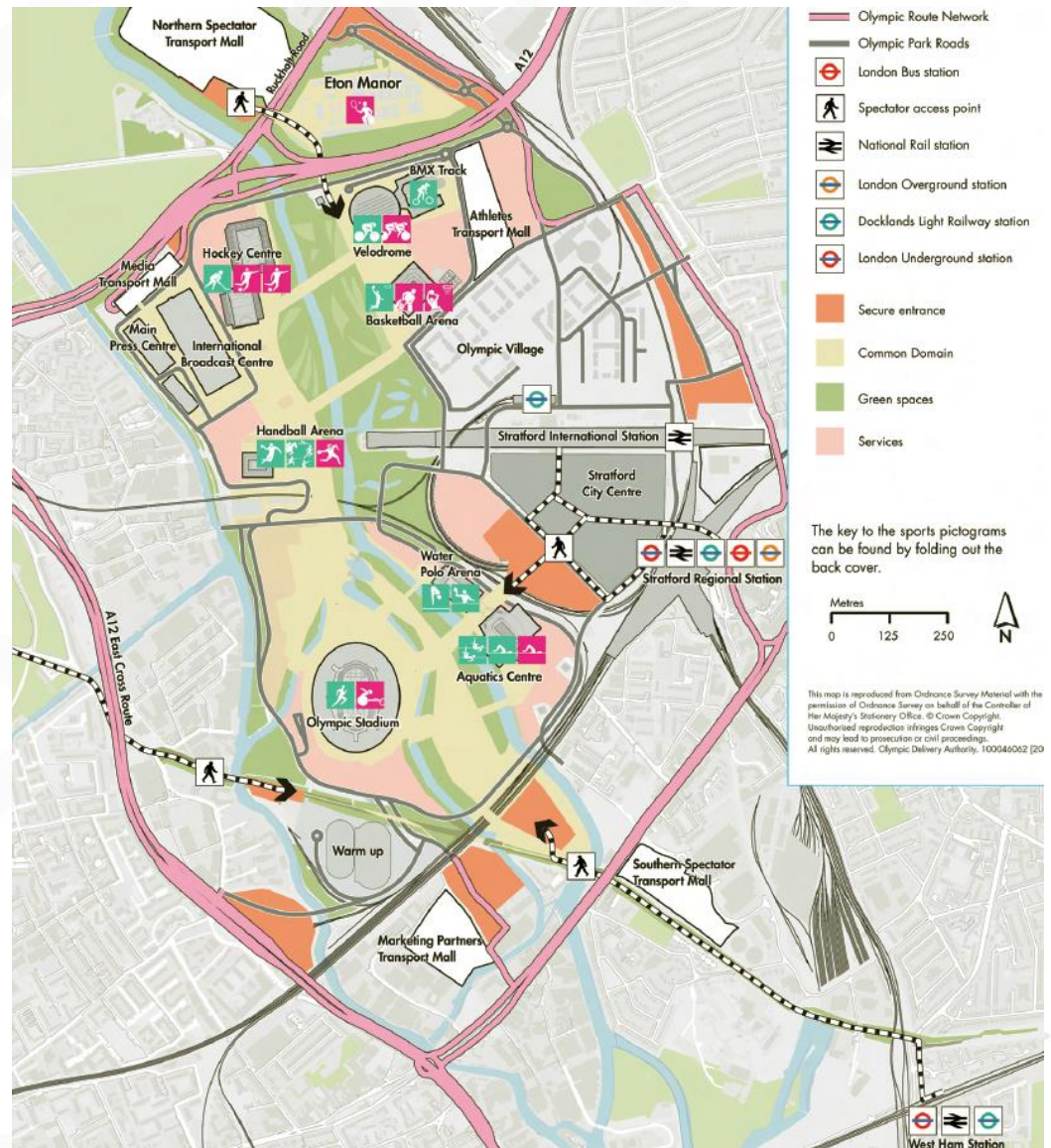


Inter-System Connections



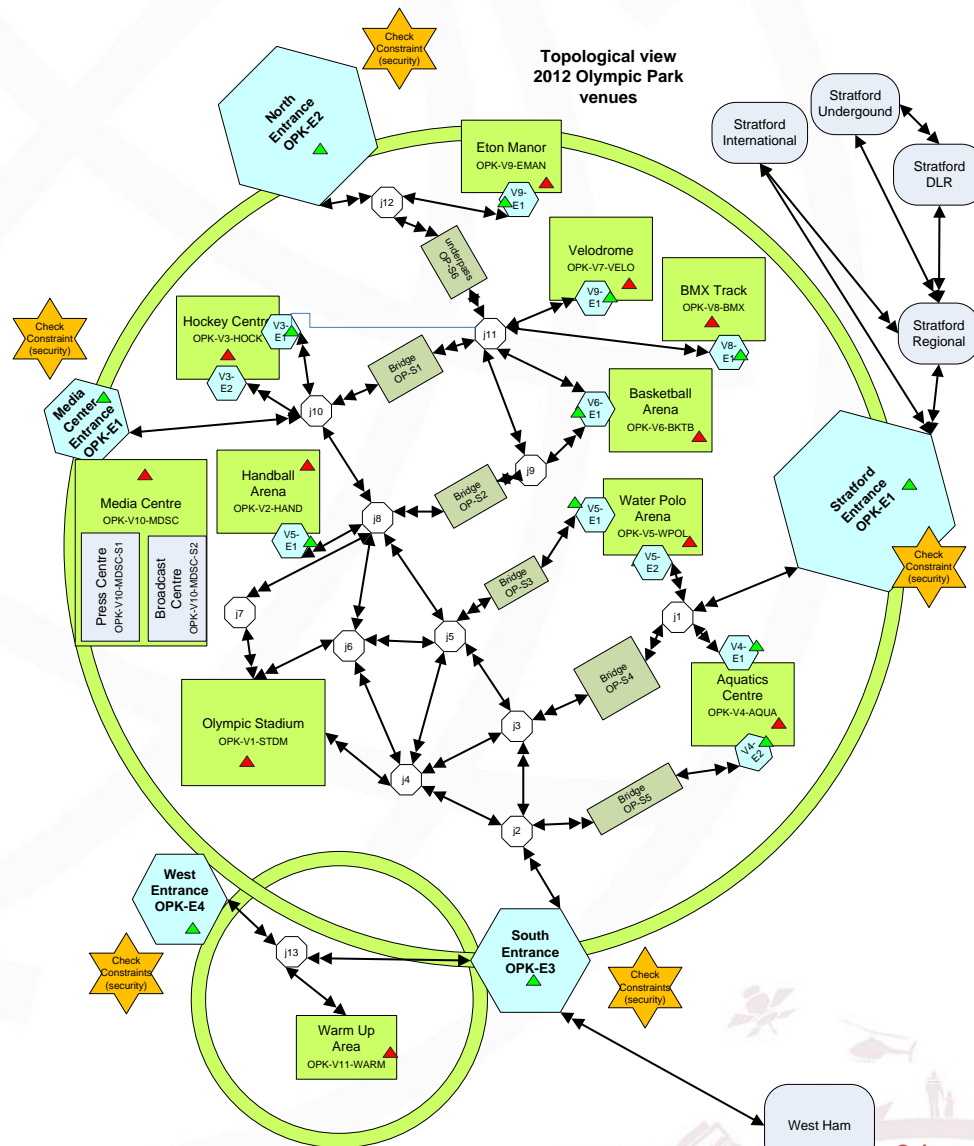
London 2011 Olympic Park

- PT Gateways
 - Stations
 - Bus Stops
- Site
 - Park
 - Venues
- Entrances
 - Security Checkpoints
 - Delays
- Paths
 - Navigation Paths



NeTEx Representation

- PT Gateways
 - Stations
 - Bus Stops
- Site
 - Park (1)
 - Venues
- Entrances
 - Delays
- Paths
 - Navigation Paths



NeTEx: Product Restrictions & Limitations are modelled

- Who can Buy, When & Where?
- When & Where (and How) can it be used?
- Machine Readable
 - To find a applicable fares
 - (Check use)
- Human Readable
 - To explain



TICKET TERMS

Please find below a summary of the conditions that apply to your selected ticket(s).

