Semantic modelling – the examples RFID in Rail and BetTerFlow

30-03-2022

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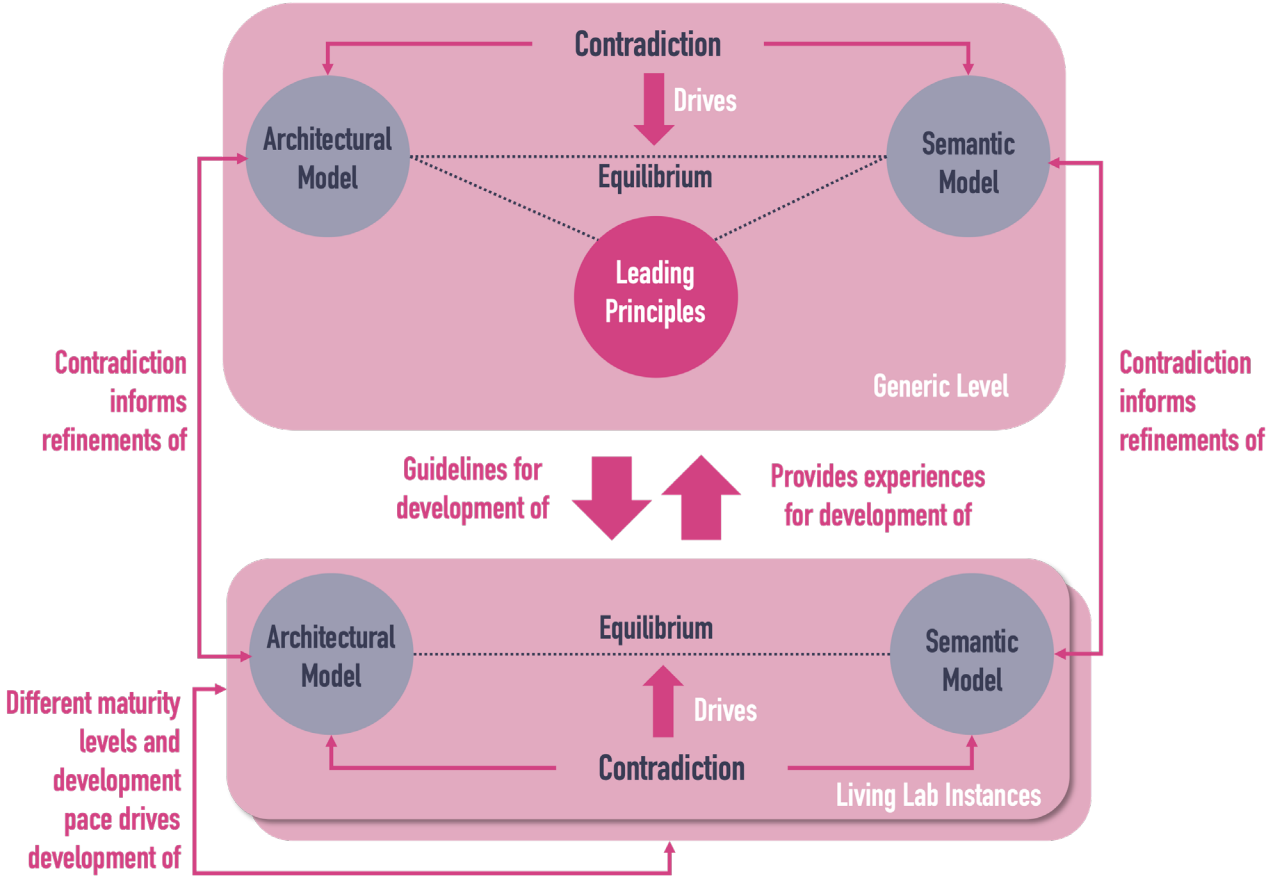
RISE

FEDeRATED NETWORK OF PLATFORMS

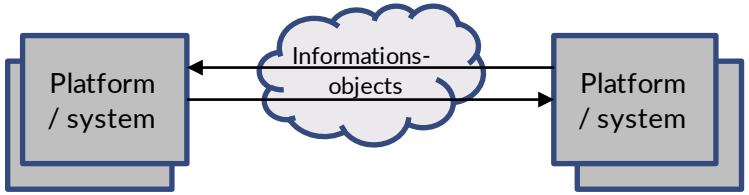
Co-financed by the Connecting Europe Facility of the European Union

Balancing the generics and the specifics



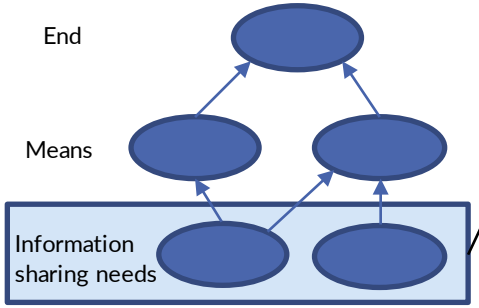
Source: FEDeRATED (2022) Intermediary progress report Pilots/LivingLabs, to be found at http://federatedplatforms.eu

