



Ubiquitous Data for Railway Operations

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Develop a data architecture that is able to provide ubiquitous data for railway operations and supporting applications

- Understand the data exchange and integration requirements of railway operations;
- Provide extensions to existing data notations that support operational data;
- Develop new data model supporting autonomous data exchange and reasoning;
- Develop appropriate architectural frameworks for distributed processing in railway operations.

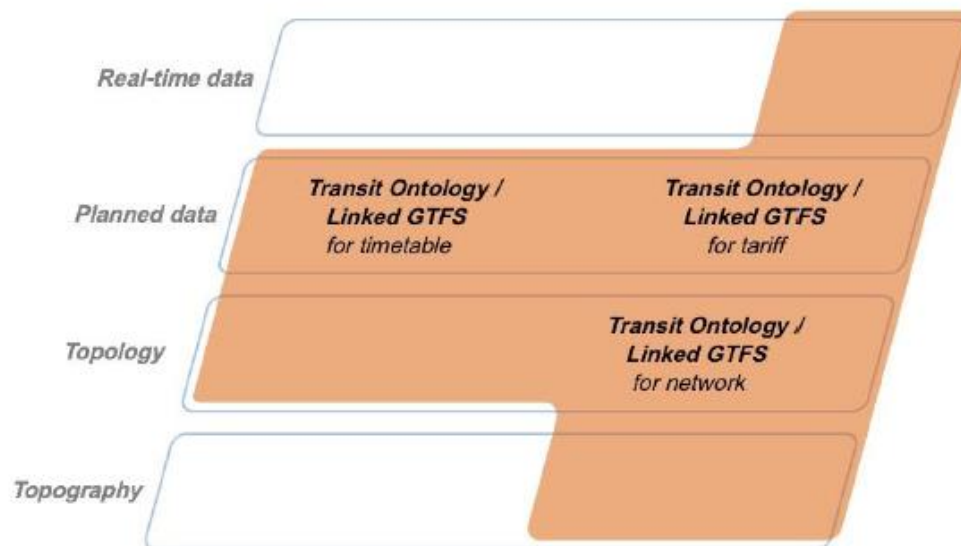
Review of Existing Models

XML-based Models	Non-XML Models	Emerging Approaches
railML 2	TAP TSI	Rail Core Ontology (RaCoOn)
RailTopoModel / railML 3	Google Transit (GTFS) and Real-time	Railway Infrastructure Ontology (RI*)
Register of Infrastructure (RINF)	OSM / ORM	Enriched GTFS (Transit ontology)
Infrastructure for Spatial Info. in the EC (INSPIRE)		Linked Open Data (NEPTUNE)
IDM ^{VU}		Public Transport Ontology of Keller, Brunk, & Schlegel
Network and Timetable Exchange (NeTEx)		Semantic Sensor Network (SSN)
Service Interface for Real-time Information (SIRI)		
TAF TSI		
ON-TIME (RTTP)		

Alignment with Storyboard Requirements

Data format Data Granularity	railML 3	IDM ^{VU}	INSPIRE	RINF	OSM
Corridor	Possible	Out of scope	Not available	Out of scope	Out of scope
Macroscopic	Possible	Possible	Possible	Possible	Possible
Mesoscopic	Possible	Out of scope	Possible	Out of scope	Possible
Microscopic	Possible	Possible	Out of scope	Possible	Possible

