Benefits and challenges of data standardisation in the context of multimodal travel information systems

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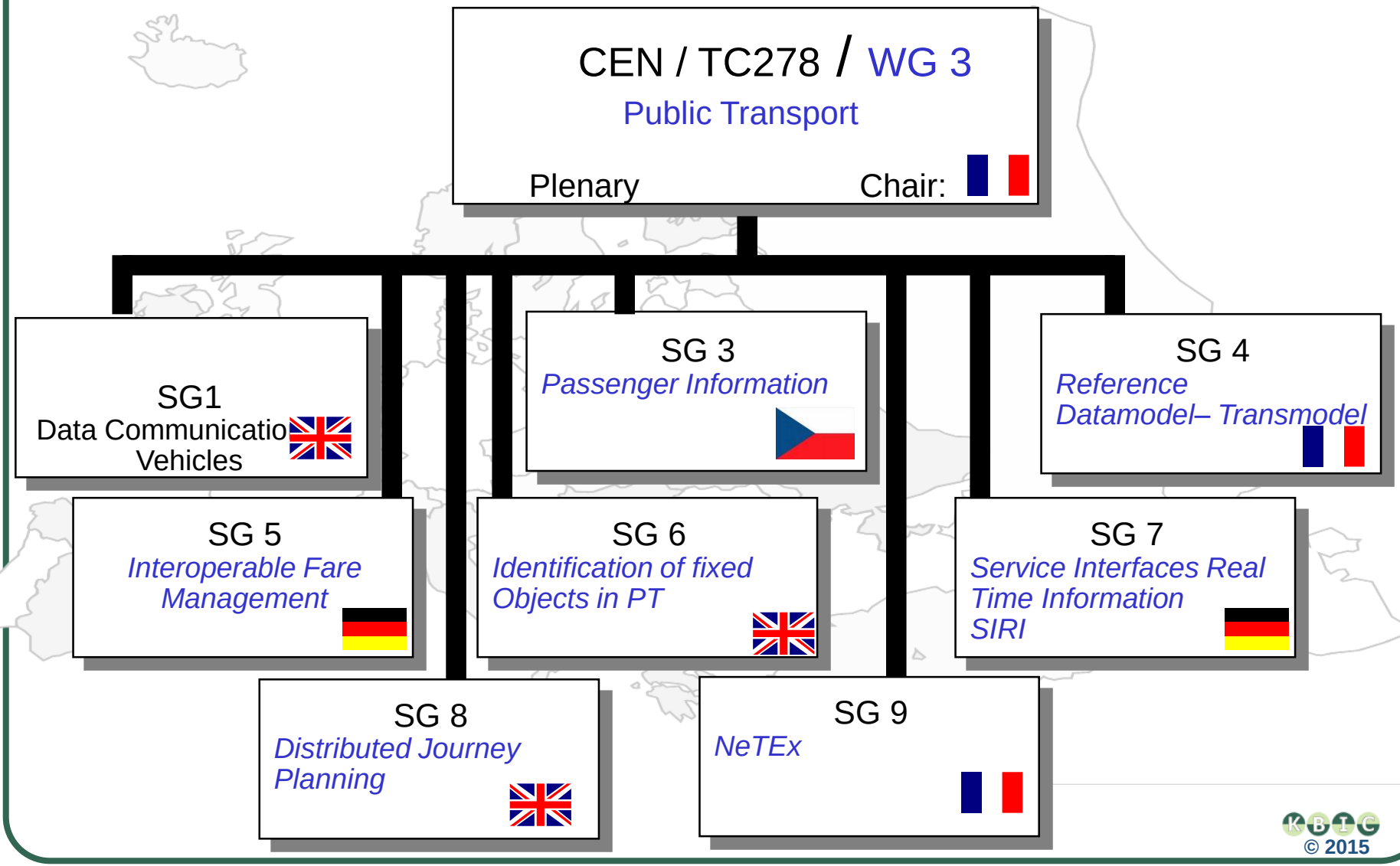
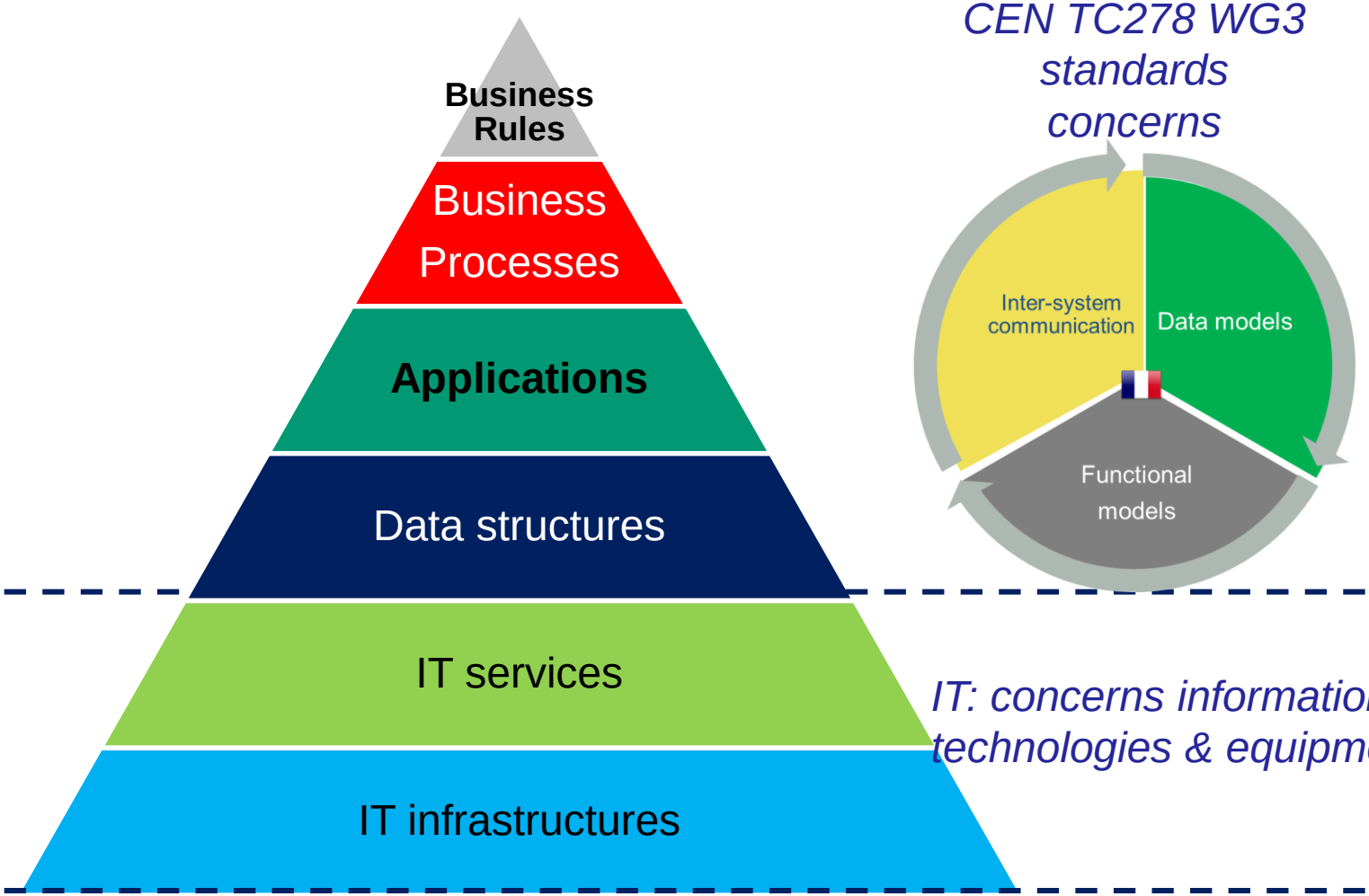
Context: Public Transport standardisation group