SCOPE OF INVESTIGATION

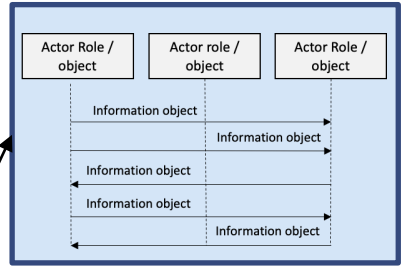


The proposed approach to validate the FEDeRATED generic semantic model

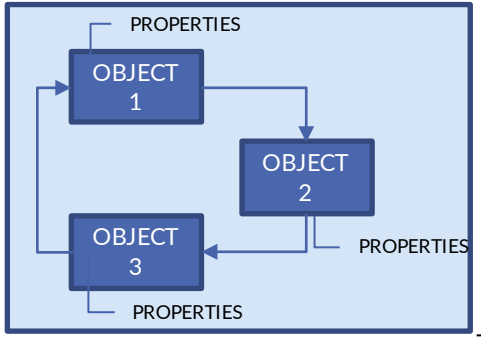
GOAL DIAGRAM (use case description)



SEQUENCE DIAGRAM (use case details)



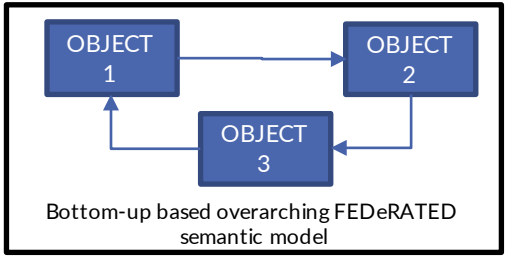
OBJECT-RELATIONSHIP DIAGRAM ((local) semantic model)



(LOCAL) DEFINITIONS

Object	Definition	Example

Per LivingLab



MAPPING / VALIDATION

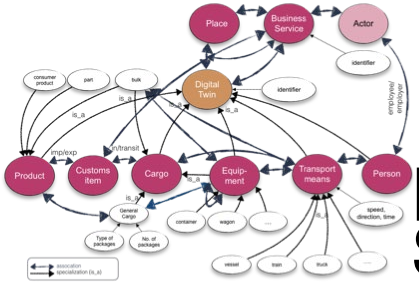


Figure 3 The FEDeRATED semantic model

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RFID in RAIL

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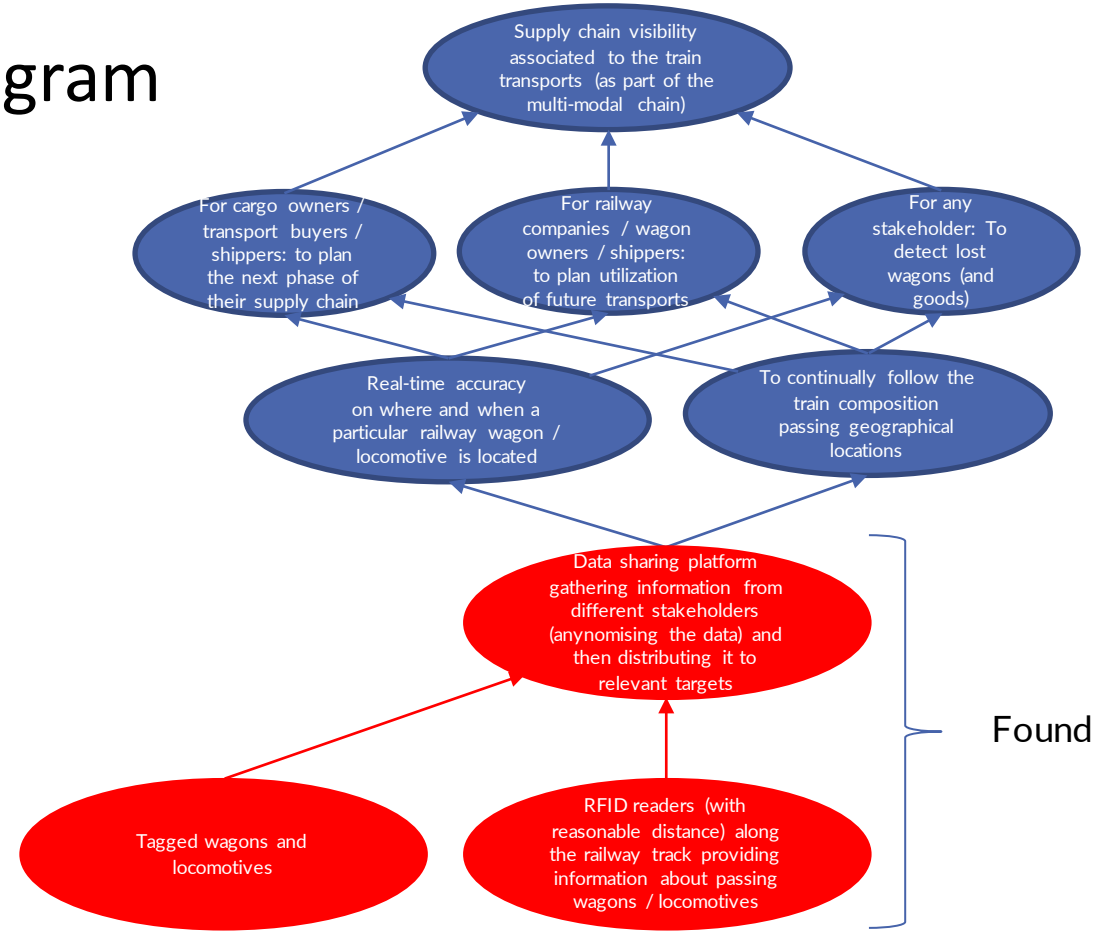
Goal diagram RFID in Rail



