


IPIC 2023

9th International Physical Internet Conference

June 13-15, 2023
Athens, Greece

SYTaDeL

A data governance framework for a federated logistics data space

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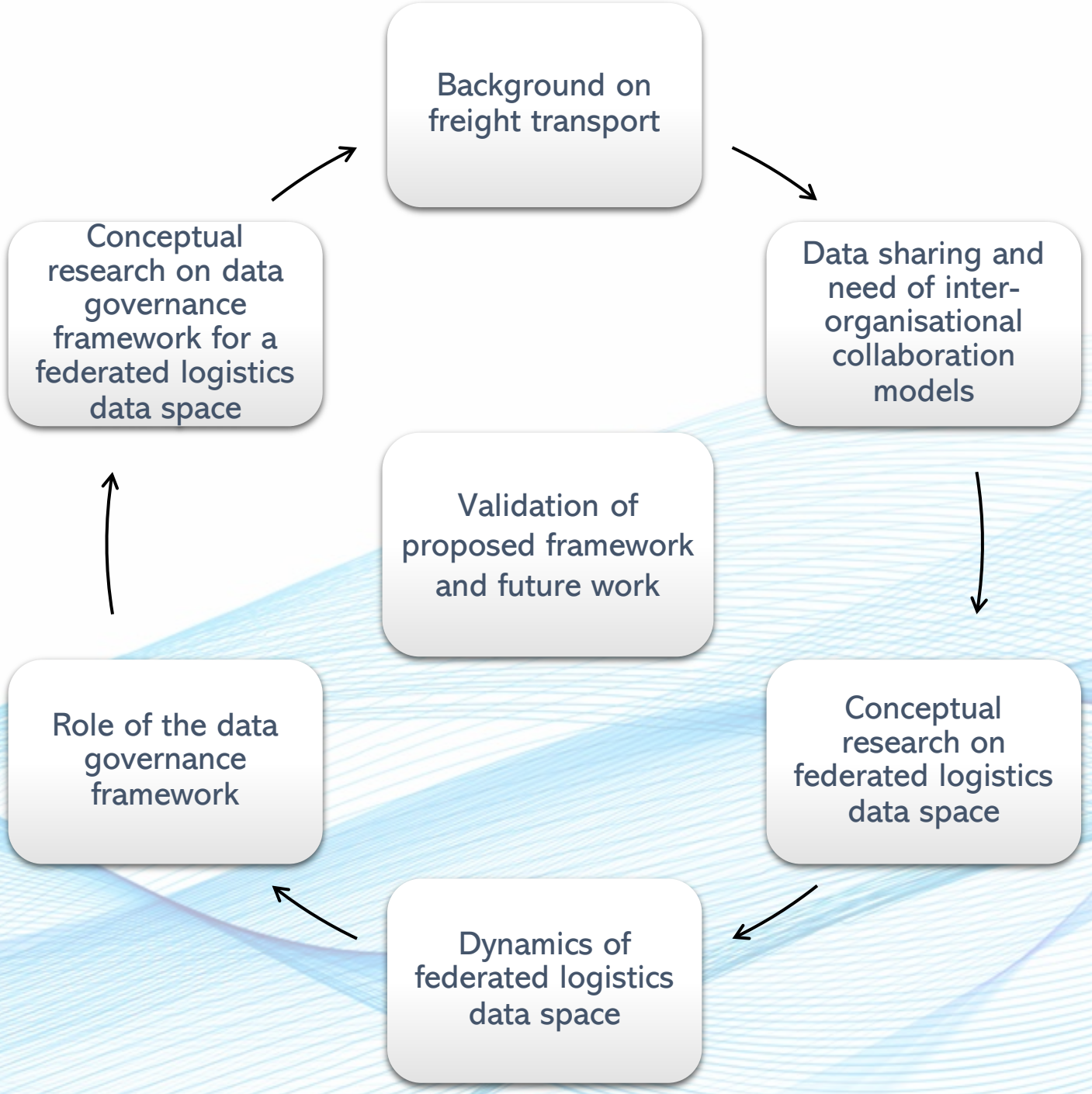
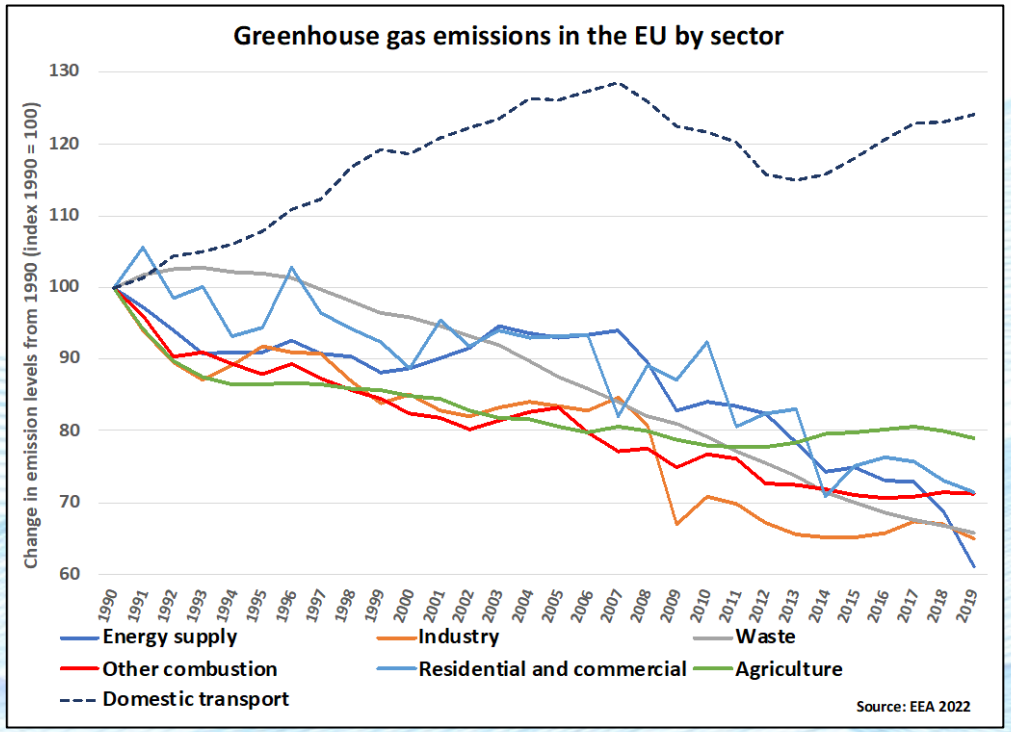
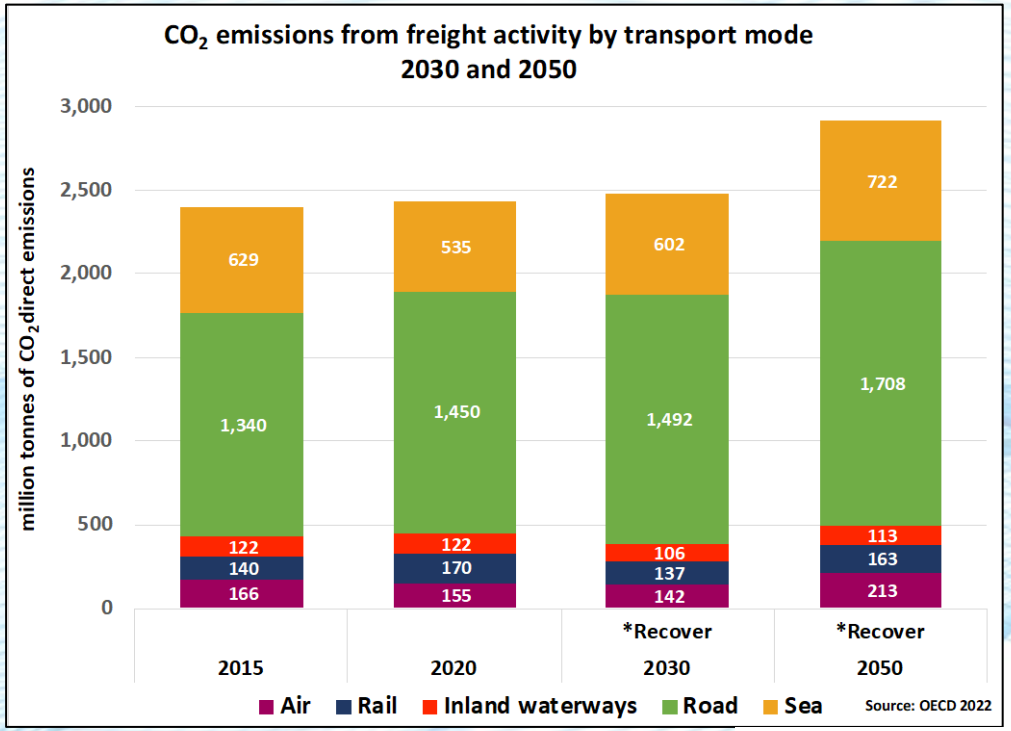
Agenda


