European Committee for Standardization

Webinar 'OpRa: a new transmodel-based exchange format for operational raw data'

25 June 2026

We start at 10:00 CET

Your webinar moderator

Els Somers

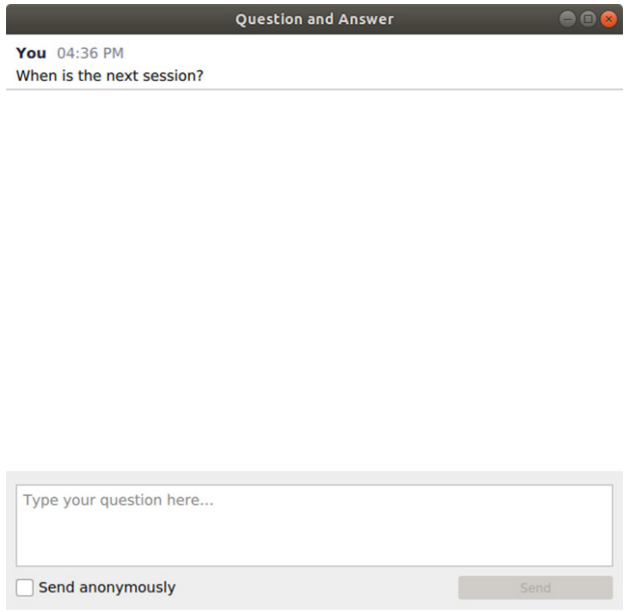
Project Manager

Public Relations

esomers@cencenelec.eu

Get the most out of the webinar today

- Use the Q&A panel to submit your questions



- Talk about us on LinkedIn, Bluesky or Instagram #training4standards @Standards4EU

Speakers

- Victoire Champenois, Policy officer at European Commission, DG MOVE
- Fabrizio Arneodo, chair of the OpRa CEN group
- Gergely Nitch, technical expert OpRa
- Andrej Tibaut, technical expert Transmodel

Opening remarks by the European Commission

Victoire Champenois, Policy officer European Commission, DG MOVE

'OpRa: a new transmodel-based exchange format for operational raw data'

Victoire CHAMPENOIS, DG MOVE, Unit B4

25.6.2026

European Commission

What are observed data in MMTIS?

"OBSERVED DATA" OPERATIONAL DATA RELATED TO TRAVEL AND TRAFFIC, SUCH AS THE LENGTH OF AND REASON FOR DELAYS AND CANCELLATIONS, RESULTING FROM AND COLLECTED DURING SERVICE OPERATIONS;

- Observed data on delays and cancellations **(for scheduled transport, i.e. rail, IWW and maritime, coach and aviation)** are linked to passengers' rights and can also enable service providers to inform passengers about their rights.

➢ **In other words, the purpose for sharing observed data is linked to passengers's rights for compensation in case of delay or cancellation.**

What is required by MMTIS?

- Only data on the arrival time or the departure time, or both, and where possible the reasons for delays or cancellations should be made accessible via the NAP ***and not any operational data collected during the journey***

Level of service 4, point 1.4 of MMTIS Annex

(b) observed data on delays and passing time – for scheduled transport:

(i) length of, and when possible the reason for, delays of at least 60 minutes for rail passenger services (in accordance with Article 19 of Regulation (EU) 2021/782);

(ii) length of, and when possible the reason for, delays in departure of more than 90 minutes for sea and inland waterways passenger services (in accordance with Article 18 of Regulation (EU) No 1177/2010);

(iii) length of, and when possible the reason for, delays in departure from a terminal of more than 120 minutes for regular bus and coach passenger services with a scheduled distance of 250 km or more (in accordance with Article 19 of Regulation (EU) No 181/2011);

(iv) length of, and when possible the reason for, flight delays at departure of at least 120 minutes; and flight delays at arrival of at least 180 minutes (in accordance with Articles 5 and 6 of Regulation (EC) No 261/2004);

(c) observed data on cancellations – for scheduled transport:

(i) cancellations, and when possible the reason, of rail passenger services;

(ii) cancellations, and when possible the reason, of sea and inland waterways passenger services;

(iii) cancellations, and when possible the reason, of regular bus and coach services with a scheduled distance of 250 km or more;

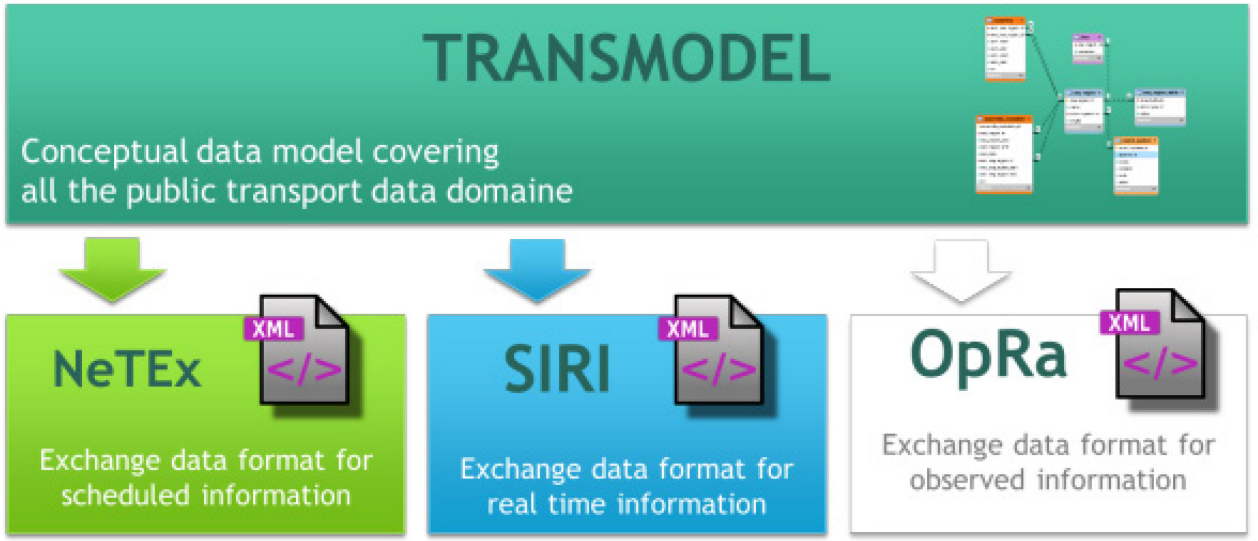
(iv) cancellations, and when possible the reason, of flights;

- The data should be stored by data holders for a suitable timeframe

European Standards in the ticketing cycle

BEFORE TRAVEL		
PLANNING	OJP	Journey planner
	Cyclinfra	Cycling infrastructure
	NeTEX	Static data
BOOKING	EUDIT	Open API for the distribution of combined products
	EFIP	EU fare profile
	BT4PT	Barcode ticketing
DURING TRAVEL		
REAL-TIME UPDATES	SIRI	Dynamic data
AFTER TRAVEL		
RECORDED INFORMATION	Opra +	Observed data

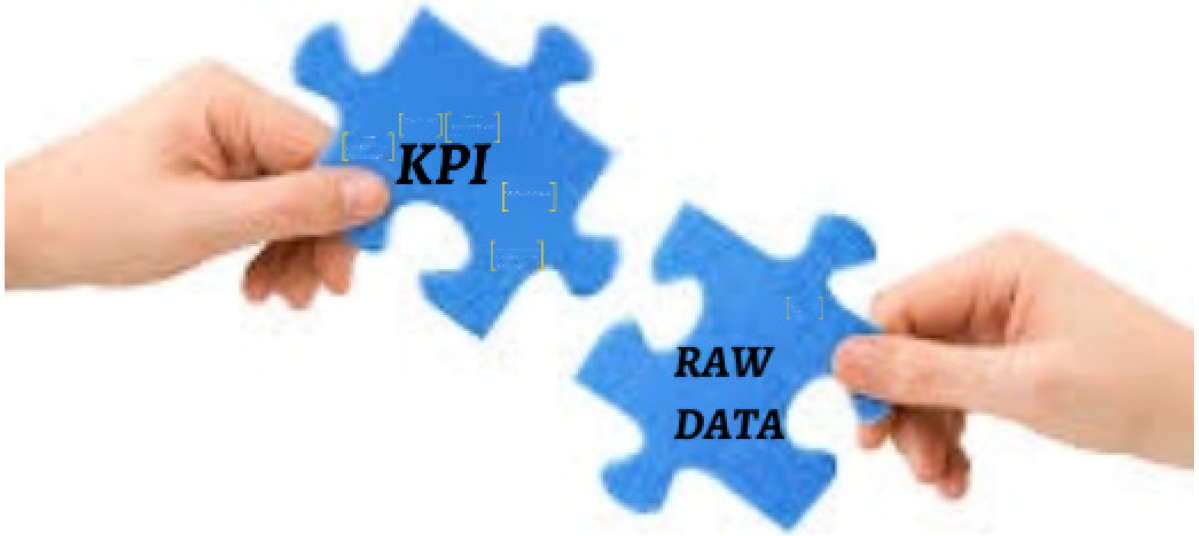
OPRA project



- The work started from the OpRa TR content to create a new Technical Specification (CEN/TS) for observed data (according to MMTIS).
- **38 months project started in July 2023.**

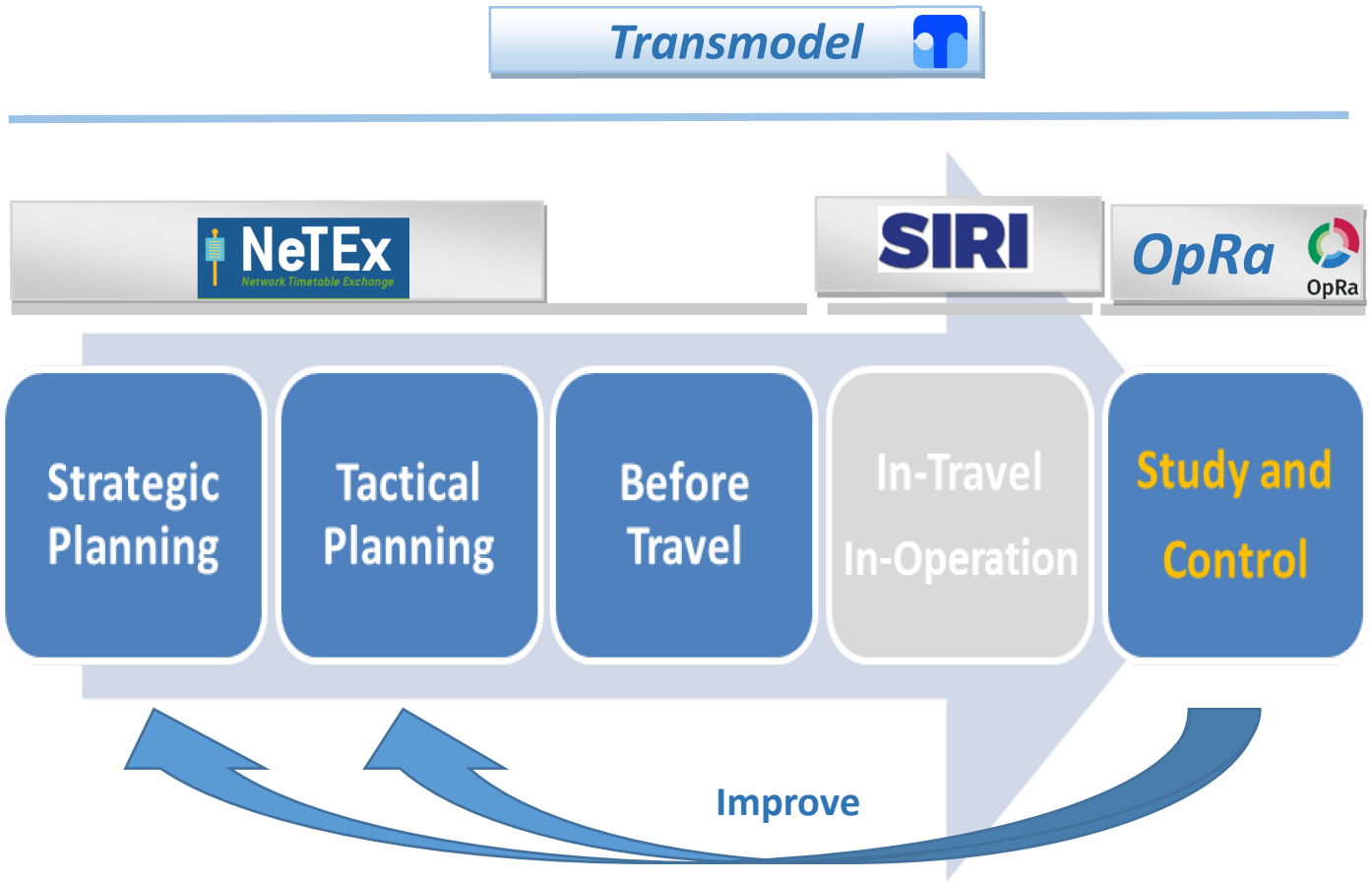
Fill in copyright information.