Public Transport standardisation group: Systems & Different Concerns



CEN TC278 WG3 standards concerns

IT: concerns information technologies & equipment

Public Transport data standardisation group main goal: to ensure system interoperability

Interoperability specification:

task of building coherent services for users out of components when these components are technically different and managed by different organizations

How to achieve it?

- **Syntactic interoperability :** capability of two or more systems to communicate and exchange data

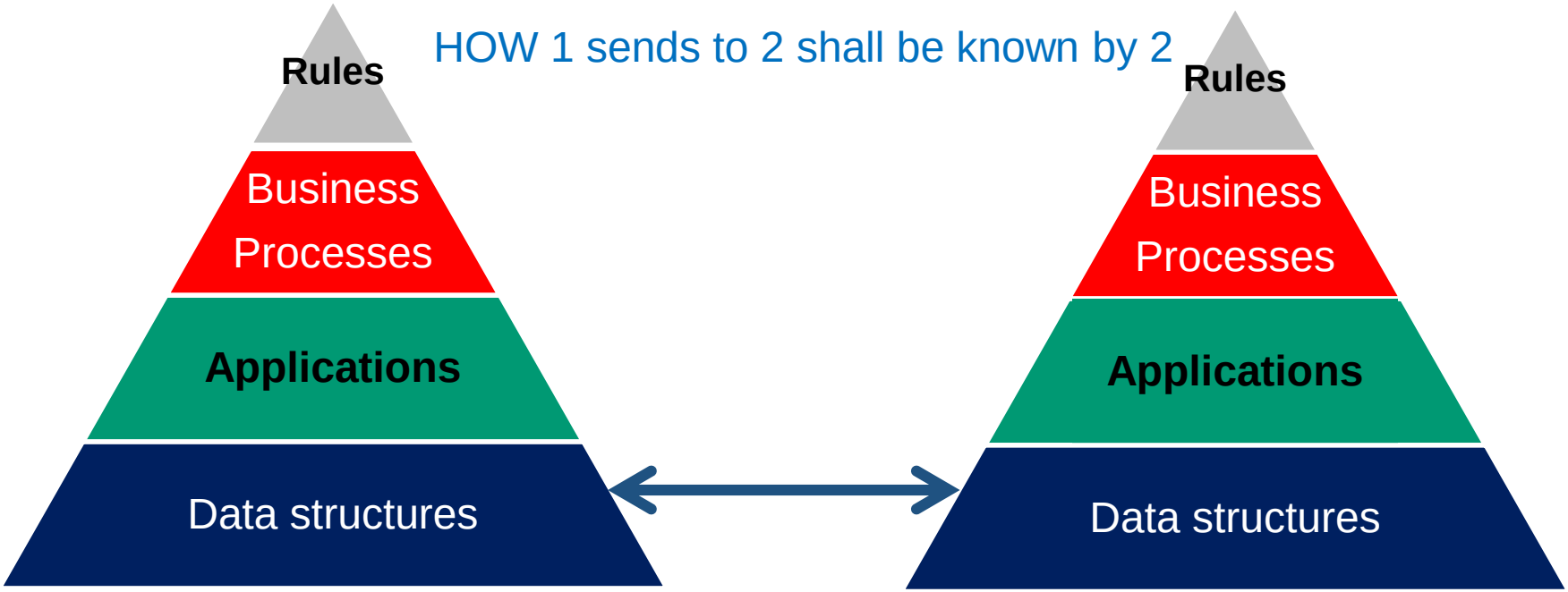
  Tools: specified data formats, communication protocols
- **Semantic interoperability** ability to automatically accurately interpret the information exchanged between two systems in order to produce useful results as defined by the end users of both systems.
- To achieve semantic interoperability, both sides must refer to a

  common reference information model.
- The content of the information exchange is unambiguously defined: *what is sent is the same as what is understood.*

