

Public transport network and stop place model and its importance for multimodal information systems

THNS - Shanghai, November 2012



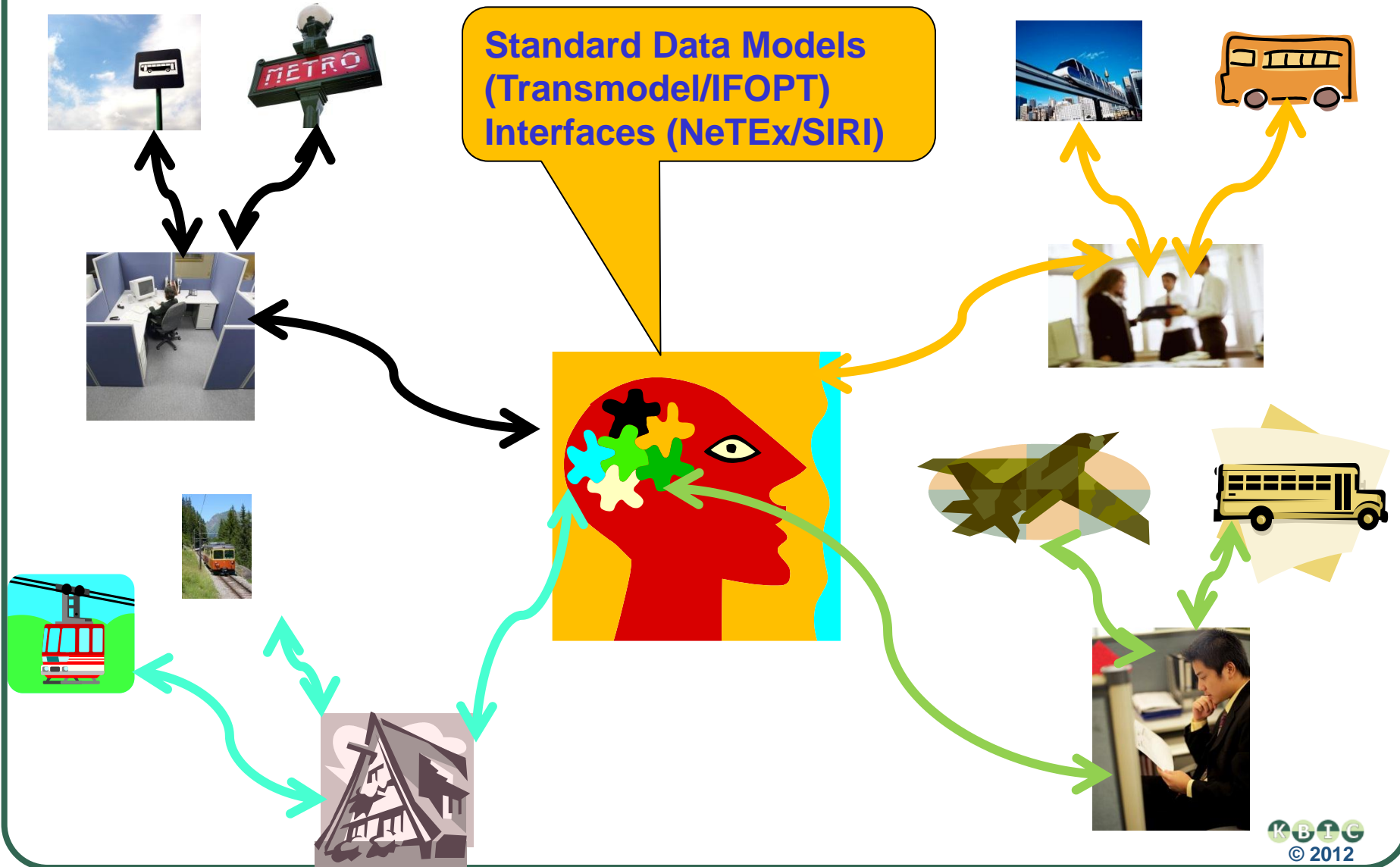
Kasia Bourée



1. Introduction
2. Main CEN Data & Interface Standards for Public Transport
3. Public Transport Network and Stop Model Use Cases & Projects:
 - Management information & statistics
 - User Information:
 - Inter-regional / multimodal trip planning
 - Stop place information: stop representation – accessibility
 - Passenger guidance
 - Stop identification
4. Conclusion & Invitation



Inter-System Exchanges & Multi-Source Data: Need for Unambiguous Data





Main Standardisation Organisations & Structure

WORLD-WIDE



Also:

IEC : International Electrotechnical Commission

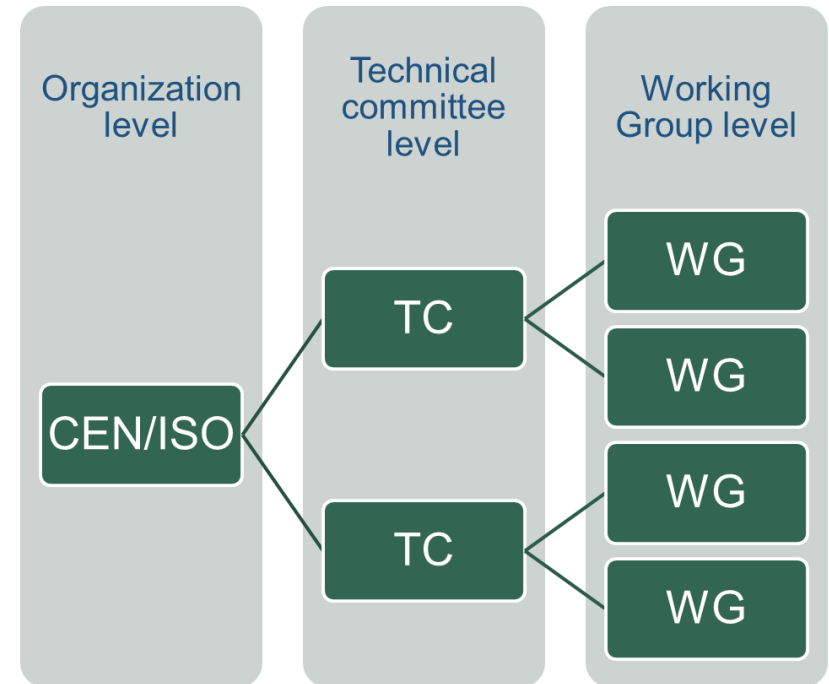
ITU: International Telecommunications Union



EUROPE-WIDE



Also: ETSI, CENELEC





Documentation Types and Characteristics



EN

European Norm revised every 5 years

TS

Technical Specification revised every 3 years

TR

Technical Report

- ❖ Result of standardisation: textual documentation (e.g. functional specification of a system, terminology, data model specification, interface specification, etc)
- ❖ Standards are in general not mandatory (except a small percentage)
- ❖ Have a different status than regulations/directives which are mandatory
- ❖ **Directives sometimes recommend the use of norms: this is the case for the CEN norm Transmodel and the European Directive for Rail**



Standardisation Topics in CEN Working Group Dedicated to Public Transport

SIRI : Service Interface for Real-time Information

NeTEx: Network & Timetable Exchange

DJPS: Distributed Journey Planning (planned)

TI-VIP: Traveller Information for Visually Impaired (dormant)