Thank you



OpRa scope

Overall scope (1/3)



Strategic Planning: PTAs high level Planning of PT Service

Tactical Planning: operators plan their resource usage (vehicles, rolling stock, personnel)

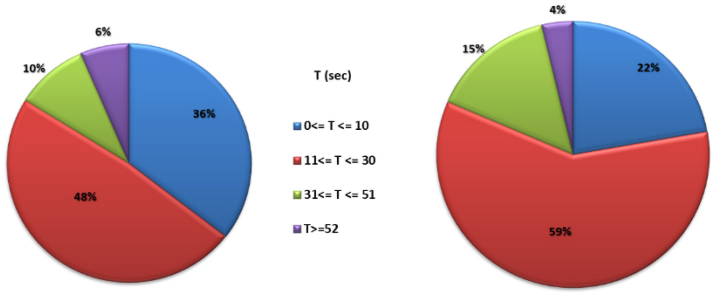
Before Travel: all planned networks and timetables are published

In-Travel: the transportation service is conducted. Real-time information exchange

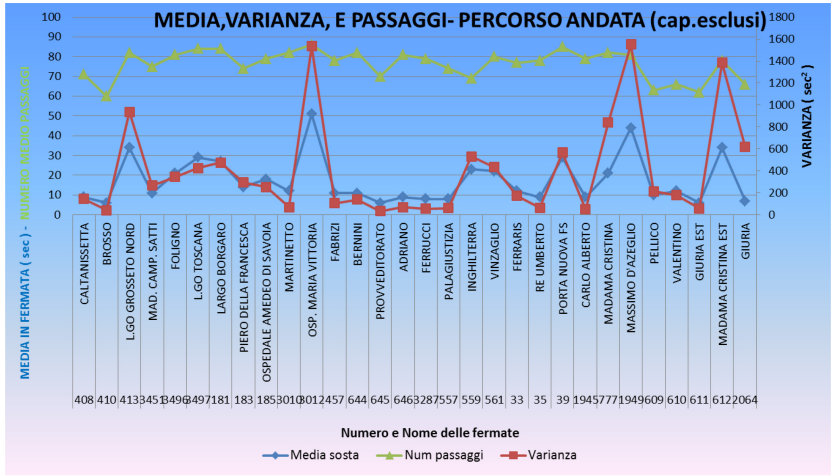
Study and control: PTAs & PROs review the history of actual operations, for improvements

Overall scope (2/3)

- Designed to fullfill MMIS Regulation for **Observed and historical data** exchange
- Defines a common data structure to describe what actually happens during service execution, enabling consistent and comparable **performance monitoring** across different operators and systems.



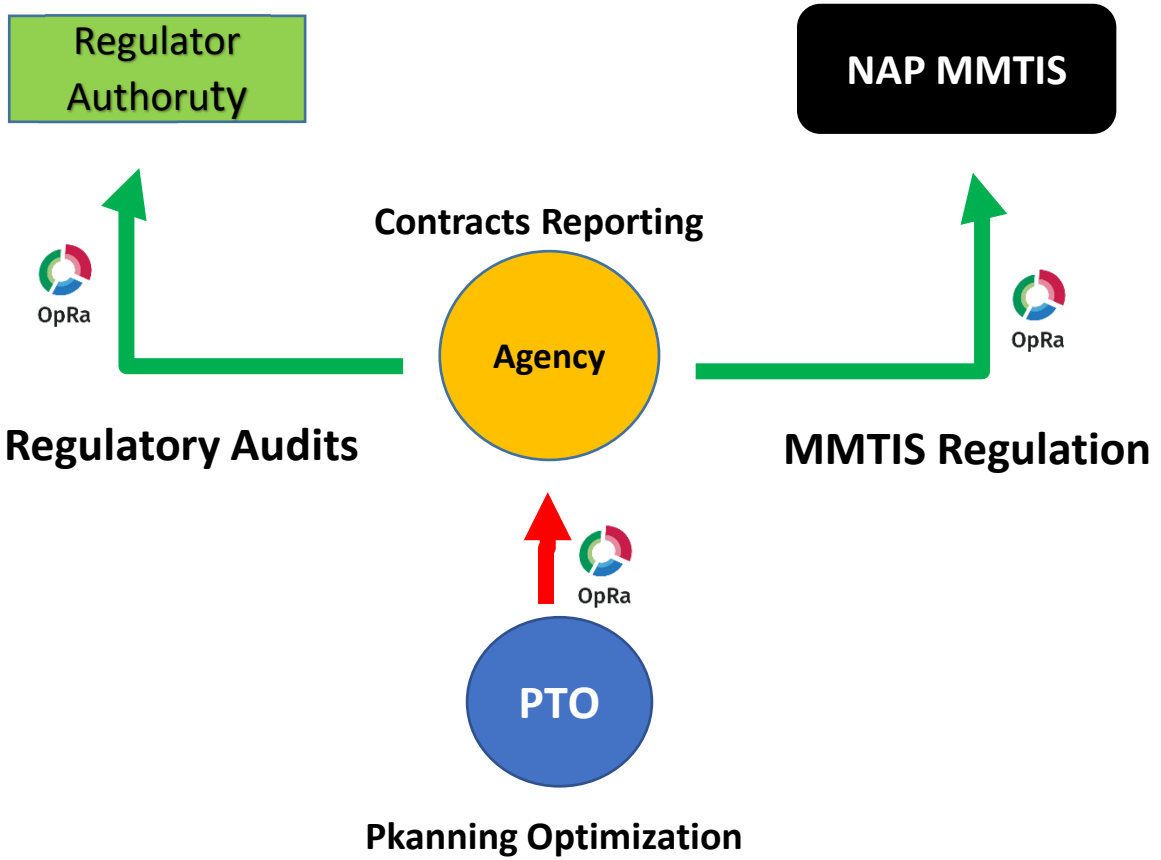
- OpRa standardizes:
  a. *Operational context*: duties, blocks, journeys, vehicle runs and service execution elements.
  b. *Raw measurements*: timestamps, positions, delays and all low-level data logs produced by onboard systems and operational platforms.
  c. *Correlation with planned data*: links between scheduled elements (as defined in Transmodel/NeTEx) and what was actually performed.
  d. *KPIs and performance indicators*: reliability, punctuality, regularity and other metrics required for service contracts and regulatory oversight.



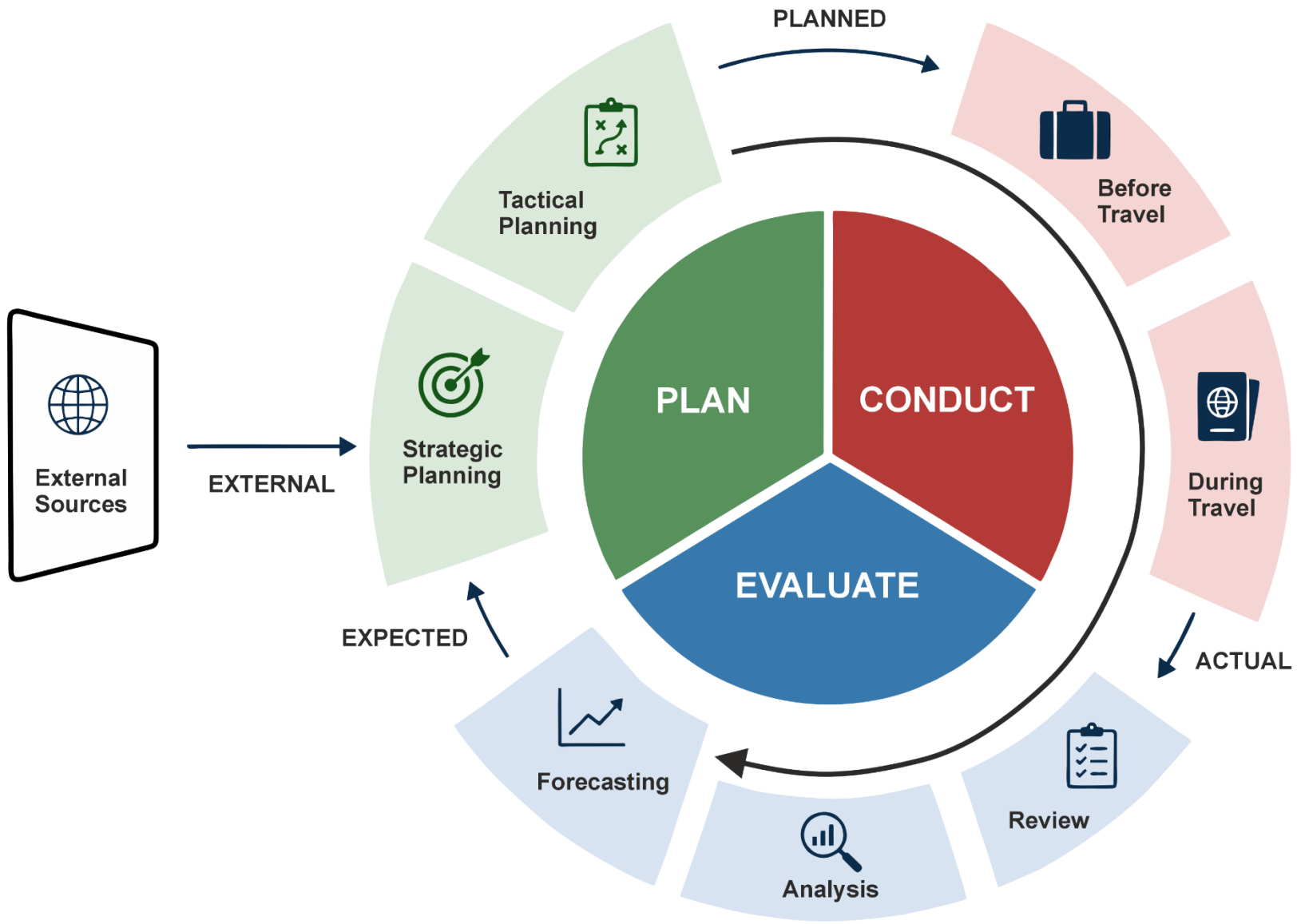
Overall scope (3/3)

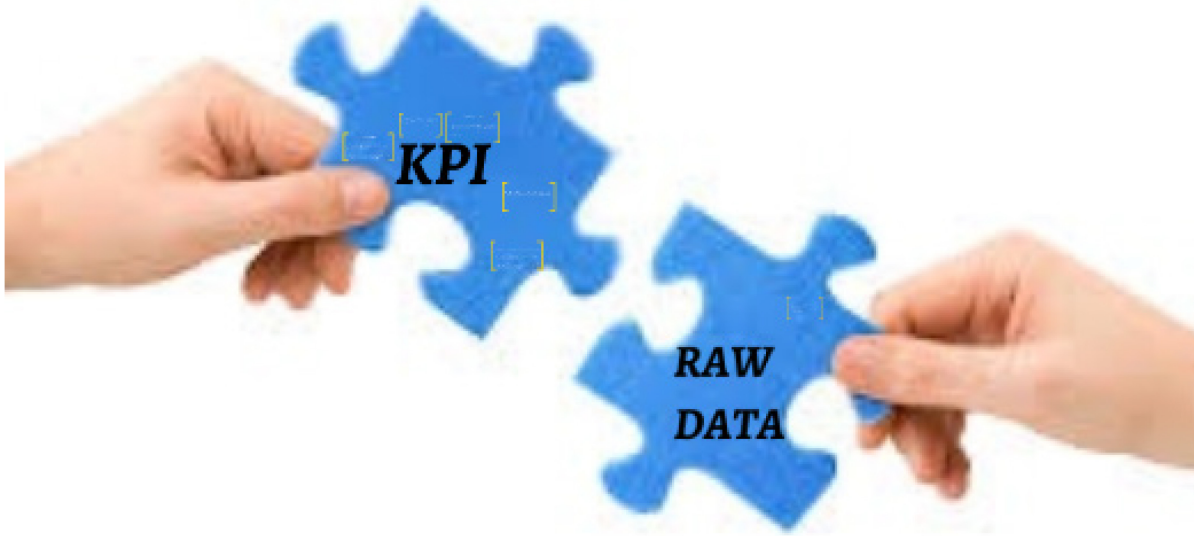
Multi-level, flexible and scalable architecture to support:

a. Performance-based public service **contract** monitoring.
b. **Regulatory audits** (national and regional authorities)
c. Business Intelligence and **operational analytics**
d. **Mobility Data Spaces** and data-sharing frameworks
e. **Data fusion** across AVL/AVM systems, ticketing, and MaaS platforms



