Economic Commission for Europe

Inland Transport Committee

Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Committee of Experts and the Working Party on the Transport of Dangerous Goods
Bern, 14–18 March 2016
Item 6 of the provisional agenda
Reports of informal working groups

4 January 2016

Report of the informal working group on telematics (Bordeaux, 6 – 8 October 2015)

Presentations made during the workshop – GEOTRANS MD pilot project

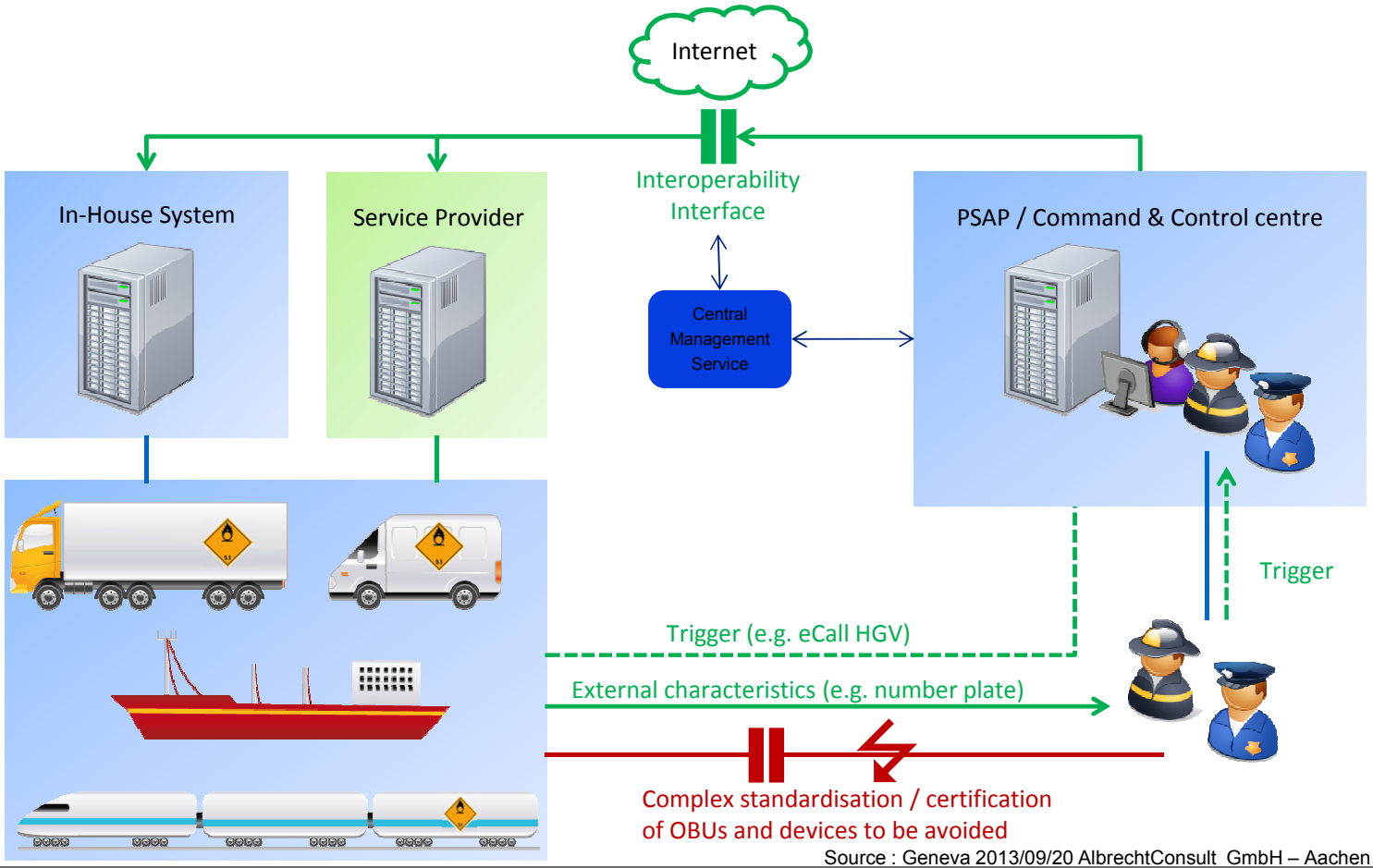
Use of Telematics for Dangerous Goods Transport

Bordeaux Workshop

06-10-2015

STATUS OF TELEMATIC WG AT BEGINNING OF THE PROJECT

Telematics System – Overview and Basic Considerations



Source : Geneva 2013/09/20 AlbrechtConsult GmbH – Aachen – Viersen

Architecture

- 2 levels of trusted party:
  - ✓ To avoid risk of “big brother” implementation
  - ✓ To allow the transport company to keep their data

- TP1 roles:
  - ✓ To guarantee to public bodies an access to the data when needed
  - ✓ To guarantee to private actors that only authorized bodies access the data

- TP2 roles:
  - ✓ To guarantee availability of the data throughout the journey
  - ✓ To provide data as requested by TP1

GEOTRANSMD PROJECT

Project context

- National call for proposals for innovative projects with objective to finalise a demonstrator
- Consortium must integrate private, university and public bodies
- Funding from 25% to 45% depending on status (SMEs, University)
- Leader has to be a private company
- Request for economic impact with a business plan and creation of jobs
- The project must be technically and economically self-standing (independently of the Joint Meeting decision)
- Links with International partners and bodies is seen as an added value

- **Total budget**: 5.9 M€, funding 1.9 M€ (33%)
  - 20% ETI
  - 33% SME
  - 29% R&D
  - 17% other

- **3 regions :**
  - 65% South-West
  - 22% Paris
  - 13% Lyon

GeoTransMD basic response

- Project partners representing many loaders and carriers in the dangerous goods sector
- Survey among these loaders and carriers to assess needs and impacts, based on the Telematic WG table
- A structure to handle the different TP1 and TP2 roles
- Analysis of the specificities of implementing the architecture
- Proposals to the Telematic WG to deal with these specificities
- Links with other European projects on the subject
- Analysis of system security needs and implementation of solutions
- Identification and description of a certification process

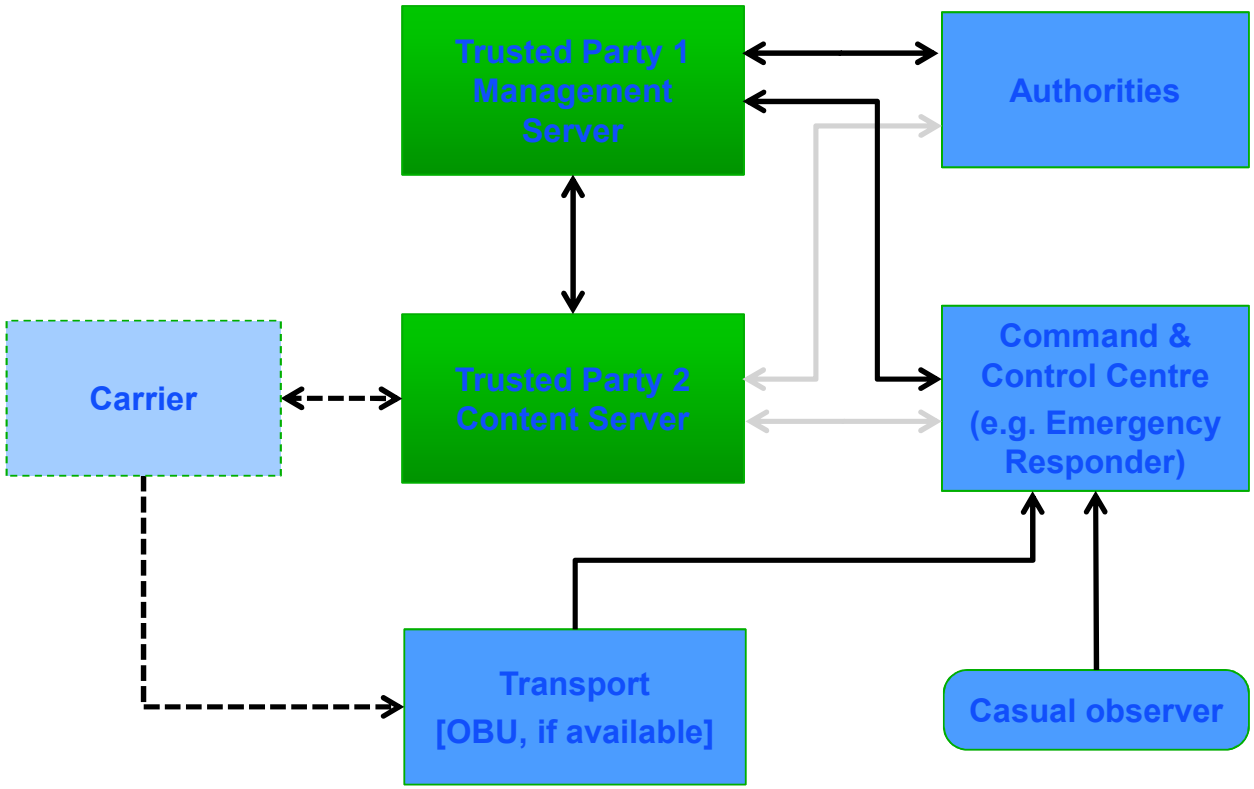
- An interface for quick and easy access by emergency response services
- A pilot with carriers
- Validation of feasibility after the pilot

GeoTransMD added value services

- To meet market needs with existing systems already used by loaders and carriers
- To consider access to these services by authorities in agreement with private actors
  - ✓ Search for key factors for emergency services to make their interventions safer
  - ✓ Identification of solutions for enhanced traffic management
  - ✓ Proposal of win-win solutions between carriers and infrastructure managers
- To propose solutions suitable for smaller transport companies

ARCHITECTURE

Telematics system high-level architecture



Source : Geneva 2013/09/20 AlbrechtConsult GmbH – Aachen – Viersen

Direct links between Trusted Party 2 and public bodies are no longer part of this architecture, following the decision taken in June 2014 by the telematic working group