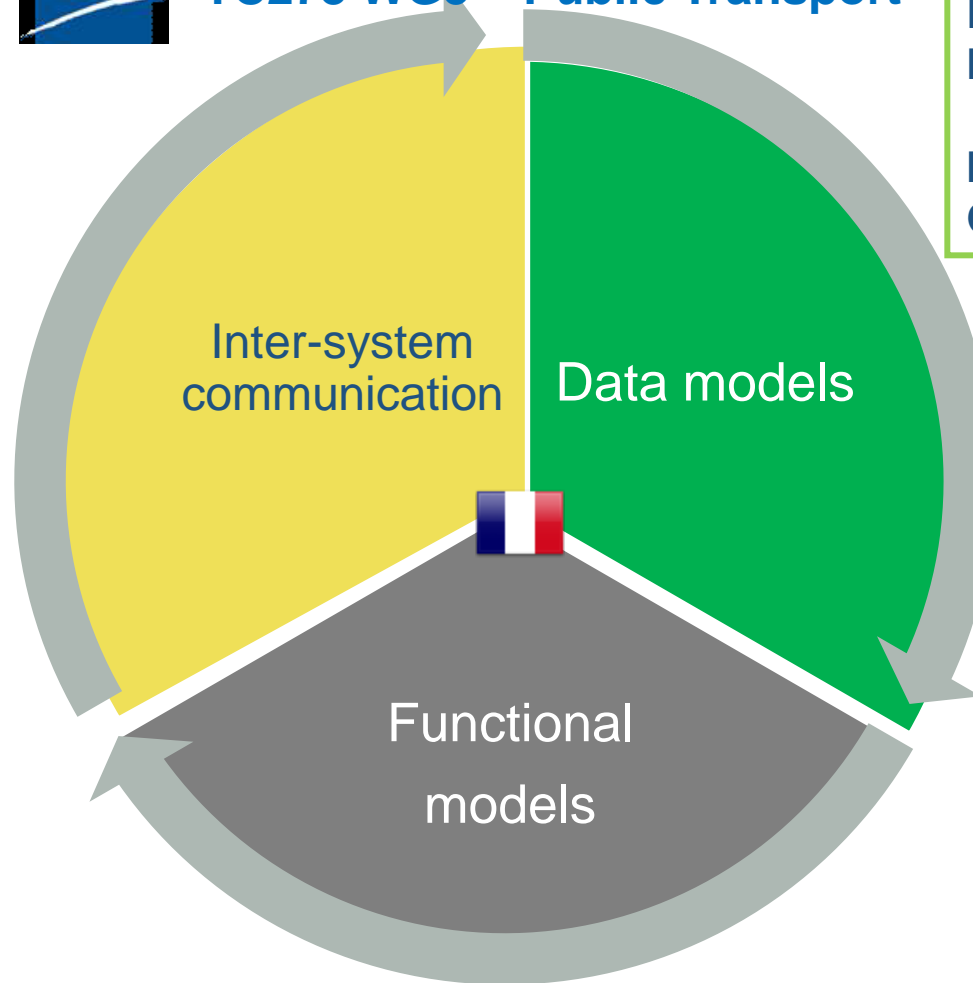


TC278 WG3 – Public Transport

Transmodel: Reference Data Model for PT

IFOPT: Fixed Objects for PT

ISO/ CEN: Geographic Data models



Integrated Fare Management



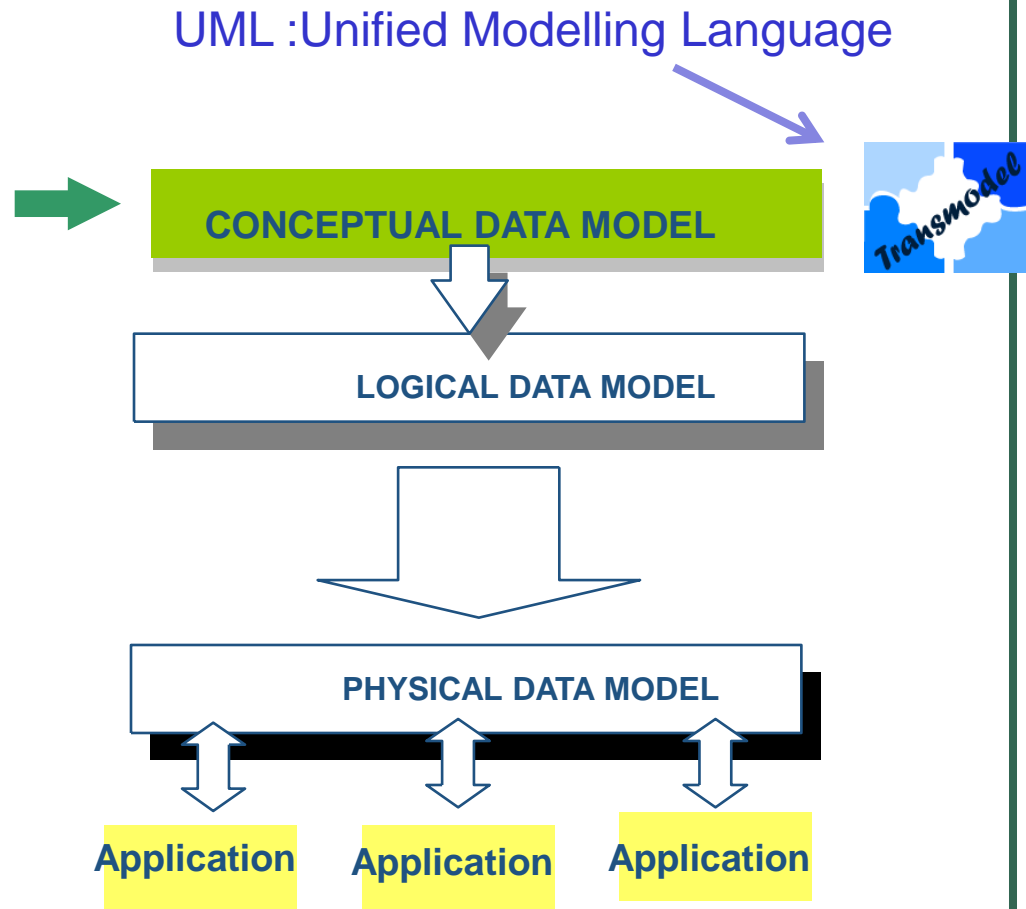
Reminder: Data Modelling Levels

Three main steps:

- Semantics of a domain
- Hardware Independent
- No redundancy

- Additional attributes
- Data formats

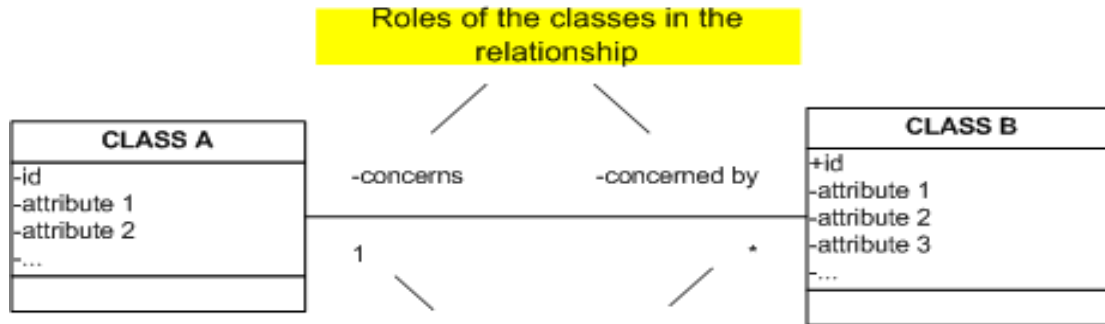
- Choice of a DBMS
- Controlled denormalization optimisations & redundancies
- Organisational rules





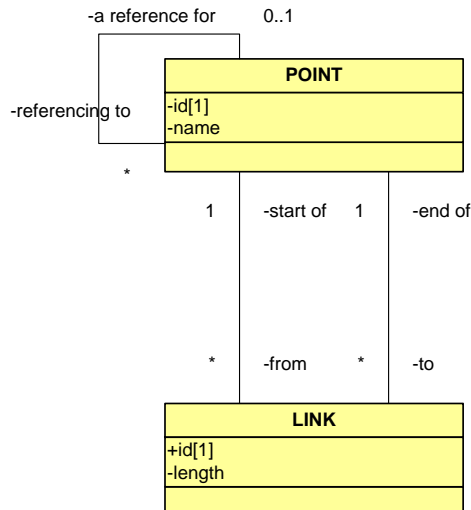
Reminder: UML Formalism for Data Models

Semantics of a domain



Cardinality of the relationship

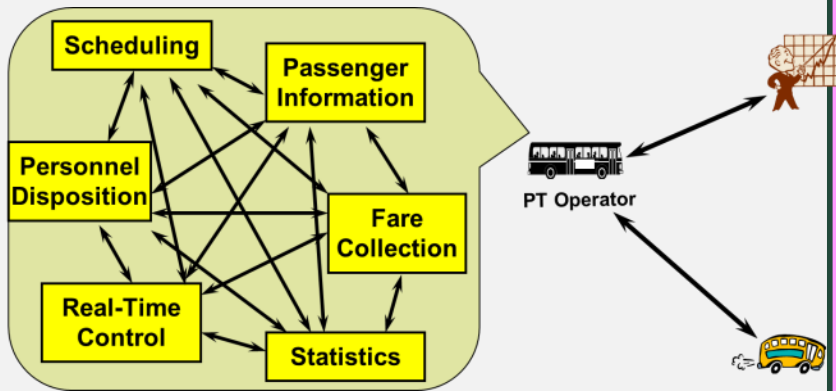
1 one and only one
 0..1 zero or one (optional)
 * many
 x..y between x and y



A link between two points
 (here stop points)

Transmodel to Solve System Complexity & Lack of Interoperability

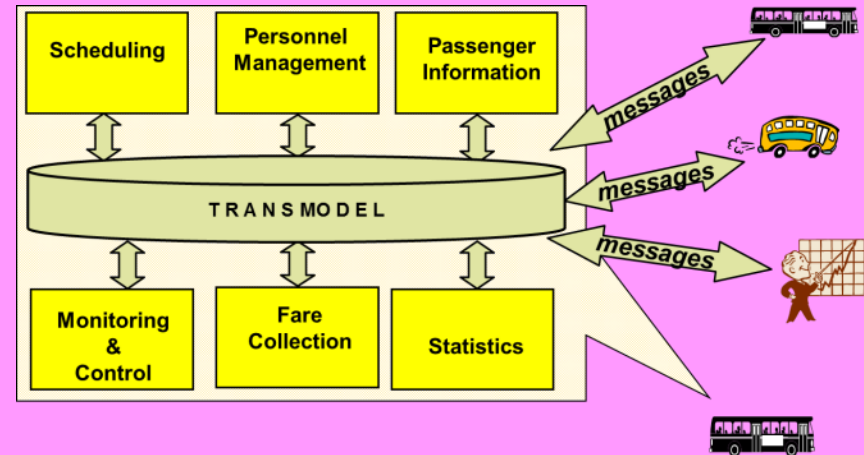
Complex System Architecture



Numerous inter-application links

- Information system complexity
- lack of interoperability
- proprietary applications
- lack of open, common system specifications