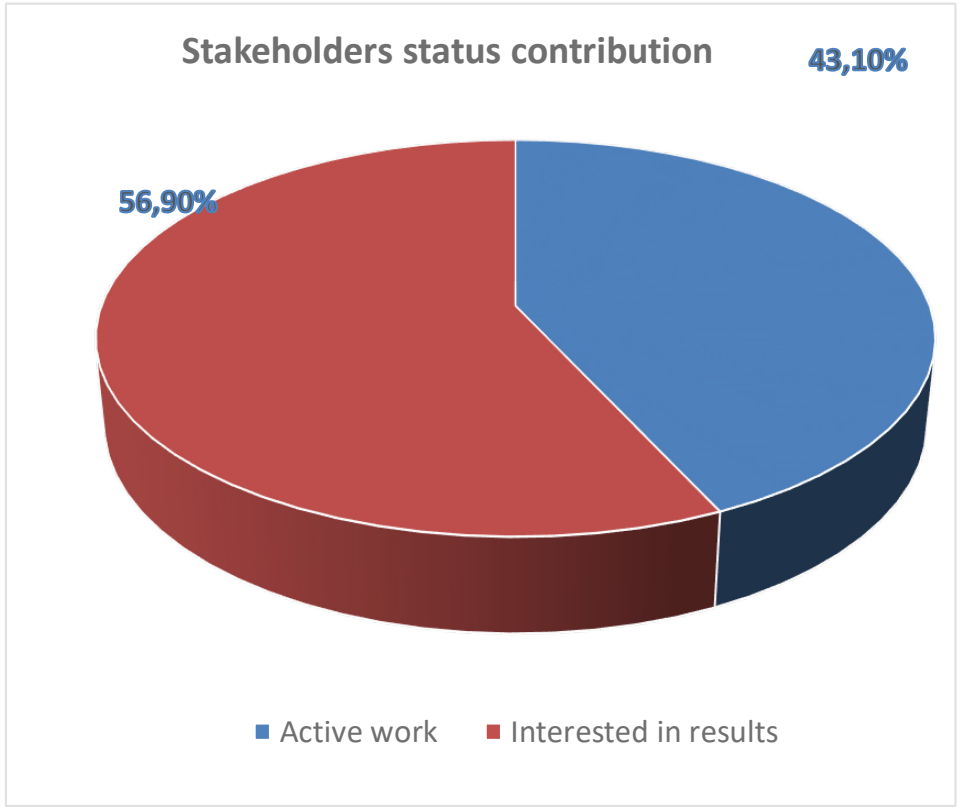
OpRa enable analysis

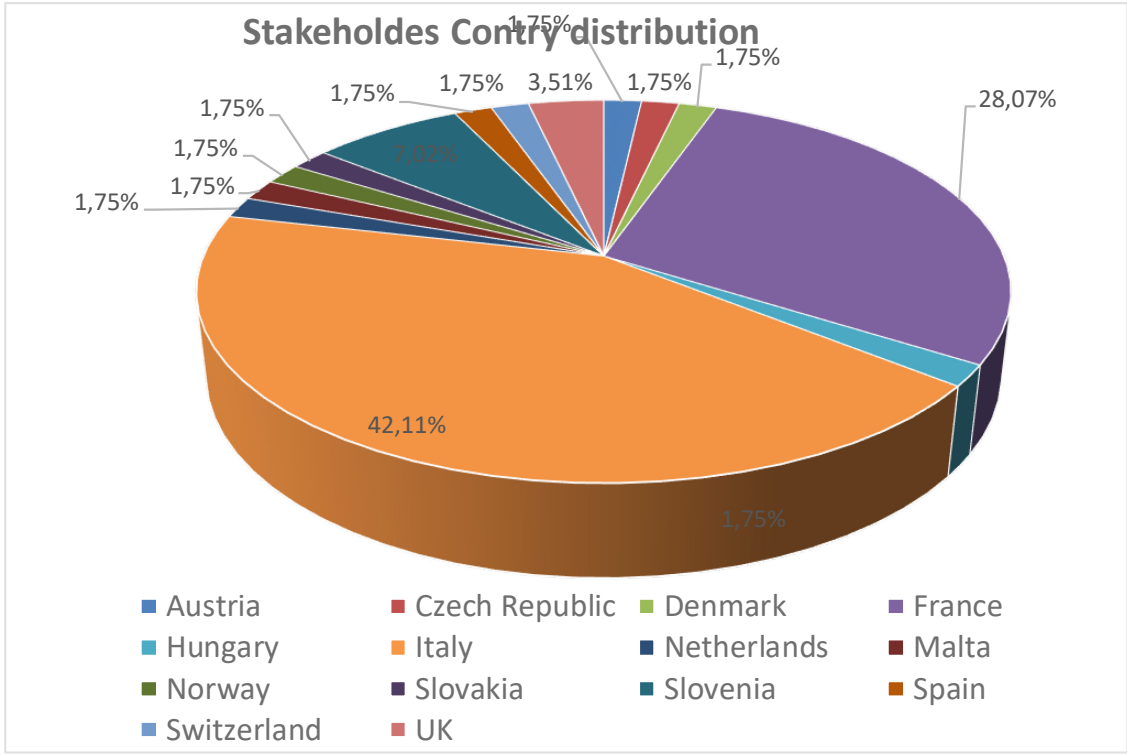




Stakeholders

Stakeholders

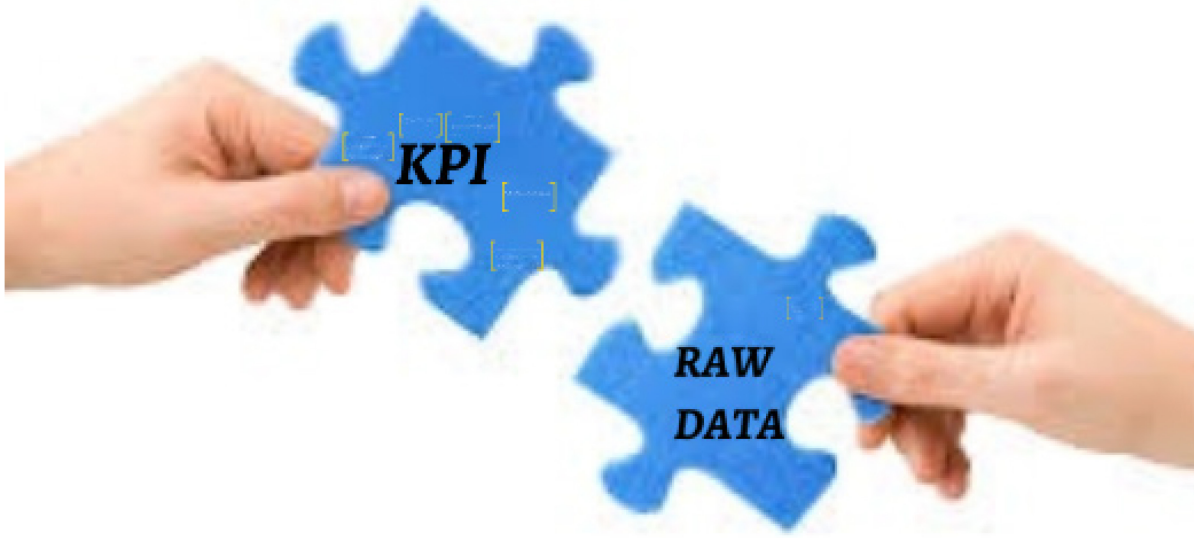




A total of **58 stakeholders** identified including *Authorities, PTO, Sw companies and System Integrators*.

Stakeholders distribution

1. Geographical stakeholders distribution (active or interested in the results).
2. Main contributors:
    1. France
    2. Hungary
    3. Italy
    4. Norway
    5. The Netherlands
    6. Slovenia
    7. Slovakia
    8. Spain
    9. UK



Use Cases

OpRa: Use Cases Top Level Diagram definition (1/2

1 Service Offer

- **Planned Service Offer**
- **Actual Service Offer**

It gathers all the themes and Use Cases relevant to the **Offer** of Transport for PT Service (e.g. Spatial and time coverage, offered seats, etc.). This category is further divided into following sub-categories:

1. Planned Service Offer (as result of Strategic and Tactical planning phases);
2. Actual (measured) service Offer.

2 Service demand

- **Expected Service Demand**
- **Actual Service Demand**

It gathers all the themes and Use Cases relevant to the **Demand** of Transport for PT Service (O/D matrix, load factor, etc.). This category is further divided into following sub-categories:

1. Expected Service Demand;
2. Actual (measured usage) service Demand.

OpRa: Use Cases Top Level Diagram definition (2/2)

3 Service Externality

It gathers all the themes and Use Cases relevant to PT Service **Externality**, that implies costs or benefit sthat affects a external party who did not choose to incur that cost or benefit (pollution emissions, safety, etc.).

4 Service Economy

- **Income Service Economy**
- **Expences Service Economy**

It gathers all the themes and Use Cases relevant to the **Economy** of Transport for PT Service in terms of incoming funds (sold tickets, etc.) and expenses (costs, etc.). This category is further divided into following sub-categories:

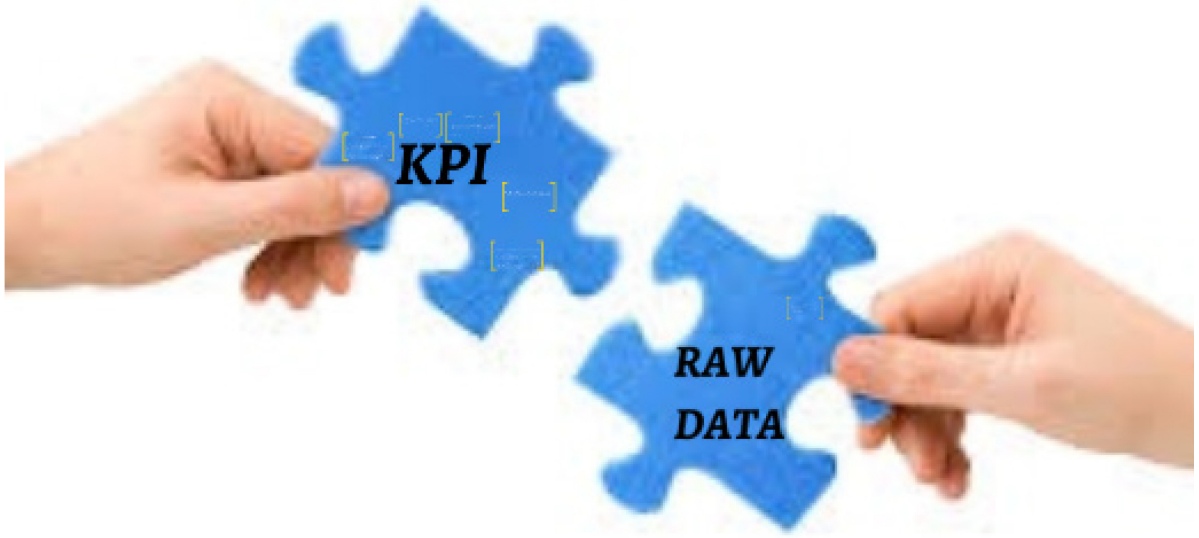
1. Income Service Economy;
2. Expences Service Economy.

5 Service Efficiency

It gathers all the themes and Use Cases relevant ot the **Efficiency** of Transport for PT Service (lines overlaps, MTBF, delays, etc.)