Background on freight transport
Data sharing and need of inter-organisational collaboration models
Conceptual research on federated logistics data space
Dynamics of federated logistics data space
Role of the data governance framework
Validation of proposed framework and future work
Conceptual research on data governance framework for a federated logistics data space

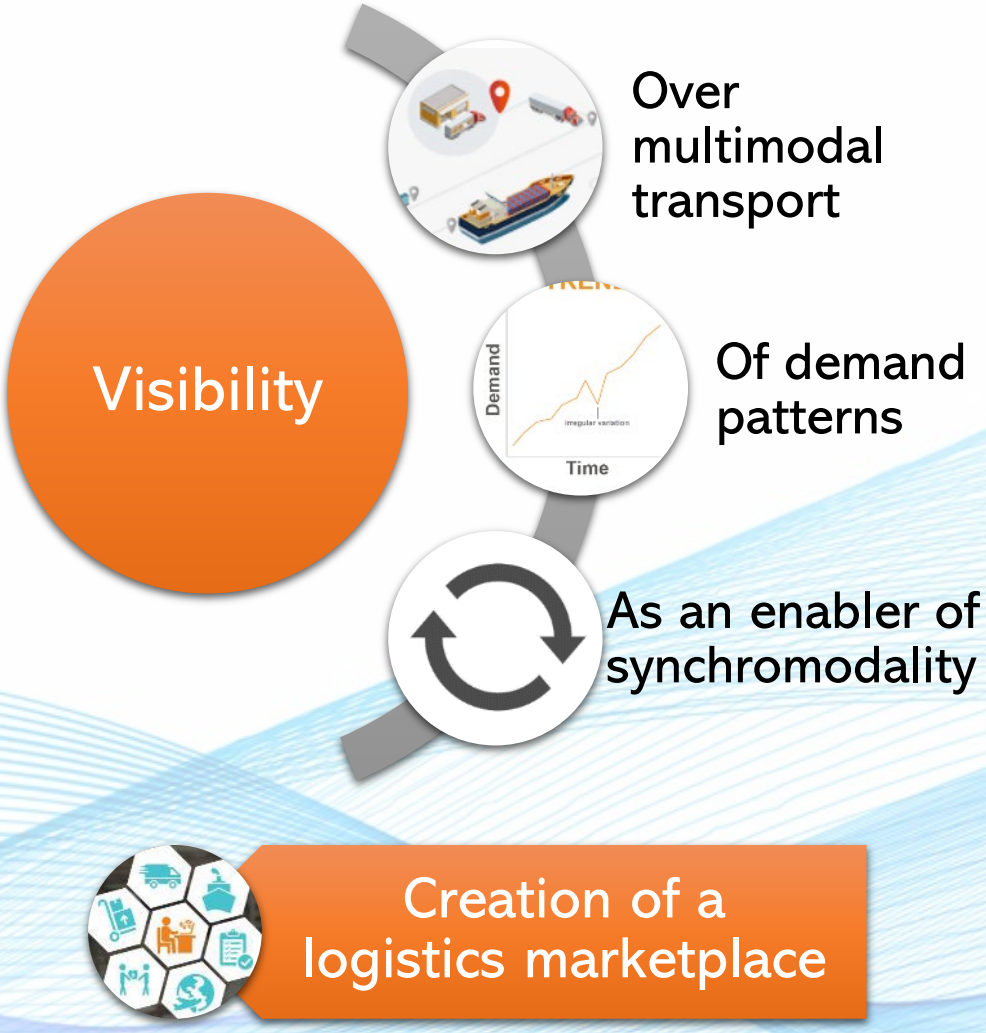
Freight transport: The big picture

- European Green Deal goals to make Europe **climate neutral by 2050**.
- **Externalities** of road transport are an increasing concern (European Commission, 2014; Kaack et al., 2018).
- By 2020, Inland Waterways and Rail transport **sectors moved only 22.6%** of the total cargo transported in Europe, being **2.8% lower** than the percentage reported in **2010** (Eurostat, 2022).





Data sharing in Logistics



Need for investigating inter-organizational collaboration models

- Data Sensitivity and Ownership Concerns
- SME-driven industry
- Small investment capabilities

What is a federated logistics data space?