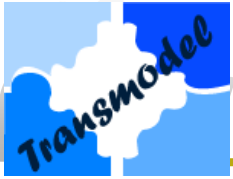
TRANSMODEL – based System Architecture



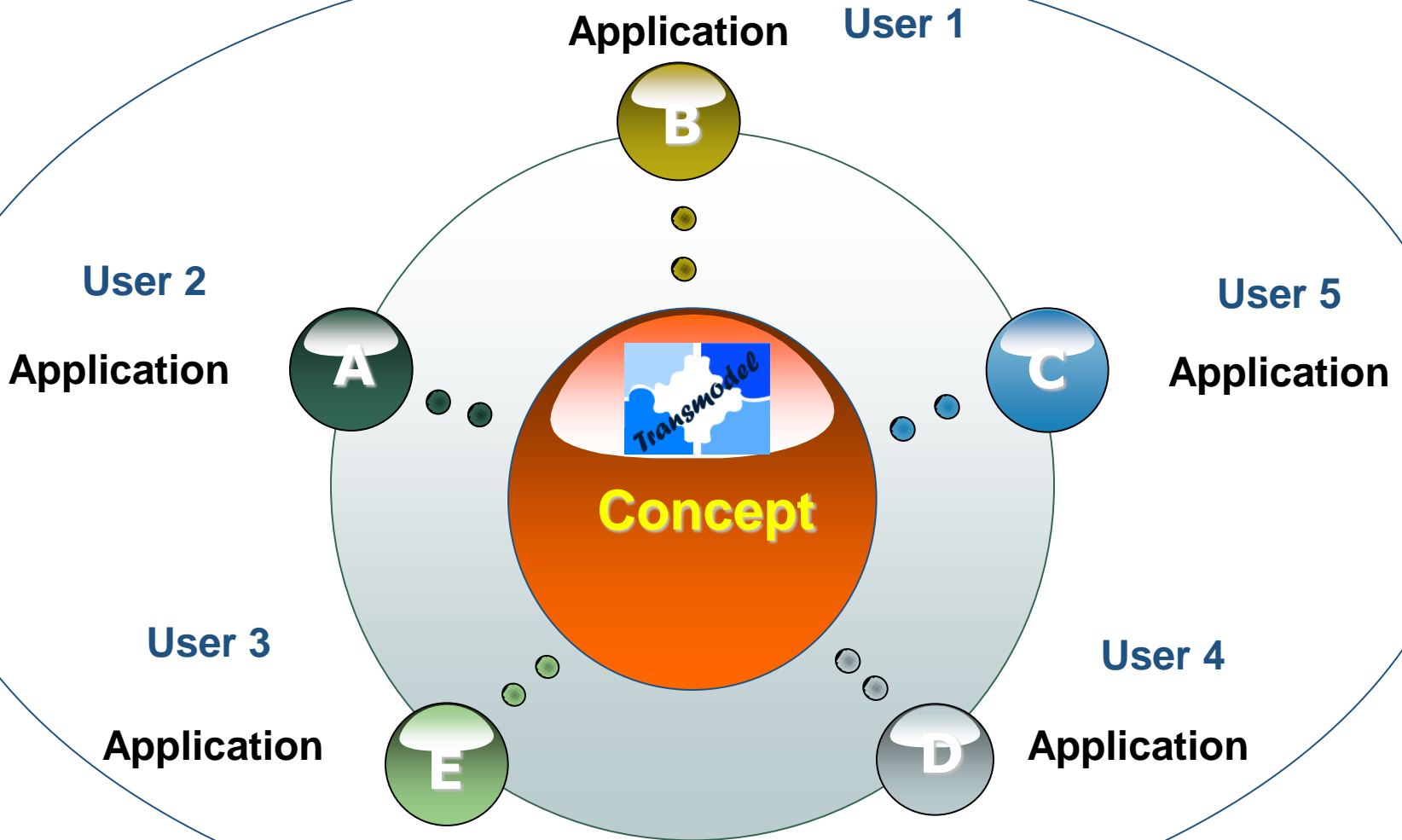
Common data structure

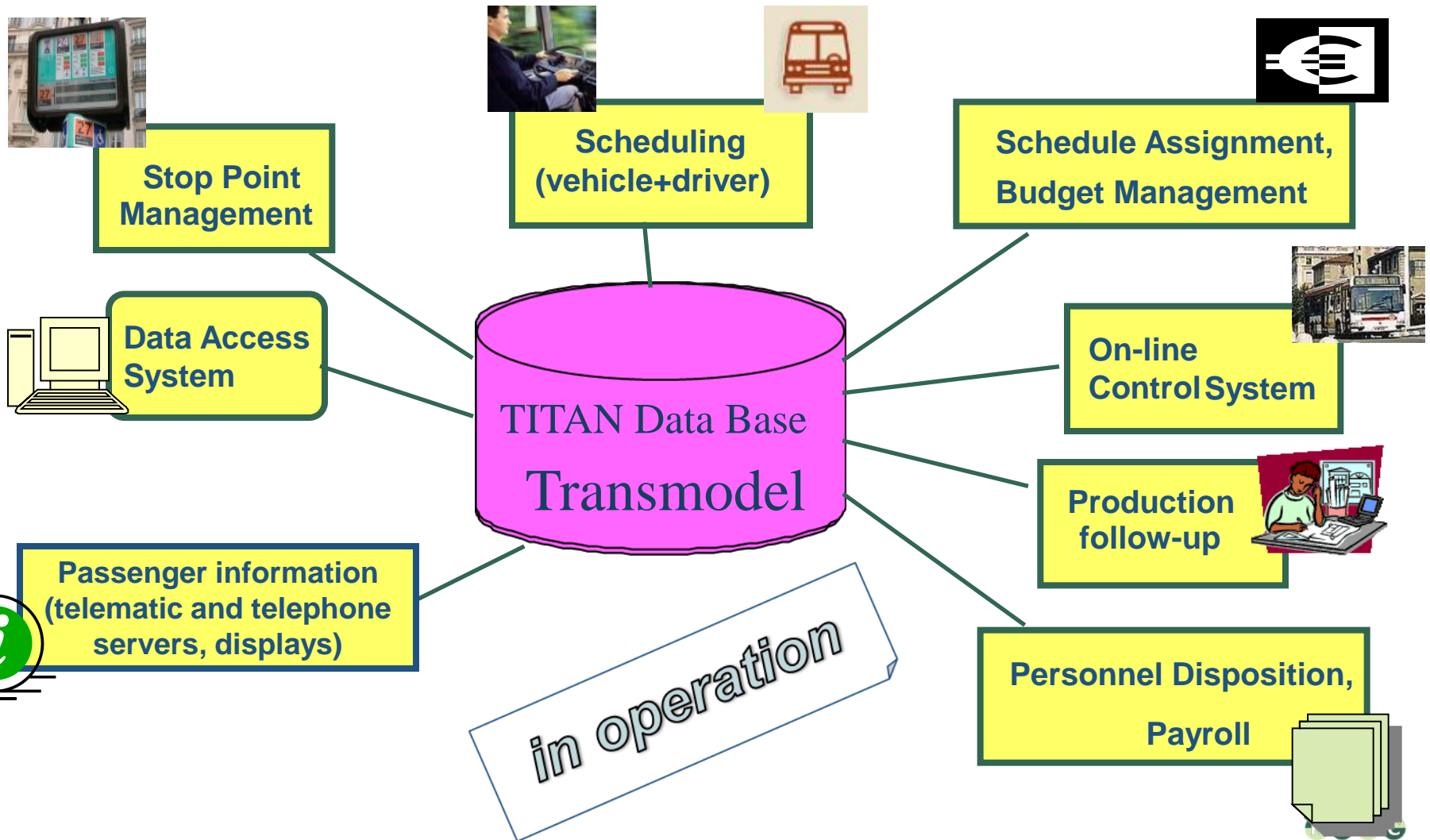
- Allows for a progressive migration
- Opens the market
- Reduces development costs
- Considers intermodality & multi-operators
- Is hardware independent
- Considers a variety of practices

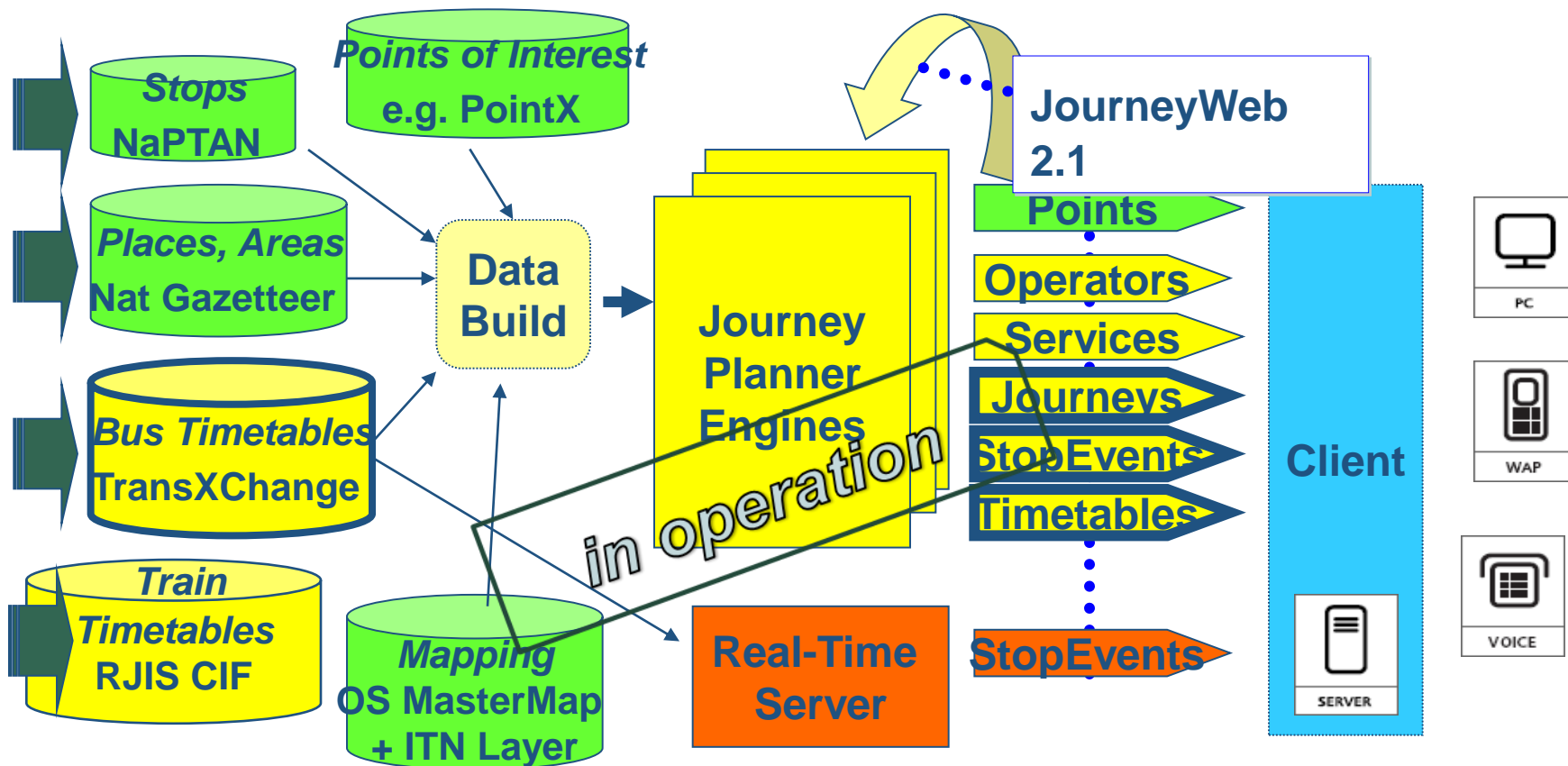
Transmodel: Conceptual & Static



Transmodel "Philosophy"