Remarks

- OpRa provides a set of standardized **KPI** already available for usage
- It is flexible and it's possible to define **custom KPI**
- Data Quality process is fundamental in order to have **good reporting**.
- OpRa is flexible, scalable and compliance with **Transmodel guarantee** coherent approach to PT Governance.
- Can exchange observed and historical data on **Delays** and **cancellations.**



OpRa UML Model

Univerza v Mariboru
Fakulteta za gradbeništvo, prometno inženirstvo in arhitekturo

Presented by Andrej Tibaut
University of Maribor, Slovenia
member of Slovenian Institute for Standardisation (SIST.si)

SIST

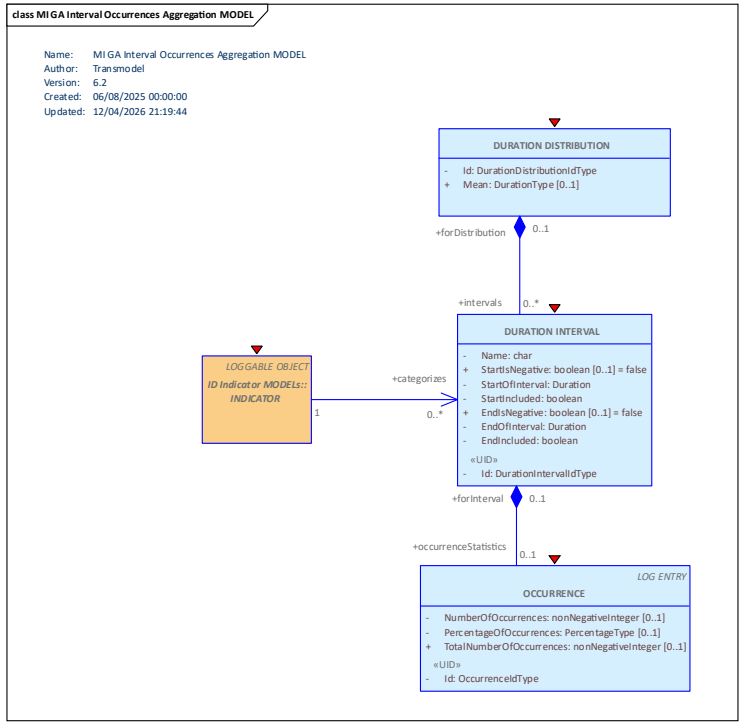
OpRa UML Modeling: Part 8

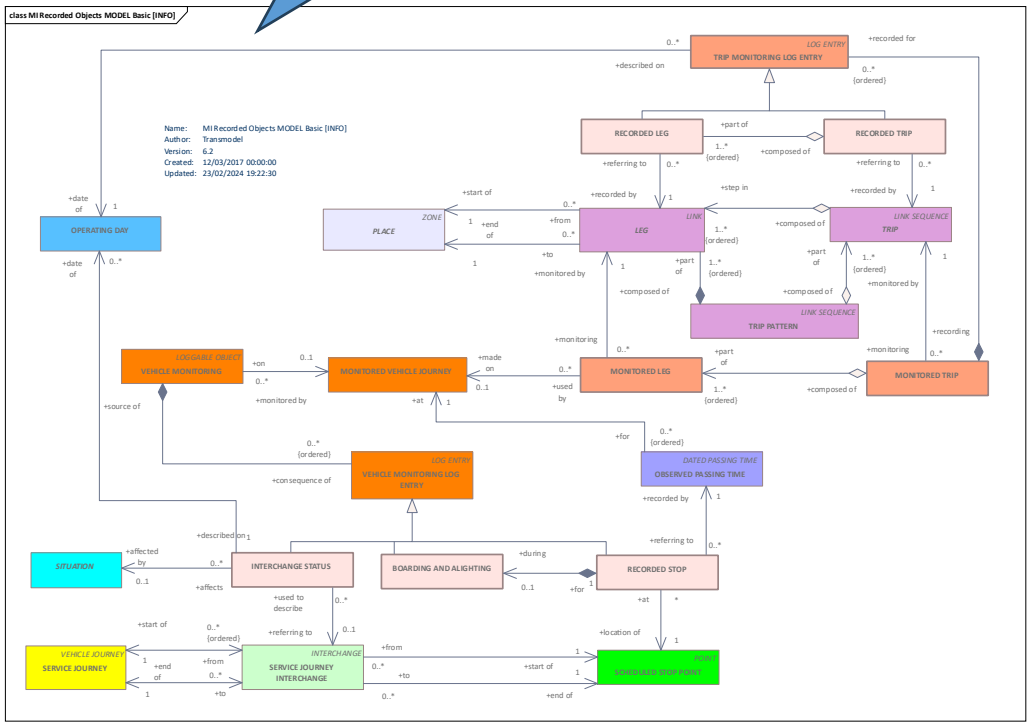
- OpRa = Transmodel Part 8 = Management Information and Statistics
- Conceptual model walkthrough
- From package structure to key diagrams

Why UML First

- Semantics before syntax
- Reuse before duplication
- Traceability to exchange models

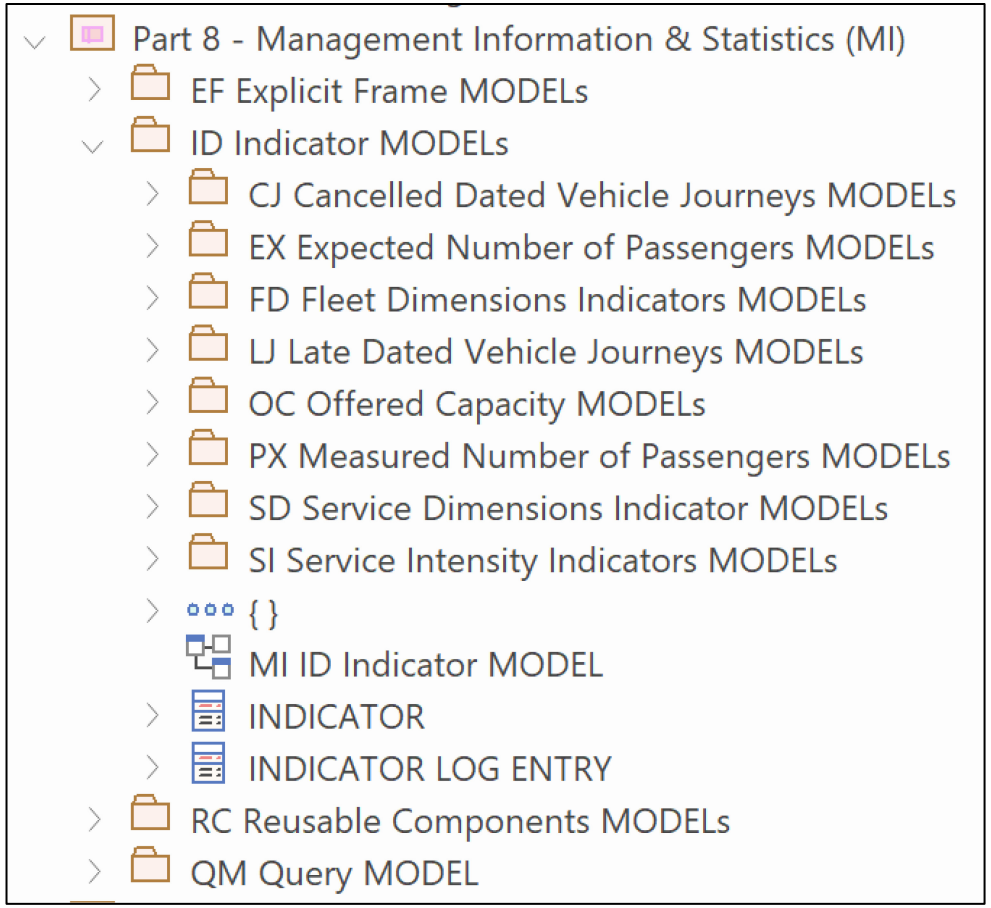
Unified Modelling Language (UML) Class diagram



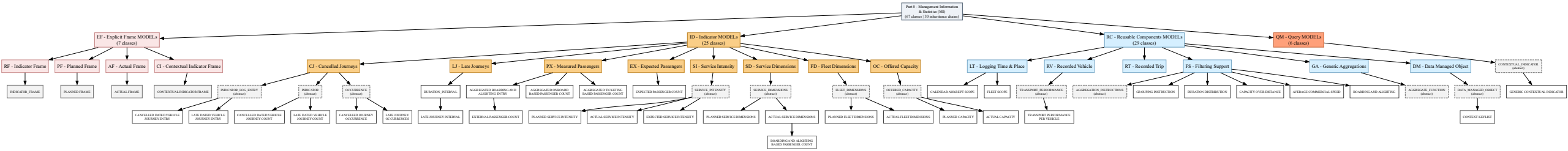


Part 8 UML model in numbers

- 26 packages
- 67 classes
- 4 main families:
  - EF (Explicit Frames) = framing layer,
  - ID (Indicators) = indicator semantics
  - RC (Reusable Components) = common reusable classes
  - QM (Query Model) = query and delivery

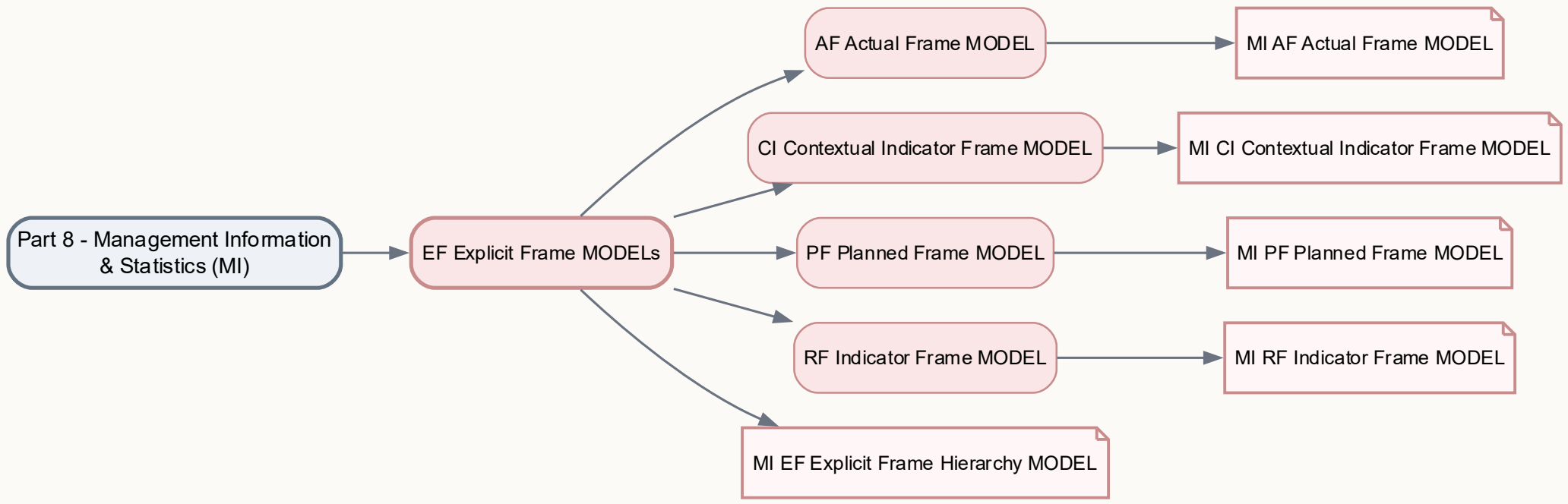


Main Package Landscape



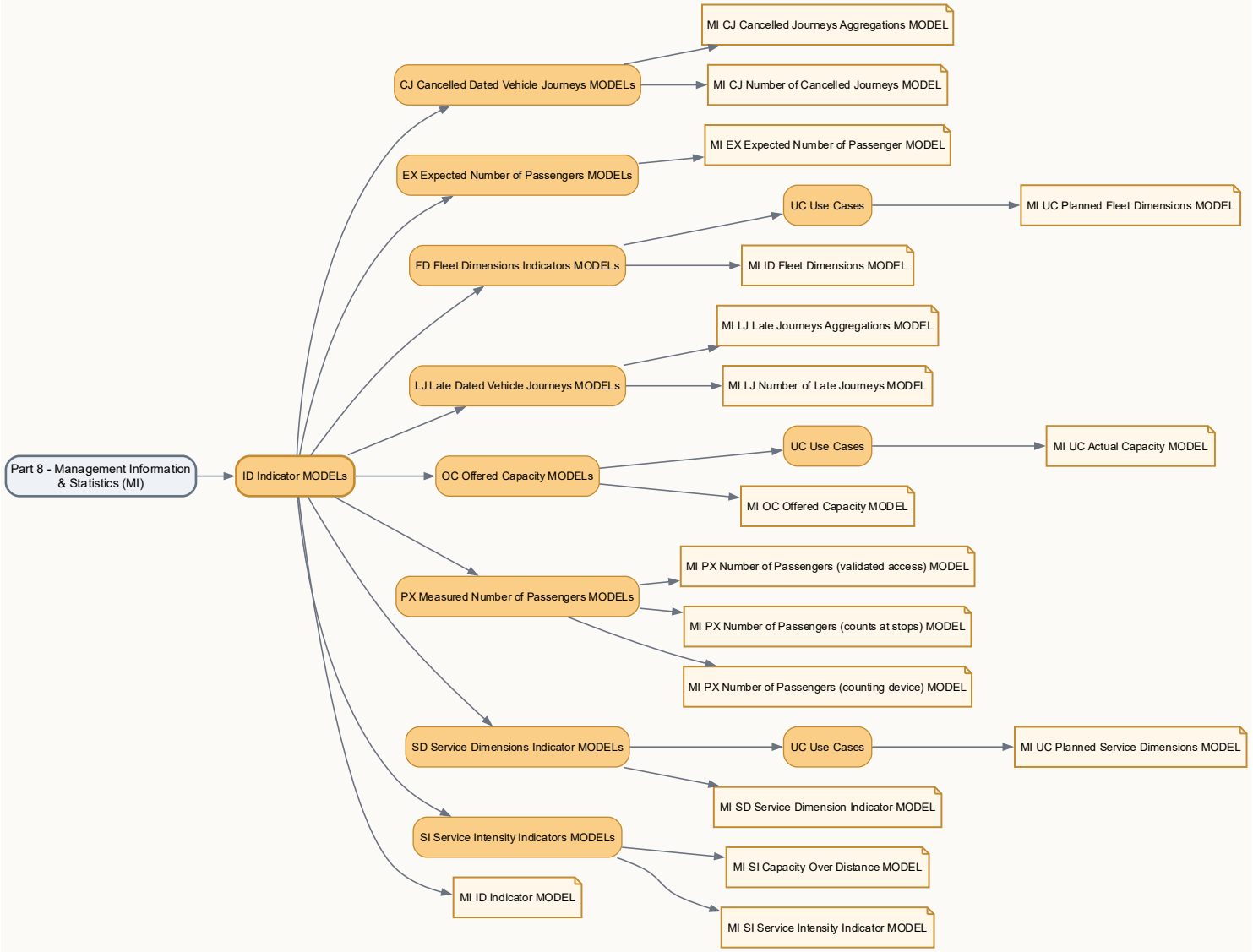
EF: Framing Concepts

- Planned / Actual / Indicator / Context frames
- Consistent carrier of indicator content