Interoperability: 2 necessary conditions

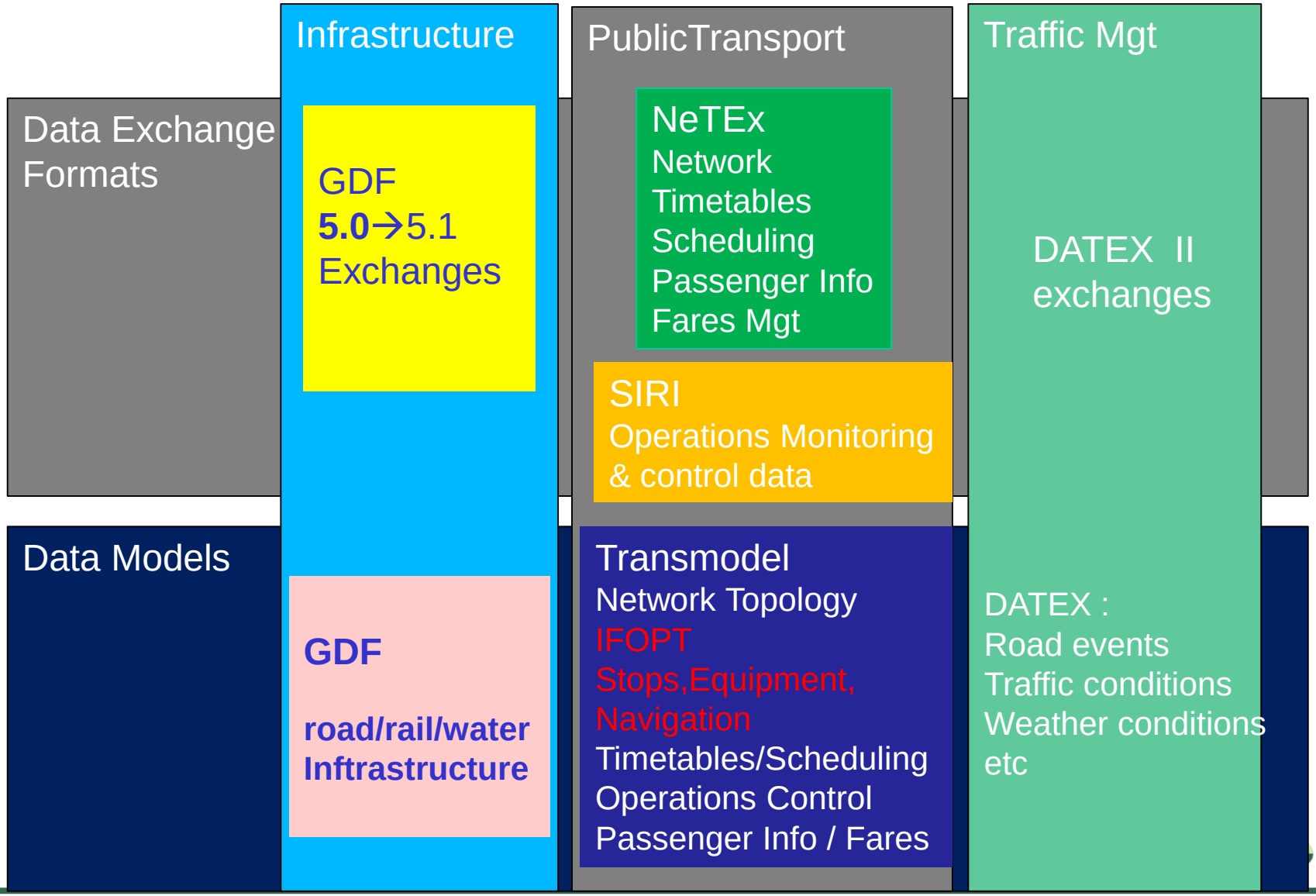
WHAT is sent by 1 shall be unambiguously understood by 2

HOW 1 sends to 2 shall be known by 2



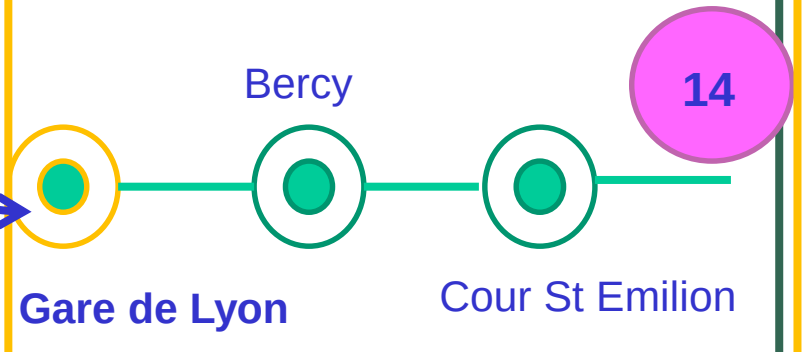
Functional models are very useful for communication purposes

Relevant Standards for Multimodal Traveller Information



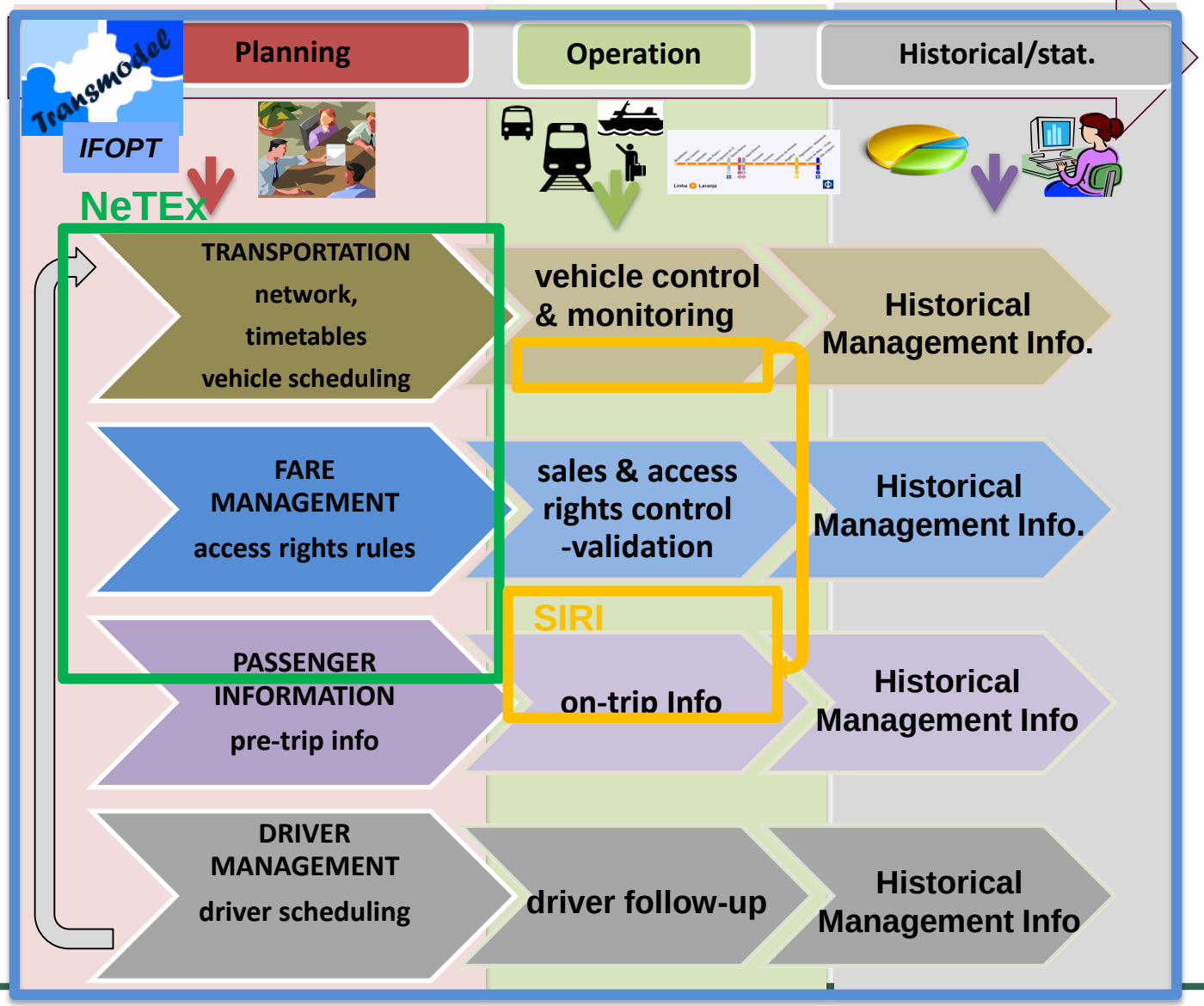
Transmodel extended by IFOPT

STOP PLACE: Gare de Lyon
and its COMPONENTs:
Boarding Positions, Quays, Entrances, Equipment, Navigation Paths