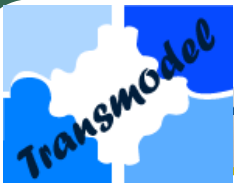




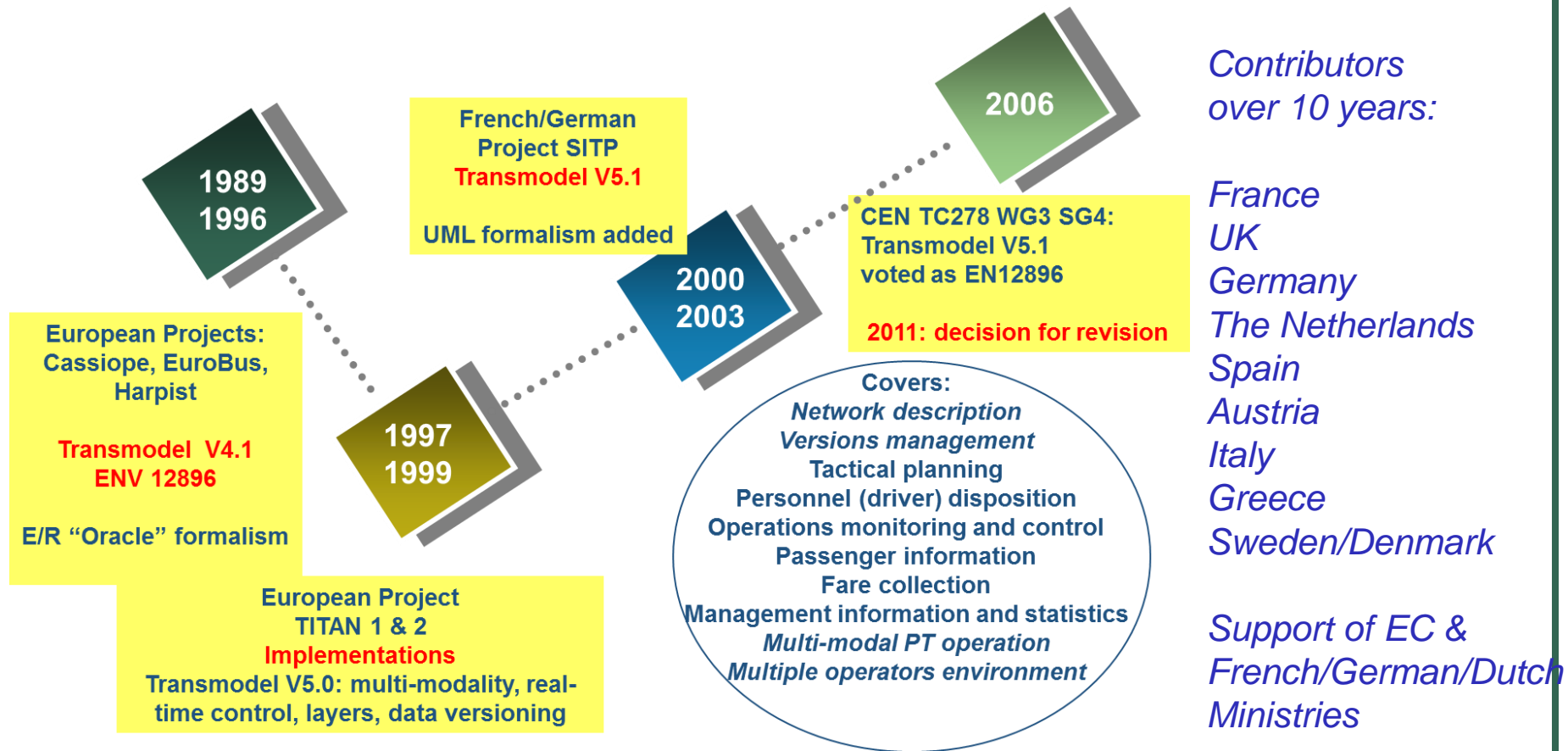


Transmodel: Common Abstract model





A Robust Basis for Information System Architecture



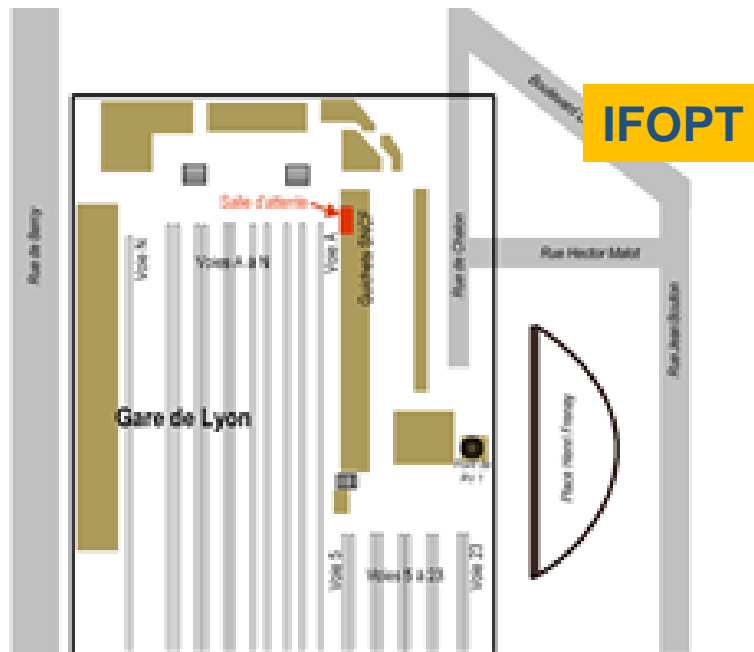
<http://www.normes-donnees-tc.org/spip.php?rubrique22>

<http://www.transmodel.org>



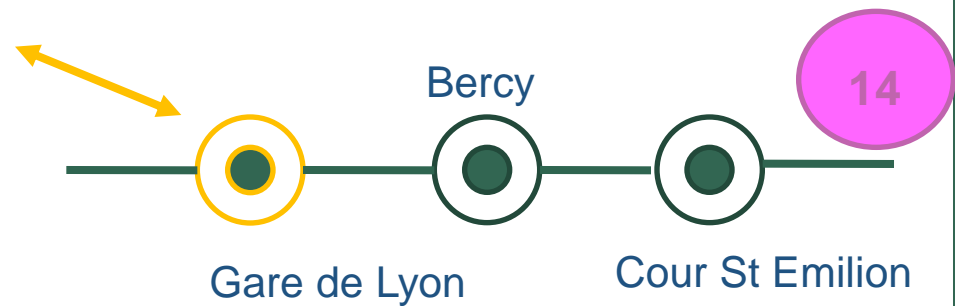
IFOPT: Stop Place Model

Physical view



Details of a stop

Logical/macrosopic view



Transmodel

Global view of a stop

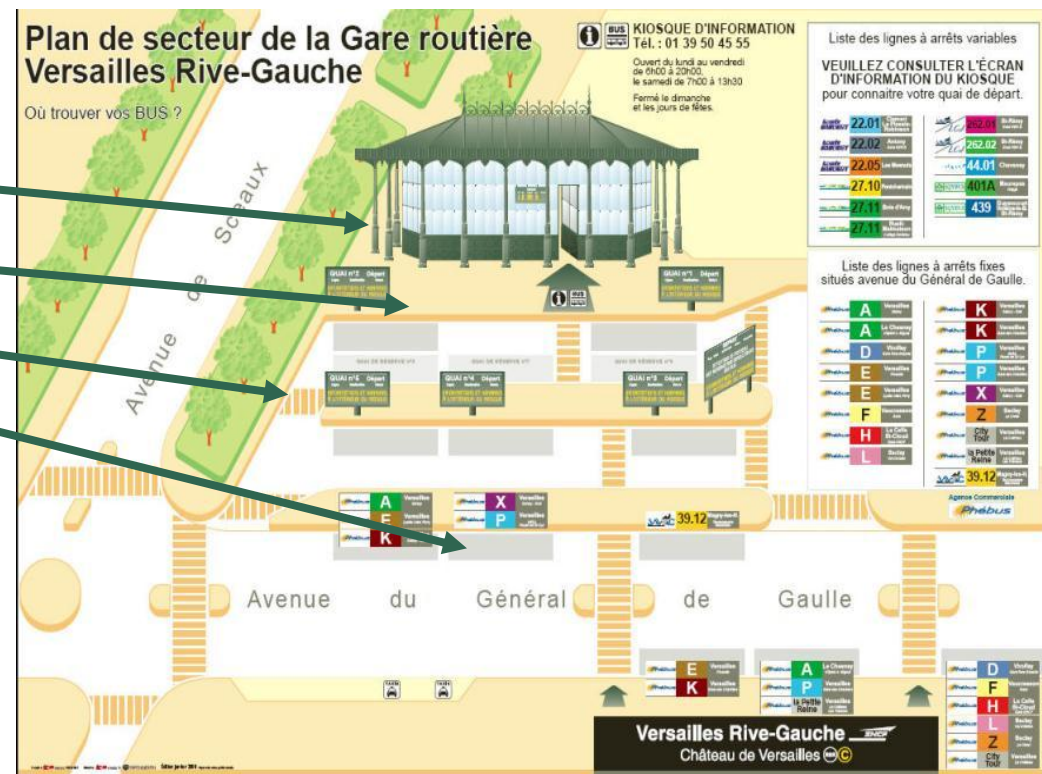


IFOPT Complex Monomodal Stop Place

IFOPT means: Identification of Fixed Objects for Public Transport

Gives a precise definition of the concept STOP and its physical «reality »:

- ❖ Dedicated zone
- ❖ Quay
- ❖ Boarding position
- ❖ Vehicle stopping position
- ❖ Entrance
- ❖ Equipment & services
- ❖ Navigations paths



IFOPT became recently a norm (EN)



IFOPT Complex Multi-Modal Stop Place

Transmodel STOP POINT
is a view of the
IFOPT STOP PLACE

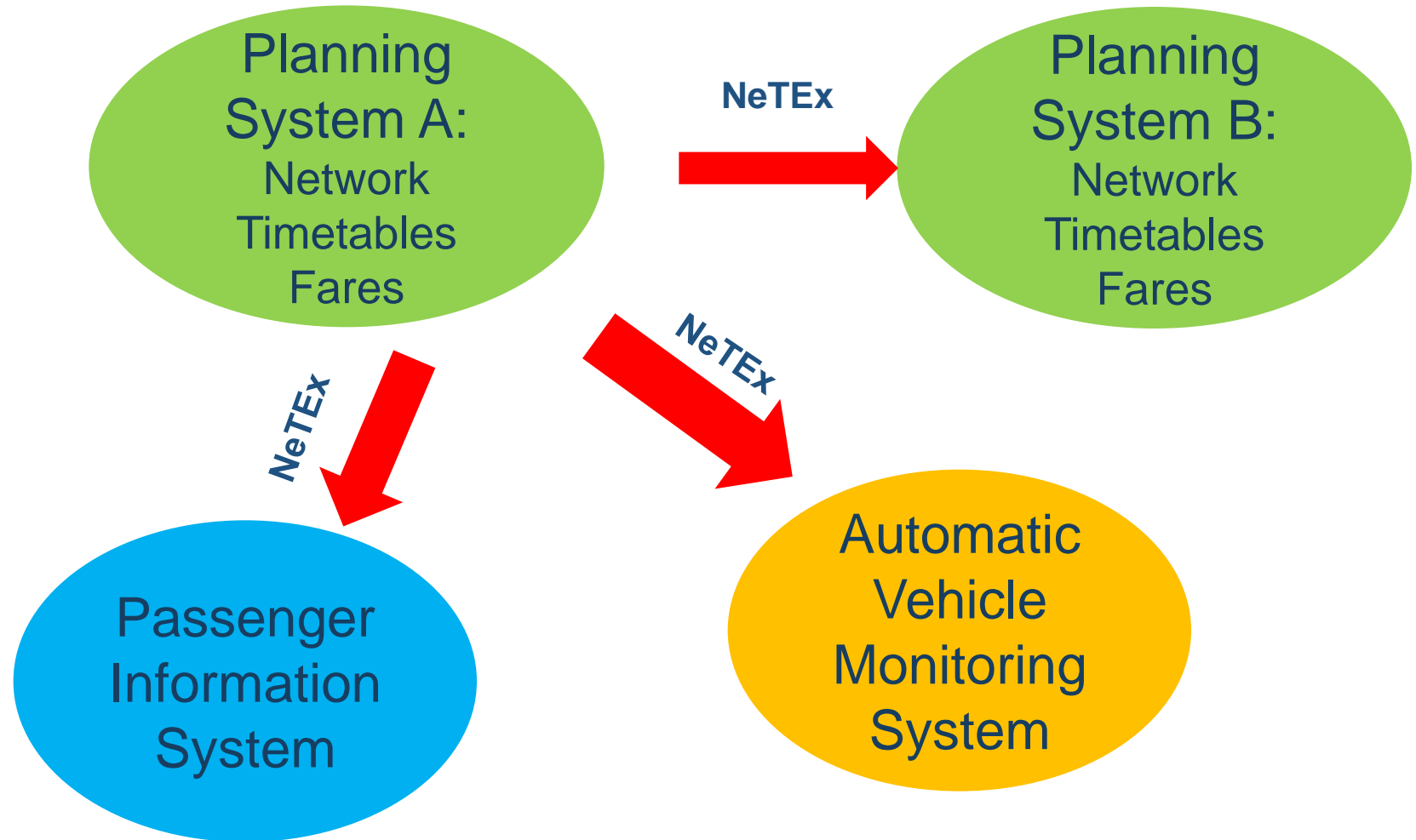
IFOPT Stop Model
is multimodal

Rail, coach, metro stations,
bus stops,
airports , etc.