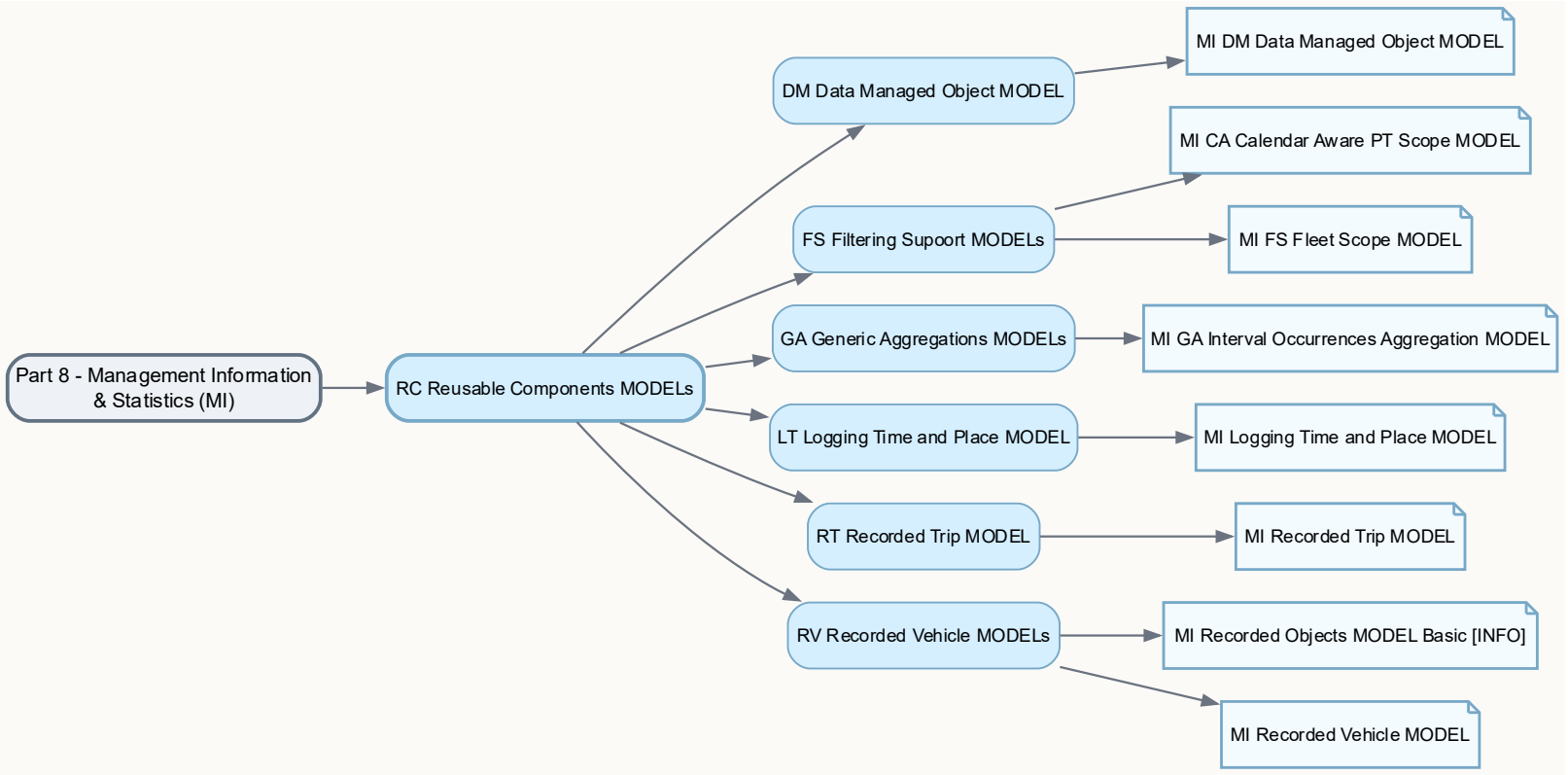
ID: Indicator Semantics

- Core KPI vocabulary
- Cancellation, delay, passengers, capacity
- Dimensions and service intensity



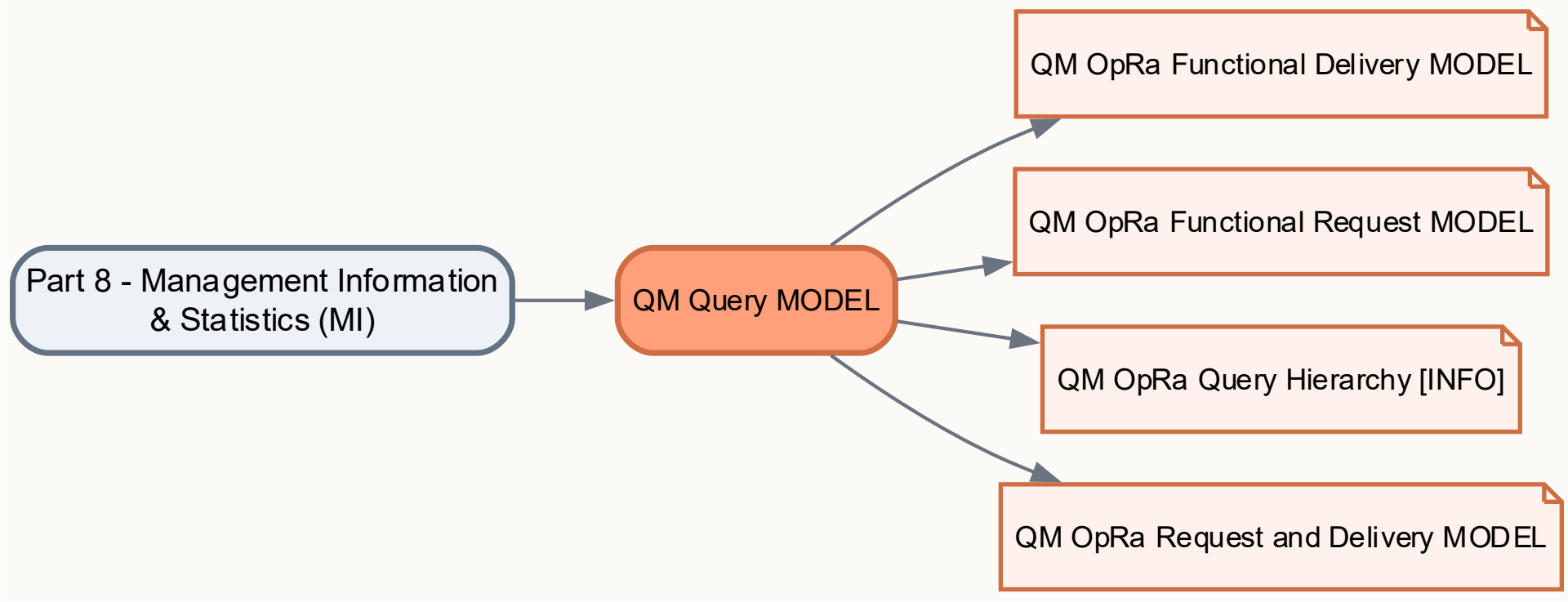
RC: Reusable Building Blocks

- Data managed objects and filtering support
- Generic aggregations and recorded structures
- Avoids duplication across indicators



QM: Query and Delivery

- Functional request and delivery
- Aggregation and grouping instructions
- Bridge from model to API behaviour

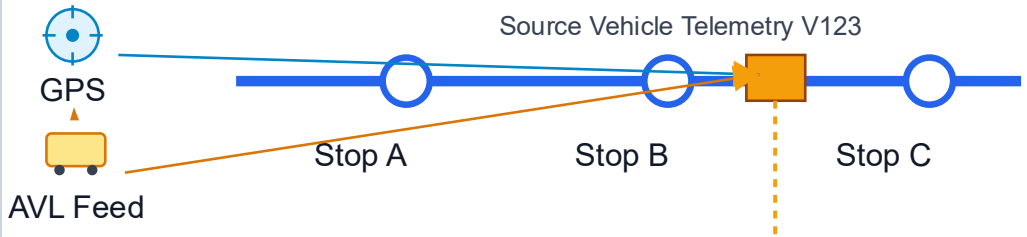


End-to-End Story: delays

- Model path from data structures to delivery: RC -> ID -> EF -> QM
- Example: **late journeys by line and period**
  - Delays explicitly required in the MMTIS

From SIRI Events to OpRa NeTEx Operational Exchange

Real time operation monitoring (SIRI SX)



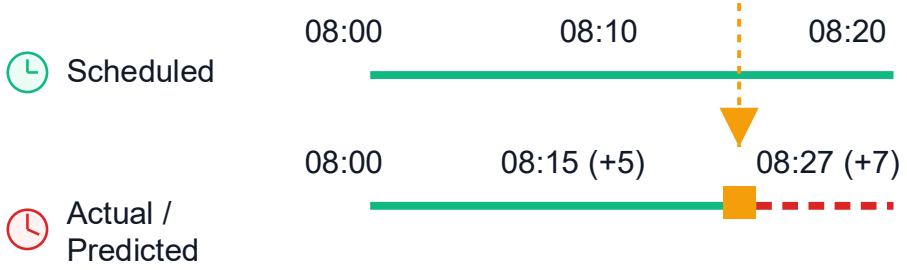
SIRI Events + Telemetry

Calendar Scope (NeTEx)

Operating Days: Mon-Fri | Validity: Annual

Reference Data

Dated Vehicle Journey (NeTEx)

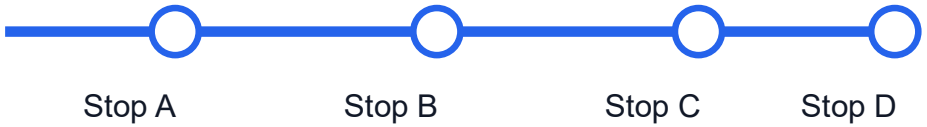


OpRa Aggregation (NeTEx)

Ingest, aggregate, publish operational data

Query + Delivery

Transport Network (NeTEx)