CHEAP DAY	
Train Operator	Most Train Operating Companies
Booking Deadlines	No deadline - walk UP fare
Discounts	Discounts are available for all railcard holders
Refunds	Full refund if wholly unused minus cancellation fee of GBP7.50 if processed online, or if processed at call centre.
Changes To Travel Plans	GBP10.00 admin charge plus upgrade to next appropriate walk up fare.
Conditions	Reservations are not essential but are recommended on certain services. Return journey must be made on same day.
Break Of Journey	Valid for break of journey on outward and return portion of ticket
Availability	Available on most off-peak journeys on any days.
Validity	Only valid for off peak travel on date shown on ticket. Not valid for travel on some Monday to Friday peak services, especially to/from London. Definition of peak period is dependent on route.

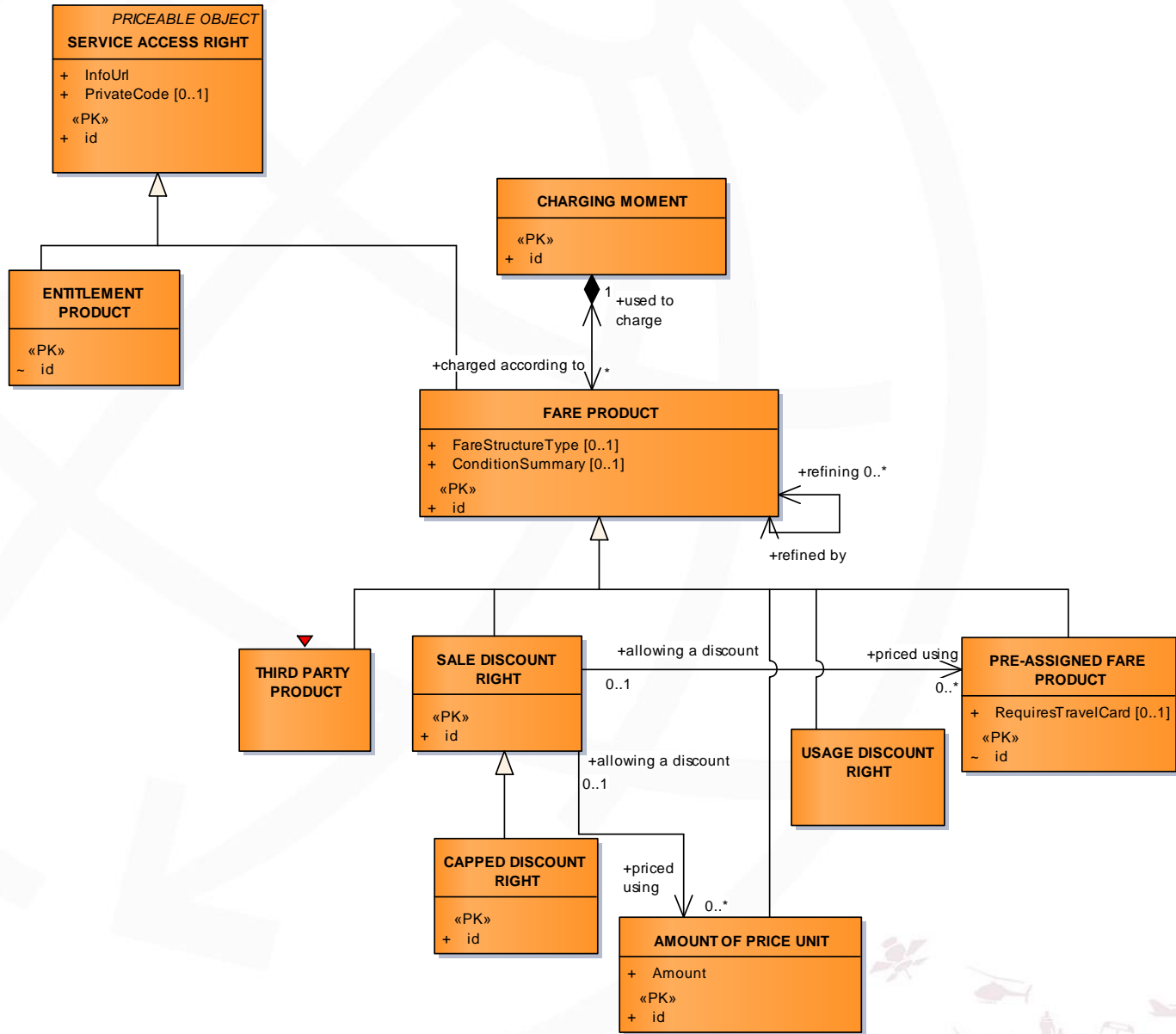


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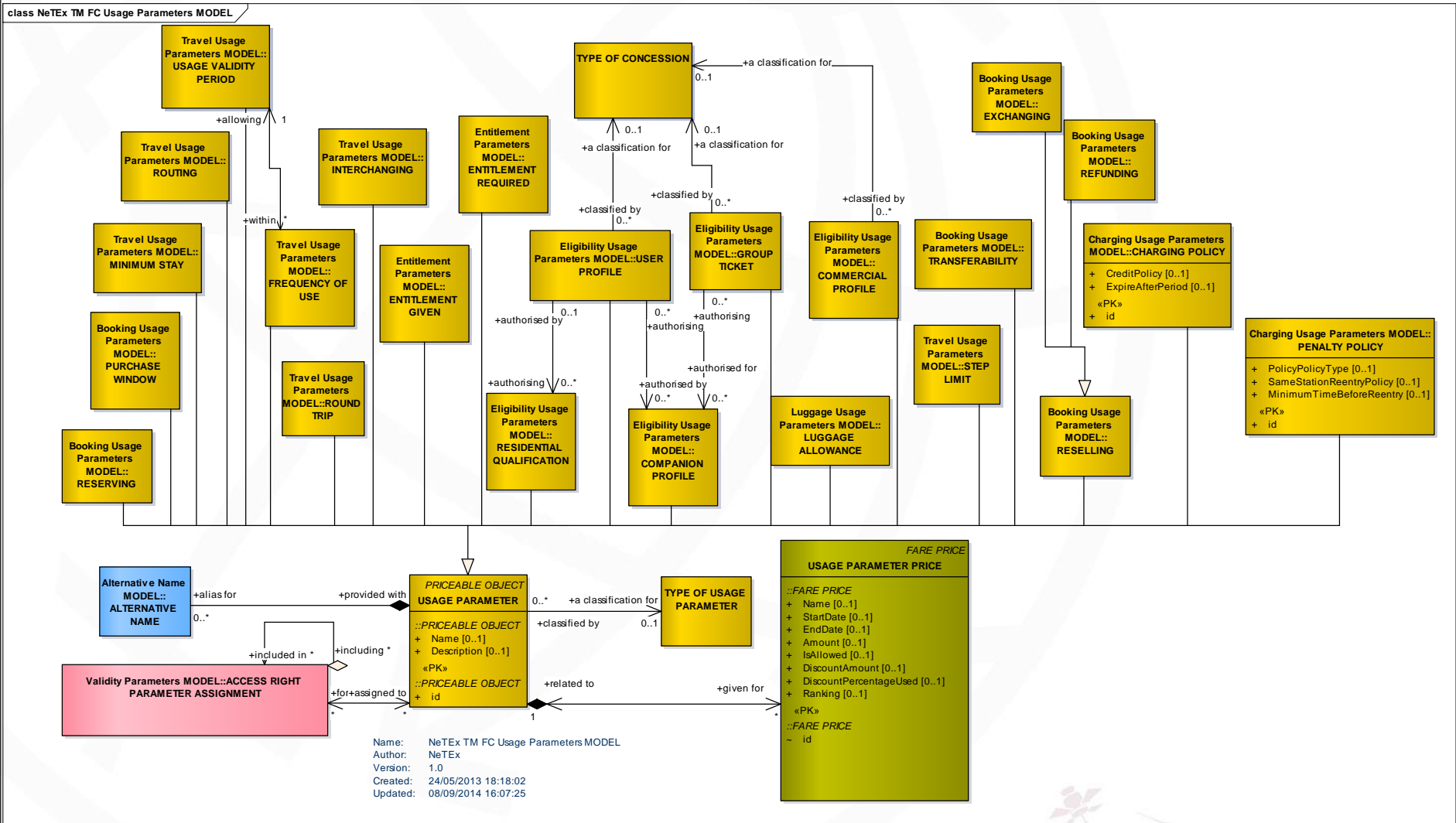
In Transmodelle: *“Fare Limitation Parameter”*