NeTEx Interfaces: Planned Information Exchange

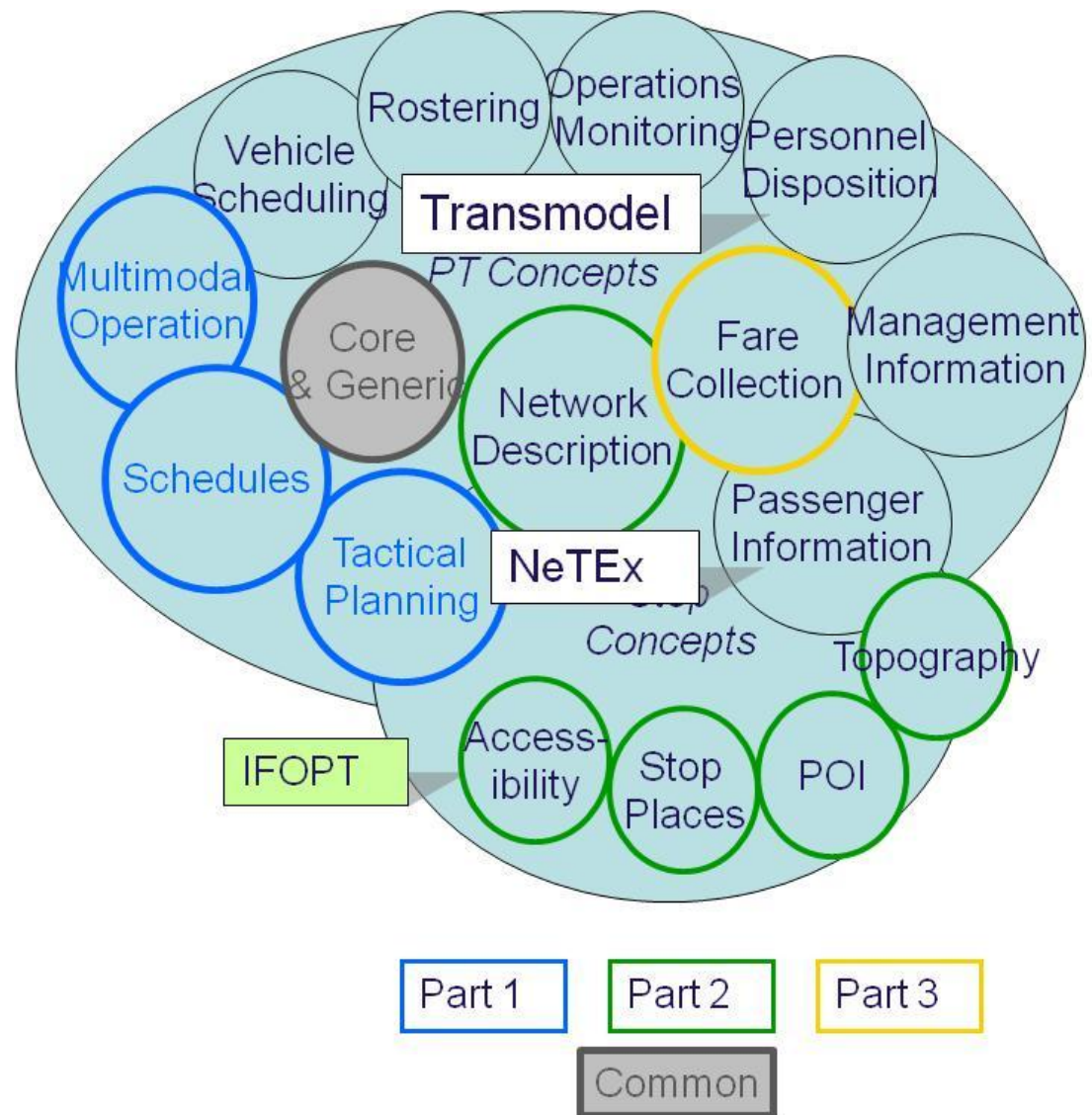


NeTEx stands for **Network and Timetable Exchange** and is a TS



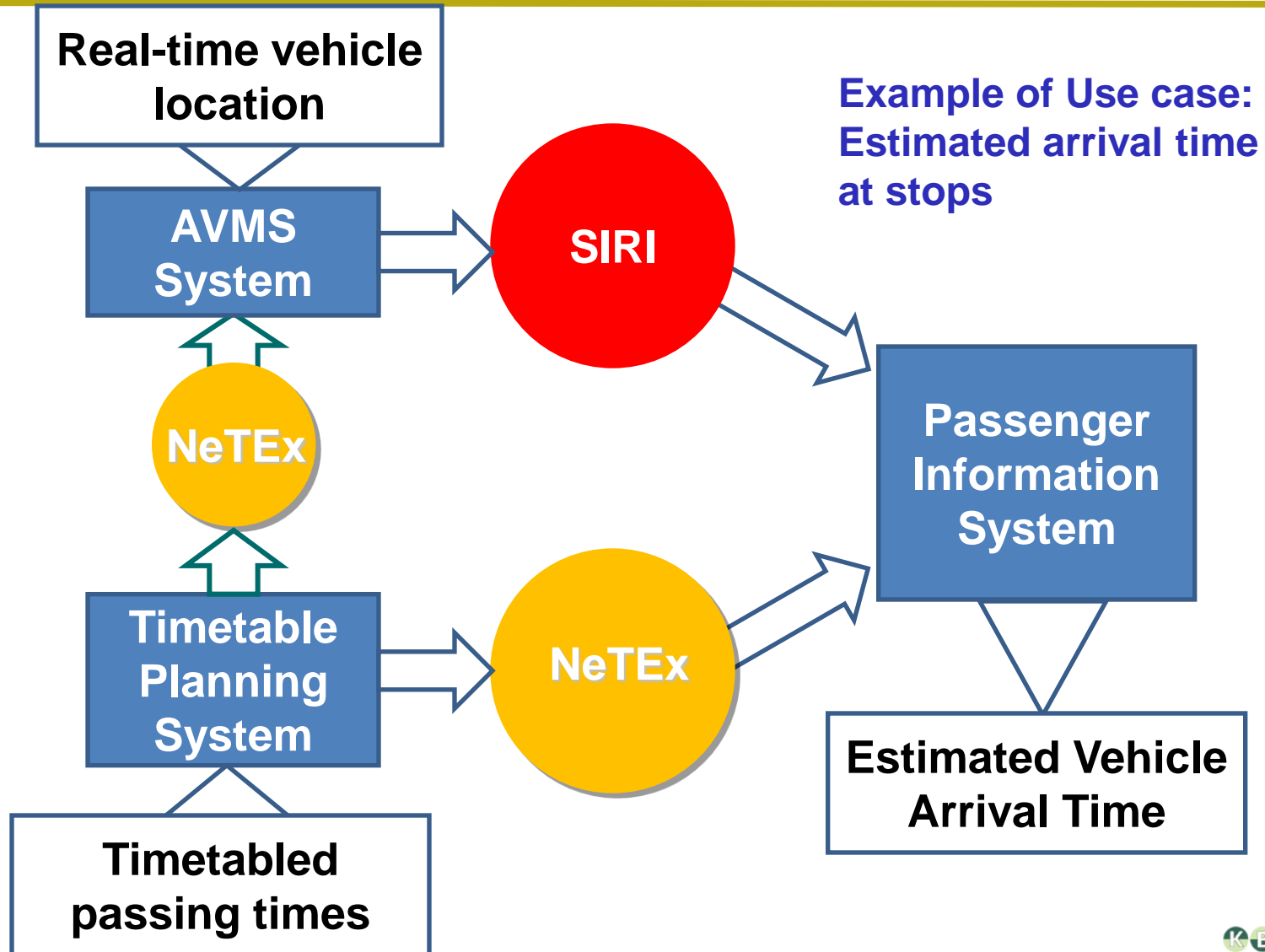
From Transmodel to NeTEx

1. Modularised: Transmodel Domain Model + harmonised with IFOPT
2. Created: a physical UML model: add attributes, formats, etc
3. Encoded: as XML schema
 - Reusable, Modular subpackages
 - Well defined dependencies
 - Uniform versioning and data ownership model
 - Validation with Examples of data from each country