Foundation for sequence diagram

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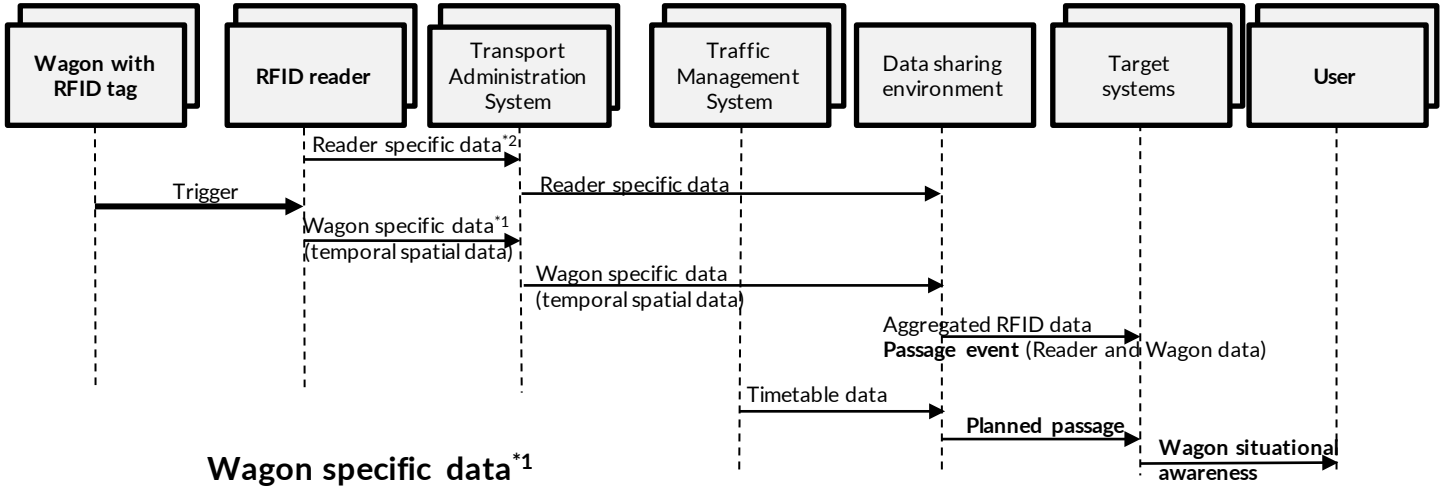
Sequence diagram – RFID in rail



Reader specific data*2
Name (incl orientation)
ID
Position (Lat, Long)
Status (OK, broken etc)

Wagon specific data*1
Vehicle-ID (wagon-ID)
Train number
RFID-reader ID
Event data (timestamp, passage ID)
Vehicle position (vagnens position i tåget)
Vehicle amount (tror det är antal vagnar på tåget)
Vehicle orientation (hur vagnen är vänd, A/B-sida)
Vehicle velocity
(One aggregated set of data per train)

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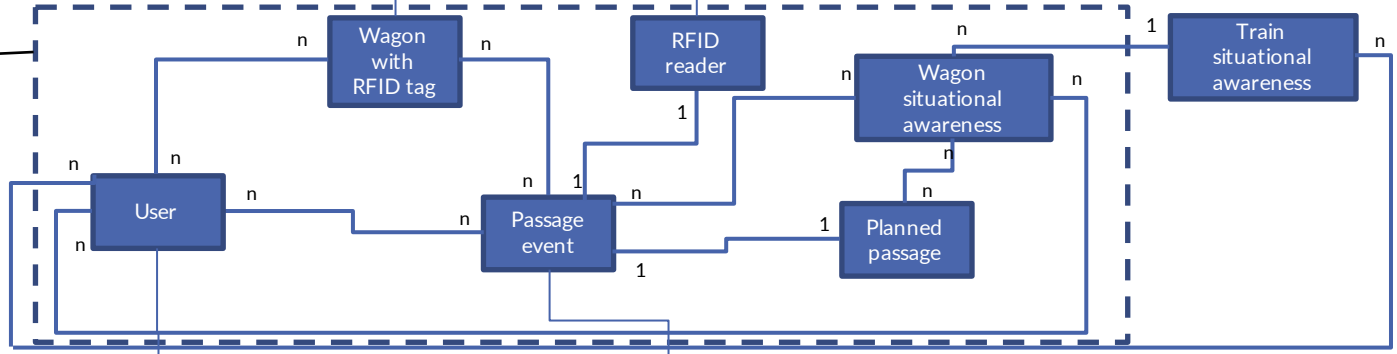
Object relationship model – RFID in Rail

Vehicle-ID (wagon-ID)
Train number
RFID-reader ID
Event data (timestamp, passage ID)
Vehicle position (vagnens position i tåget)
Vehicle amount (tror det är antal vagnar på tåget)
Vehicle orientation (hur vagnen är vänd, A/B-sida)
Vehicle velocity
(One aggregated set of data per train)

Name (incl orientation)
ID
Position (Lat, Long)
Status (OK, broken etc)

Scope of RFID in Rail



Cargo owners / transport buyers
Railway companies / wagon holders
Any stakeholder

Time
Position (Lat, Long)
Vehicle velocity
Vehicle-ID (wagon-ID)

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(Local Definitions)