Preliminary Basic TP1 Service

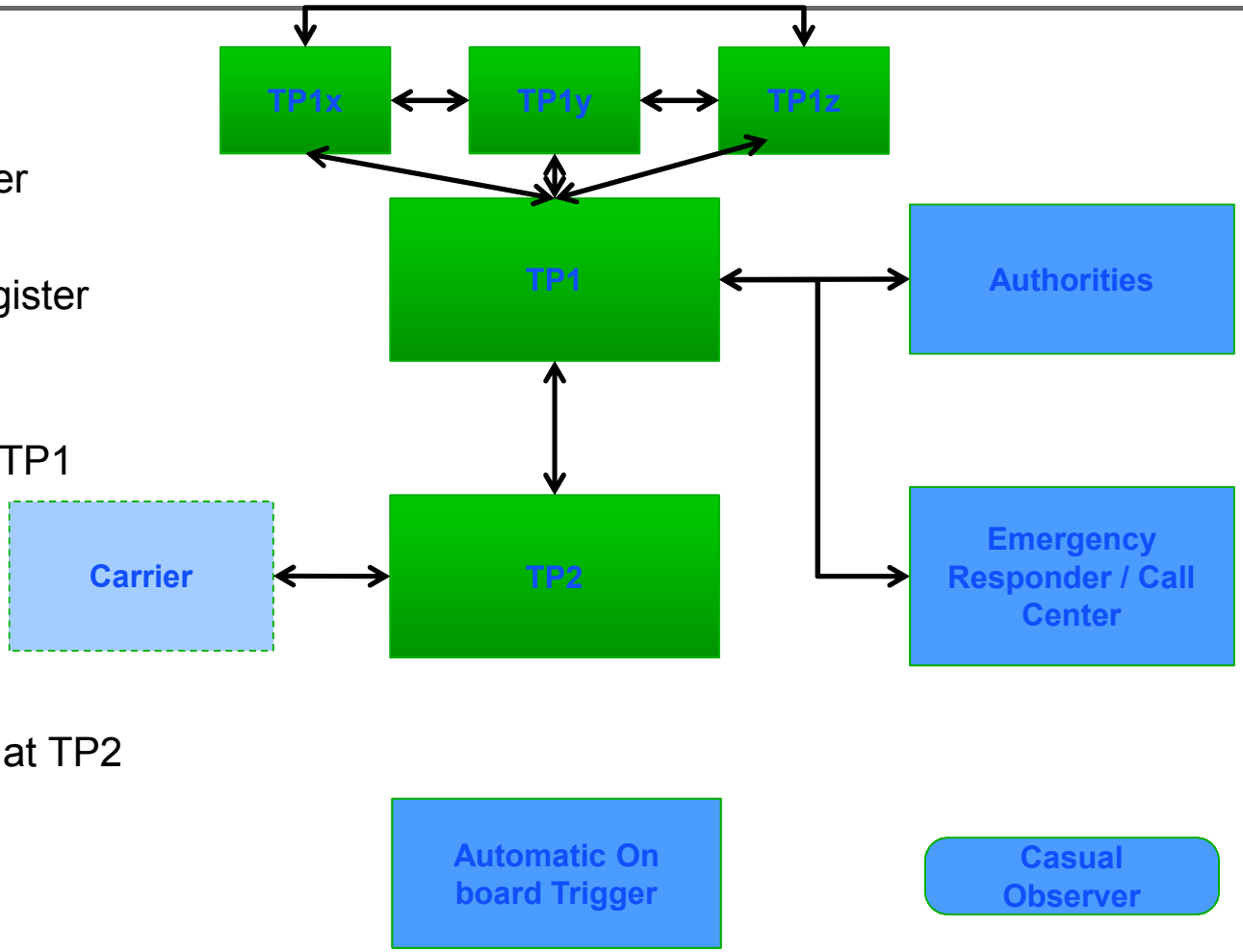
- Registering the identification of each transport unit and of the TP2 which holds the electronic transport documents from the moment the start of the transport is declared to that when it is declared finished.
- Processing requests for access to electronic documents from emergency services or public authorities.
- Retrieving electronic documents from the appropriate TP2 and sending them back to the service requesting them.
- Registering and handling the public services authorised to use the service.
- Registering and handling the different TP2s

Minimum Scenario

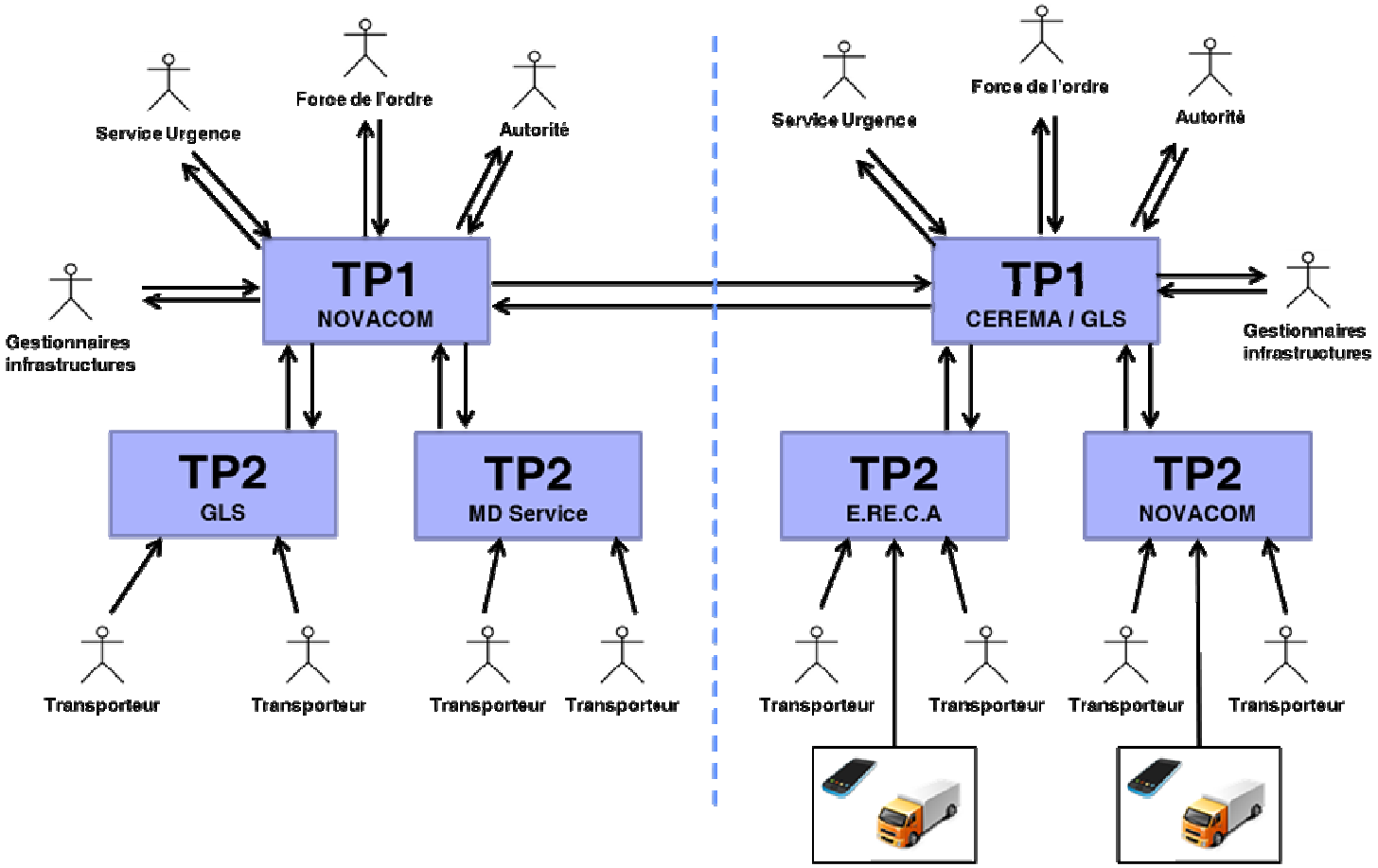
- Before departure of a load of dangerous goods, a transport company registers a transport document on a TP2 server.
- The TP2 then holds the following information:
  - ✓ a transport unit ID
  - ✓ a transport document ID
  - ✓ a status (Active until complete unloading, Inactive after) for automated 3 month archive according to 5.4.4.1
- The TP2 sends the transport unit ID and its status to the TP1, as well as any updates to the status.
- An external player (Authority, emergency services) wishing to obtain information on the transport document connects to a TP1.
- If the external player is authorised, the request is processed by the TP1 server, which relays the information held by the TP2 (hence the term “Proxy” chosen for the architecture).

Common Part – Link to be installed

- TP1s link together
- Public bodies register at TP1
- TP2 registers at TP1
- Carrier registers at TP2



GeoTransMD Prototype



SURVEY TO LOOK AT IMPACT

Some results of the survey

- 95 % of respondents : handle through IT (totally or partially) dangerous goods
- Use of new technology as GNSS (Global Navigation Satellite System)
- For tracking and security
- For Route optimisation and to spot restricted routes
- For packaged goods the average number of transport documents is 15

Main expectations expressed during the survey

- Define a common format for data exchange
- Promote paperless transport document usage
- Consider improvement of information concerning dangerous goods in “limited quantities”
- Include information on restricted routes
- Allow selective management of restriction by a better identification of the DG type and geolocation

PROPOSAL FOR TP2 ADDED SERVICES IDENTIFICATION

TP2 Optionnal classification

- Basic TP2 (Minimum required by the architecture): just makes accessible in real time the transport document with out regarding if it is coherent, complete, etc…
  This TP2 is the lowest level of service to meet the requirements defined in the architecture as TP2

- Added values services to basic TP2

  - ✓ Fleet management TP2: offers additional services to the carrier for better fleet management
  - ✓ Dangerous goods regulation TP2: proposes to the carrier services to control the integrity of the document regarding regulation, automatic load level calculation, compatibility with transport unit and/or driver authorisations, limit for tunnel classes, etc…
  - ✓ OBU TP2: Includes dedicated onboard sensors to indicate the status of the mechanical aspects of the transport unit, the transported products, etc…
  - ✓ Real time traffic information TP2: provides in close contact with infrastructure operators and traffic managers, real time alert on the planned route, extra authorisation in accordance with infrastructure management policy, etc…

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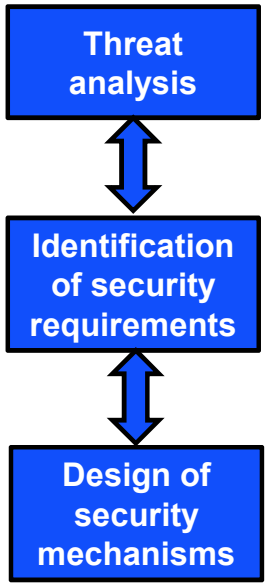
SECURITY AND AVAILABILITY

Security Architecture 1/2

- Security measures incorporated into the system design process in its early stages

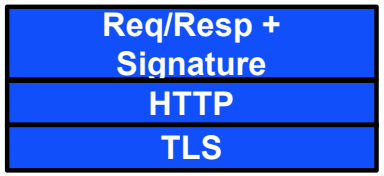
- Threat analysis
  - ✓ " STRIDE per element" methodology for threat modeling
- High risk threats
  - ✓ Spoofing
    - e.g., using spoofed TP2 requests, add/delete/alter a transport
    - document stored at TP1
  - ✓ Tampering
    - e.g., alter/replay of a transport related information in transit
  - ✓ Repudiation
    - e.g., TP2 denies or claims having sent a transport document
- Minimum security requirements
  - ✓ Mutual authentication
  - ✓ End-to-end integrity-protected data transmission
  - ✓ Secure audit/logging and access management



Security Architecture 2/2

- Digital certificates per organization
  - ✓ Issued by trusted certification authorities
  - ✓ Registered at TP1/TP2
- Certificates used for authentication and authorization

- Communication security using TLS
  - ✓ Integrity and confidentiality protections
    - TLS does not provide non-repudiation (temporary session key)
- Request/Response digital signature
  - ✓ e.g., XML signature, WS-Security
  - ✓ Logging of signed Request/Response messages
- Mutual authentication using TLS
  - ✓ TLS mutual authentication mode
  - ✓ TLS server authentication mode with request/response signature-based client authentication



LIVE DEMONSTRATION BUILT FROM A REAL ACCIDENT

THANK YOU FOR YOUR ATTENTION

SOME QUESTIONS FOR THE DISCUSSION

What kind of ID ?