SIRI : Real-Time Information Exchange





SIRI Interfaces

Transmodel: PT model

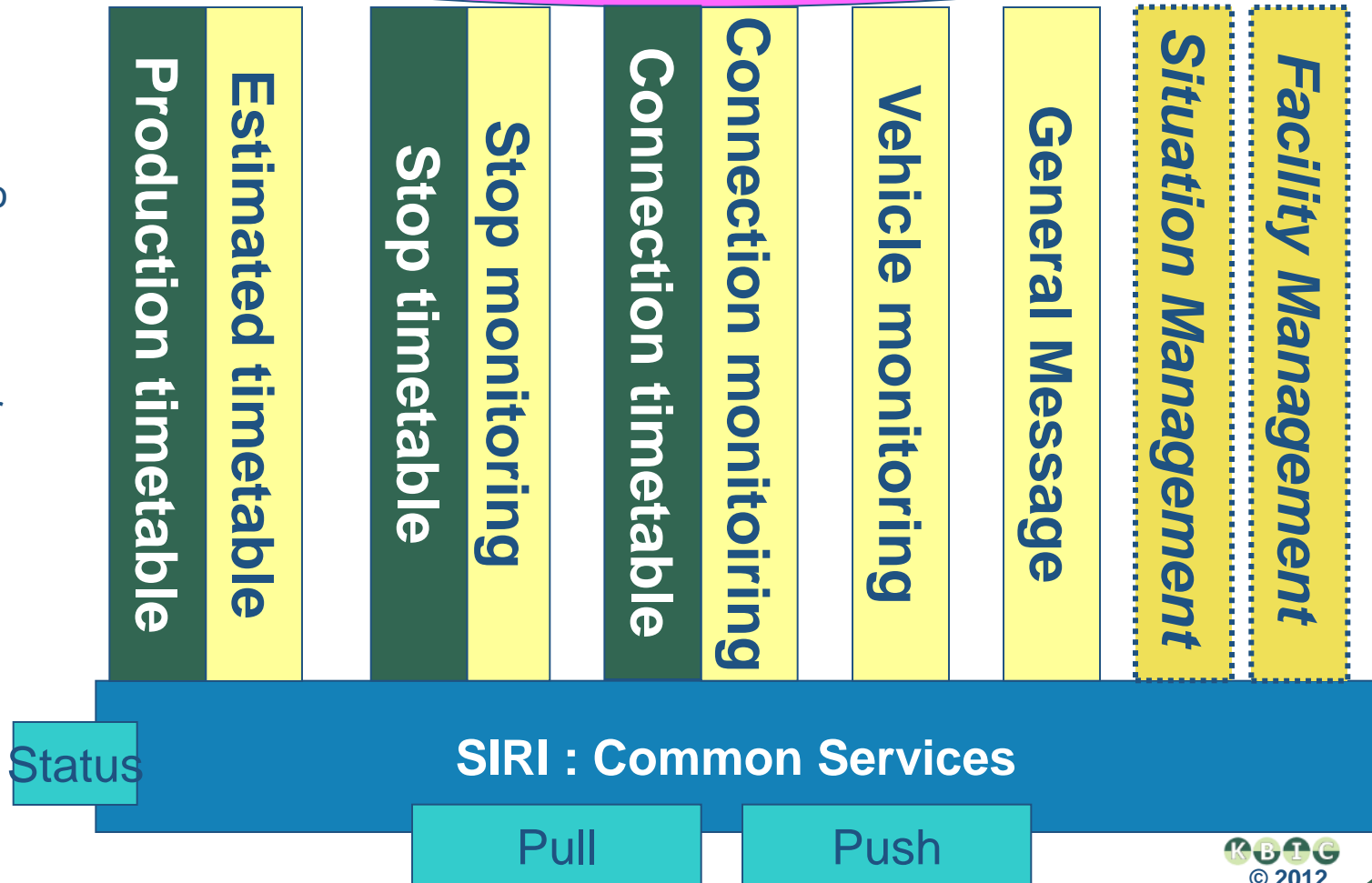
Stop Points, Vehicle Journeys, Lines, Journey Patterns, Vehicles, etc

**SIRI is for
Real Time
Information
Exchange**

Structured into
a range of
services

Common data
transport layer

SIRI is a TS





Currently Known SIRI Users

EU : Germany , France, Ireland, Norway, Sweden, UK

Switzerland, Australia - considered

Israel

Canada, USA

China (Shanghai)

<https://groups.google.com/group/siri-developers>





Transmodel + IFOPT => Standard PT Network Model



The PT topology is a submodel of Transmodel:

Line, Route, Route Point, Journey Pattern,

Stop Point, Timing Point

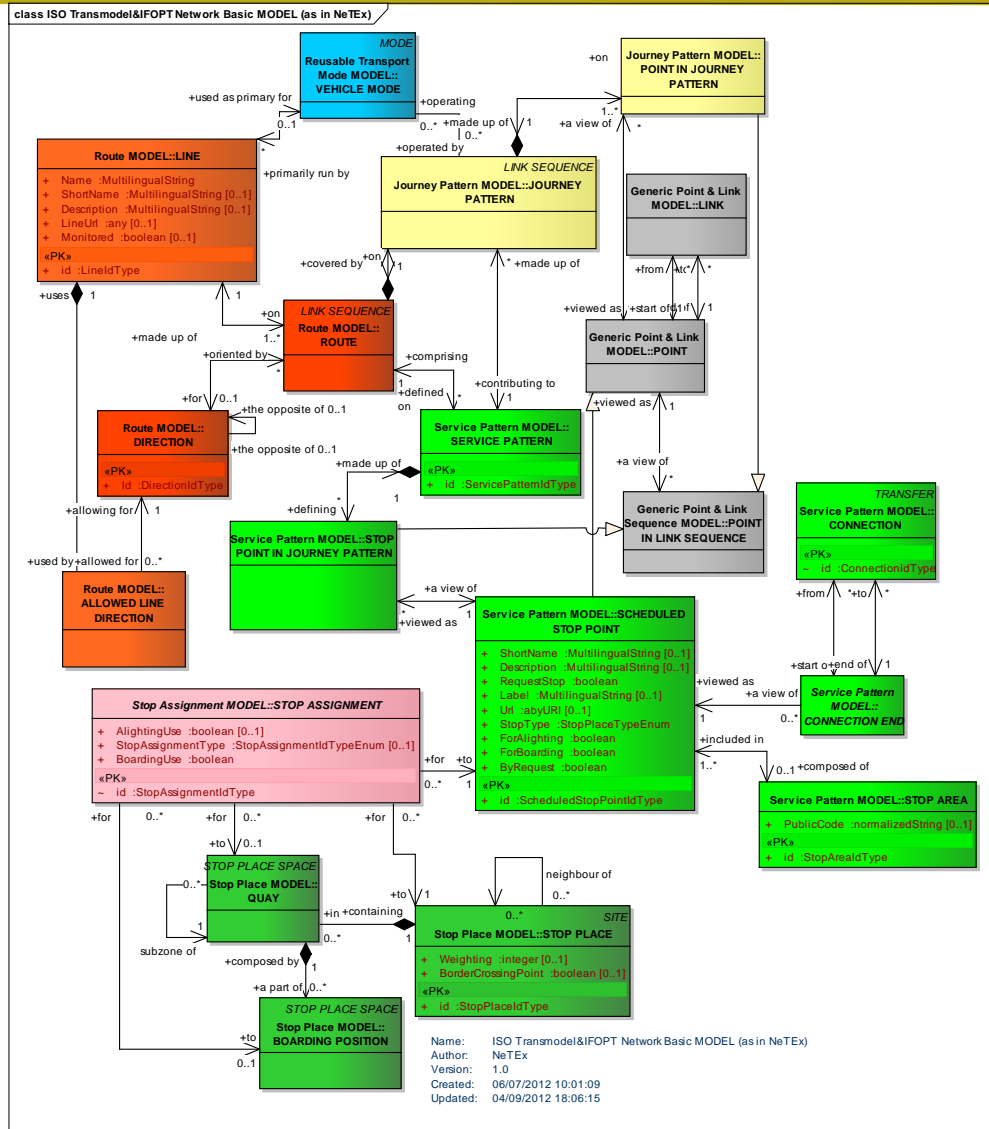
IFOPT:

Stop Place & related concepts





Transmodel+IFOPT=> Standard PT Network Model



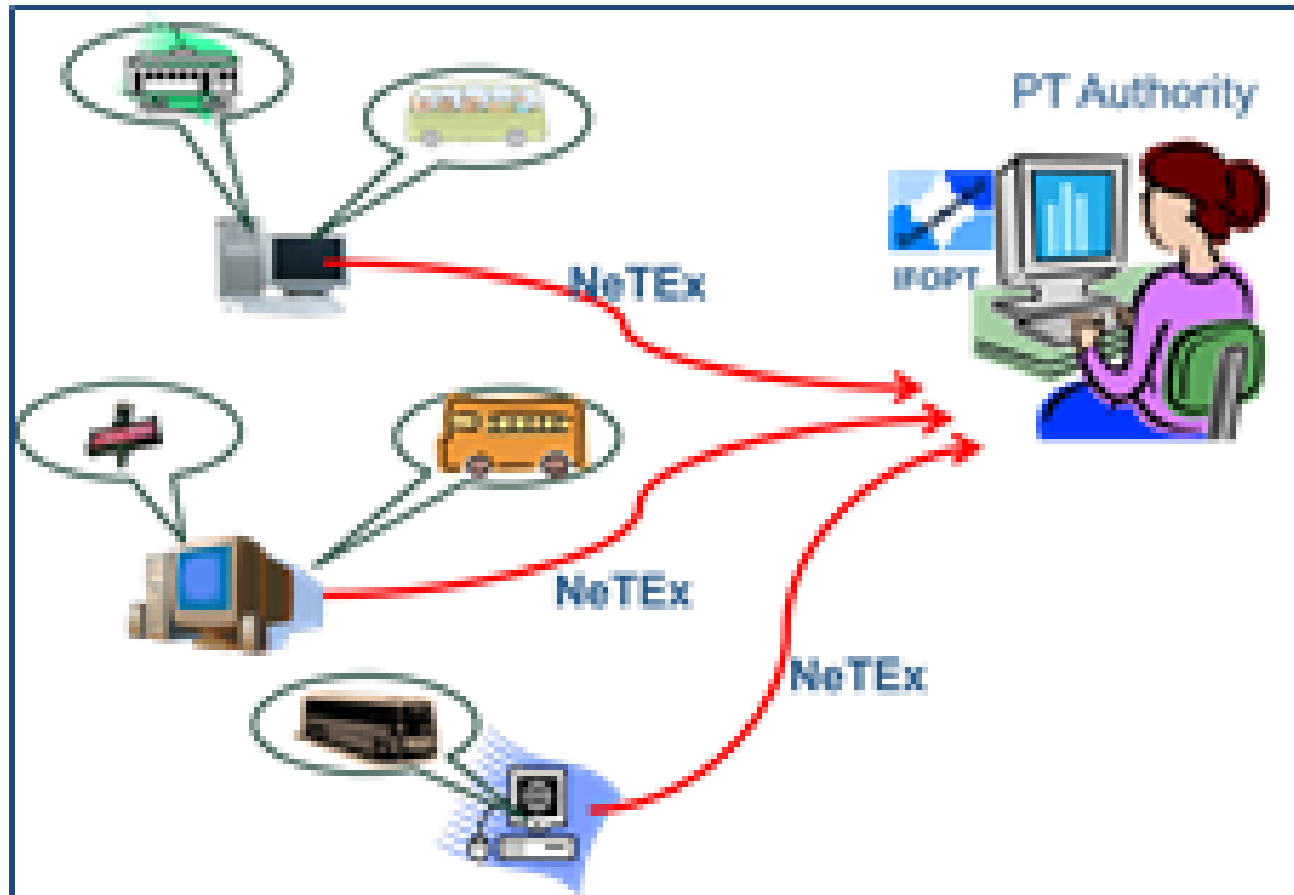
UML Data Model:

Description of a Public Transport Multimodal Network



What is the Use of a Network and Stop Model? Management Information Systems

Multisource Data Collection by A PT Authority for statistics:
A common reference model facilitates data aggregation



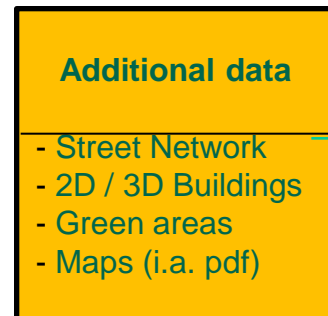
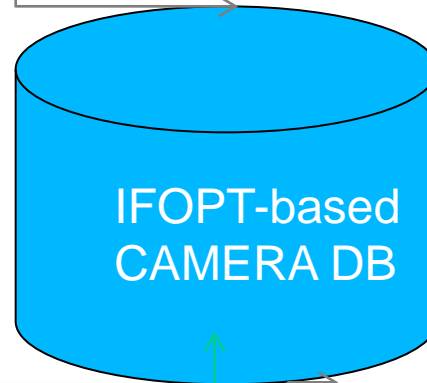
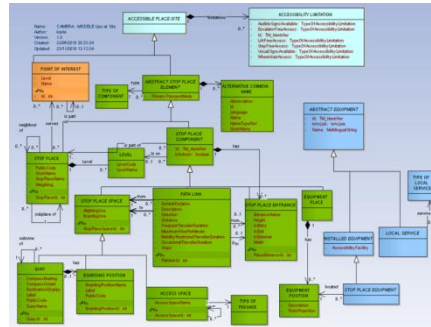
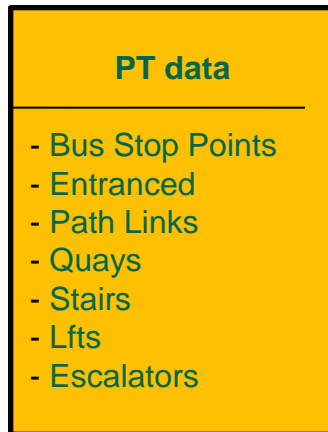


What is the Use of a Network and Stop Model? Passenger Information (2)

General Architecture of the CAMERA Project



Data Entry



Tools



Use Cases

- Stop Place Representation
- In-door Passenger Guidance
- Accessibility for disabled
- PT search around a POI
- Stop Publication according to INSPIRE



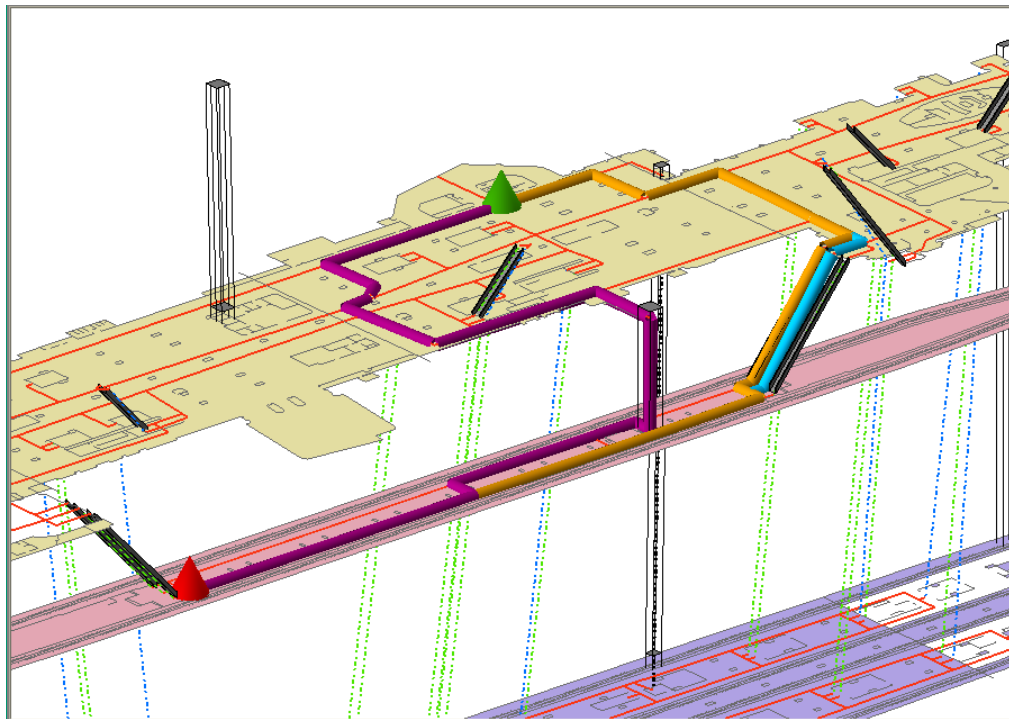


What is the Use of a Network and Stop Model? Passenger Information (3): navigation paths

CAMERA: 2D/3D representations of complex stations

MobiGIS
Votre partenaire SIG

K B I C



Scenario 1 : Aucune restriction



Scenario 2 : Personne à mobilité limitée



Scenario 3 : Personne en fauteuil



Navigation paths through complex stations according to mobility constraints

Implementation of webservices: <http://stationways.dryadebox.net>

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What is the Use of a Network and Stop Model? Passenger Information (4)

Stop Place maps for trip preparation : pilot stop places

La Baule



Saumur





What is the Use of a Network and Stop Model? Passenger Information (5)

Representation of Complex Stations





What is the Use of a Network and Stop Model? Passenger Information (6)

Virtual visit of Stop Places



Gare de
SAUMUR



Affichage
Informations



Affichage
Plan



Position
Origine



Auto
Rotation



Plein
Ecran



Aide
Utilisateur

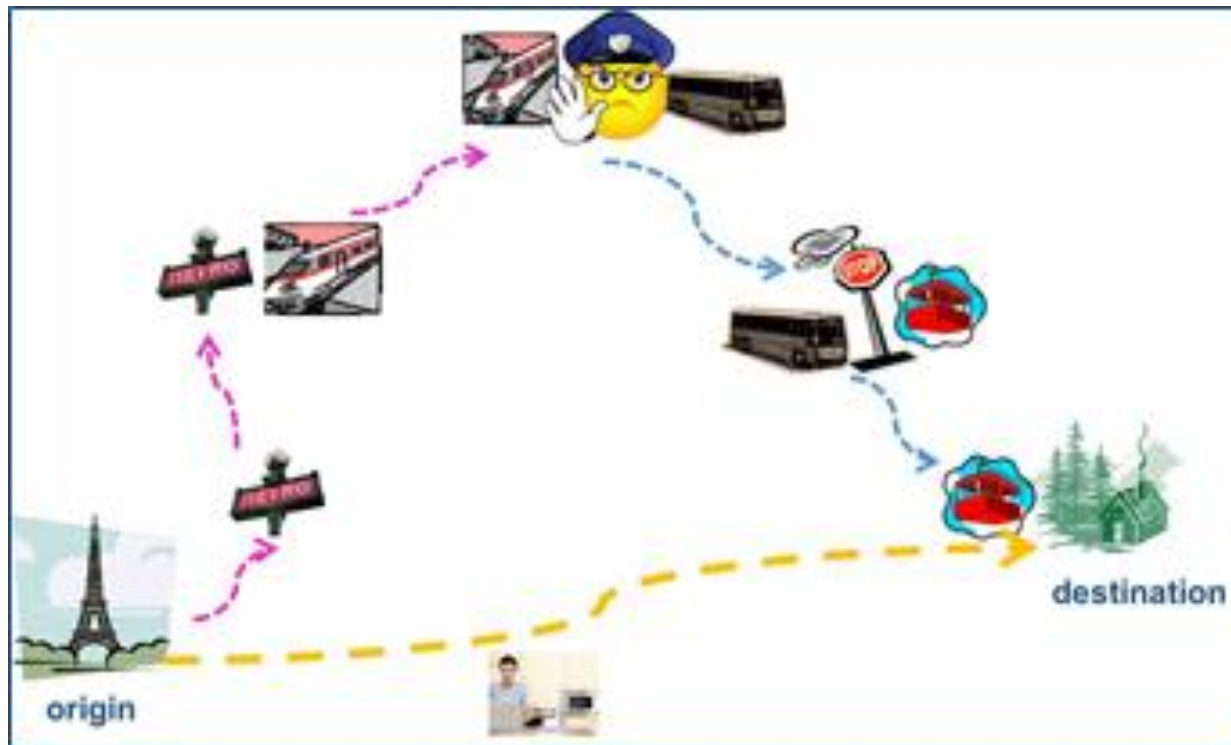




What is the Use of a Network and Stop Model? Passenger Information (7)

Inter-regional Trip Planning

A trip from Paris to the Swiss Alps may involve several systems and several modes: in order to correctly describe each part of the trip a common stop place identification is necessary. IFOPT indicates a method for such an unambiguous identification.





What is the Use of a Network and Stop Model?

Network Planning & Management: Stop Identification

Method to build clusters of physical stops (STOP PLACES)

Systematic built of IDs → **stop « numbering » method**

Example: Project of the Greater Paris Region (PT Authority STIF)