Conceptual Framework for federated logistics data space

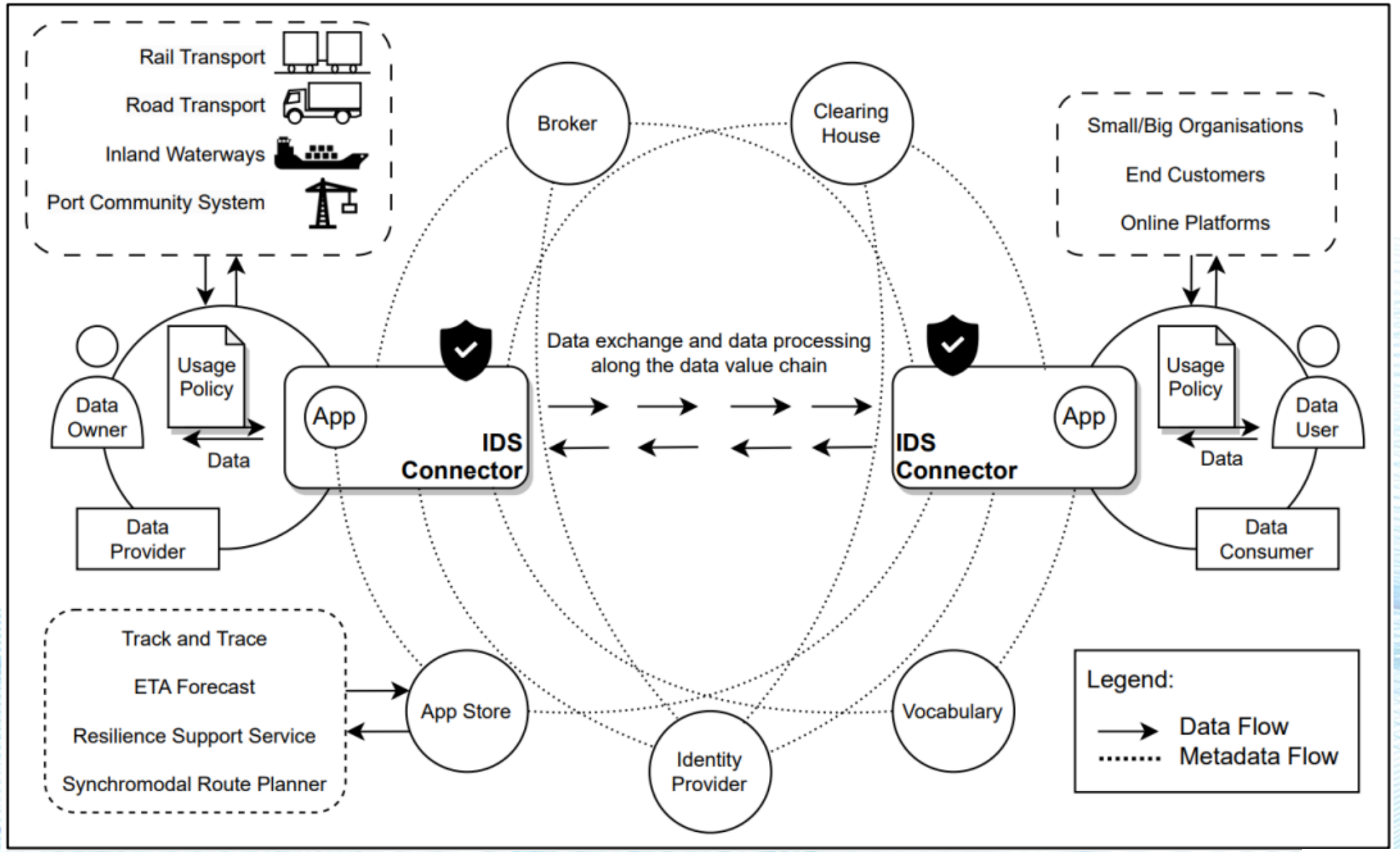
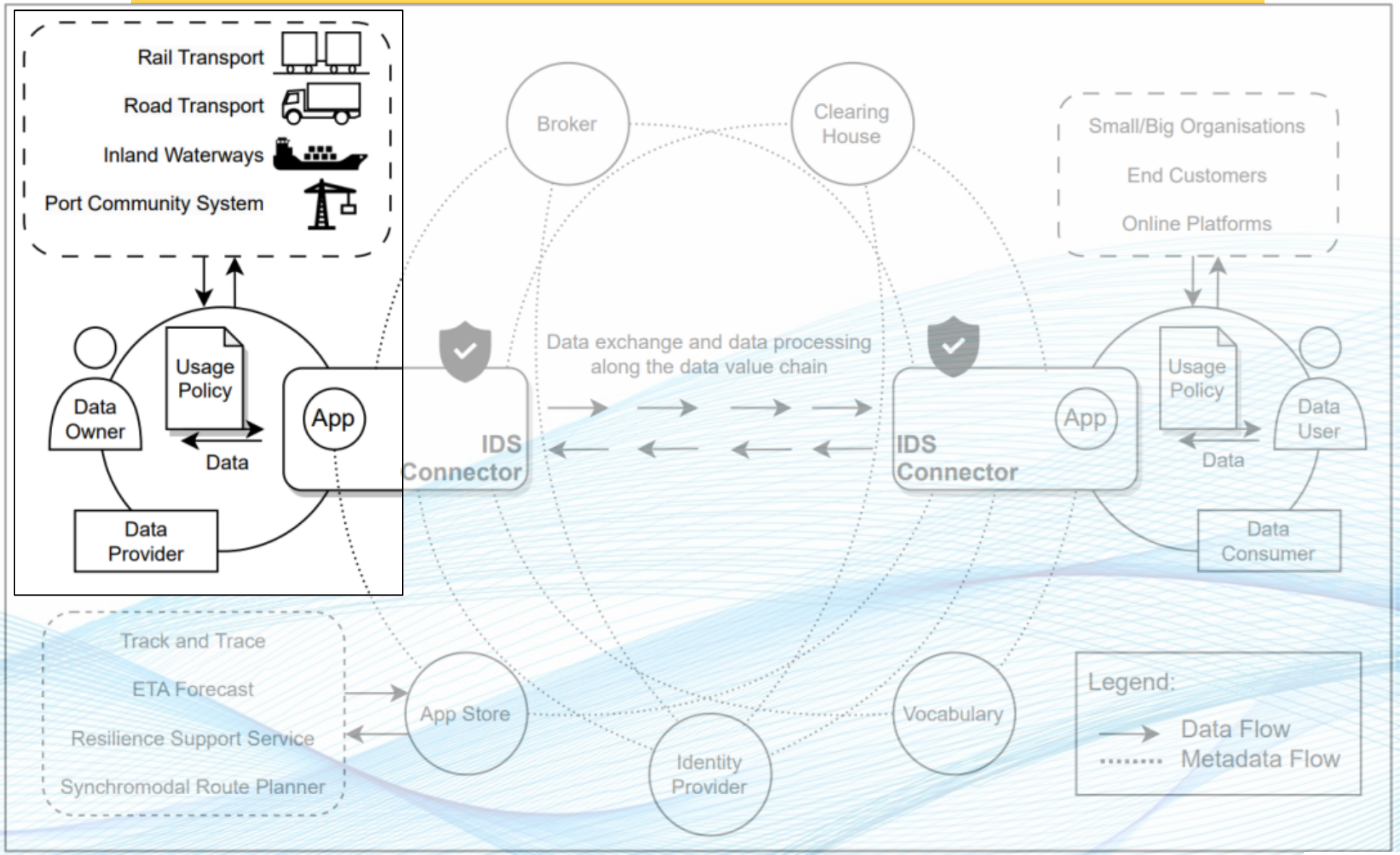