Information received in case of emergency

	Automatic Trigger	Casual Observer
Train	**Time** Id of the train +Id of the wagon **Location GNSS** Alerts and parameters TP2 url	**Time** Perhaps position of the wagon **Location** Description of environment and event
Truck or car	**Time** VIN vehicle / VIN trailer **Location GNSS** Alerts and Parameters TP2 url	**Time** Identification plate number Description of the vehicle **Location** Description of environment and event
Ship	**Time** Id of the ship **Location GNSS** Alerts and Parameters TP2 url	**Time** Name of the ship **Location** Description of environment and event
Container	**Time** BIC **Location GNSS** Alerts and Parameters TP2 url	**Time** Description of the container **Location** Description of environment and event

Telecommunication coverage of the transport network

	Coverage
Train	Very variable outside urban areas
Truck or car	Very variable especially outside urban areas and in mountains
Ship	Very variable outside urban areas
Container	Depends on the mode of transport

Need to add several indentification methods

	Automatic Trigger	Casual Observer
Train	**Time** Id of the train +Id of the wagon **Location GNSS**	**Time** Train and perhaps position of the wagon **Location**
Truck or car	**Time** VIN vehicle / VIN trailer **Location GNSS**	**Time** Identification plate number vehicle/trailer Description of the vehicle **Location**
Ship	**Time** Id of the ship **Location GNSS**	**Time** Name of the ship **Location**
Container	**Time** BIC **Location GNSS**	**Time** Container and perhaps BIC **Location**

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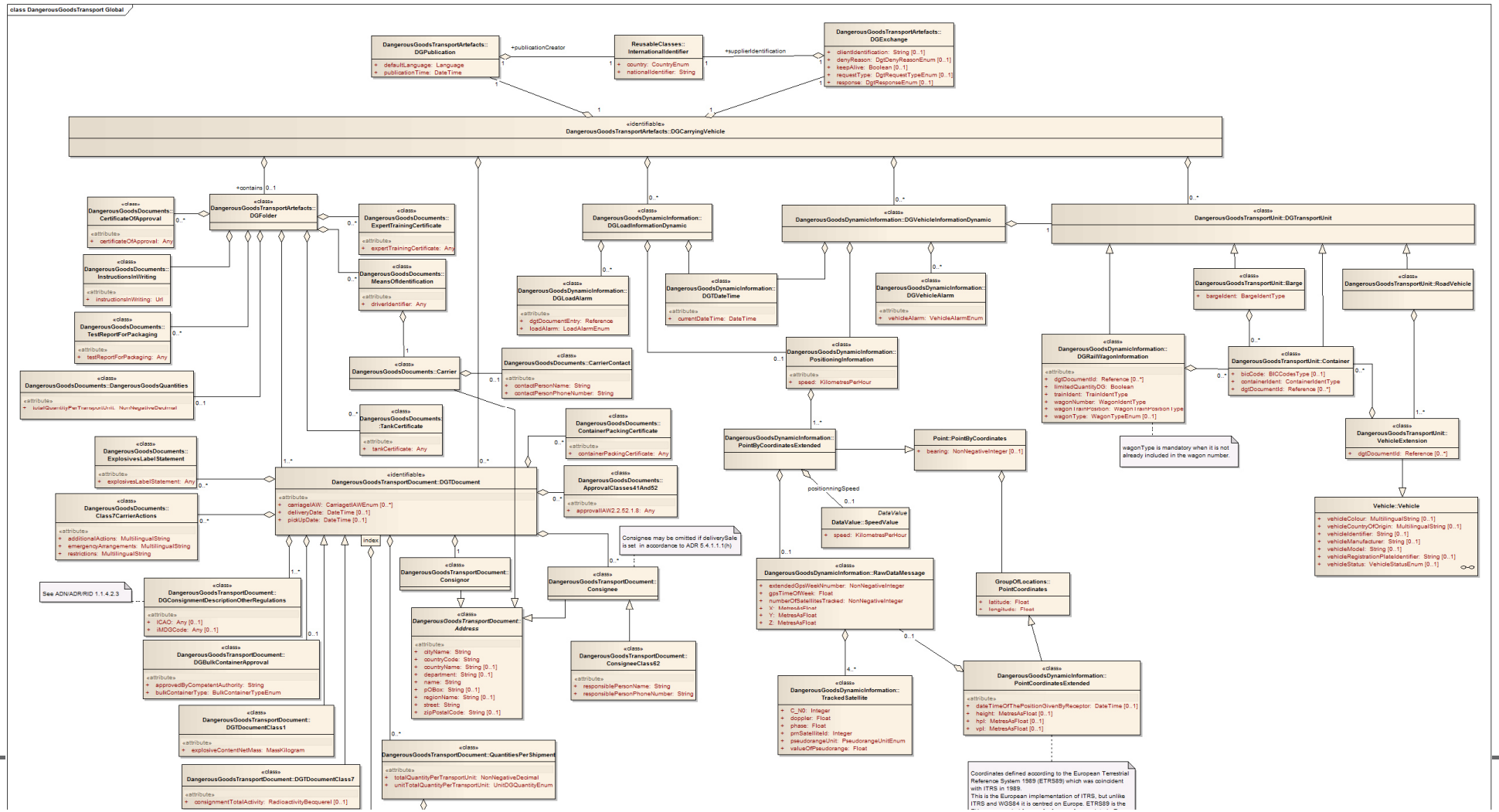
jean-philippe.mechin@cerema.fr

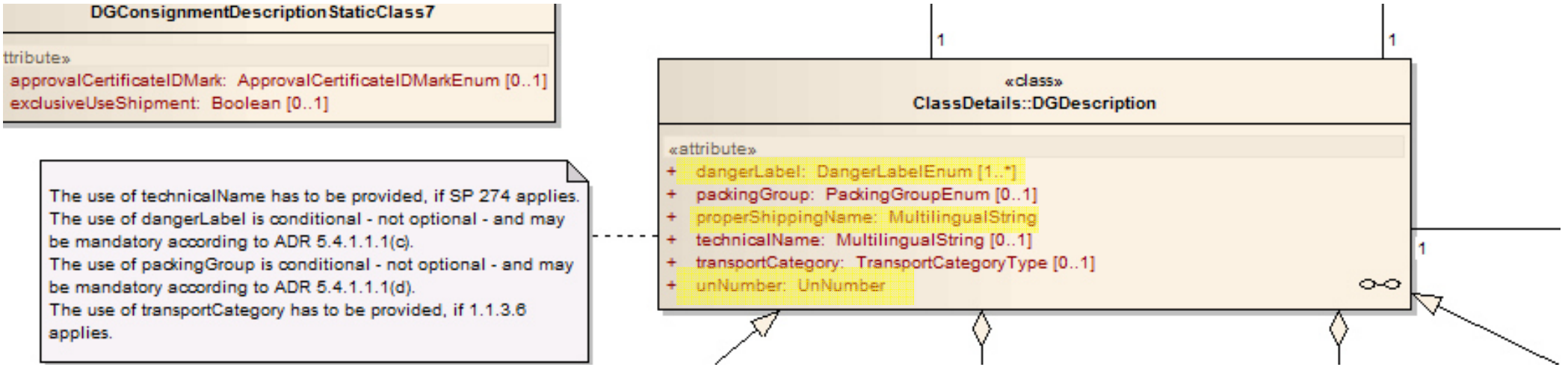
THANK YOU FOR YOUR ATTENTION

DATA MODEL

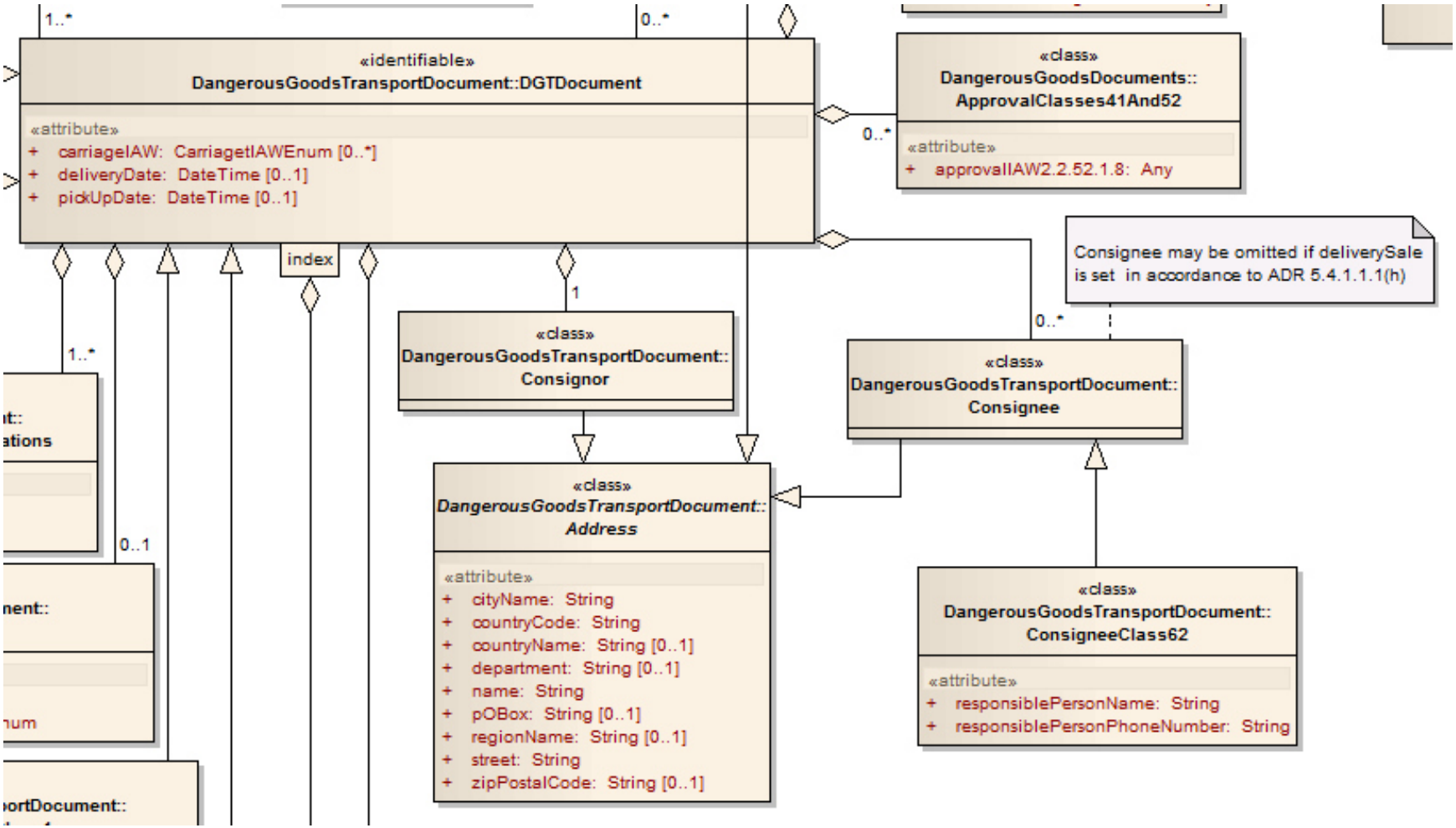
Exhaustive data model proposal from « Who does What » table