Object	Definition	Example(S)
User	Stakeholders in the logistic chain	Wagon owners, shippers
Wagon with RFID tag	Wagon (or loco) equipped with RFID tag(s) complying with standards (GS1)	
RFID reader	Fixed installed RFID-reader along the tracks	
Passage event	Data transfer between reader and tag when a wagon is passing the site	Contains i.a. time stamp, site and wagon-ID
Planned passage	Planned time in the timetable from Traffic Management System	*Planned site and time:* >MGB;20220310;11:22<
Wagon situational awareness	Aggregation of several passage events for one specific wagon	
Train situational awareness	Aggregation of several wagon passage events	

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BetTerFlow

Work in progress

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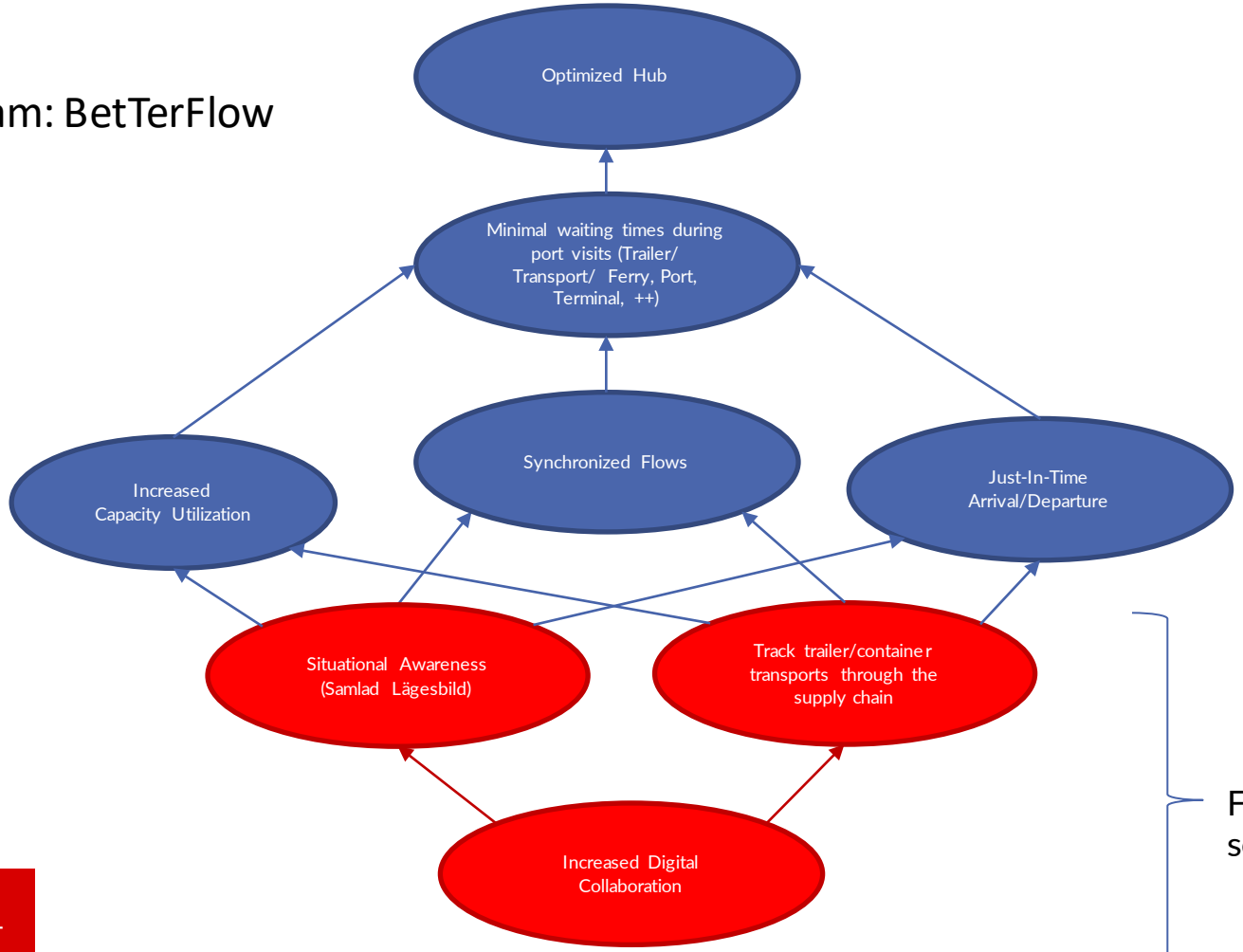
Goal diagram: BetTerFlow