Storyboard 1: Infrastructure data for operation and simulation

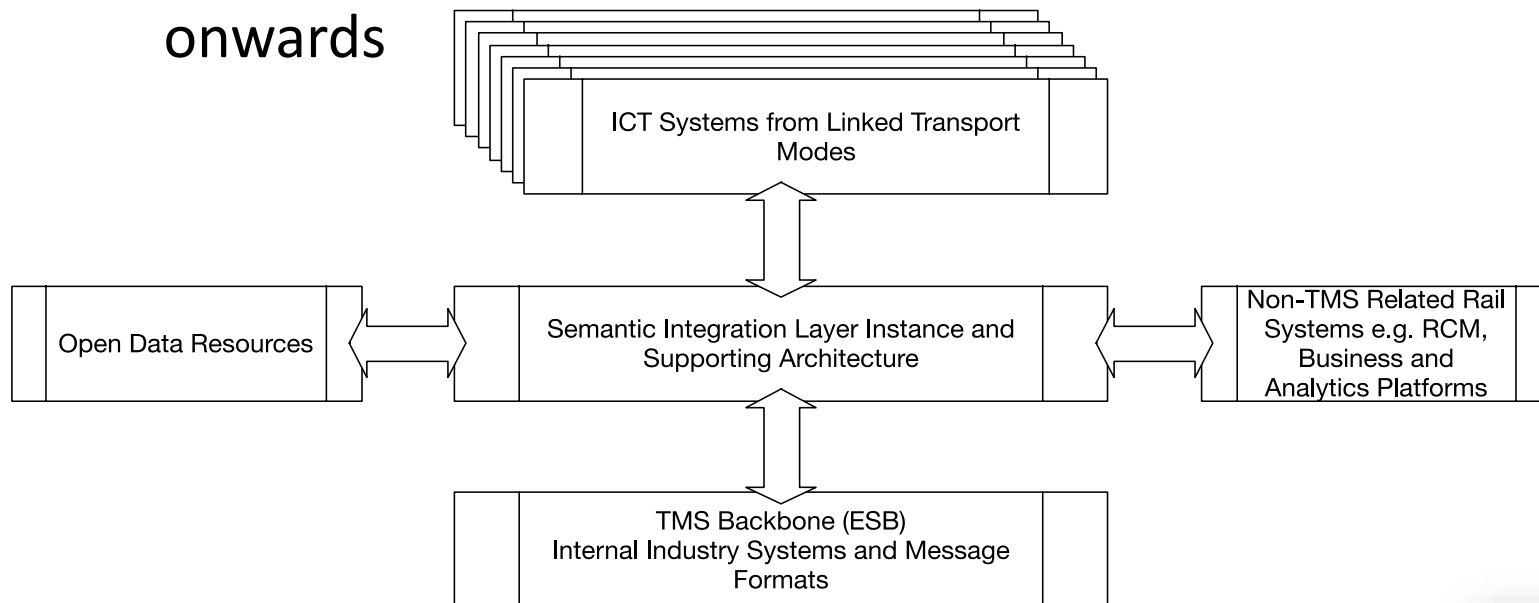
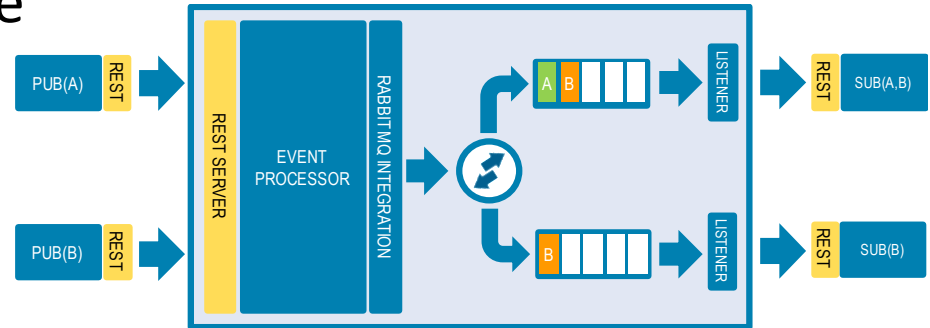