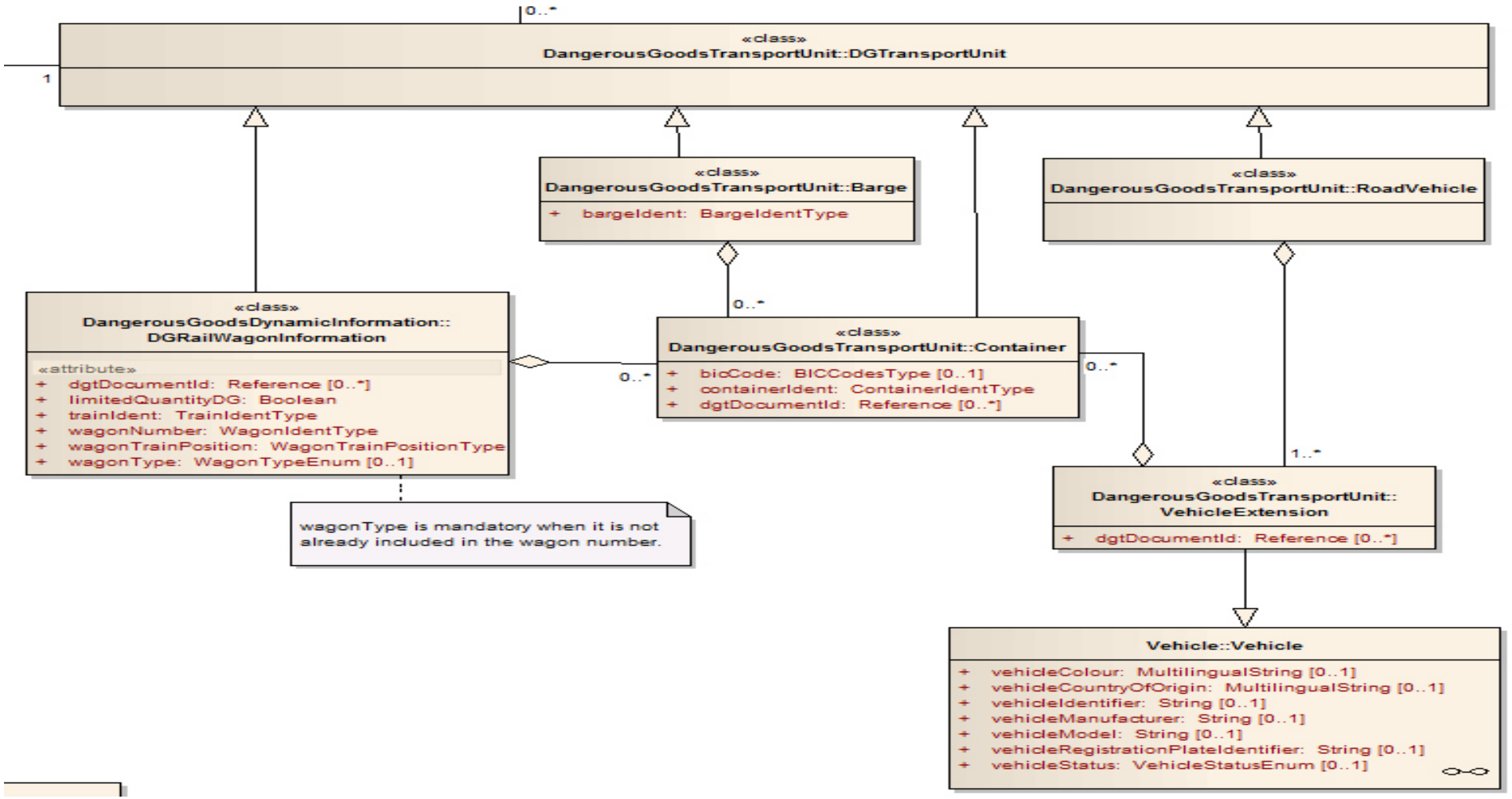
Mandatory DG description



Identification of Consignor and Consignee



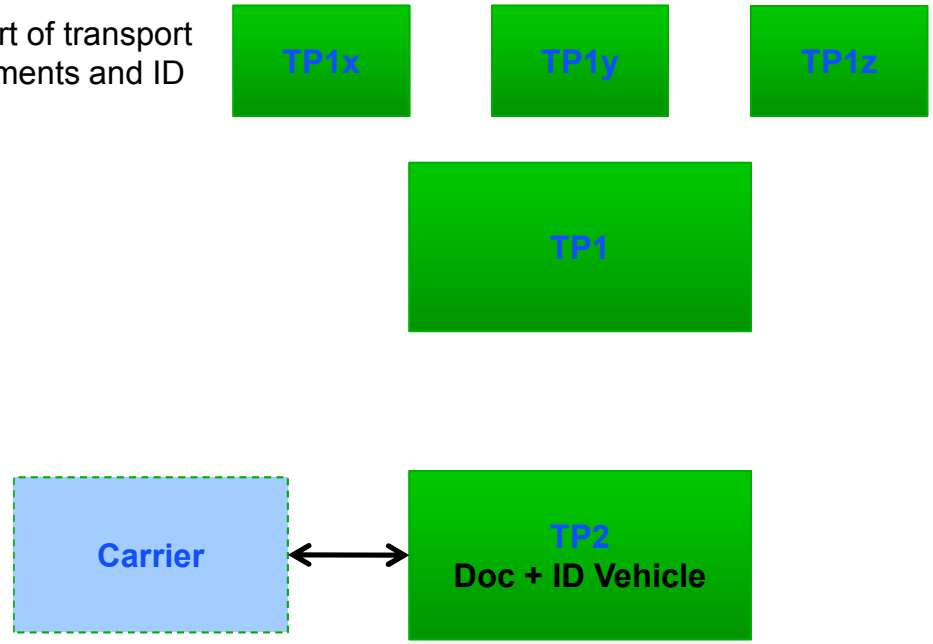
Unit transport



SIMPLE CASE

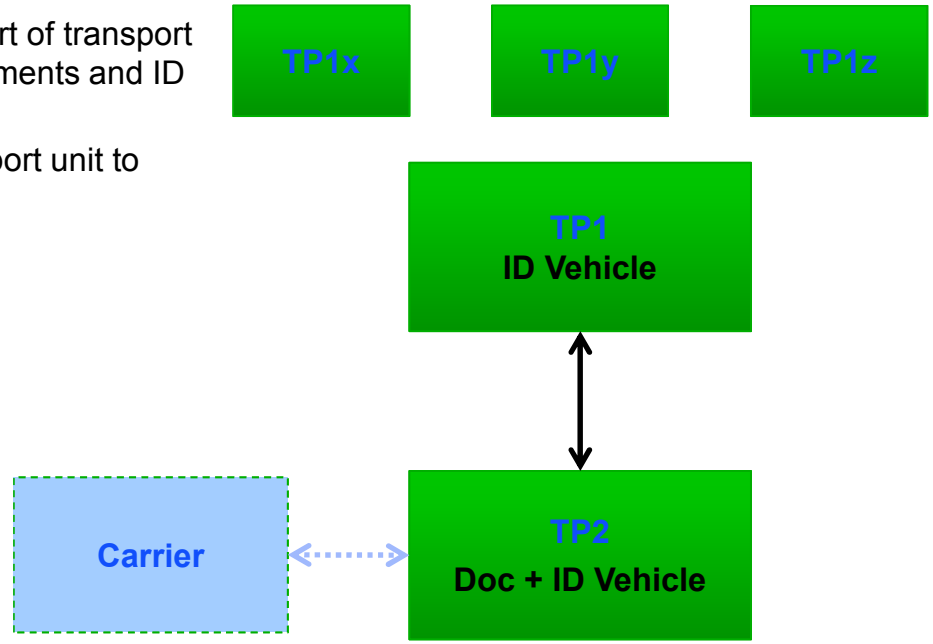
Simple Case 1

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit



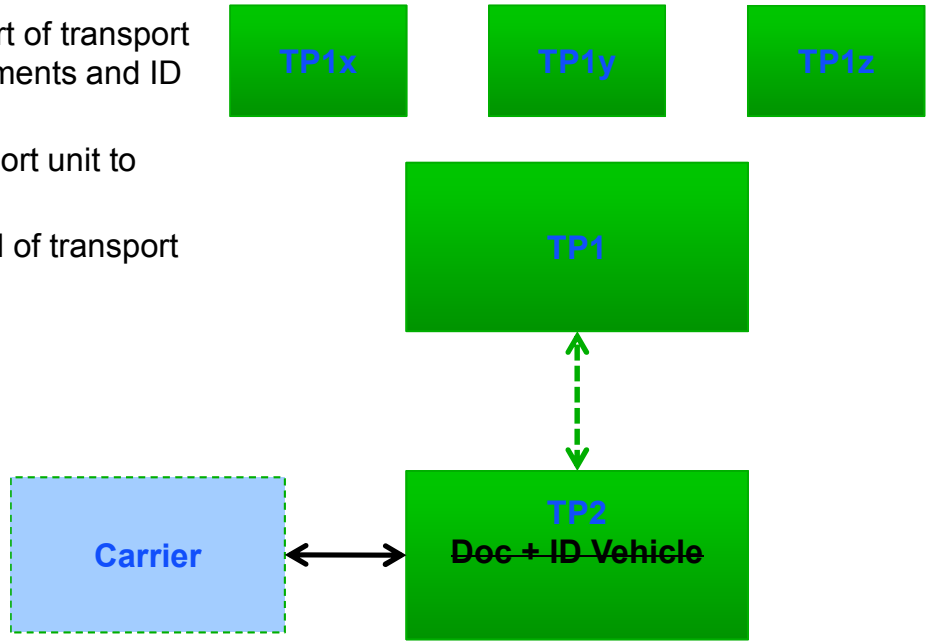
Simple Case 2

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1



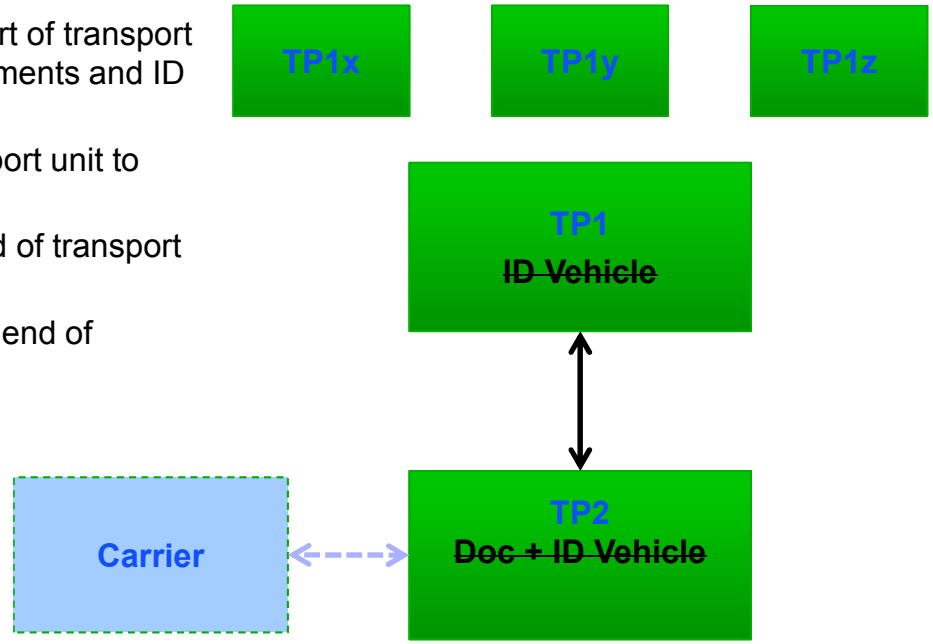
Simple Case 3

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Carrier declares end of transport to TP2



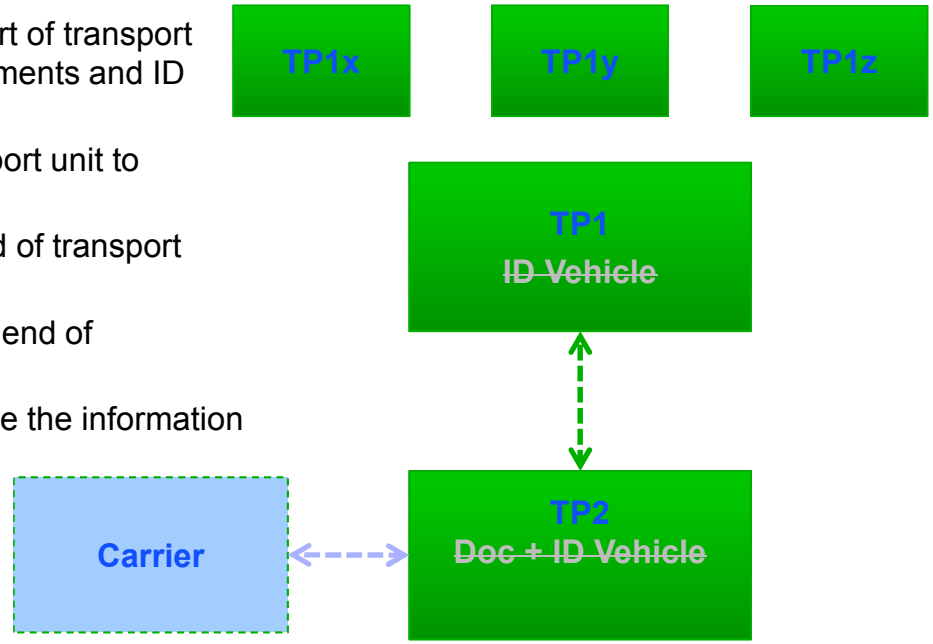
Simple Case 4

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Carrier declares end of transport to TP2
4. TP2 informs TP1 of end of transport