Foundation for sequence diagram

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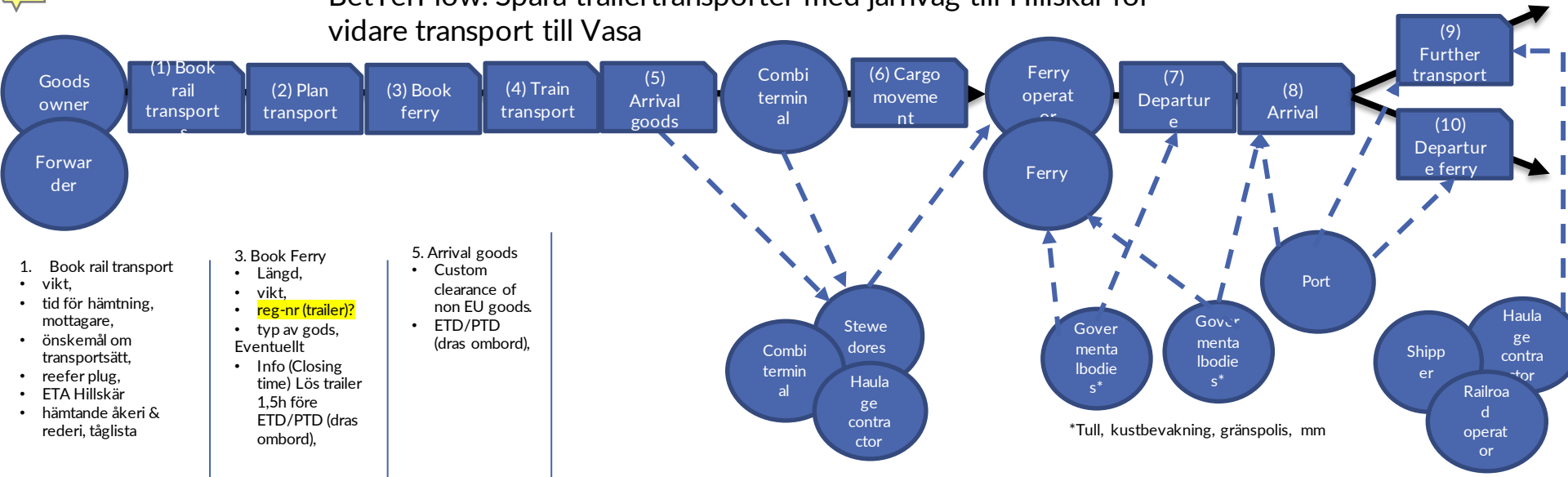
BetTerFlow: Spåra trailertransporter med järnväg till Hillskär för vidare transport till Vasa



*Tull, kustbevakning, gränspolis, mm

1. Book rail transport
- vikt,
- tid för hämtning, mottagare,
- önskemål om transportsätt,
- reefer plug,
- ETA Hillskär
- hämtande åkeri & rederi, tåglista

2. Plan transport
- Ledtider,
- pris,
- miljö,
- ledig kapacitet,

3. Book Ferry
- Längd,
- vikt,
- reg-nr (trailer)?
- typ av gods,

Eventuellt
- Info (Closing time) Lös trailer 1,5h före ETD/PTD (dras ombord),

4. Train transport
- ETA Hillskär,
- ATA tidigare,
- ETD & ATD
- för tåg, tåglista

5. Arrival goods
- Custom clearance of non EU goods.
- ETD/PTD (dras ombord),

6. Cargo movement

Reefer plug, trailer 1,5h före ETD/PTD (dras ombord),
- Unload from train
- Load tugmaster
- Pull from terminal onboard ferry

7. Departure

Hanteringsprognos, kvittens ombord, info om ändrad ETD&ATD, info om ändrad ETA/ATA, IMDG (International Multimodal Dangerous Goods). Status->ankomst, in-checkad, nekad- godkänd
- Statusar:
  - kvittens ombord,
  - info om ändrad ETD&ATD,
  - info om ändrad ETA/ATA.
  - ankomst,
  - in-checkad,
  - nekad- godkänd
  - lastad.
  - Info avgång hamn

8. Arrival
- Statusar
  - info om ETA&ATA
  - no-show, kvittens avlastad, hämtande åkeri.
- Lastmanifest till myndigheter & kopia ombord,

9. Further transport
- Kvittens avlastning
- statusar:
  - ankomst fartyg,
  - lossad enhet,
  - informera nästa lastbärare,
  - godsägare, Transportör,
  - Gods lämnat hamnen