Figure 1: Data architecture for a Federated Logistics Data Space based on IDS (International Data Space) initiative

Conceptual Framework for federated logistics data space



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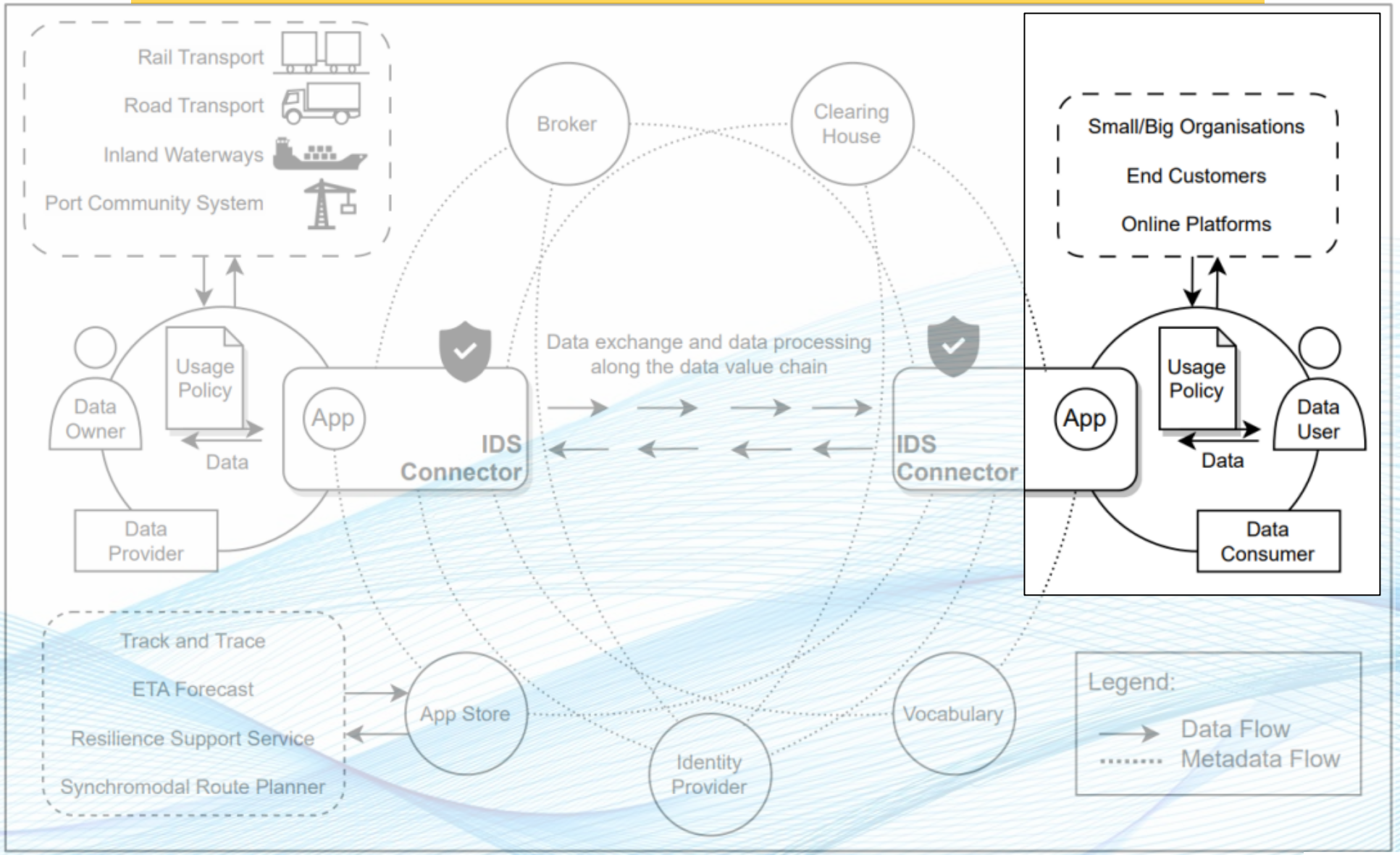