Simple Case 5

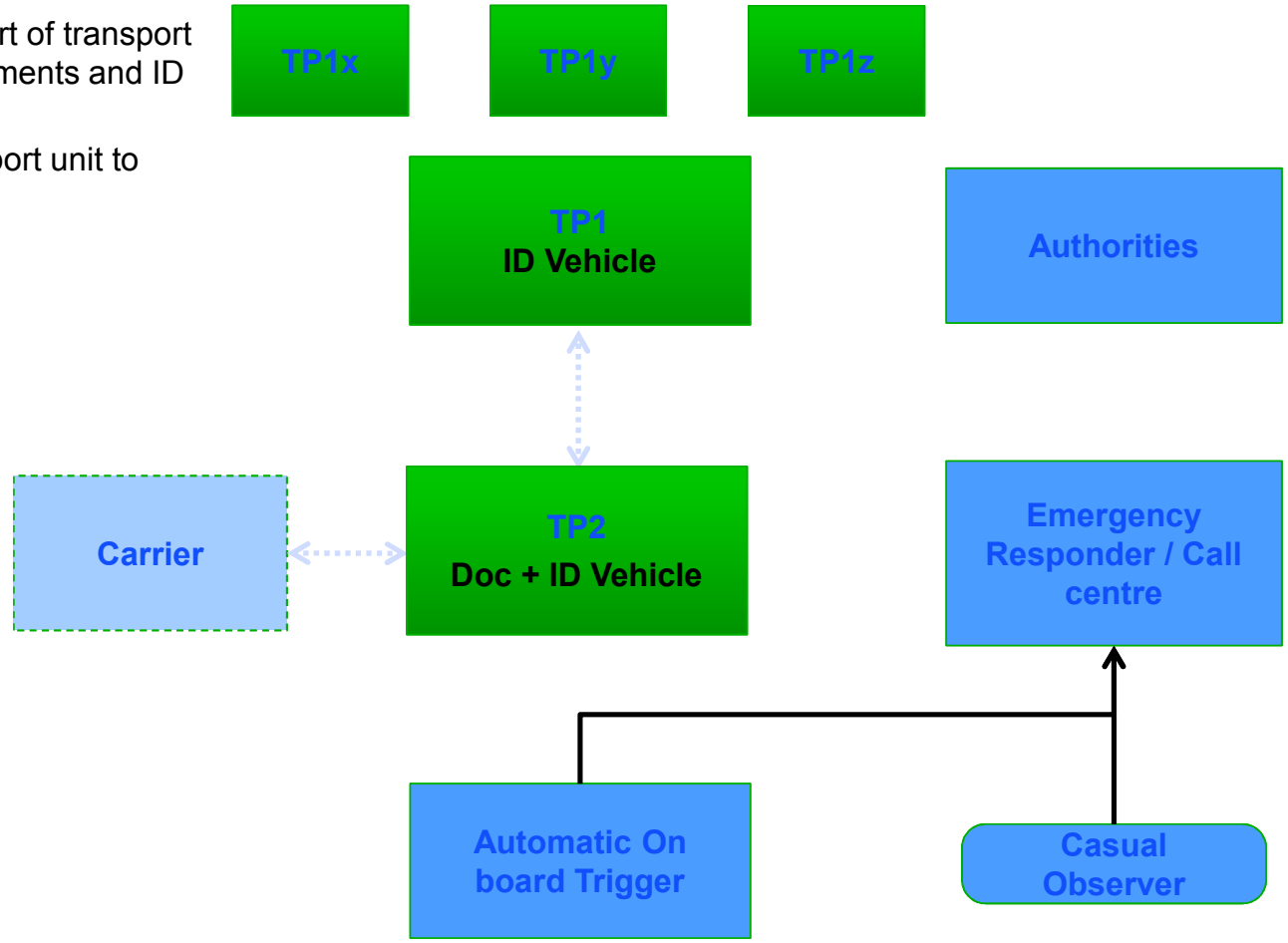
1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Carrier declares end of transport to TP2
4. TP2 informs TP1 of end of transport
5. TP2 and TP1 archive the information



ACCIDENT USE CASE

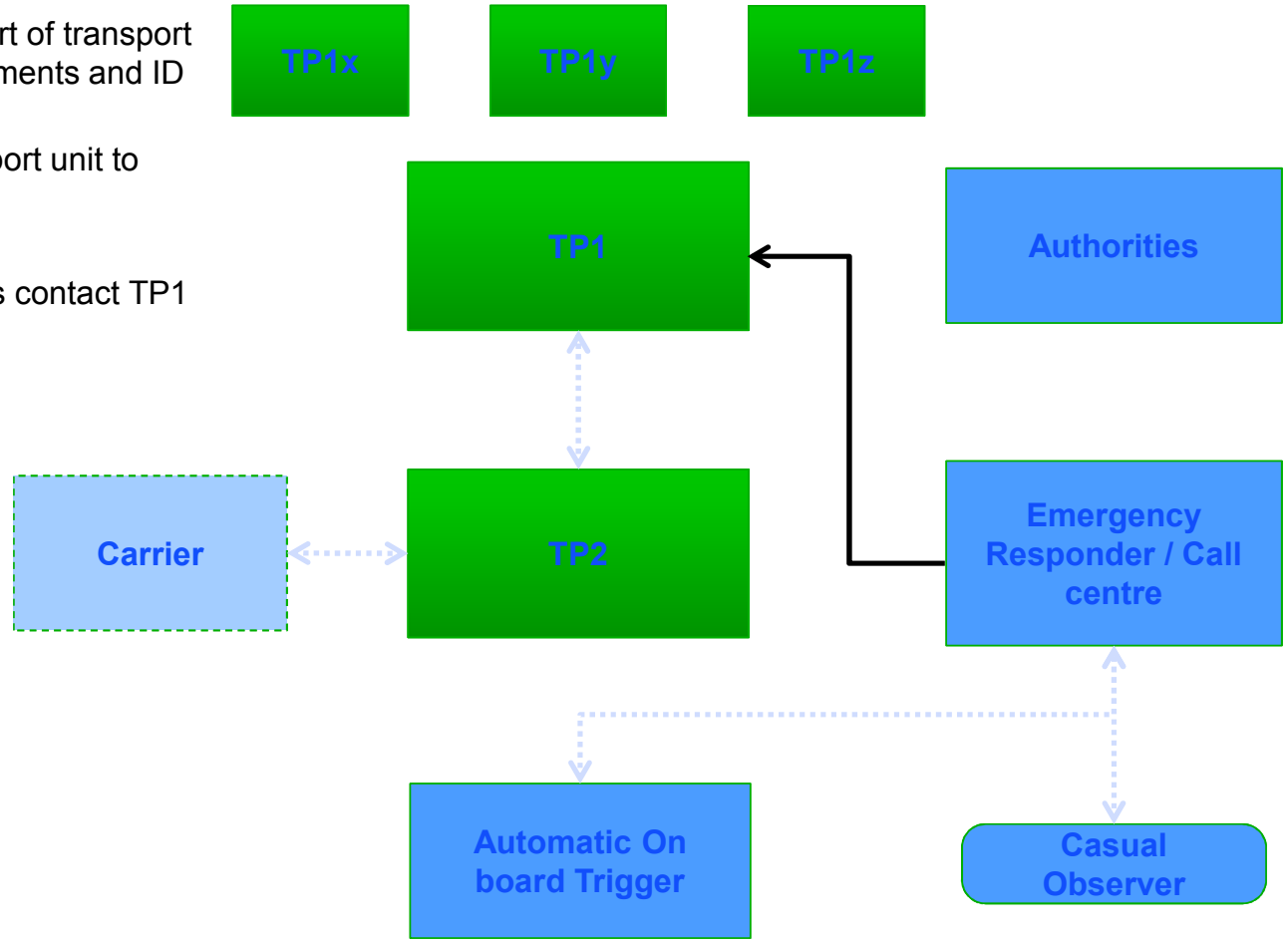
In case of accident

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Alert



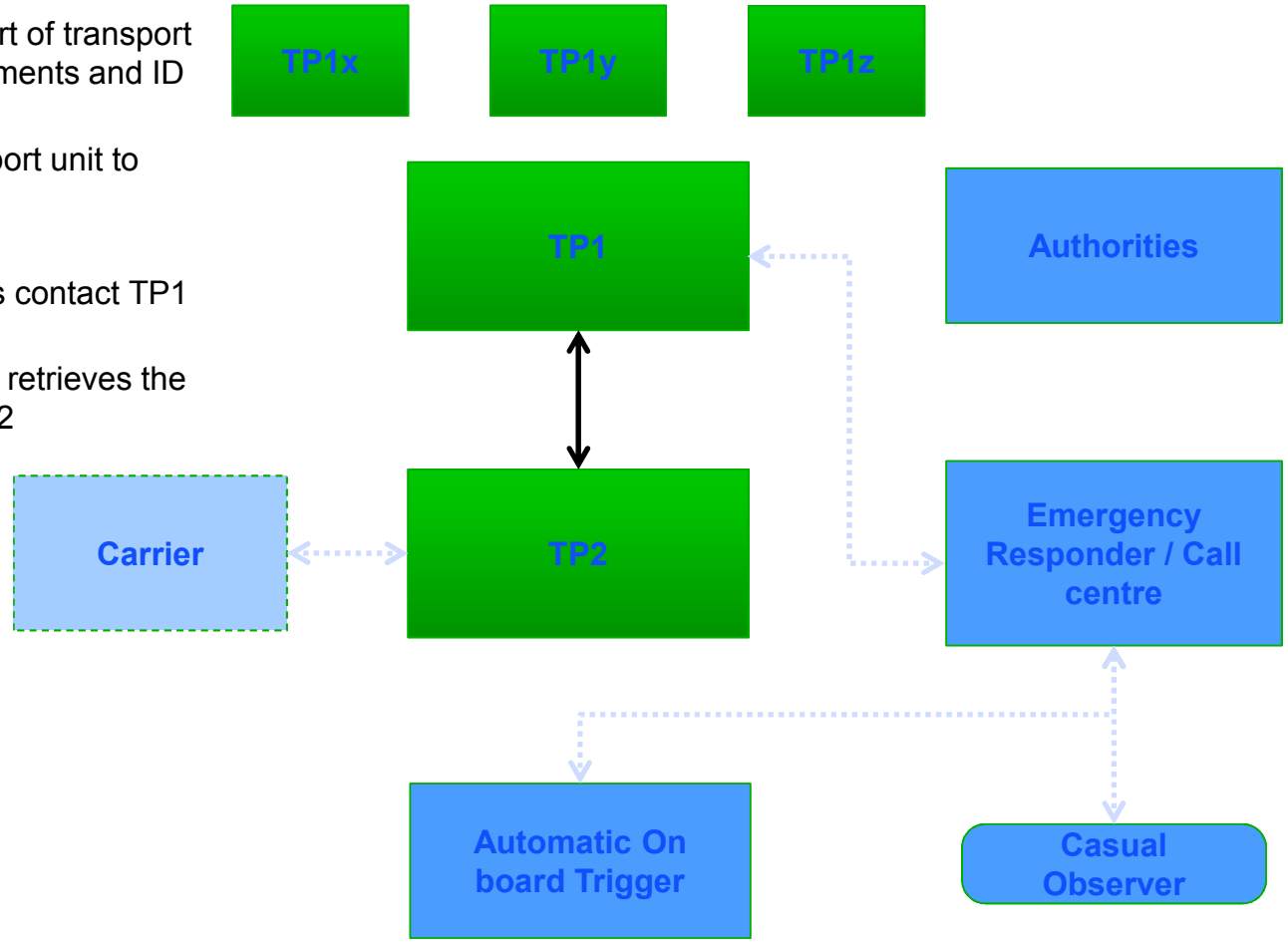
In case of accident

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Alert
4. Emergency services contact TP1 with the vehicle ID