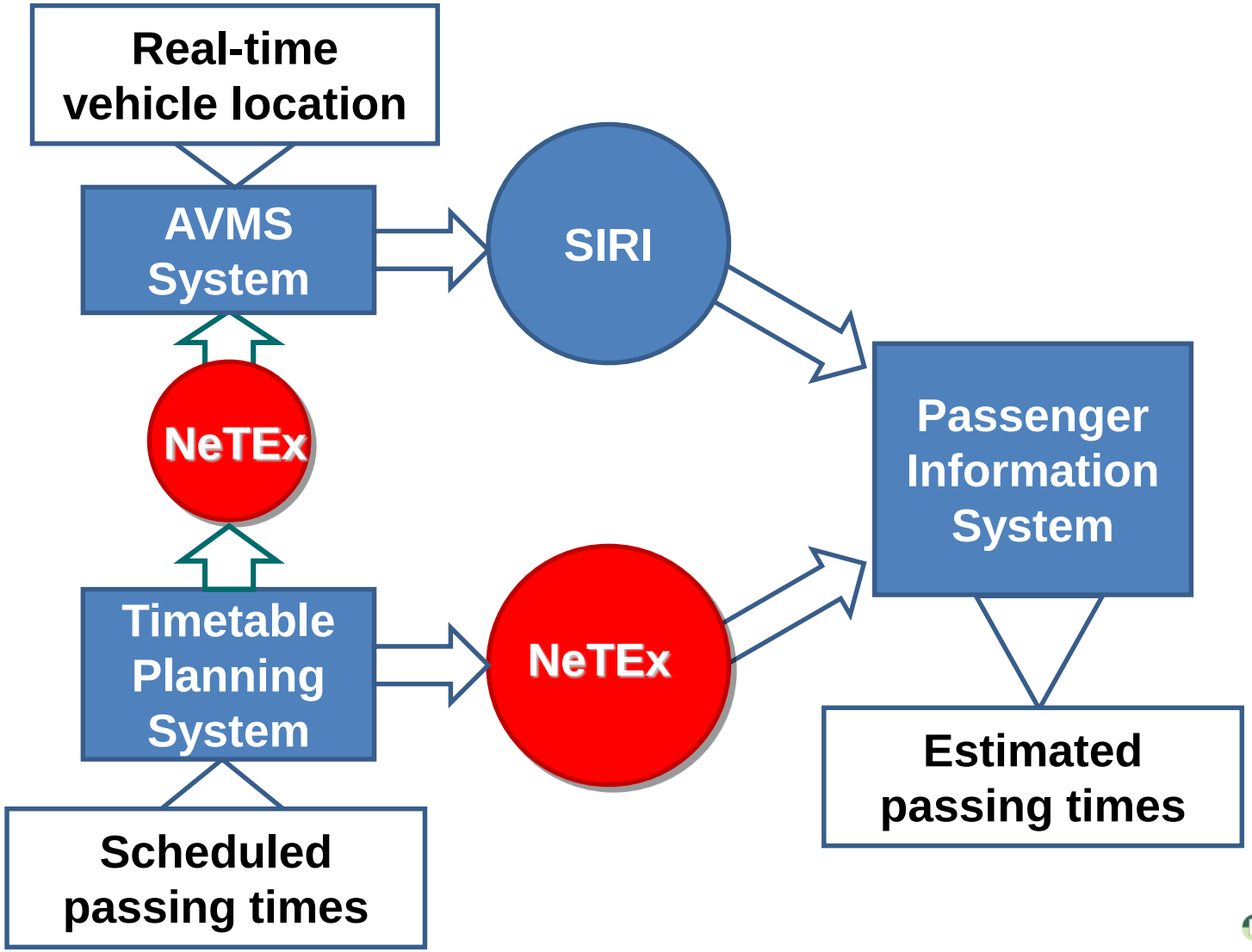


SCHEDULED STOP POINT

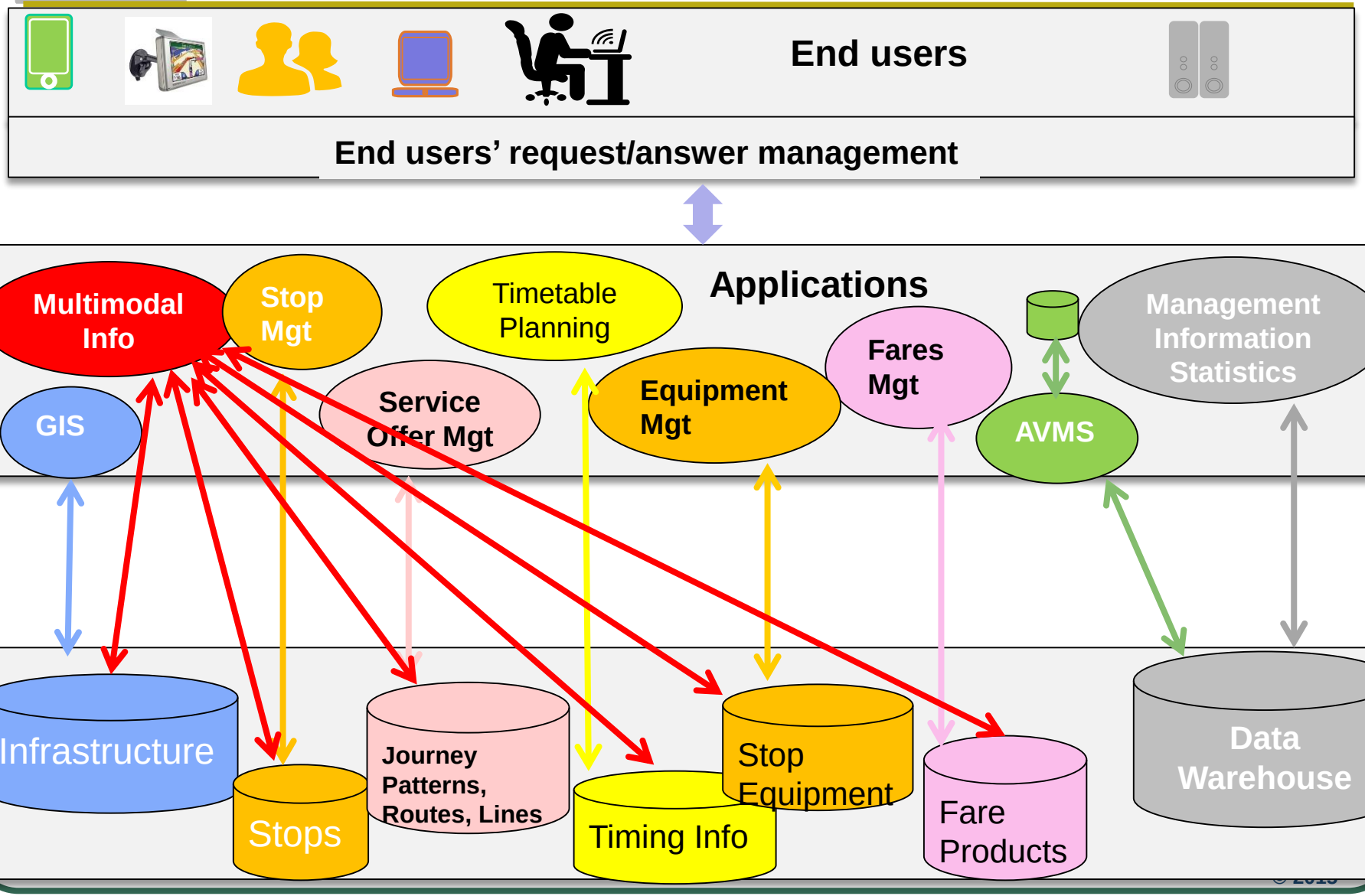
Transmodel- IFOPT–NeTEx–SIRI differences & similarities: boundary