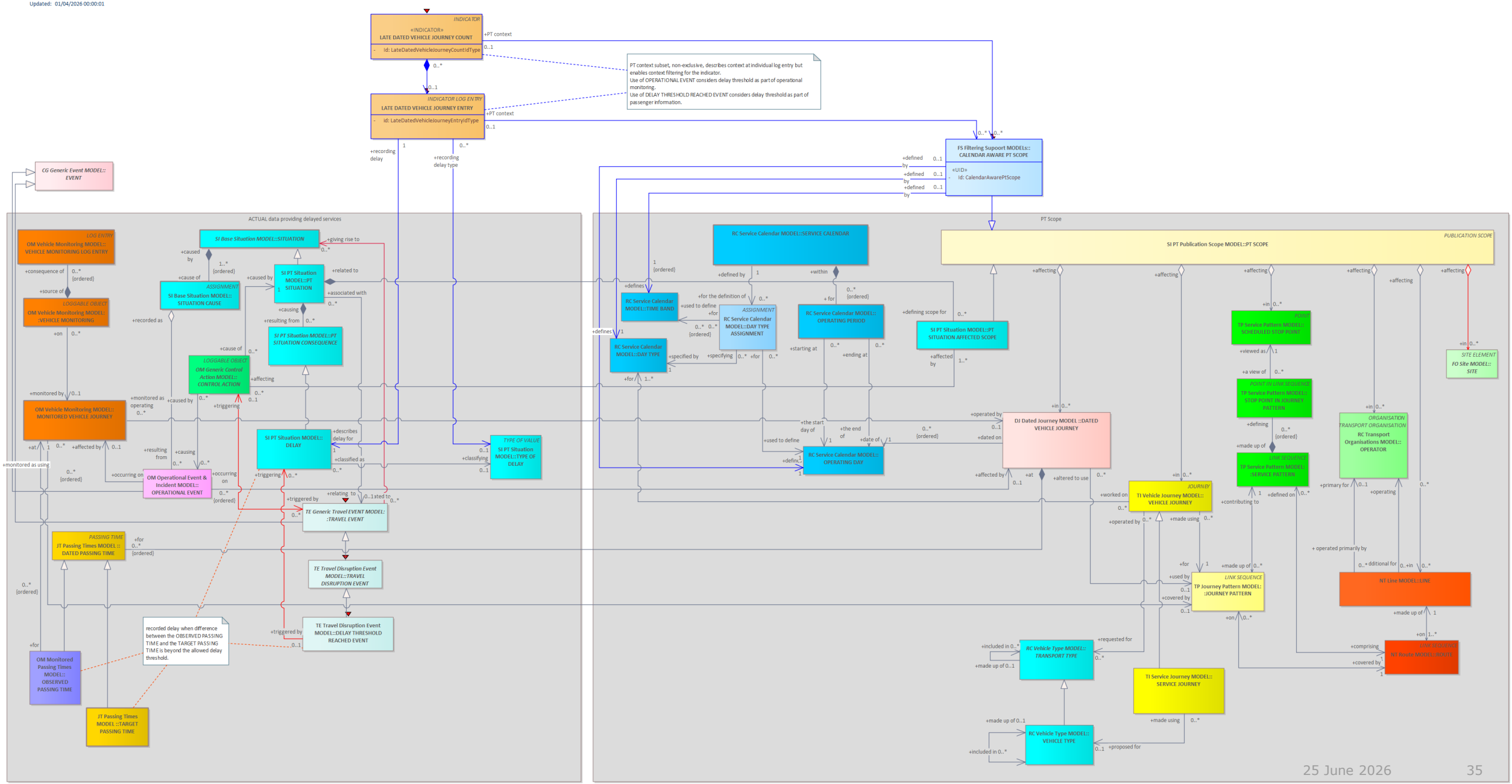


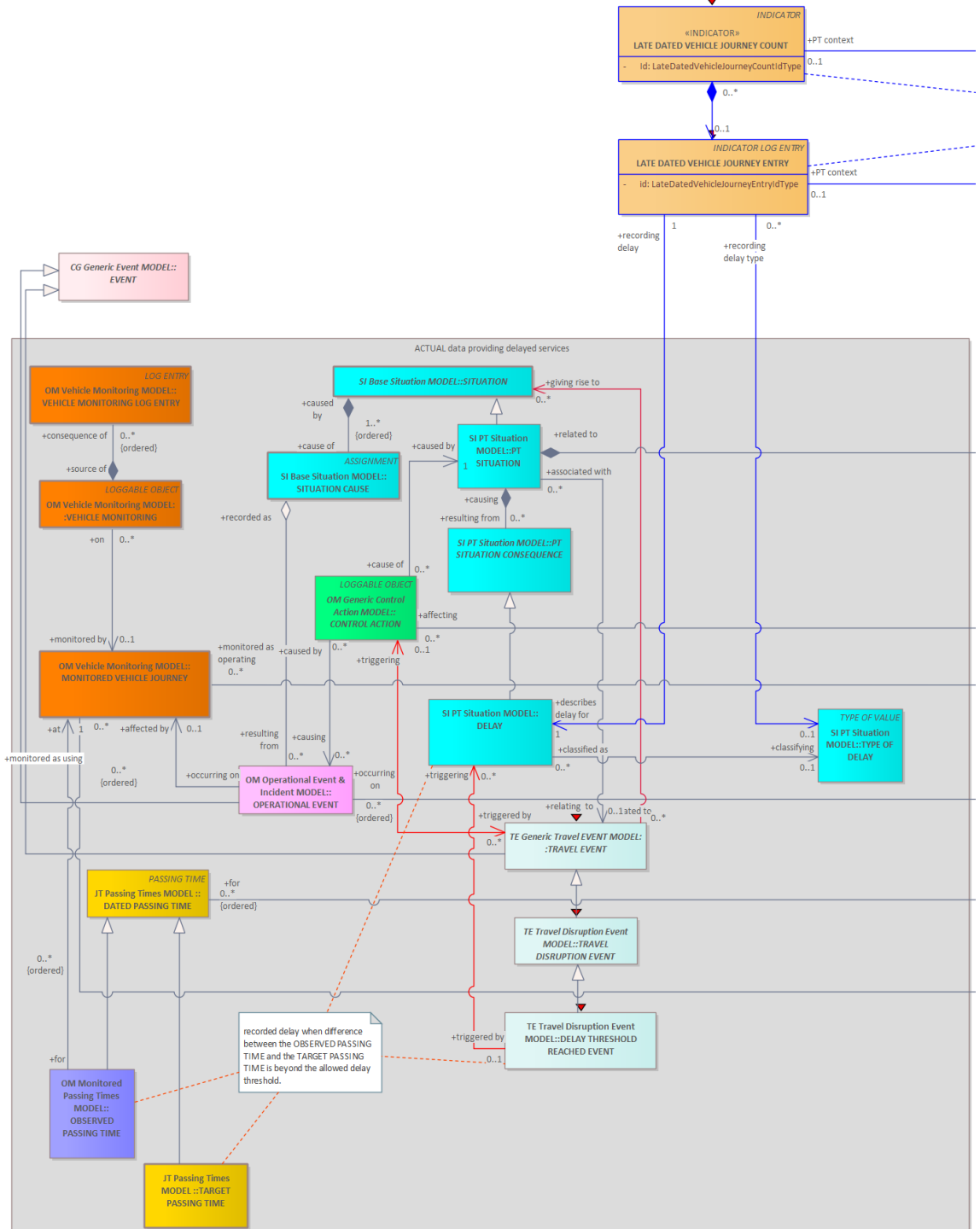
OpRa Query Model

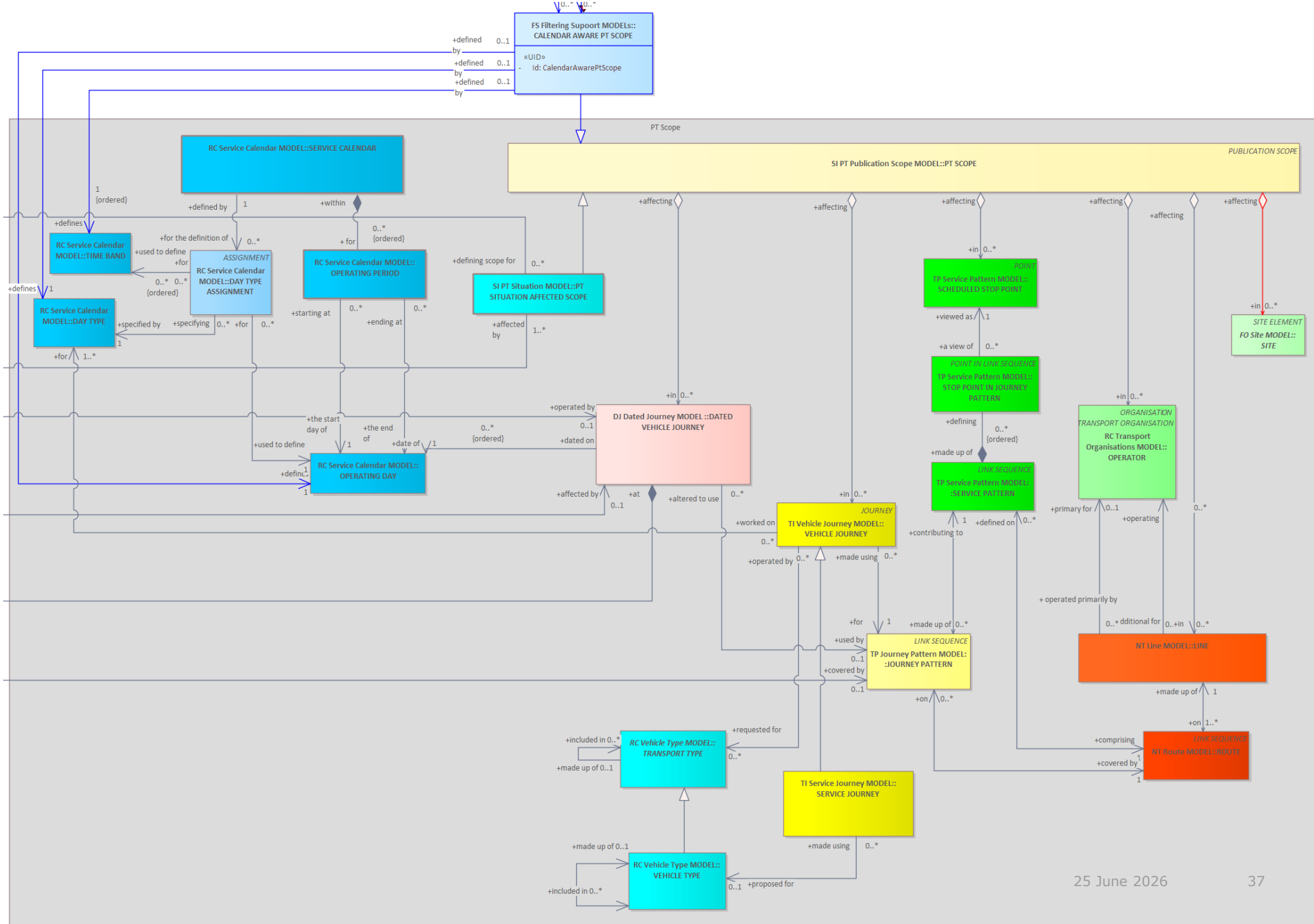
OpRa Request / Delivery reporting

class MI LJ Number of Late Journeys MODEL

Name: MI LJ Number of Late Journeys MODEL
Author: Transmodel
Version: 6.2
Created: 18/06/2025 00:00:00
Updated: 01/04/2026 00:00:01

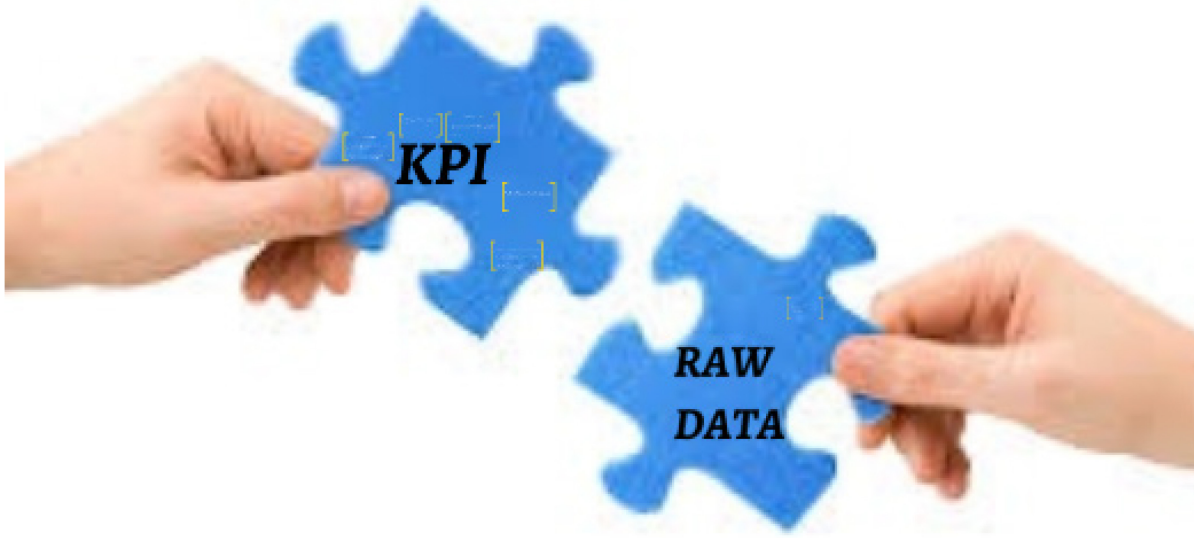



INDICATOR
«INDICATOR»
LATE DATED VEHICLE JOURNEY COUNT
- id: LateDatedVehicleJourneyCountIdType
+PT context
0..1
0..*
0..1
INDICATOR LOG ENTRY
LATE DATED VEHICLE JOURNEY ENTRY
- id: LateDatedVehicleJourneyEntryIdType
+PT context
0..1
+recording delay
1
0..*
+recording delay type
CG Generic Event MODEL:: EVENT
ACTUAL data providing delayed services
LOG ENTRY
OM Vehicle Monitoring MODEL:: VEHICLE MONITORING LOG ENTRY
+consequence of
0..*
{ordered}
+source of
LOGGABLE OBJECT
OM Vehicle Monitoring MODEL: :VEHICLE MONITORING
+on
0..*
SI Base Situation MODEL::SITUATION
+giving rise to
0..*
+caused by
1..*
{ordered}
+cause of
ASSIGNMENT
SI Base Situation MODEL:: SITUATION CAUSE
+caused by
SI PT Situation MODEL::PT SITUATION
1
+related to
+associated with
0..*
+causing
+resulting from
0..*
SI PT Situation MODEL::PT SITUATION CONSEQUENCE
+recorded as
+cause of
0..*
LOGGABLE OBJECT
OM Generic Control Action MODEL:: CONTROL ACTION
+affecting
0..*
0..1
0..*
+triggering
+monitored by
0..1
+monitored as operating
0..*
+caused by
OM Vehicle Monitoring MODEL:: MONITORED VEHICLE JOURNEY
+at
1
0..*
+affected by
0..1
+monitored as using
0..*
{ordered}
+resulting from
0..*
+causing
0..*
+occurring on
OM Operational Event & Incident MODEL:: OPERATIONAL EVENT
+occurring on
0..*
{ordered}
SI PT Situation MODEL:: DELAY
+describes delay for
1
+classified as
0..*
+triggering
0..*
TYPE OF VALUE
SI PT Situation MODEL::TYPE OF DELAY
0..1
+classifying
0..1
+relating to
0..1
+triggered by
0..*
TE Generic Travel EVENT MODEL: :TRAVEL EVENT
PASSING TIME
JT Passing Times MODEL :: DATED PASSING TIME
+for
0..*
{ordered}
TE Travel Disruption Event MODEL::TRAVEL DISRUPTION EVENT
0..*
{ordered}
recorded delay when difference between the OBSERVED PASSING TIME and the TARGET PASSING TIME is beyond the allowed delay threshold.
+triggered by
TE Travel Disruption Event MODEL::DELAY THRESHOLD REACHED EVENT
0..1
+for
OM Monitored Passing Times MODEL:: OBSERVED PASSING TIME
JT Passing Times MODEL ::TARGET PASSING TIME