Storyboard 2: Effective usage of cross-mode capacity

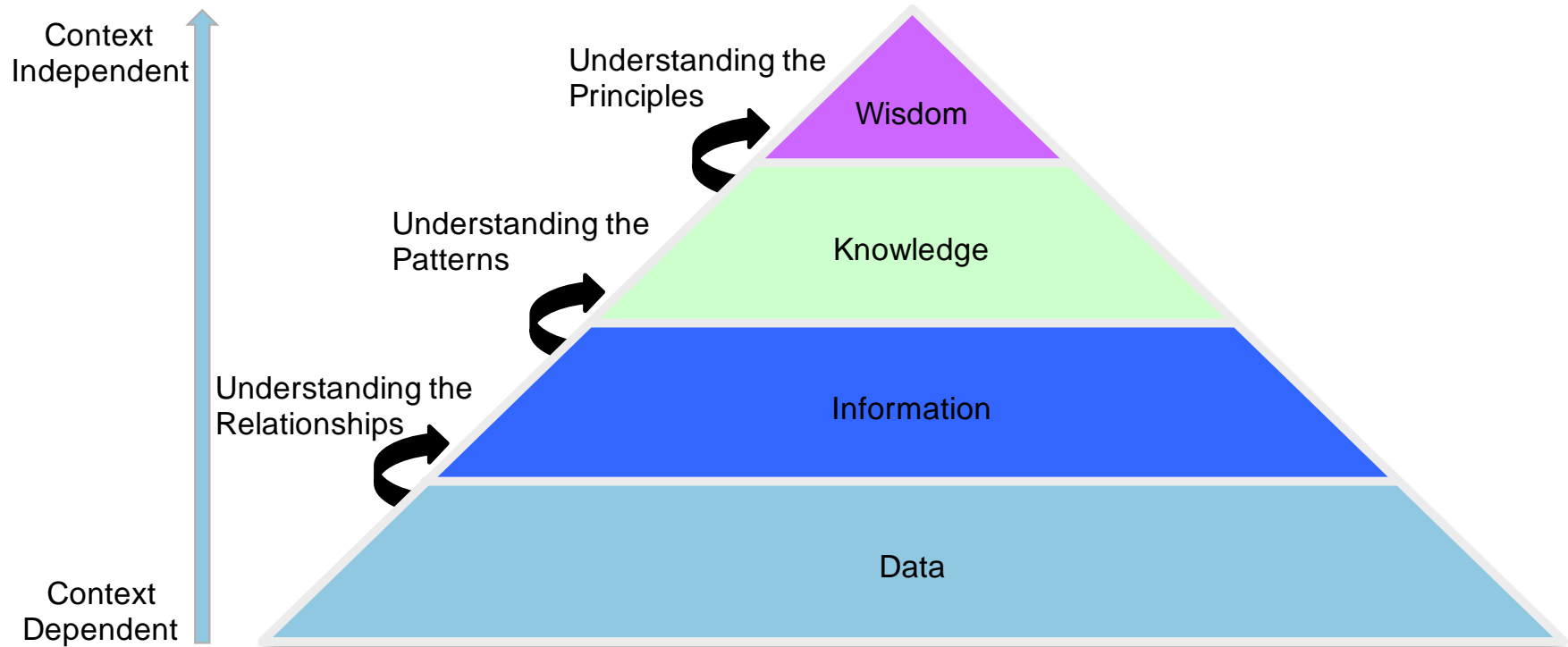
ESB Architecture for Conventional ICT

Best practice (ICT) is applicable