NeTEx – SIRI differences & similarities: scope



Multimodal Traveller Information Services need multi-source (inter-dependent) data



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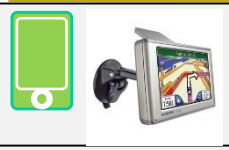


End users

End users' request/answer management

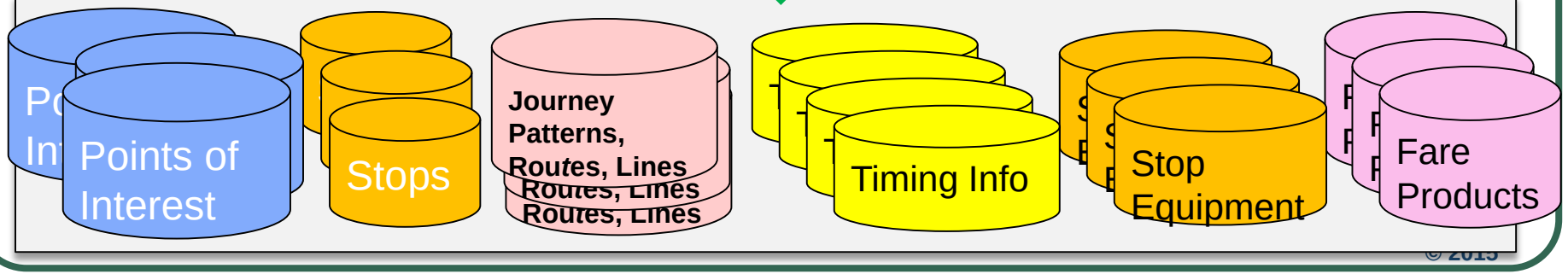
Applications

Multimodal Information Service

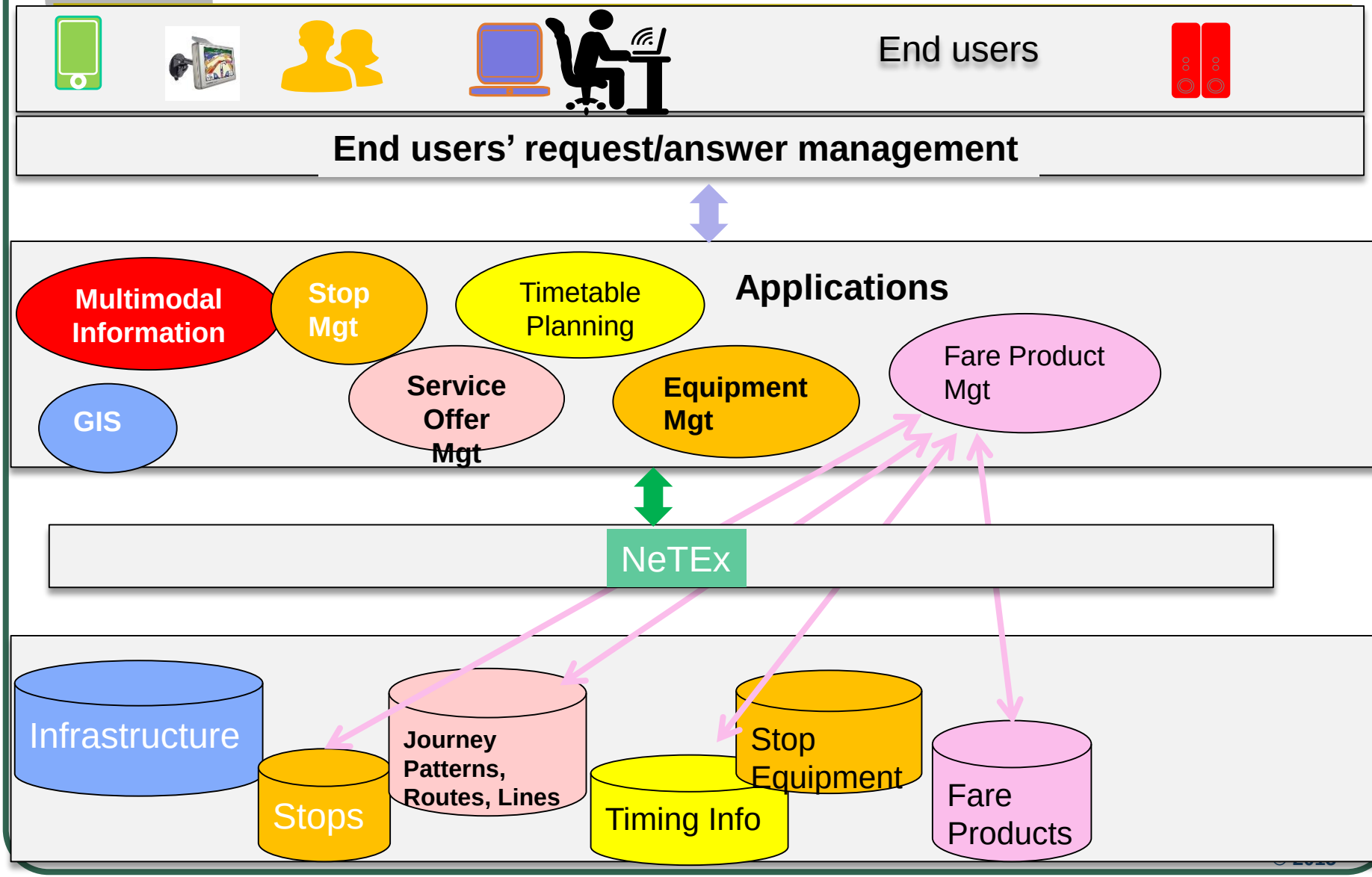
AVMS

NeTEx

SIRI



Interoperability means: service continuity in case of system extensions

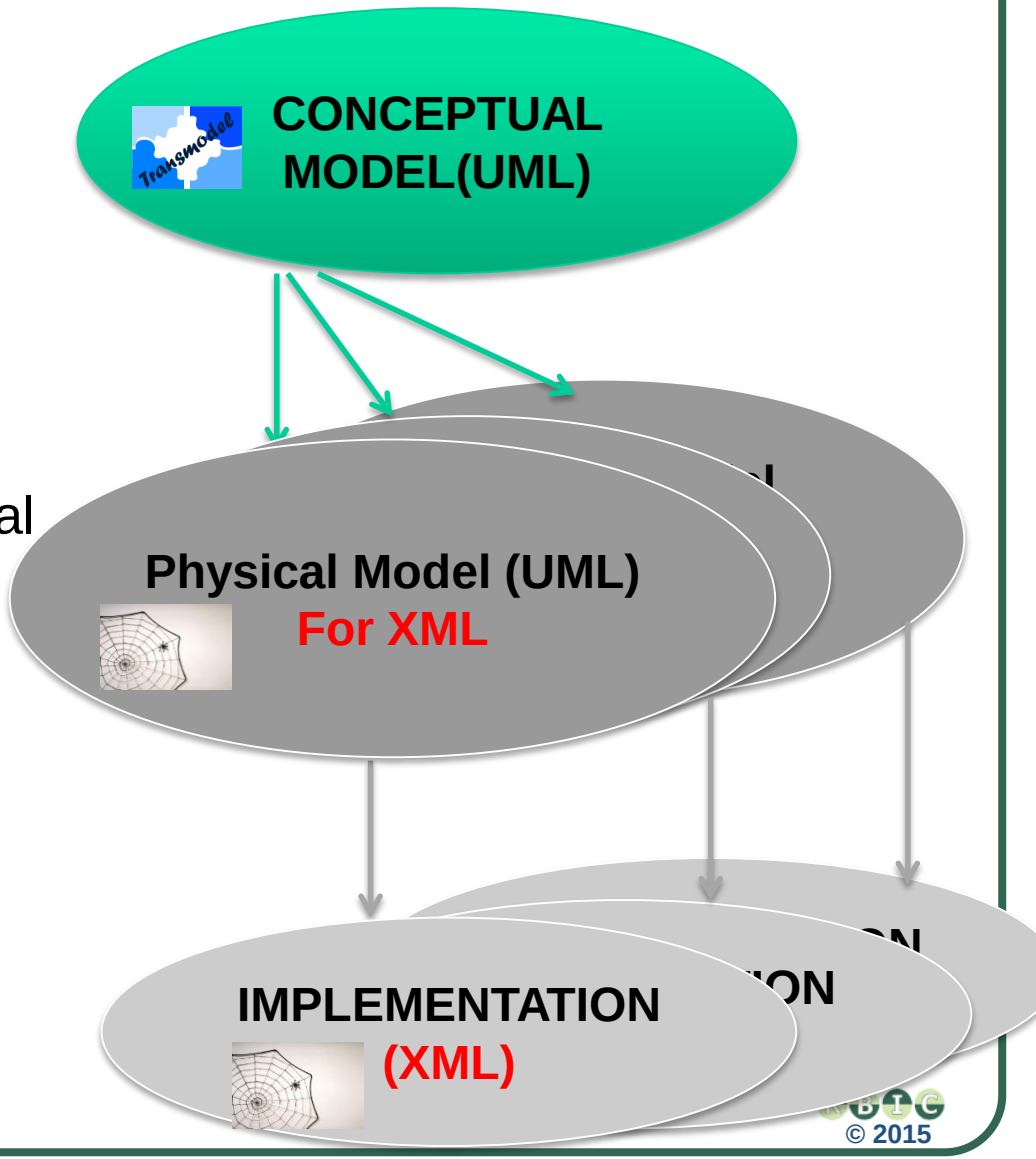


Conceptual model is implementation independent
(Transmodel)

Multiple physical models
for different target implementations may be derived from one conceptual model NeTEx XML Physical design

Implementation
is derived from physical model NeTEx XML Schema

THIS APPROACH ENSURES COHERENCE OF INFORMATION



Conclusions: are NeTEx/SIRI/Datex sufficient to ensure interoperability in the context of Multimodal Information Systems?

They are certainly useful - some other elements to be taken into account:

- Existence of a common reference data model: it is not sufficient to provide the « Line Ref » (case of SIRI exchanges) if « Line » is something different for the two parties (semantic interoperability)
- It is necessary to harmonise standards *where they interact*: if information on a road event is provided to a PT system (e.g. through Datex), it has to be « understood » by a Transmodel–based PT system (harmonisation)
- WHAT PART of information is exchanged: only stops/routes? only timetables? or both? stop equipment? stop accessibility features? (definition of exchange profiles)