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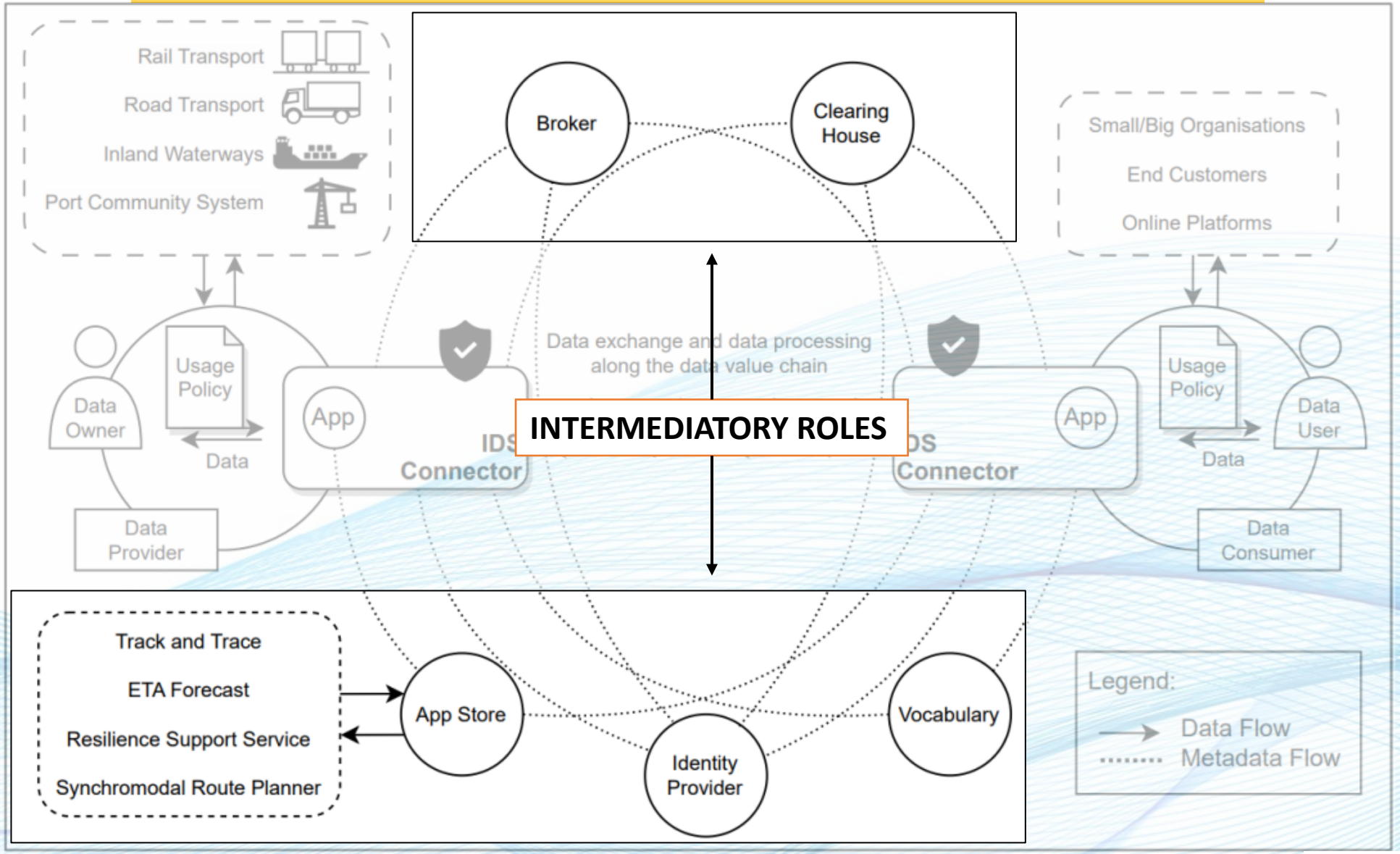

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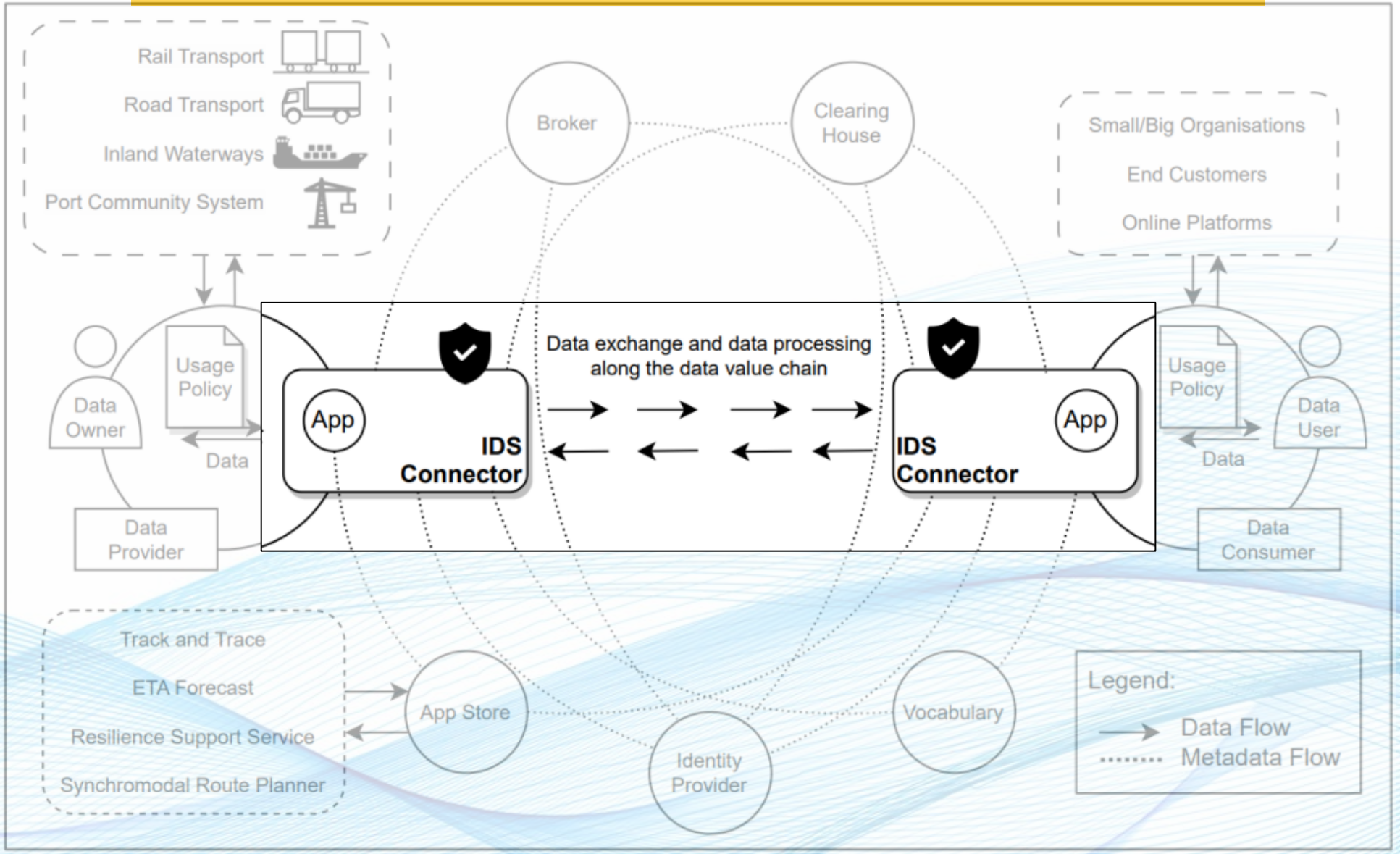