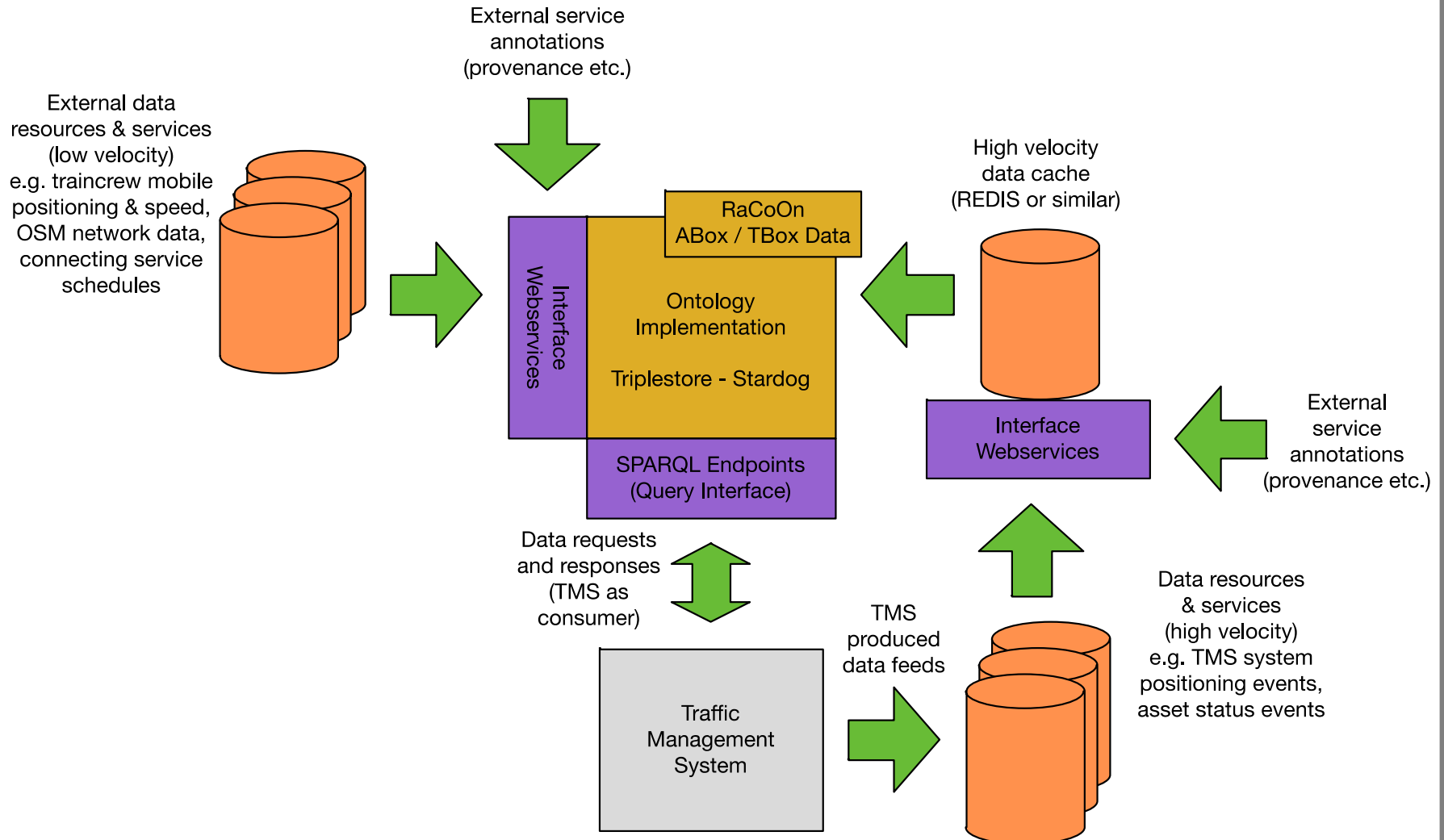
- Adopt recommendations from ON-TIME and others!
- Builds on a decade of work from InteGRail onwards