- Local agreements fix further particularities of the profiles
- In a EU-wide context: global (national?), unambigious, accessible stop repositories (based on a reference model)

THANK YOU
FOR YOUR ATTENTION

http:// netex-cen.eu
http://transmodel-cen.eu
http://kasia.bouree.fr

Transmodel: Reference Data Model for Public Transport

What is it ?

European Norm specifying the *information semantics of several Public Transport functional areas*

1. Network Topology Definiton: routes, lines, stops (using IFOPT standard), …
2. Timetable Planning: run times, journeys…
3. Vehicle Scheduling: vehicle services, …
4. Operations Monitoring and Control: daily production plans, control actions triggers and consequences
5. Fare Management: access rights/fare products definition, control, validation, sales
6. Passenger Information: general/specific information based on scheduled/or real-time data
7. Driver Management: driver schedules, rostering, driving personnel disposition
8. Management Information: raw data dedicated to statistics and indicators

Development

1990→1997:Transmodel V4.1.1→ 2001: Transmodel v5.1 (published 2006)

Participants

France, Germany, Greece, Italy, Netherlands, UK, Spain, Sweden, EU projects

Current status?

Transmodel V6 (update) : Parts 1-2-3: passed public enquiry stage (2015)

NeTEx: Network-Timetable-Fare Exchange

What is it ?

- New CEN standard for *XML Public Transport data exchange for Passenger Information* (network- timetables -fares)
- Approach: Model Driven Design
- Transmodel UML (model of the structure of data exchange messages)➔ Physical UML (for an XML implementation) ➔ XML implementation

Who were the active participants?