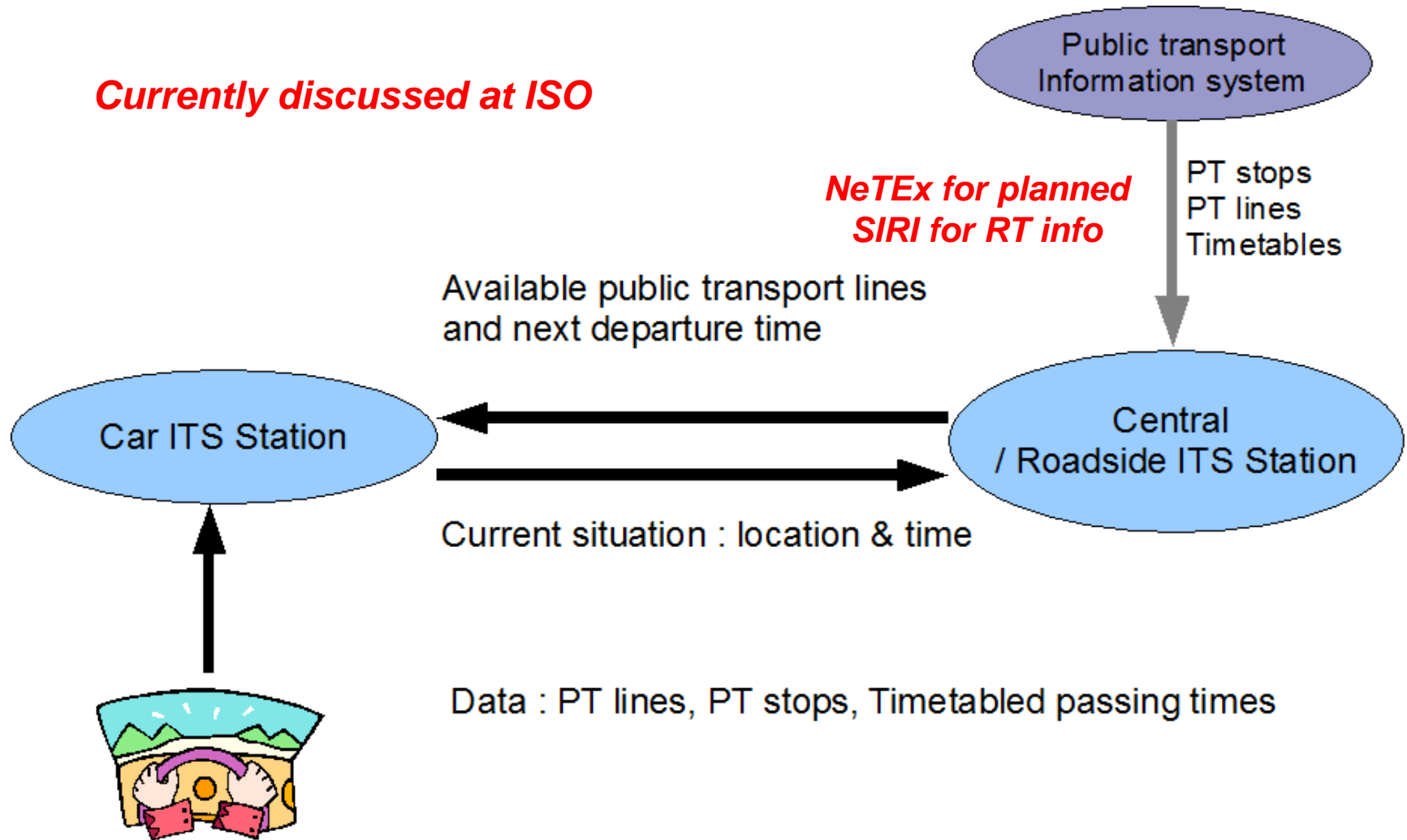




What is the Use of a Network and Stop Model?

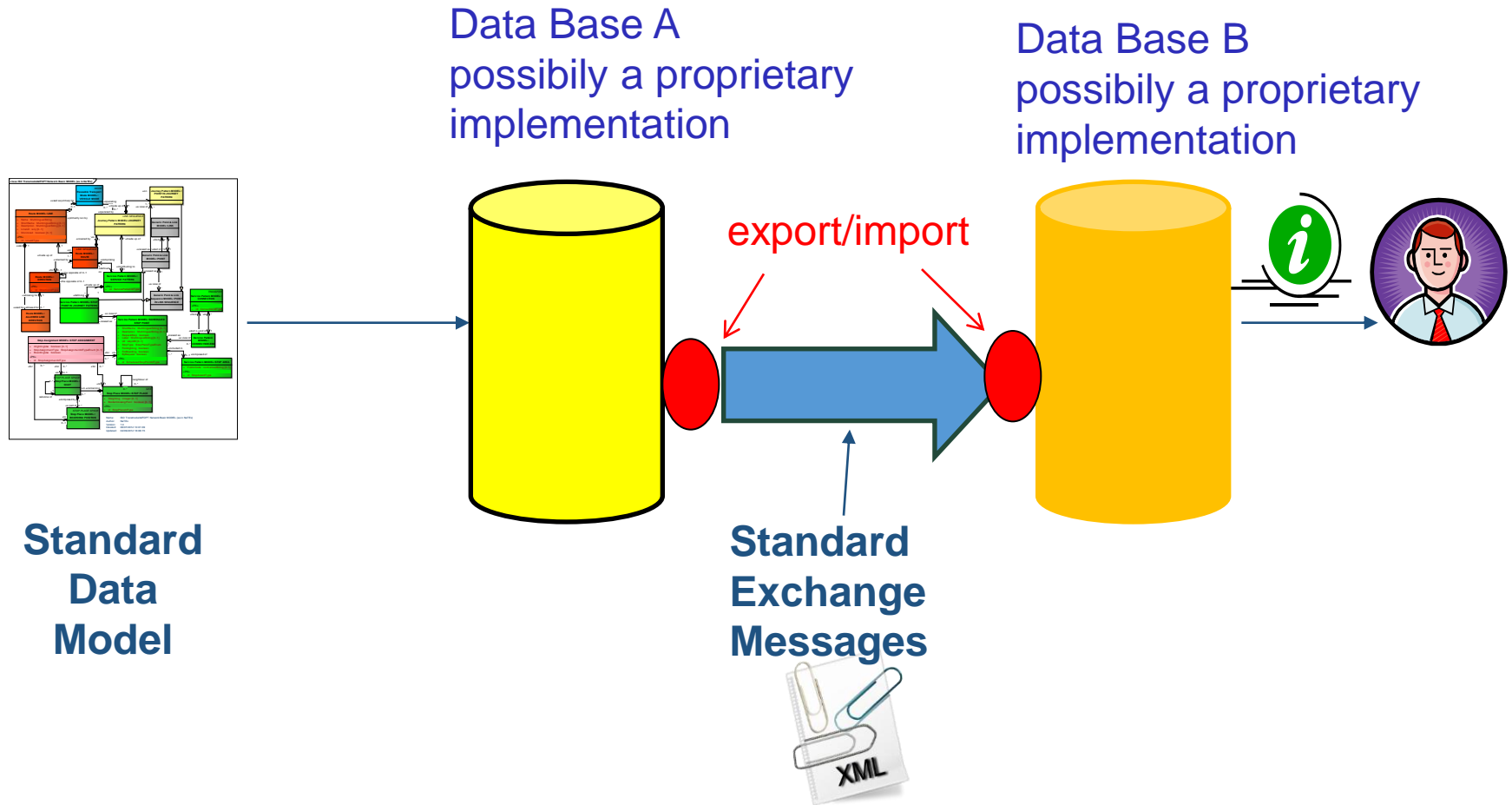
Multi-Modal On-board Information Private Car/Public Transport (ISO)

Currently discussed at ISO





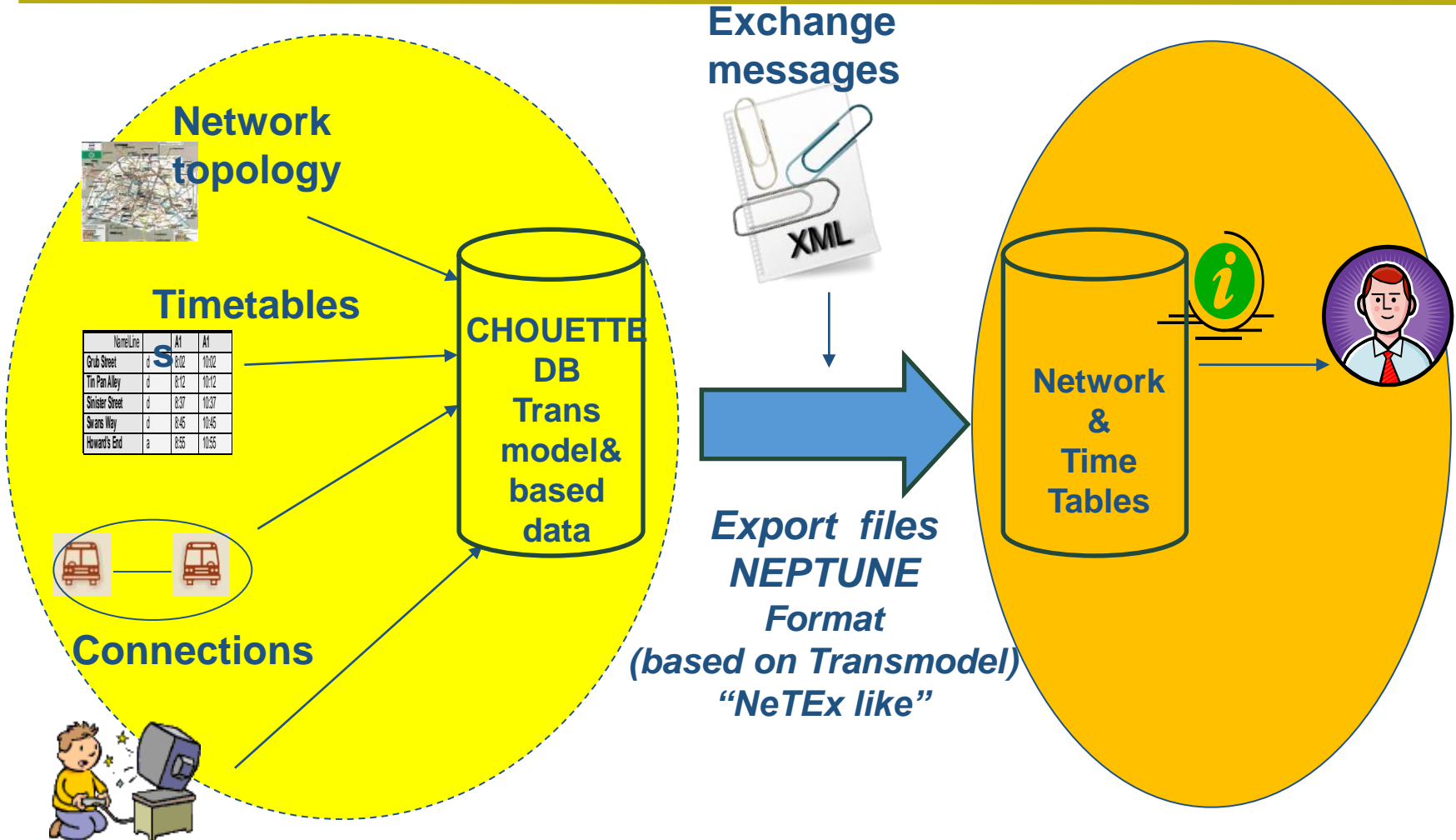
Importance of Coherent Data and Interface Standards



*A coherence between standard interfaces & data models - basis for data bases
simplifies export/import applications*



Use of Standards Suite in France: Standard based DB and Interface



CHOUETTE - tool: data capture & export



Use Standard Data Models
for Your Data Bases and Interfaces!

Join the Standardisation Groups!

Your Input and Needs will be Taken Into Account



谢谢

Thank you !

Thanks to MobiGIS and to my CEN TC278 WG3 colleagues Christophe Duquesne and Nick Knowles for providing some of the pictures for this presentation

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