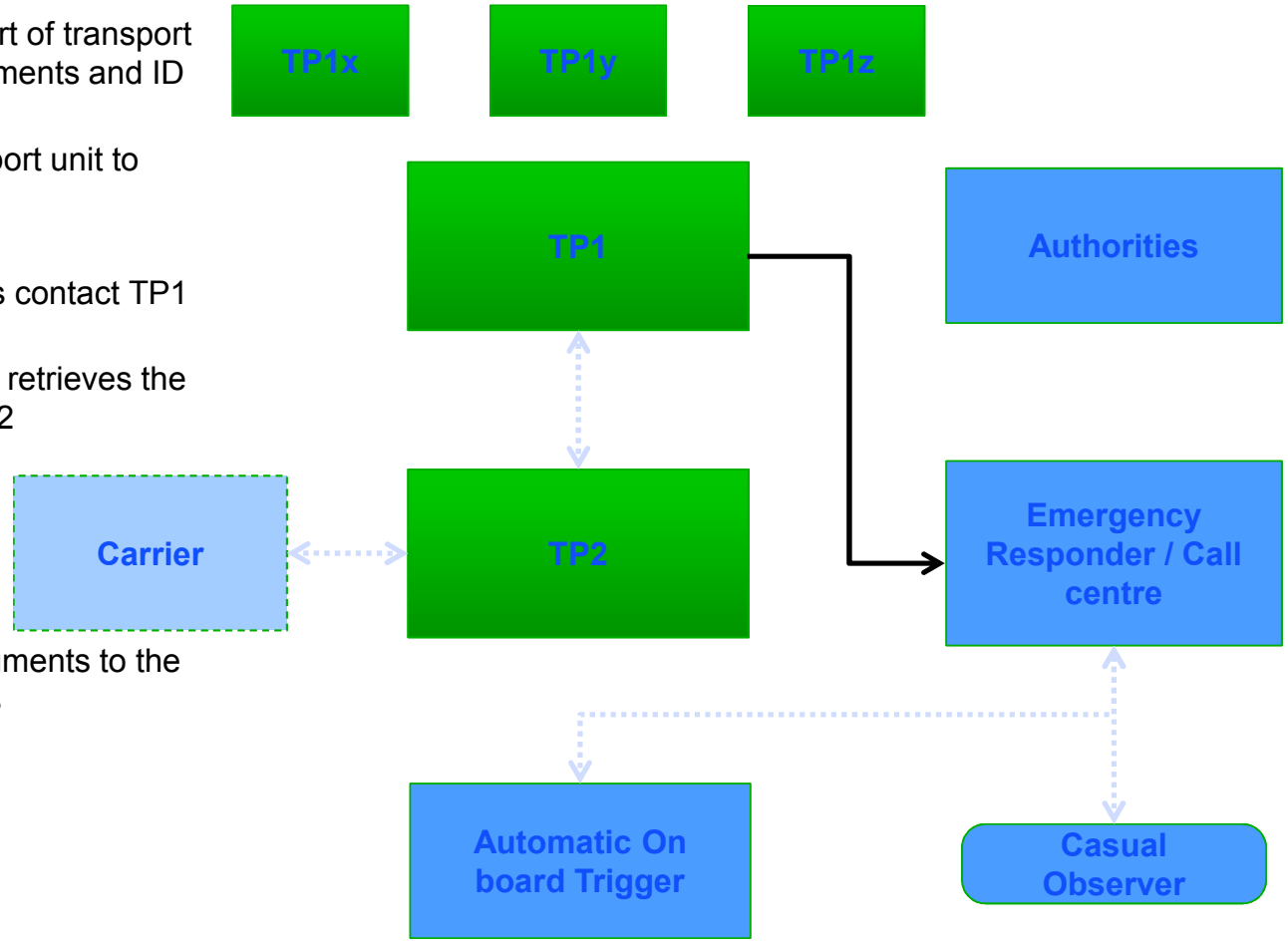
In case of accident

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Alert
4. Emergency services contact TP1 with the vehicle ID
5. If TP1 finds the ID it retrieves the documents from TP2



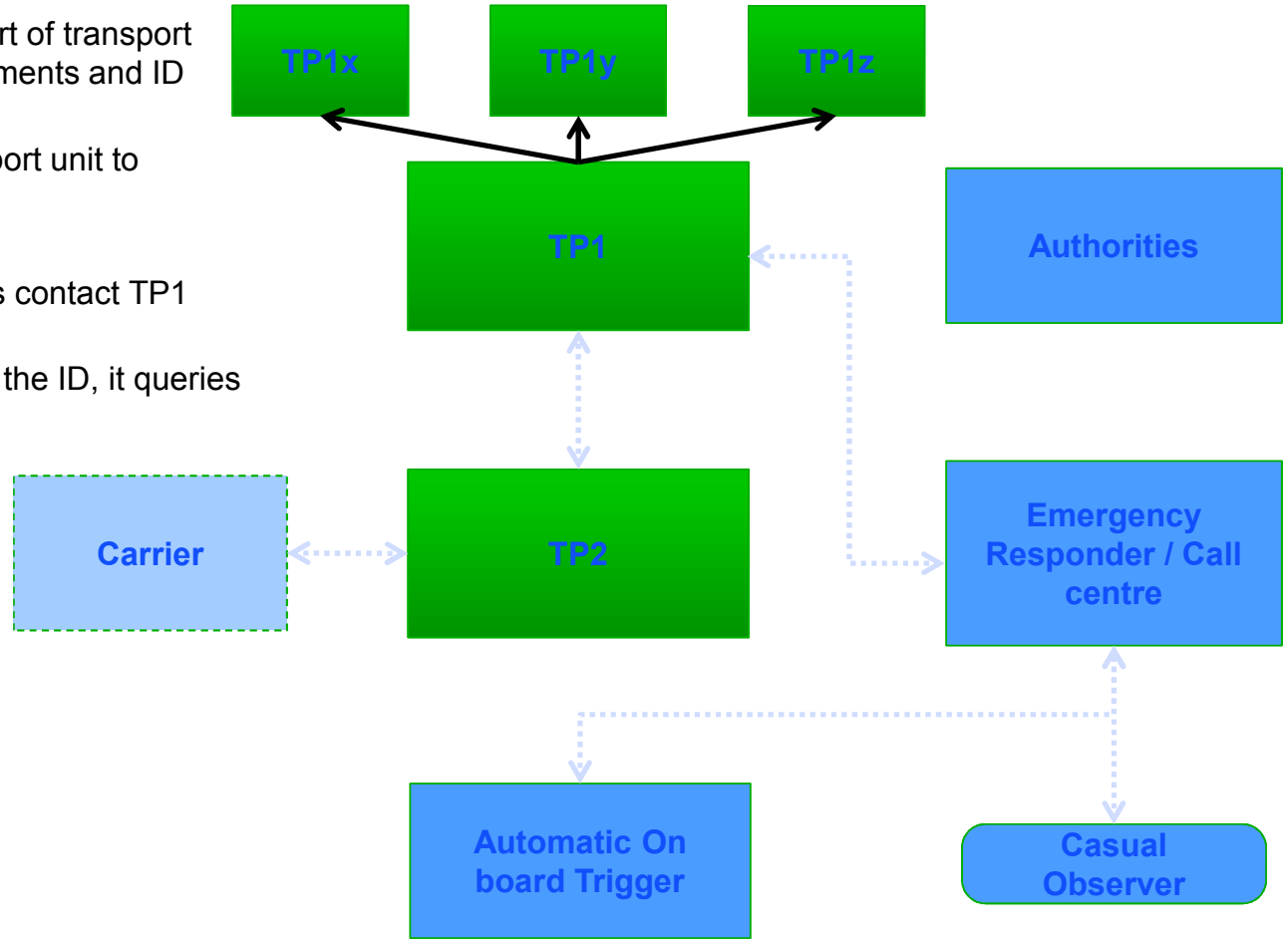
In case of accident

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Alert
4. Emergency services contact TP1 with the vehicle ID
5. If TP1 finds the ID it retrieves the documents from TP2
6. TP1 sends the documents to the emergency services



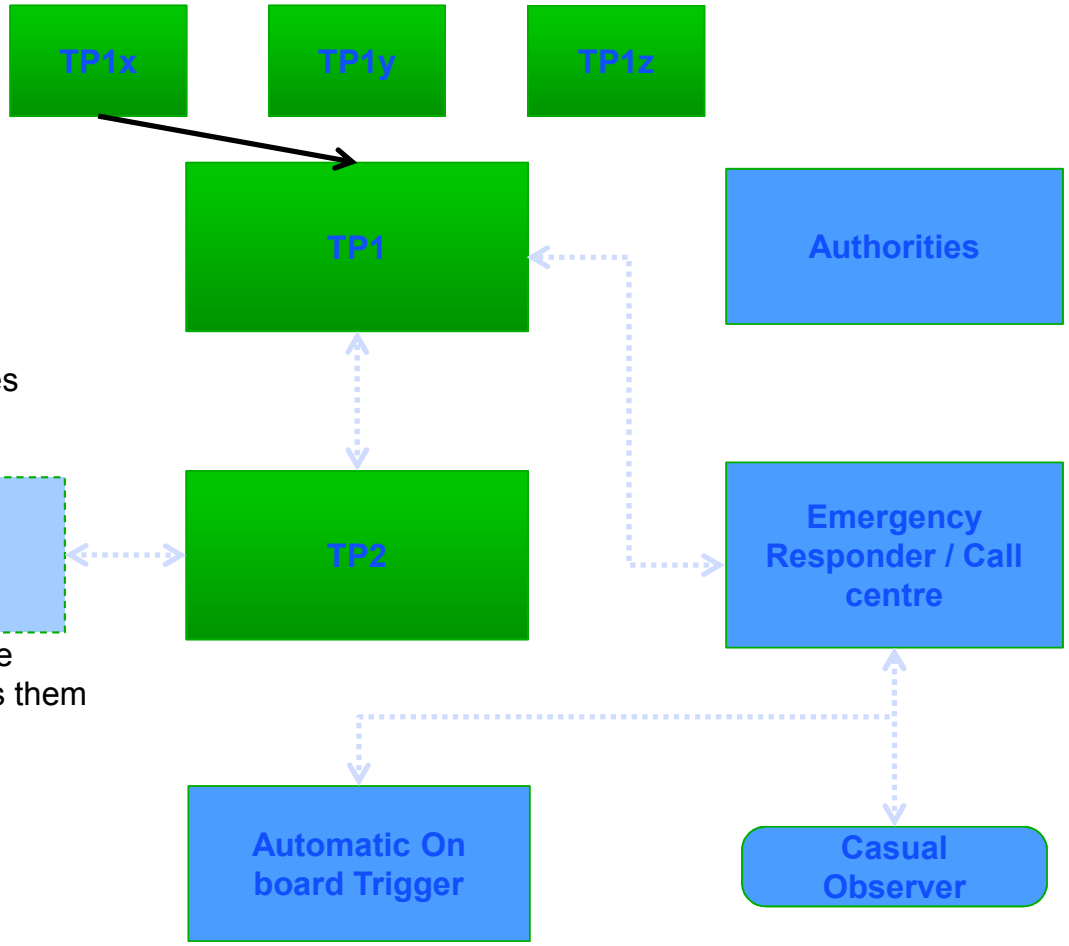
In case of accident

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Alert
4. Emergency services contact TP1 with the vehicle ID
5. If TP1 does not find the ID, it queries the other TP1s