- Austria, Germany, France, Hungary, Italy, Netherlands, Sweden, Slovenia, ERA/UIC, UK

Inputs

- CEN: Transmodel, IFOPT (stop model)
- National: VDV 452, TransXChange, NEPTUNE, UIC ++

Deliverables

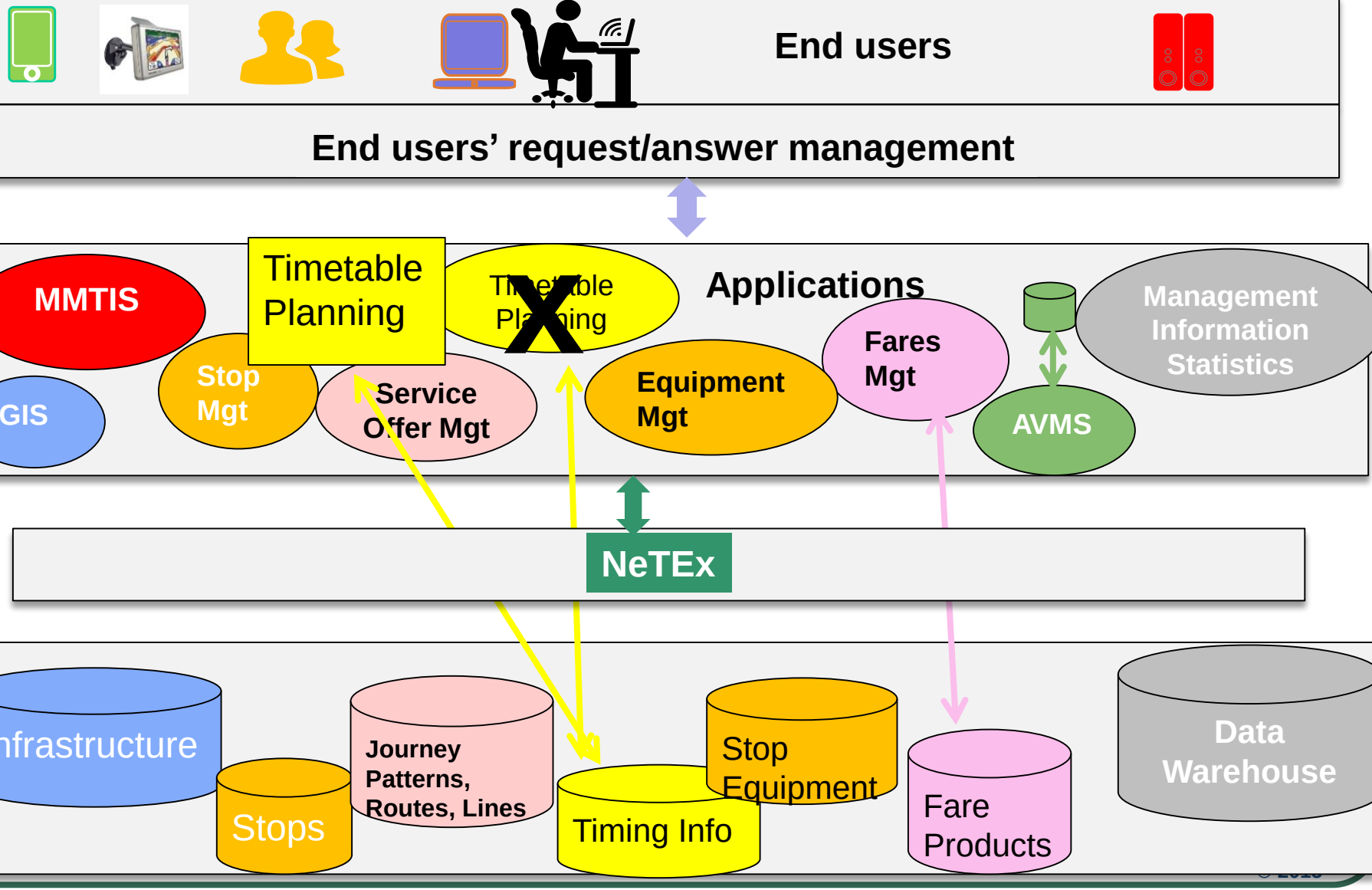
- CEN specification document (TS),
- Part 1: Network, Part 2: Timetables, Part 3: Fares (2014/15)
- NeTEx XML schema as reusable packages
- XML Examples
- National Mapping tables

Information Layers Inter-dependence

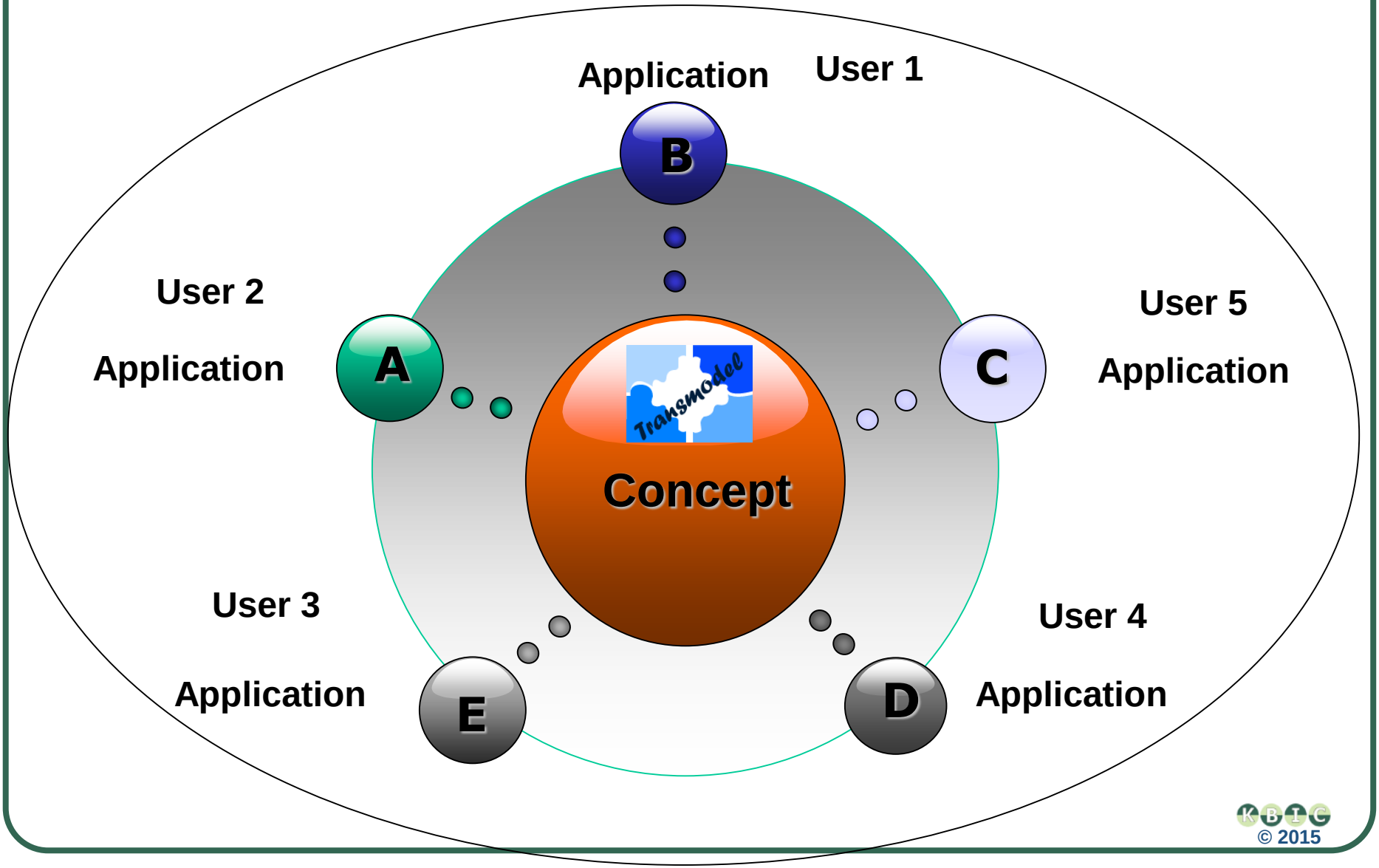
Information layers	Examples of data types
Traffic Management data	road conditions, incidents, traffic lights status, weather conditions, etc
Real-time Urban Logistics data (freight &car)	parking (actual) availability, urban area access status
Real-time Public Transport data	events/incidents/alarms/control actions and consequences on production plans, stop equipment availability, car/bicycle sharing availability, car pooling options, fare control/validation
Fare data	PT fares, parking fares, car/bicycle sharing/car pooling fare, road tolling, urban access fares
Timing data	vehicle run times, public timetables, PT services, freight access times
(Service) Network data	stop places & equipment, car/freight parking, car/cycle sharing/car pooling areas, routes&journey patterns
Infrastructure data	road network, rail network, points of interest, cartographic data