10. Departure ferry
- Statusar:
  - Info om ändrad ETD&ATD

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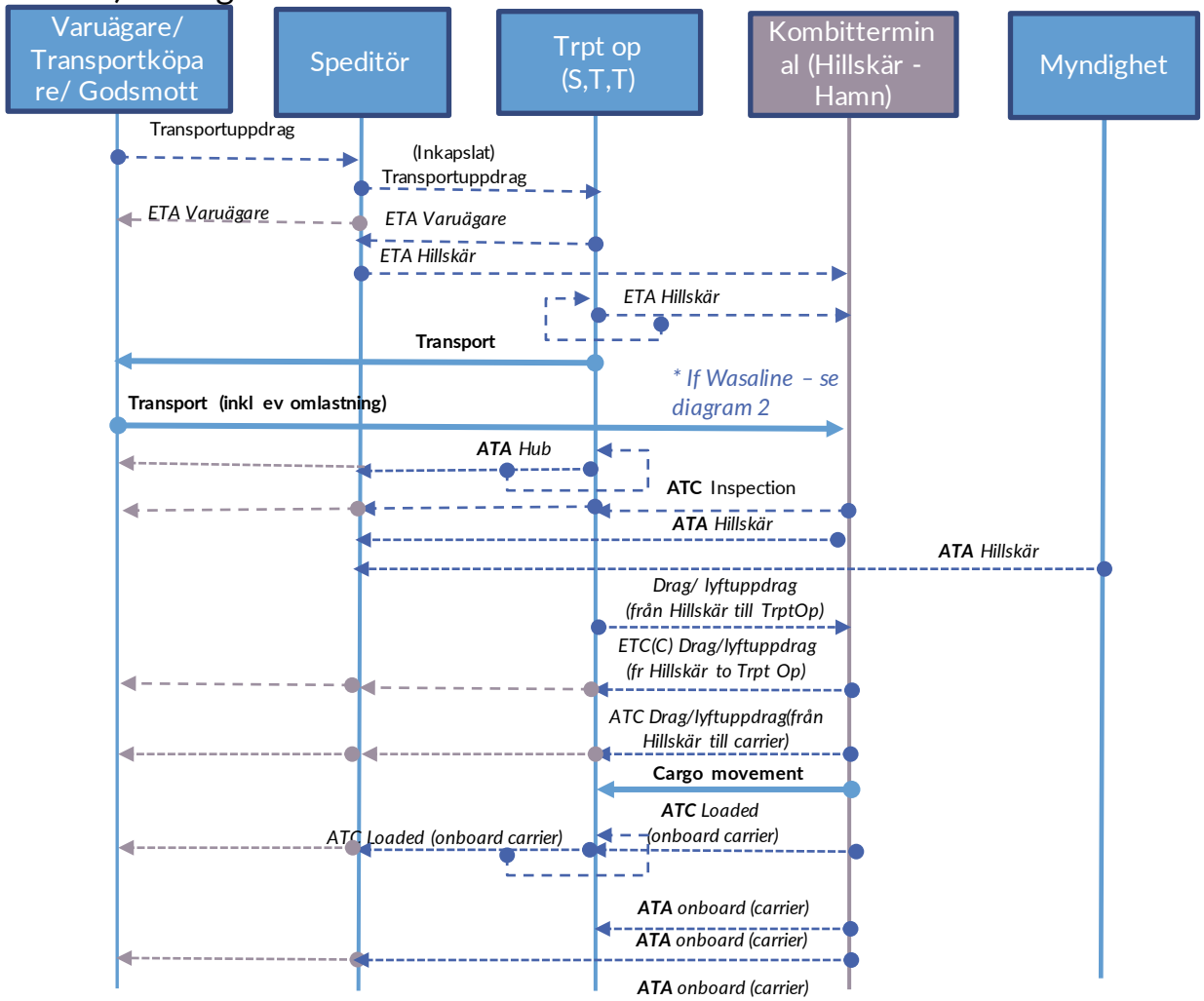
BetTerFlow (HUB Centric) – Diagram 1: Huvudflöde