Fare Product Model

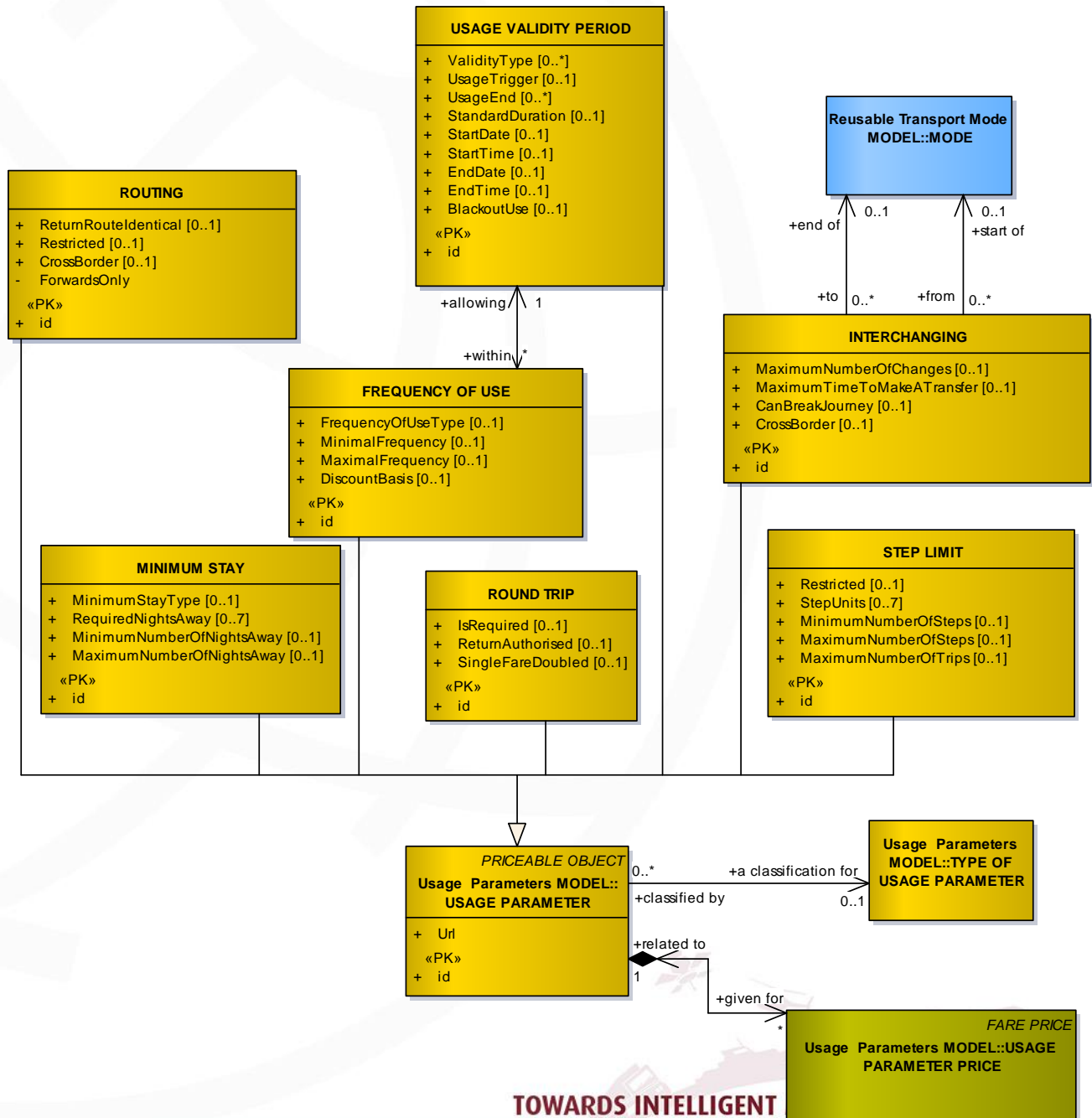
class NeTex TMFC Fare Product Basic MODEL