FS Filtering Supoort MODELs::
CALENDAR AWARE PT SCOPE
«UID»
- Id: CalendarAwarePtScope
+defined by
0..1
PT Scope
RC Service Calendar MODEL::SERVICE CALENDAR
SI PT Publication Scope MODEL::PT SCOPE
PUBLICATION SCOPE
RC Service Calendar MODEL::TIME BAND
RC Service Calendar MODEL::DAY TYPE
ASSIGNMENT
RC Service Calendar MODEL::DAY TYPE ASSIGNMENT
RC Service Calendar MODEL:: OPERATING PERIOD
SI PT Situation MODEL::PT SITUATION AFFECTED SCOPE
RC Service Calendar MODEL:: OPERATING DAY
DJ Dated Journey MODEL ::DATED VEHICLE JOURNEY
TI Vehicle Journey MODEL:: VEHICLE JOURNEY
JOURNEY
TI Service Journey MODEL:: SERVICE JOURNEY
POINT
TP Service Pattern MODEL:: SCHEDULED STOP POINT
POINT IN LINK SEQUENCE
TP Service Pattern MODEL:: STOP POINT IN JOURNEY PATTERN
LINK SEQUENCE
TP Service Pattern MODEL: :SERVICE PATTERN
TP Journey Pattern MODEL: :JOURNEY PATTERN
ORGANISATION
TRANSPORT ORGANISATION
RC Transport Organisations MODEL:: OPERATOR
NT Line MODEL::LINE
NT Route MODEL::ROUTE
SITE ELEMENT
FO Site MODEL:: SITE
RC Vehicle Type MODEL:: TRANSPORT TYPE
RC Vehicle Type MODEL:: VEHICLE TYPE
+defines
+defined by
+within
+for the definition of
+used to define
+for
+specified by
+specifying
+starting at
+ending at
+defining scope for
+affected by
+affecting
+operated by
+dated on
+the start day of
+the end of
+date of
+altered to use
+worked on
+made using
+in
+viewed as
+a view of
+made up of
+defining
+contributing to
+defined on
+primary for
+operating
+operated primarily by
+additional for
+used by
+covered by
+on
+requested for
+included in
+made up of
+comprising
+proposed for

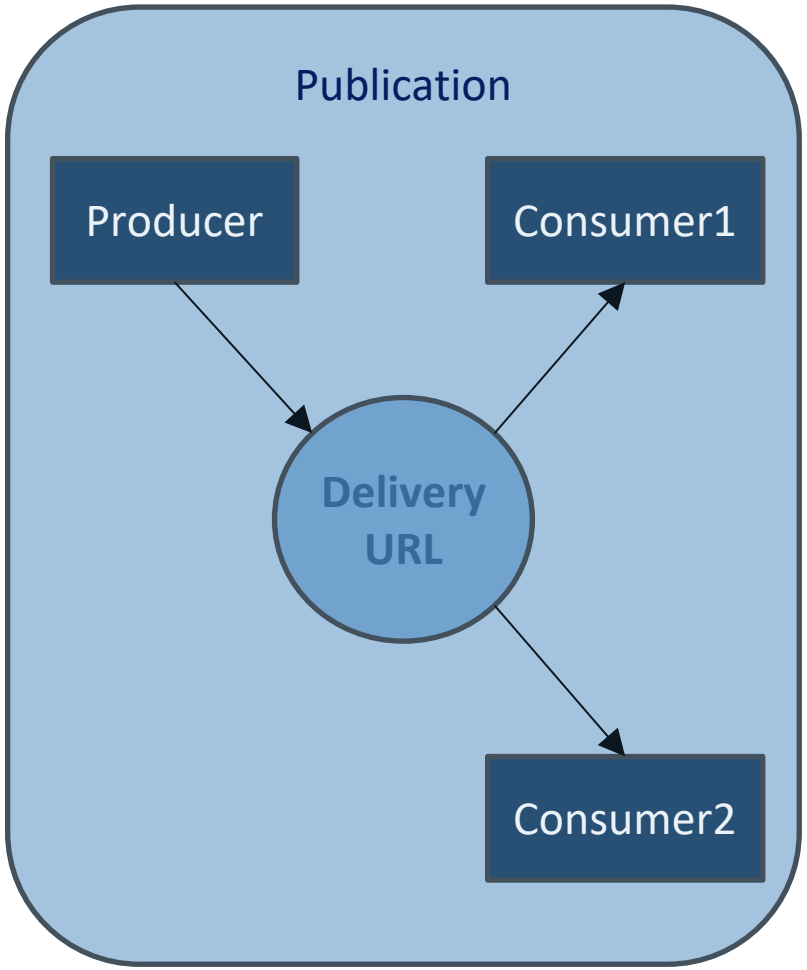
Conclusions

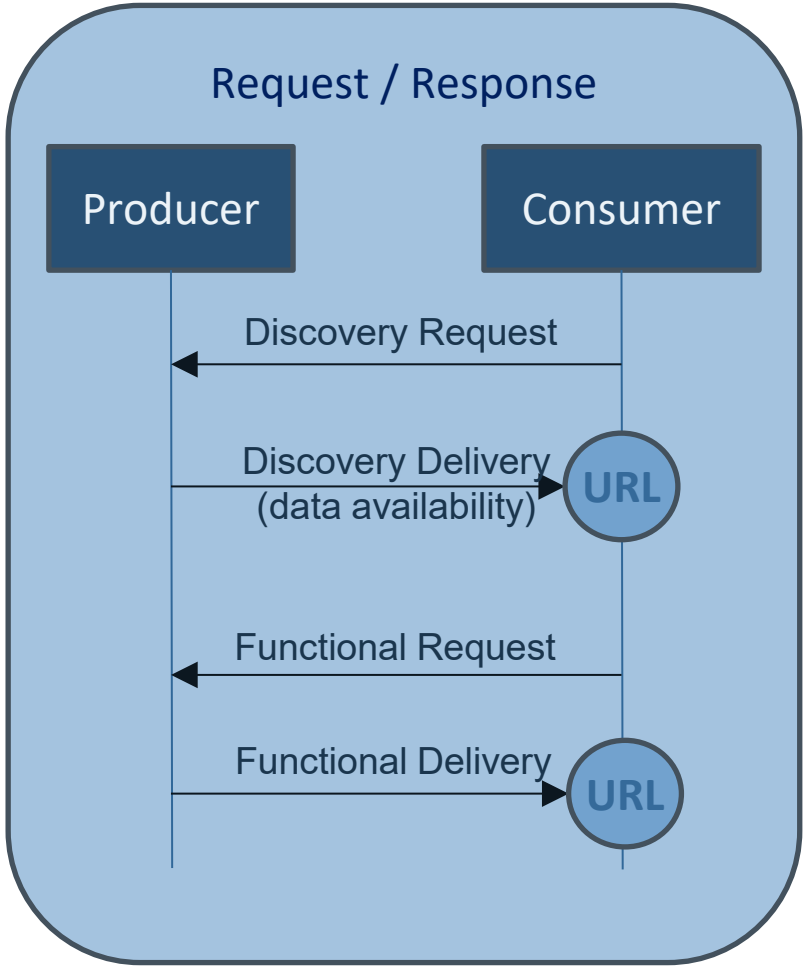
- Layered and coherent analytics model
- Extendable without redesign
- Keeps UML model as source-of-truth before schema/API change