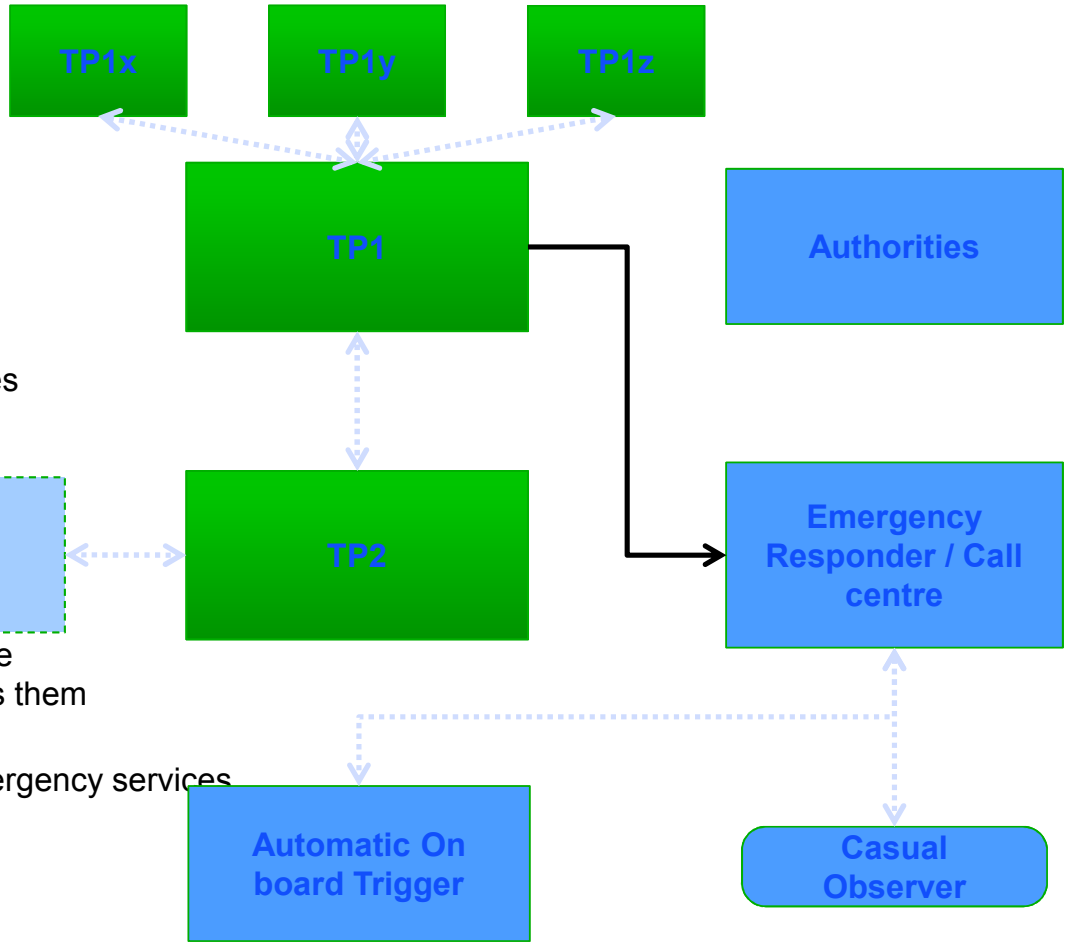
In case of accident

1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Alert
4. Emergency services contact TP1 with the vehicle ID
5. If TP1 does not find the ID, it queries the other TP1s
6. The TP1 holding the ID retrieves the documents from the TP2 and sends them to the enquiring TP1



In case of accident

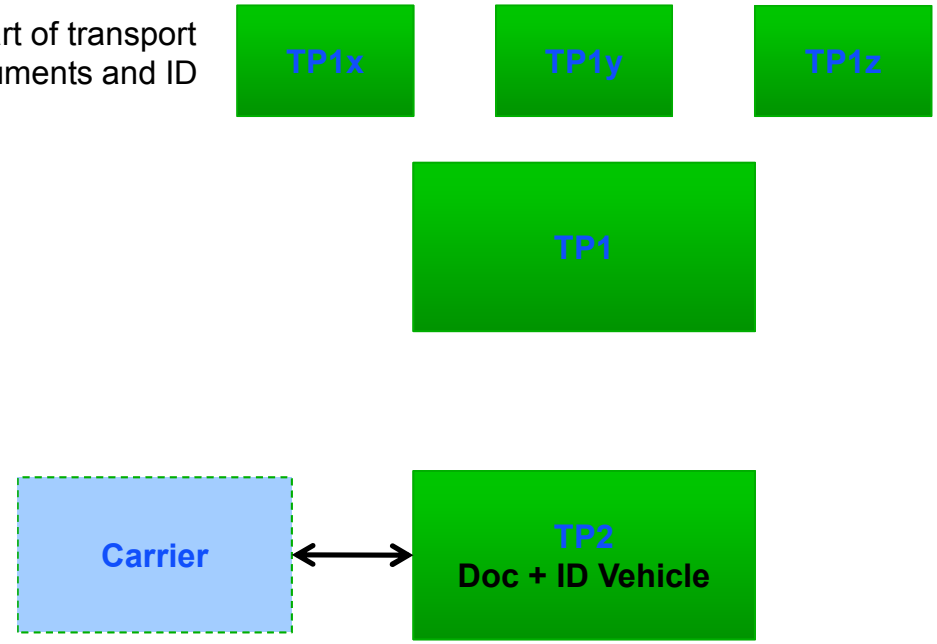
1. Carrier registers start of transport onTP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Alert
4. Emergency services contact TP1 with the vehicle ID
5. If TP1 does not find the ID, it queries the other TP1s
6. The TP1 holding the ID retrieves the documents from the TP2 and sends them to the enquiring TP1
7. The latter forwards them to the emergency services



MULTIPLE LOAD AND DELIVERY USE CASE

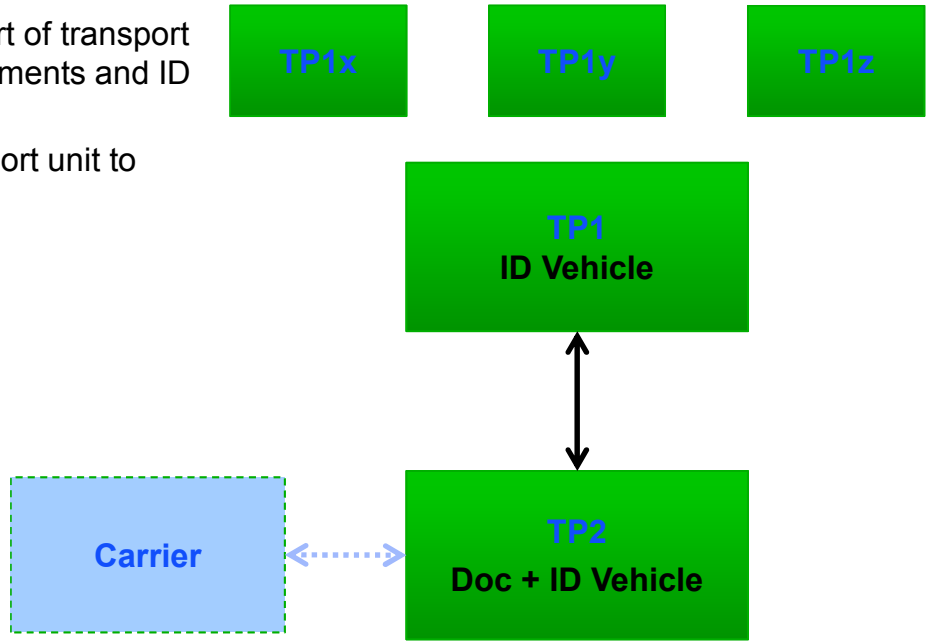
Case of multiple loading/unloading 1

1. Carrier registers start of transport on TP2, giving documents and ID of transport unit



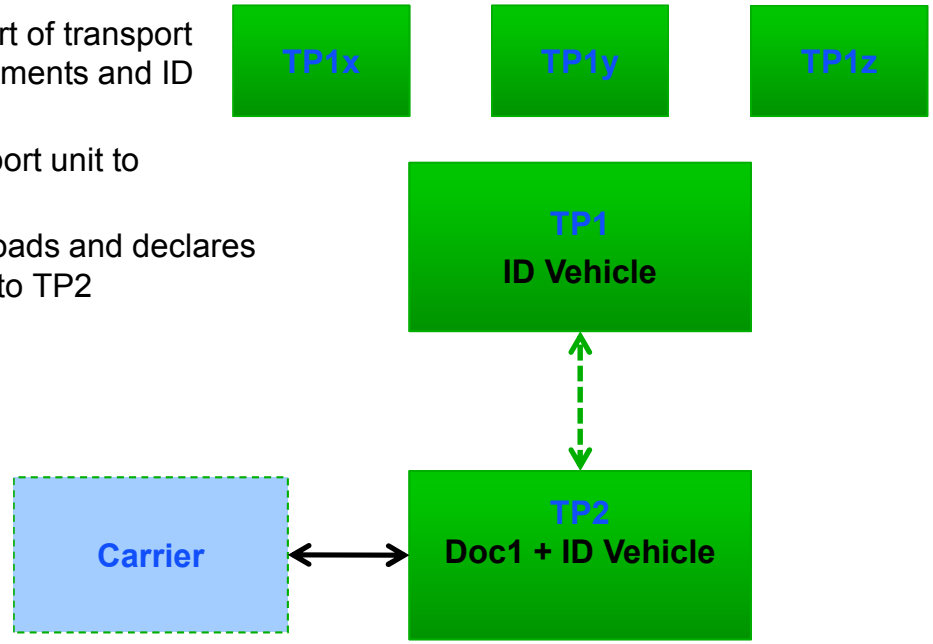
Case of multiple loading/unloading 2

1. Carrier registers start of transport on TP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1



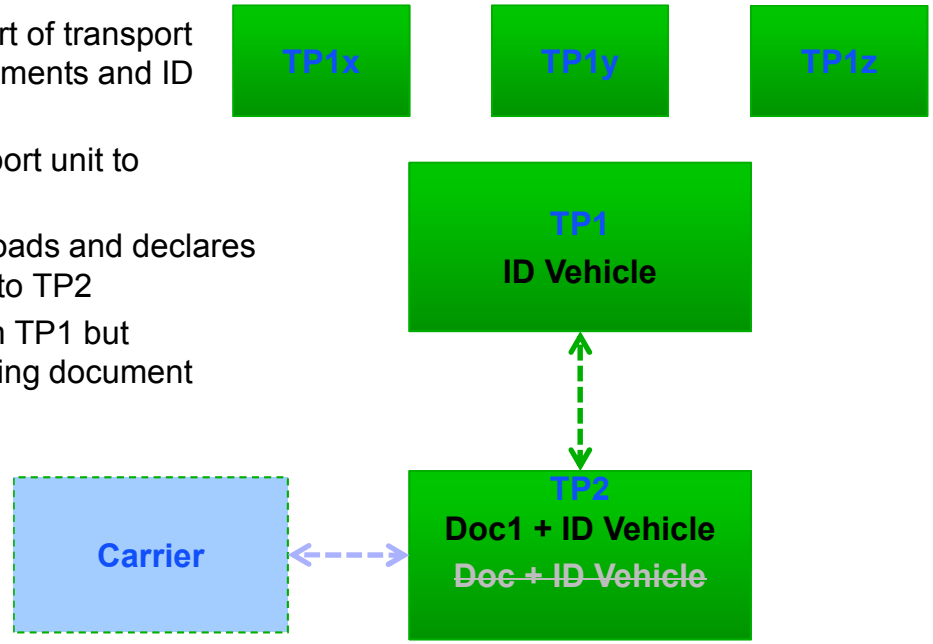
Case of multiple loading/unloading 3

1. Carrier registers start of transport on TP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Carrier loads or unloads and declares document changes to TP2