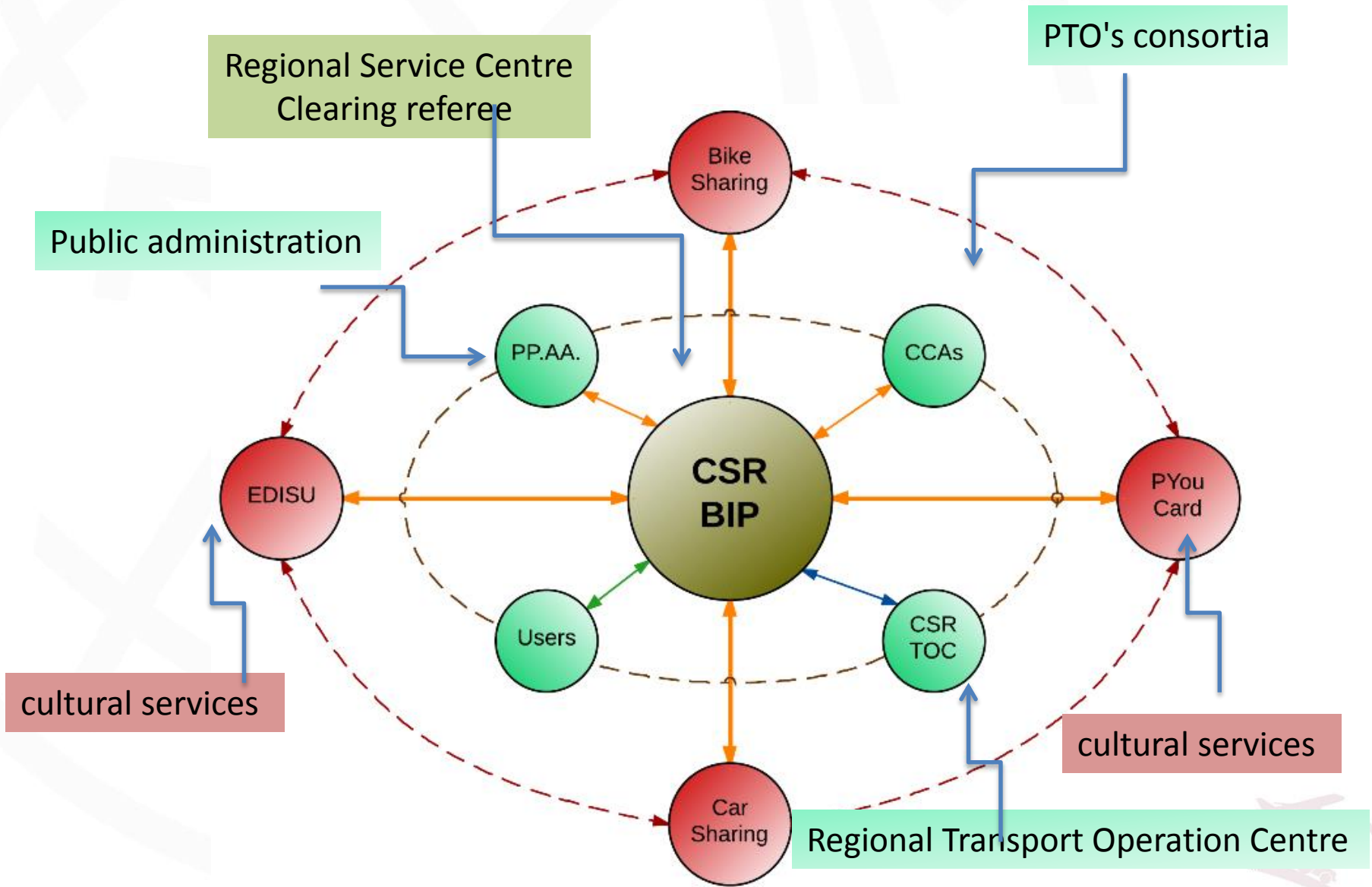
Usage (Limiting) Parameters



Travel Usage Parameters

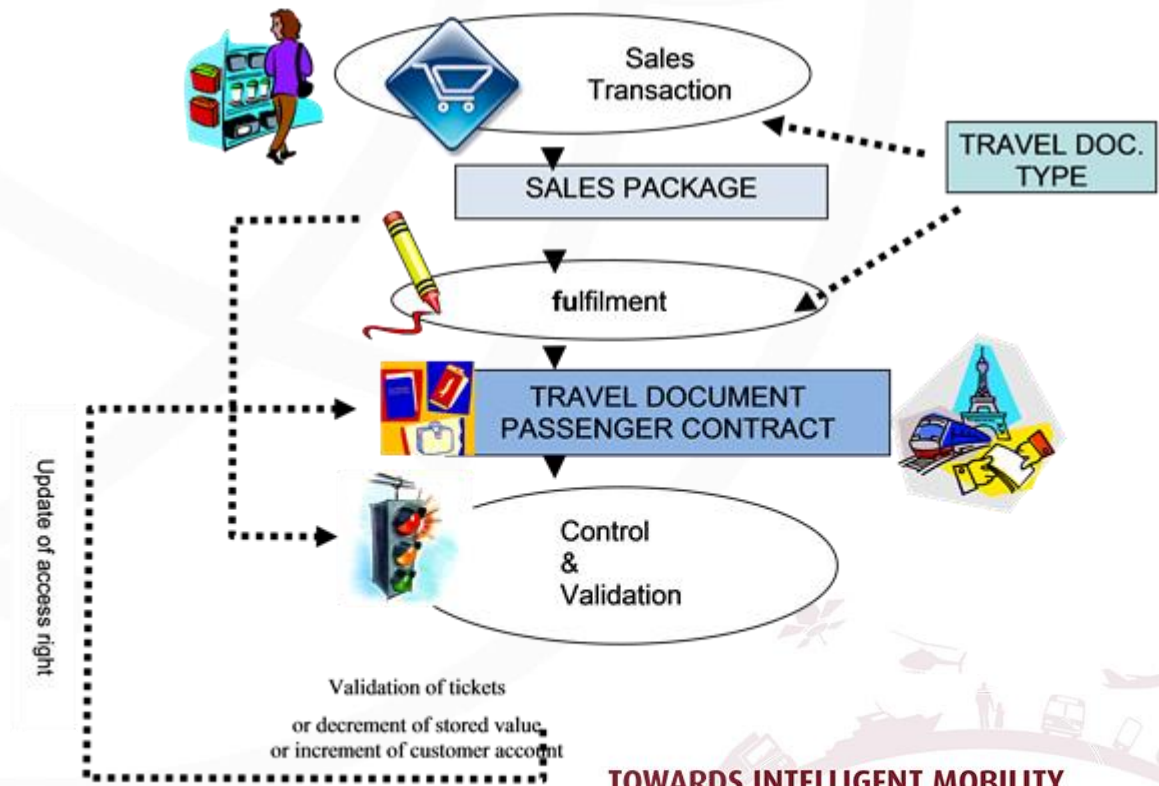
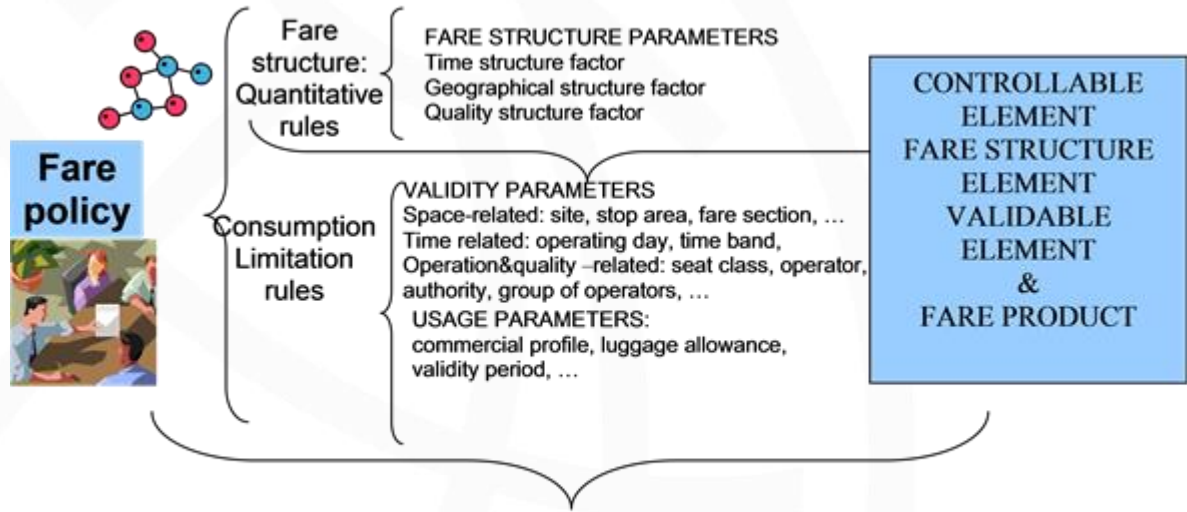


BIP Project



Fare Management

Main Processes



TOWARDS INTELLIGENT MOBILITY

Better use of space

GTFS vs NeTEx

GTFS

Is an efficient format for final simple timetable, but

- No journeys split and join (for rail operation)
 - No clear distinction btw journey patterns & routes
 - No operational data linked to passenger information like heading sign changes, on board information
 - Validity conditions are limited
 - No differentiated connection times
 - No interchange times (no complex interchange rules)

 - Minimal support for fares (flat fares, point to point fares, no usage conditions)
 - inadequate for combined , complex fare structures like space &time based, limited user profiles
 - No contracts, only prepaid fares (no post-payment, no pay as you go)
 - No flexibility in price, discounts calculation (final price only).
 - No combination with long distance (mainly for urban)
-
- NeTEx is modular - has reusable components
 - Has complex versions/validity management
 - Defines coherent sets of aggregated data

Thank You For Your Attention!

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<http://kasia.bouree.fr>



Transmodel – NeTEx – EPTIS : A European Standard for Modelling and Exchanging Fares

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