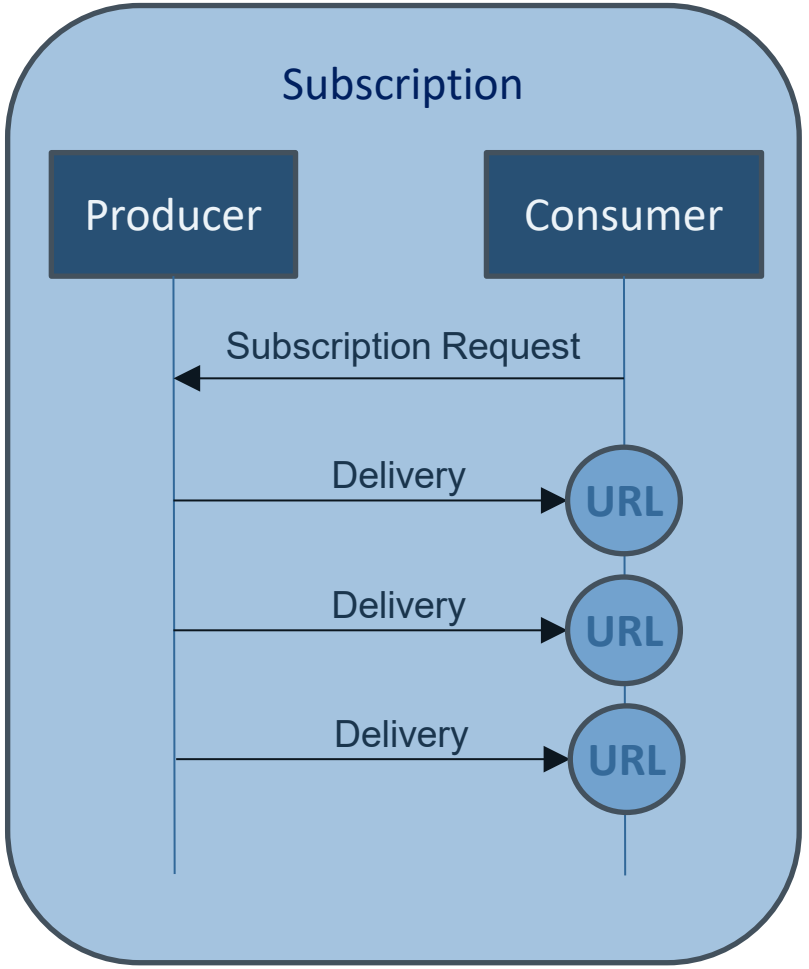


OpRa physical XML/XSD implementation

Collaboration models

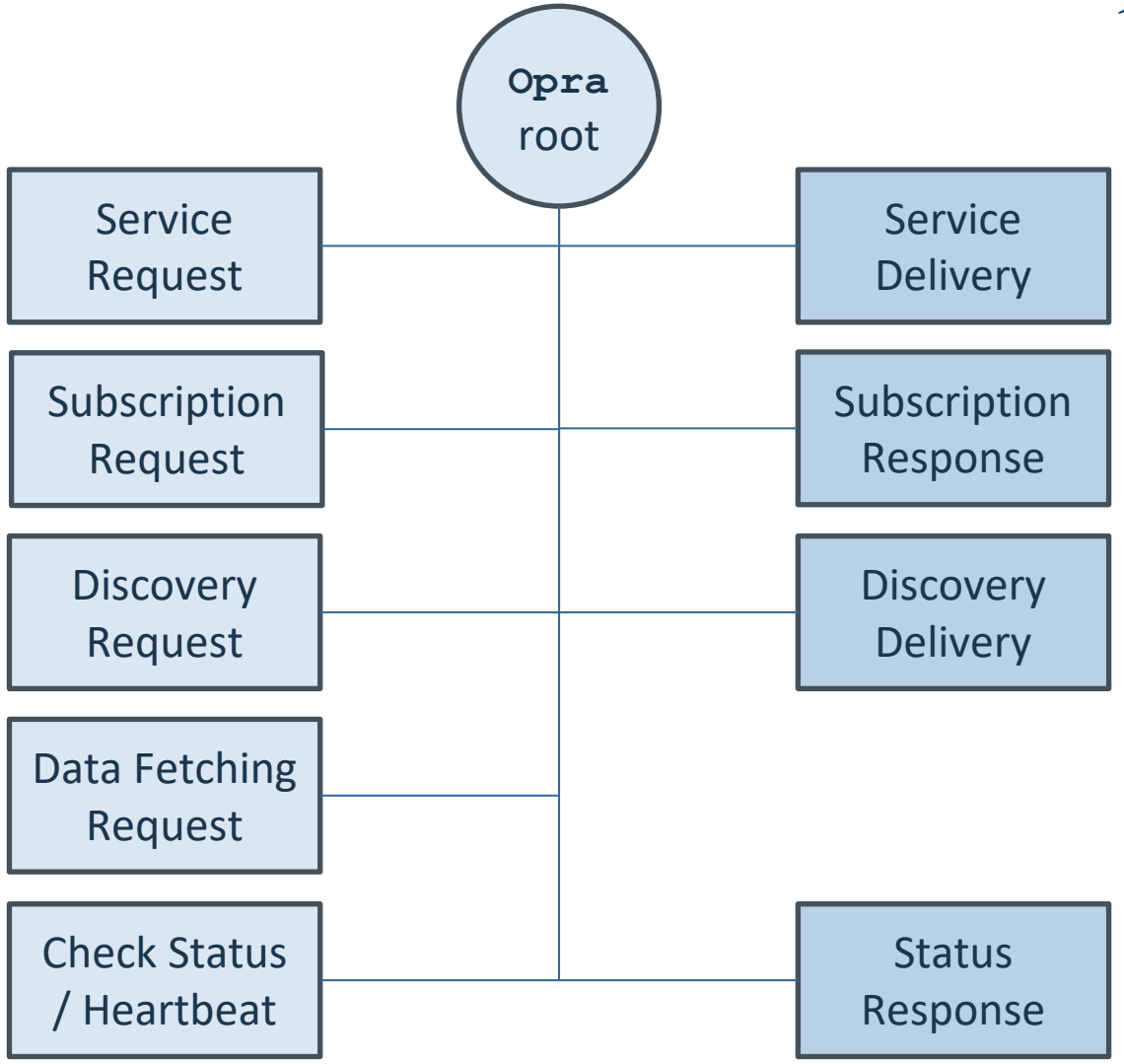




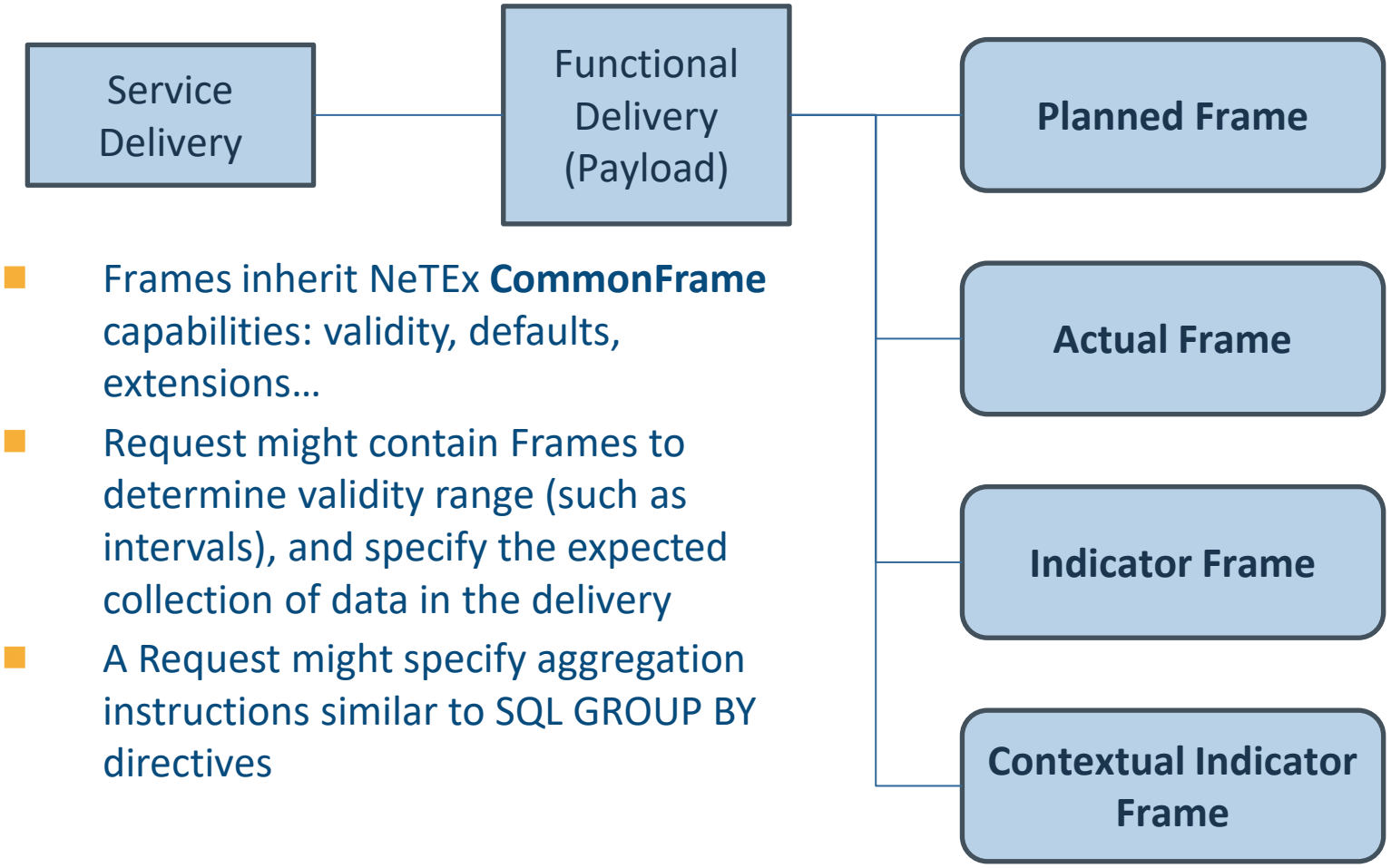


Services

- Services' design re-uses SIRI structures
- Under the root **<Opra>** XML node, first level determines the message type
- Not all message types are shown here



Frames



- Frames inherit NeTEx **CommonFrame** capabilities: validity, defaults, extensions…
- Request might contain Frames to determine validity range (such as intervals), and specify the expected collection of data in the delivery
- A Request might specify aggregation instructions similar to SQL GROUP BY directives

Provides the planned service in NeTEx structure (or URL to a NeTEx publication)

Provides the actual service in NeTEx structure (what concluded)

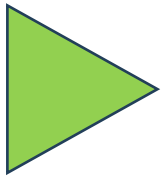
Presents standardized indicators and related underlying entries that add up to indicators

Presents non-standardized indicators that require underlying context to be interpretable

Indicator Frame

Indicators' implementation principles

- IndicatorFrame: a collection of **Indicators** and (in many cases) **IndicatorLogEntries**
- IndicatorLogEntries represent smaller state recordings or transactional components
- For each Indicator, a (Functional) Request, a Discovery Request and a Discovery Delivery element is defined to fine-tune system behaviour.



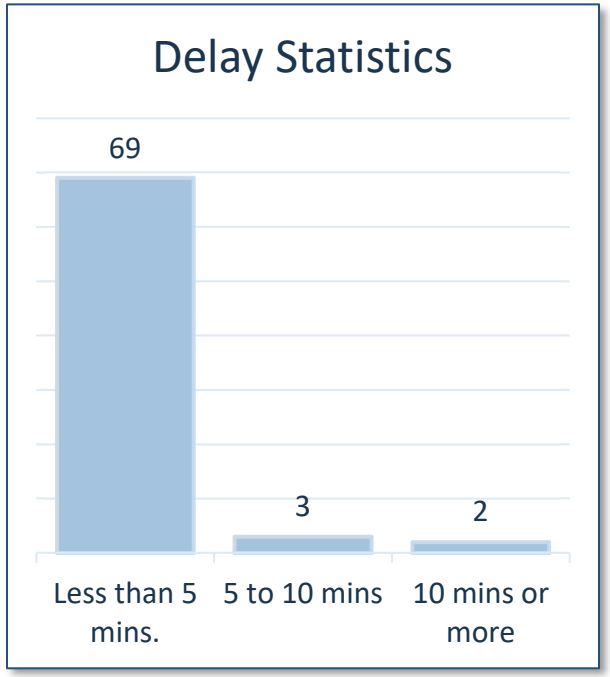
Example: Late Dated Vehicle Journey Count

- **LateDatedVehicleJourneyCount** (the Indicator) represents delay classification for its scope
- **LateDatedVehicleJourneyEntry** (the IndicatorLogEntry) represents individual delay records („transactions") which is aggregated in the LDVJ Count Indicator
- When implementing, you might choose to present the individual entries, or to present the statistics only

Example: Late Dated Vehicle Journey Count implementation

```
<dataObjects>
     <IndicatorFrame>
          <netex:ValidBetween>
                    <netex:FromDate>2025-03-16T00:00:00</netex:FromDate>
                    <netex:ToDate>2025-03-18T23:59:59</netex:ToDate>
          </netex:ValidBetween>
          <PreparednessLevel>Cleansed</PreparednessLevel>
          <indicatorLogEntries>
                    <LateDatedVehicleJourneyEntry>
                              <netex:JourneyPatternRef ref="Test:JP:10:T1-T3a"/>
                              <netex:DatedVehicleJourneyRef ref="Test:DVJ:20250316_0700"/>
                              <DelayDuration>PT5M</DelayDuration>
                    </LateDatedVehicleJourneyEntry>
                    <LateDatedVehicleJourneyEntry>
                              <netex:JourneyPatternRef ref="Test:JP:10:T1-T3a"/>
                              <netex:DatedVehicleJourneyRef ref="Test:DVJ:20250316_1330"/>
                              <DelayDuration>PT5M</DelayDuration>
                    </LateDatedVehicleJourneyEntry>
          </indicatorLogEntries>
          <indicators>
                    ...
          </indicators>
     </IndicatorFrame>
</dataObjects>
```

Example: Late Dated Vehicle Journey Count implementation




```
<dataObjects>
      <IndicatorFrame>
            <indicators>
                  <LateDatedVehicleJourneyCount>
                        <netex:JourneyPatternRef ref="Test:JP:10:T1-T3a"/>
                        <intervals>
                              <DurationInterval>
                                    <EndOfInterval>PT5M</EndOfInterval>
                                    <EndIncluded>false</EndIncluded>
                                    <NumberOfOccurrences>69</NumberOfOccurrences>
                                    <PercentageOfOccurrences>0.9324</PercentageOfOccurrences>
                              </DurationInterval>
                              <DurationInterval>
                                    <StartOfInterval>PT5M</StartOfInterval>
                                    <StartIncluded>true</StartIncluded>
                                    <EndOfInterval>PT10M</EndOfInterval>
                                    <EndIncluded>false</EndIncluded>
                                    <NumberOfOccurrences>3</NumberOfOccurrences>
                                    <PercentageOfOccurrences>0.0405</PercentageOfOccurrences>
                              </DurationInterval>
                        </intervals>
                  </LateDatedVehicleJourneyCount>
            </indicators>
      </IndicatorFrame>
</dataObjects>
```

Contextual indicator representation

- Placeholder for exchanging non-standard indicators
- Requires a context definition (eg. a regulation reference)
- Can re-use the Transmodel-based reference system within OpRa (referring to parts of the network, journeys, etc.)
- Custom units of measurement can be specified (eg. μg/veh.km for emissions)

- Examples
  - Vehicle cleanliness
  - Employee performance on a vehicle journey
  - Signage quality
  - Fuel consumption
  - Emission levels
- Prerequisites before application
  - ID tags for the contextual indicators
  - Regulation context reference string

Example: vehicle cleanliness exchange

For each line, a cleanliness check is conducted. Each vehicle is classified between 1-5, and the average is exchanged.

```
<dataObjects>
    <ContextualIndicatorFrame>
        <FrameContext>SAMPLE_NATIONAL_PUBLIC_TRANSPORT_REPORTING</FrameContext>
        <ContextualIndicator>
            <netex:LineRef>Test:line:10</netex:LineRef>
            <IndicatorID>VehicleCleanlinessClassification</IndicatorID>
            <IndicatorValue>2.5</IndicatorValue>
        </ContextualIndicator>
        <ContextualIndicator>
            <netex:LineRef>Test:line:20</netex:LineRef>
            <IndicatorID>VehicleCleanlinessClassification</IndicatorID>
            <IndicatorValue>4</IndicatorValue>
        </ContextualIndicator>
    </ContextualIndicatorFrame>
</dataObjects>
```

Your feedback

Thanks for your attention !

CEN OpRa experts Team:

- **Fabrizio Arneodo,** chair of the OpRa CEN group
- **Gergely Nitsch,** technical expert OpRa
- **Andrej Tibaut,** technical expert Transmodel
- **Tim Rivett**, technical expert and editor

For more information: https://transmodel-cen.eu/index.php/opra/

European Committee for Standardization

Thank you for your participation!

Upcoming events/webinars:

2026-06-25 – Webinar 'How to become compliant with EU Digital Product Passport legislations: Guidance on the recent published European standards' (livestreamed on YouTube: www.youtube.com/@CENCENELEC)

2026-07-03 - Webinar 'Introduction to the Vienna Agreement and the different cooperation modalities'

2026-10-09 – Webinar 'Webinar 'Anthropometric and strength data of children for use in standardization'