Fysiskt flöde

Info flöde

Direkt eller indirekt

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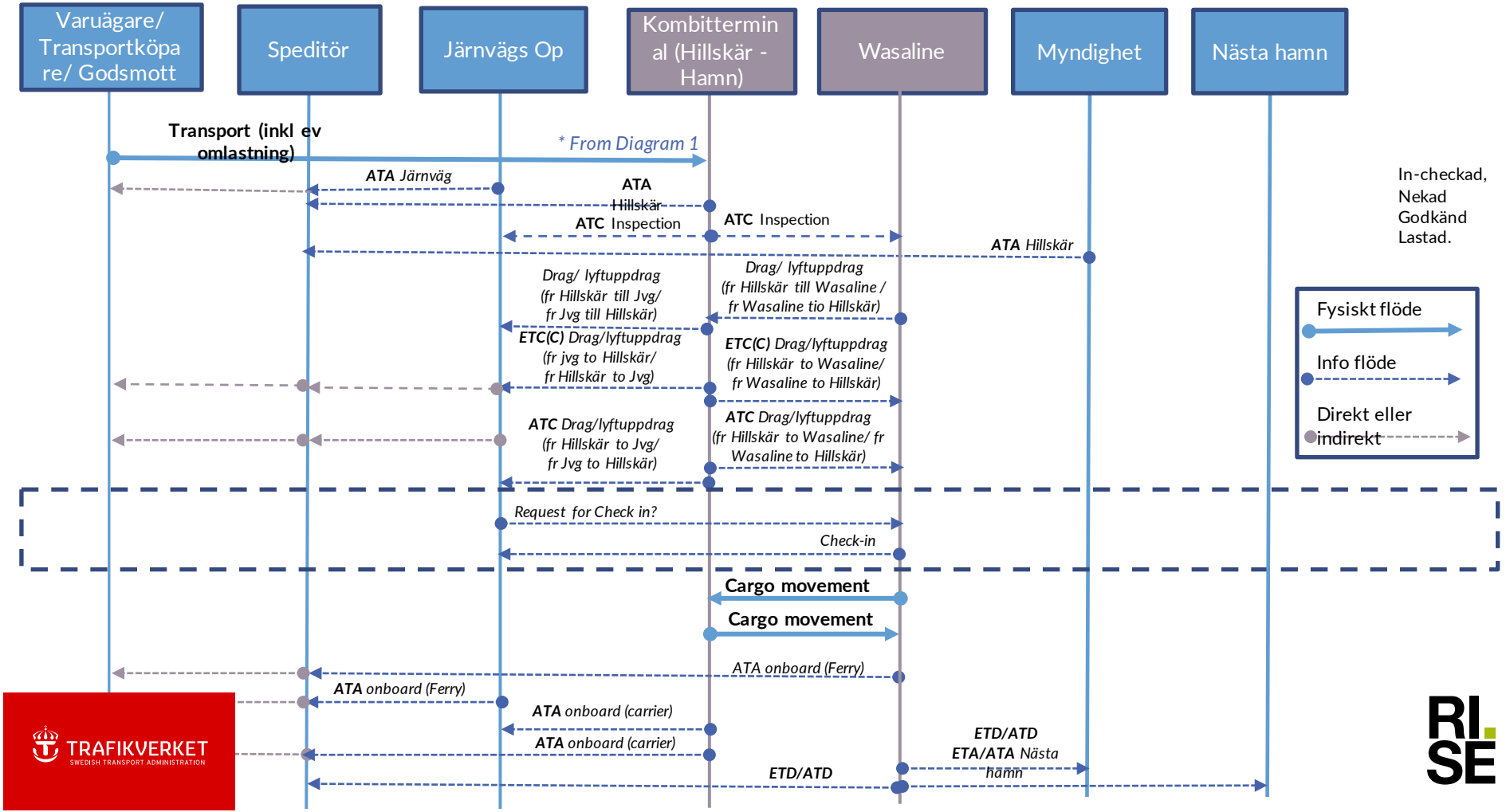
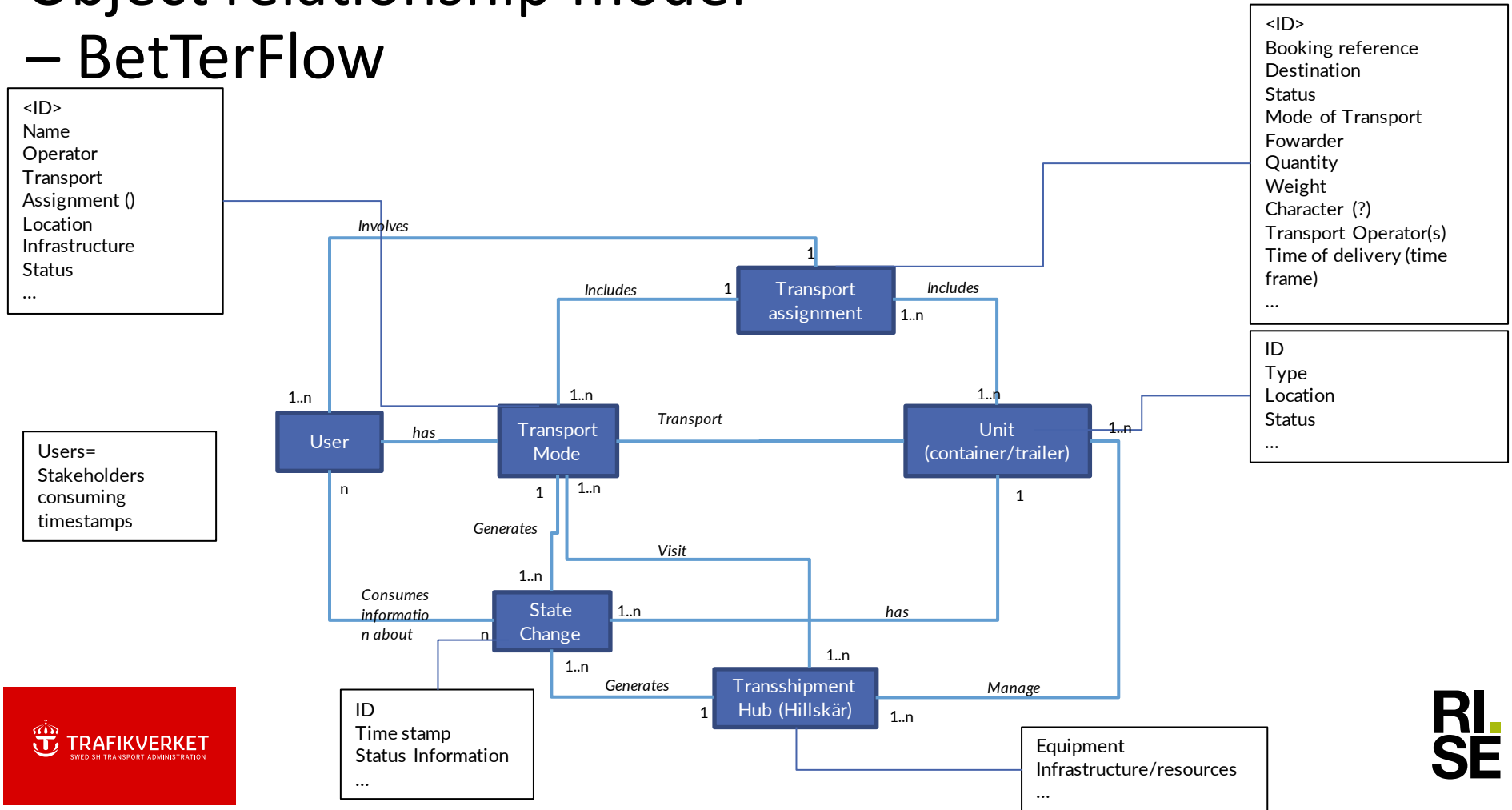
BetTerFlow (HUB Centric) – Diagram 2: *Details Hillskär - Wasaline*



Object relationship model – BetTerFlow



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(Local Definitions) BetTerFlow

Object	Definition	Example(S)
User	Actors consuming time stamps	All stakeholders
Transport mode	The type of transport mode used to transport a unit	*Ship (ropax, ro-ro, etc), truck, train*
Transport assignment	An assignment capturing one or several transports of unit(s) from A to B, including special requirements	Itinerary
State Change	State change of a unit/transport, captured as timestamps	ETA, ETD, ETC, ETCC, ATA, ATD, ATC, ATCC, Loaded, Unloaded etc.
Unit	The unit to be handled/transported	Container, trailer
Transshipment Hub	A transport hub for transshipment, connecting transport legs/transport modes	Hillskär