Ubiquitous Data is Removed from System Context



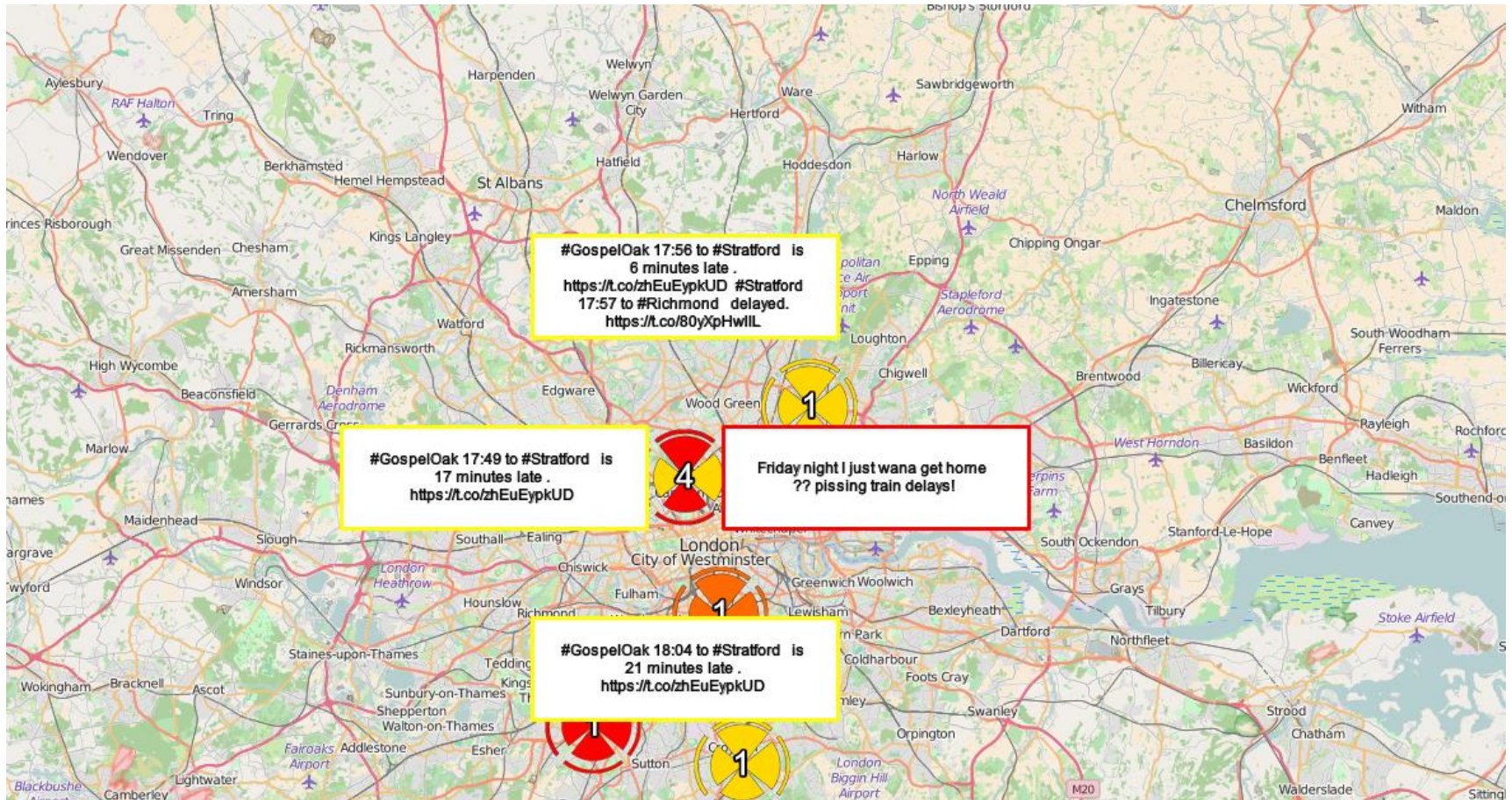
Architecture for Ubiquitous Data



Leveraging Open Data Resources for Improved Situational Awareness

Data Resource	Examples
Social media data	Content, geolocation, time of creation, links to other content
IM public data	Live vehicle movements, train describers, notifications of TSRs etc.
Ordnance survey	Infrastructure layout
ATOC data	Timetables, fares and supporting information
NaPTAN	Information on access points / interchanges

Geolocated, Grouped Incidents



Thank you for your kind attention

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