Case of multiple loading/unloading 4

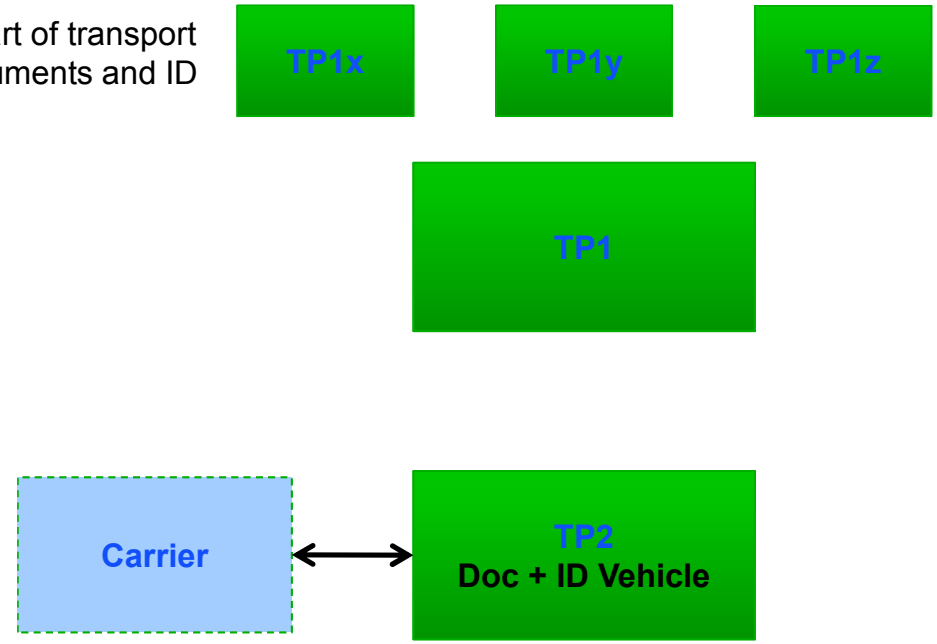
1. Carrier registers start of transport on TP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Carrier loads or unloads and declares document changes to TP2
4. TP2 does not inform TP1 but archives the preceding document



CASE OF COUPLING CHANGE

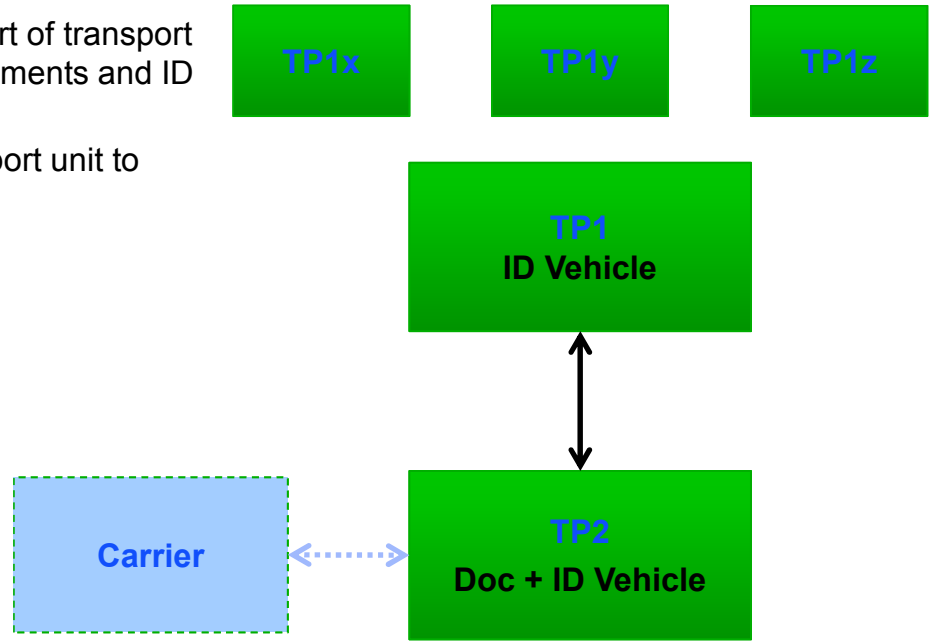
Case of coupling change 1

1. Carrier registers start of transport on TP2, giving documents and ID of transport unit



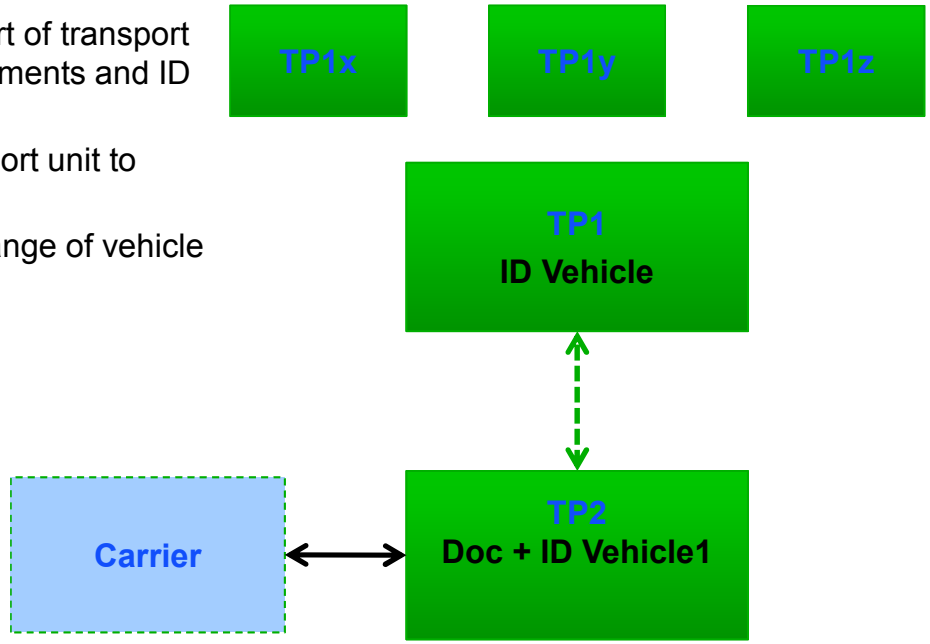
Case of coupling change 2

1. Carrier registers start of transport on TP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1



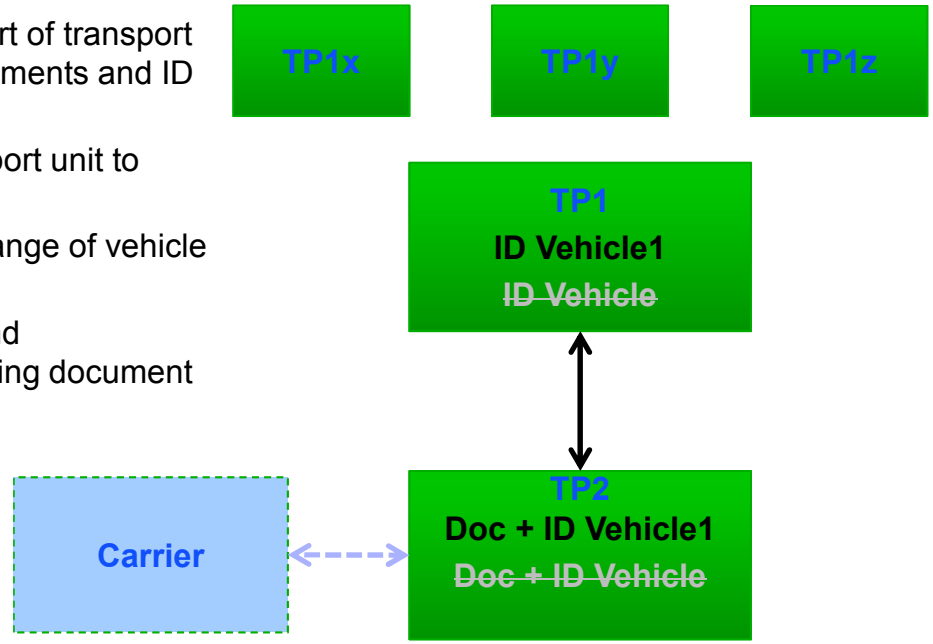
Case of coupling change 3

1. Carrier registers start of transport on TP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Carrier declares change of vehicle to TP2



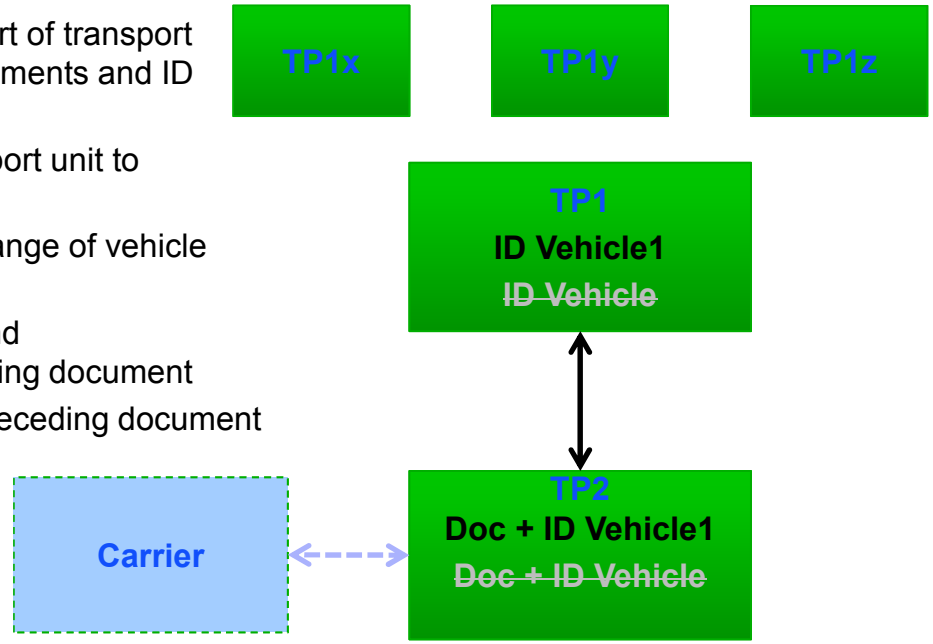
Case of coupling change 4

1. Carrier registers start of transport on TP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Carrier declares change of vehicle to TP2
4. TP2 informs TP1 and archives the preceding document



Case of coupling change 5

1. Carrier registers start of transport on TP2, giving documents and ID of transport unit
2. TP2 declares transport unit to TP1
3. Carrier declares change of vehicle to TP2
4. TP2 informs TP1 and archives the preceding document
5. TP1 archives the preceding document



WORK IN PROGRESS
« GUIDELINES FOR IMPLEMENTATION »

How to deal with for the modules ?

- Considering technical solutions developed by the project:

  - ✓ Make recommendations on minimum criteria on

    - Third parties and associate services
      - Type of communication, exchanges

    - Datacenters
      - level of services, security (CEA), …

    - GNSS Positioning (if used on volontary basis)