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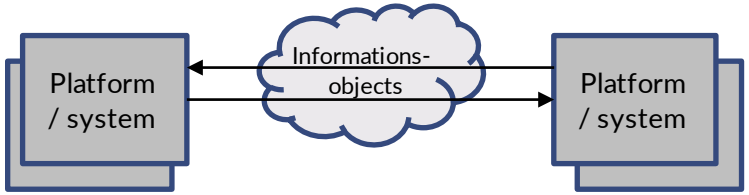
SCOPE OF INVESTIGATION



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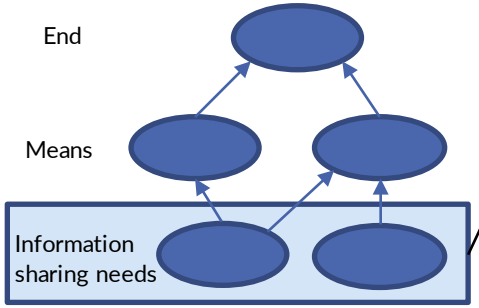

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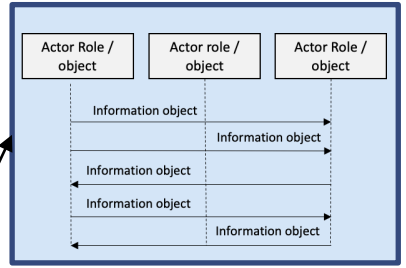

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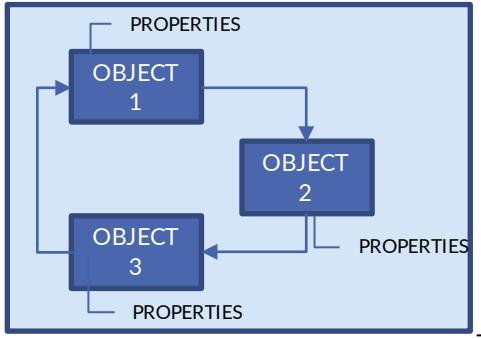

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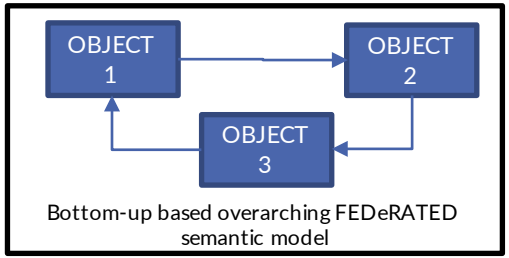

Bottom-up based overarching FEDeRATED semantic model

MAPPING / VALIDATION

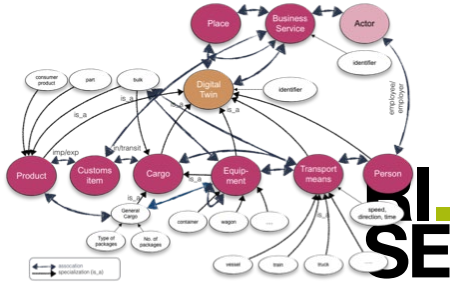

Figure 3 The FEDeRATED semantic model

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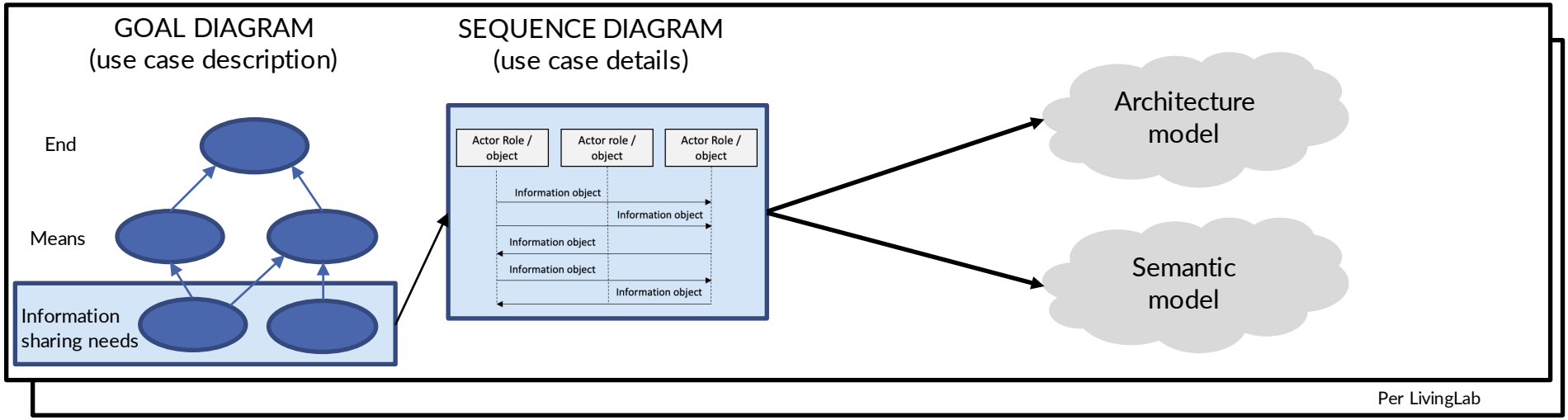
Basis for both semantic model and architecture model!



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