Information layers are not independent → need for common information structure

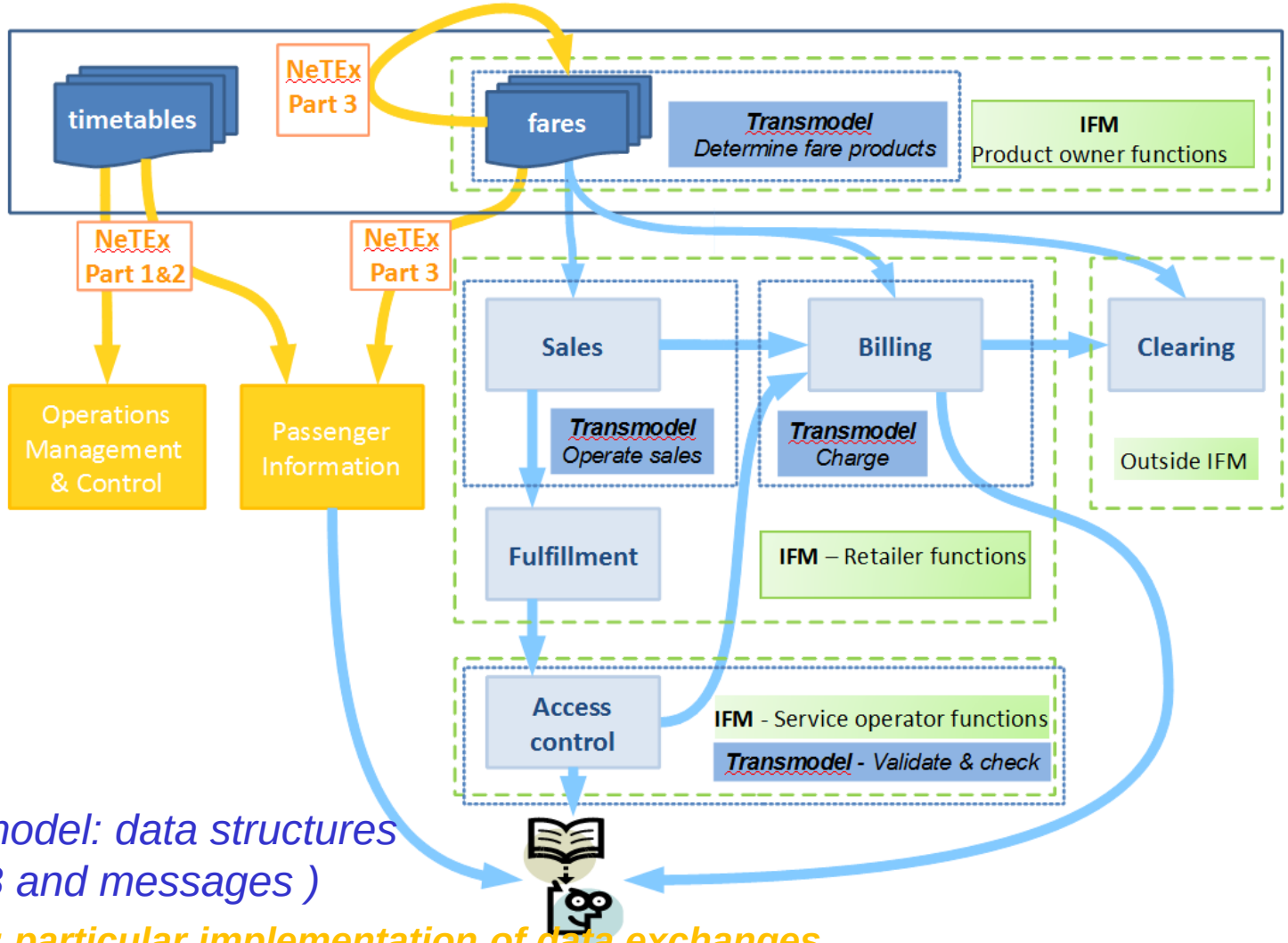
Interoperability means: service continuity in case of application replacement



Semantic interoperability: one concept for all



Transmodel –NeTEx– IFM differences and similarities: boundary and scope



Transmodel: data structures (for DB and messages)

NeTEx: particular implementation of data exchanges

IFM - Interoperable Fare Managment: functional model for Fare Management

Stop Point Management

Scheduling (vehicle+driver)

Schedule Assignment, Budget Management

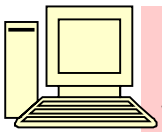
TITAN Data Base

Transmodel

On-line Control System

Production follow-up

Personnel Disposition, Payroll



Data Access System

Passenger information (telematic and telephone servers, displays)