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Dynamics of a federated logistics data space

- Complex architecture
- Data sharing with competitors
- Who is responsible for what?
- Data Security, Privacy and Accountability
- Control over the data assets
- How to build trust between the ecosystem actors?

Role of data governance in federated logistics data space

- Data governance is "the practice of authority, control, and shared decision-making over the management of data assets."

  (Earley et al., 2017)

- Data governance is "a system of decision rights and accountabilities for information-related operations, implemented following models that determine who can take what actions with what information, and when, under what conditions, and using what methods."

  (Panian, 2010)

- Considering the broader aspect, Data management practices such as data replication, data archiving, security, backup, metadata management (MDM), data traceability and lineage, business glossary mapping, governance council, release and change management, master data, and business are all governed by standards and procedures known as data governance.

  (Narasiah et al., 2016)

Data governance is an associative process defining each actor's responsibility (accessing, viewing, transferring) and the usage policy in the organisation's or ecosystem's data management.

Conceptual framework of data governance for a federated logistics data space

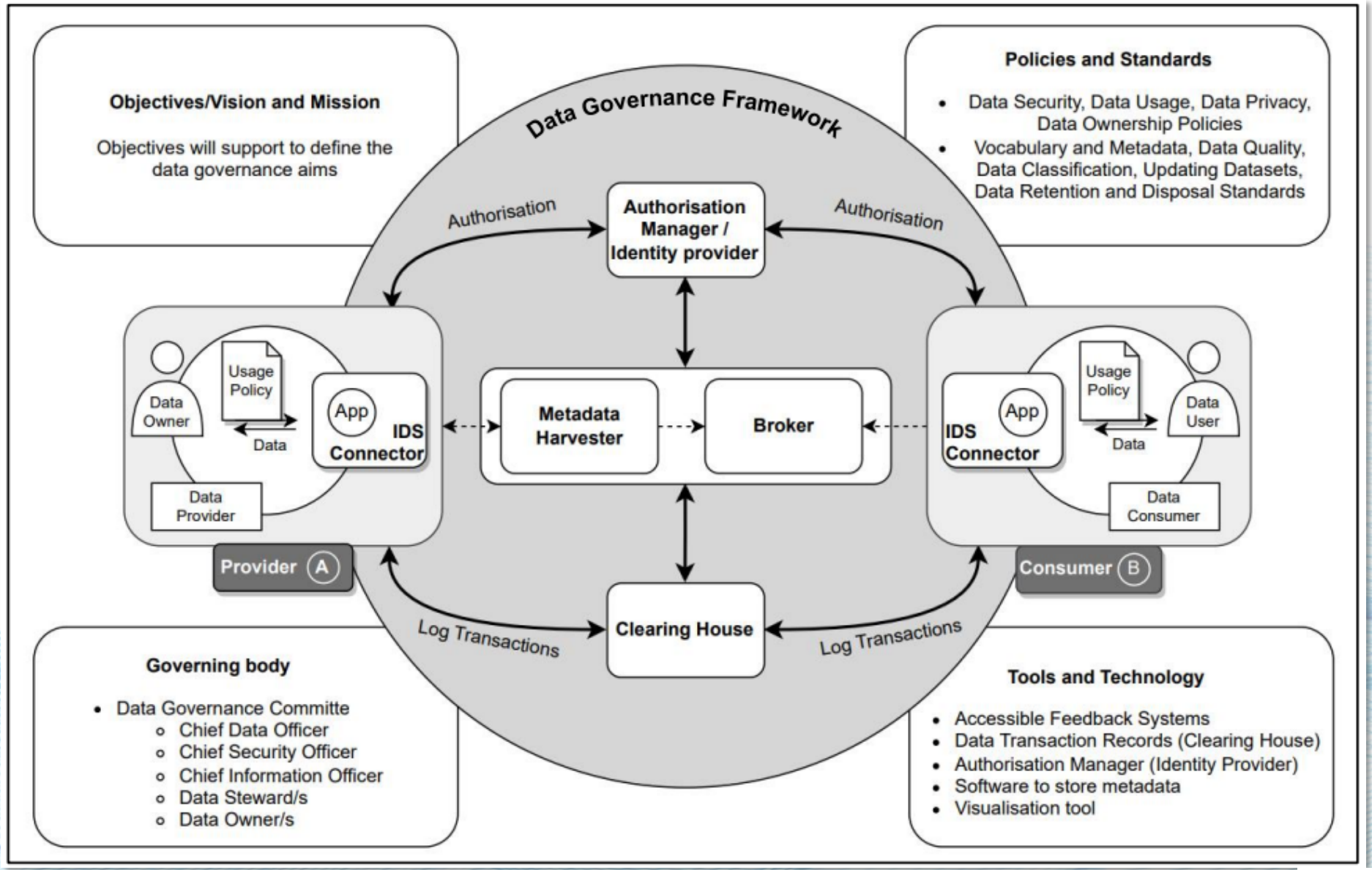
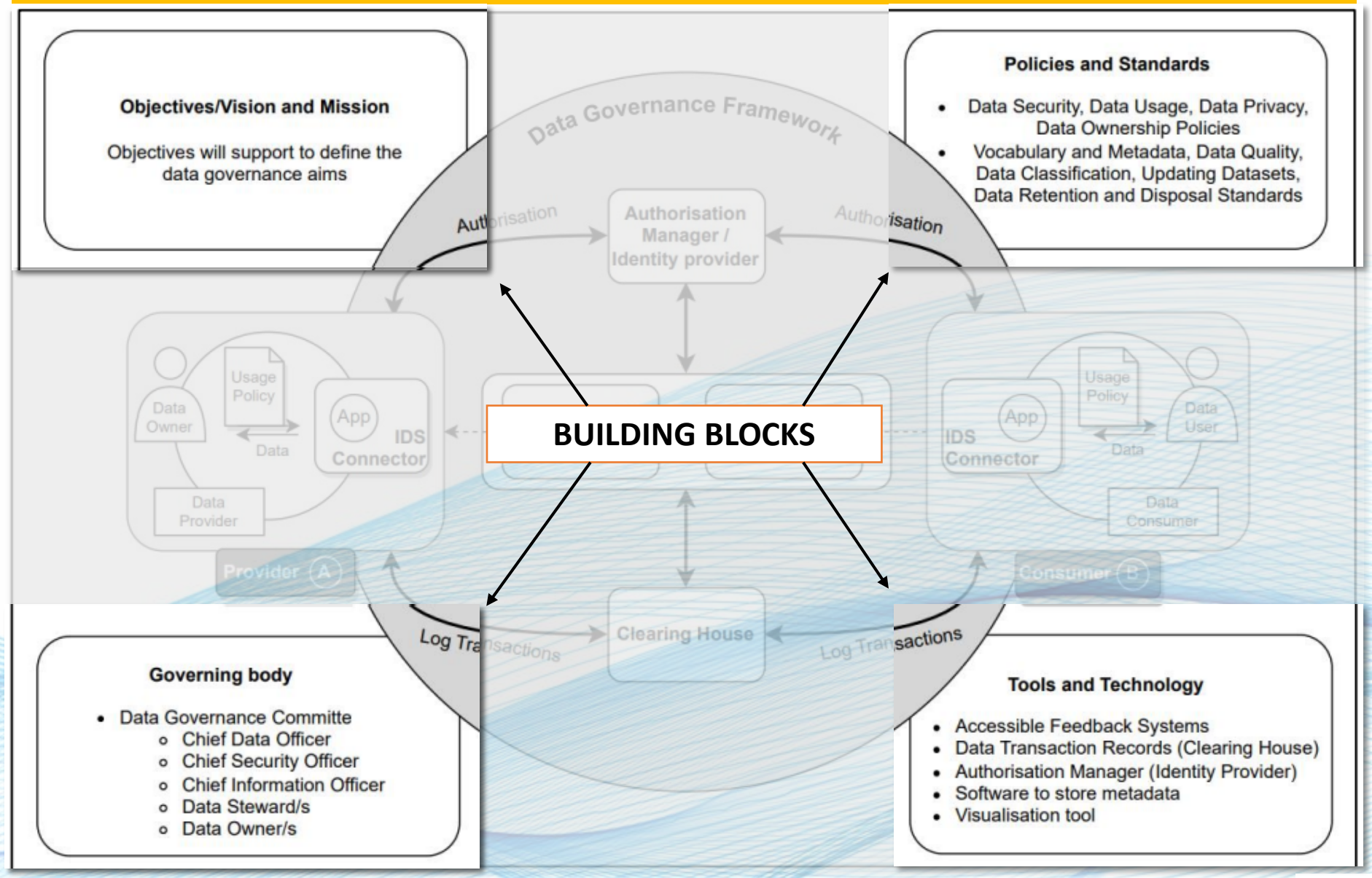


Figure 2: Data Governance Framework and its building blocks together with the IDSA architecture for a federated logistics data space (Legend: ⇢ Metadata flow, ↔ interconnected intermediatory roles)

Conceptual framework of data governance for a federated logistics data space



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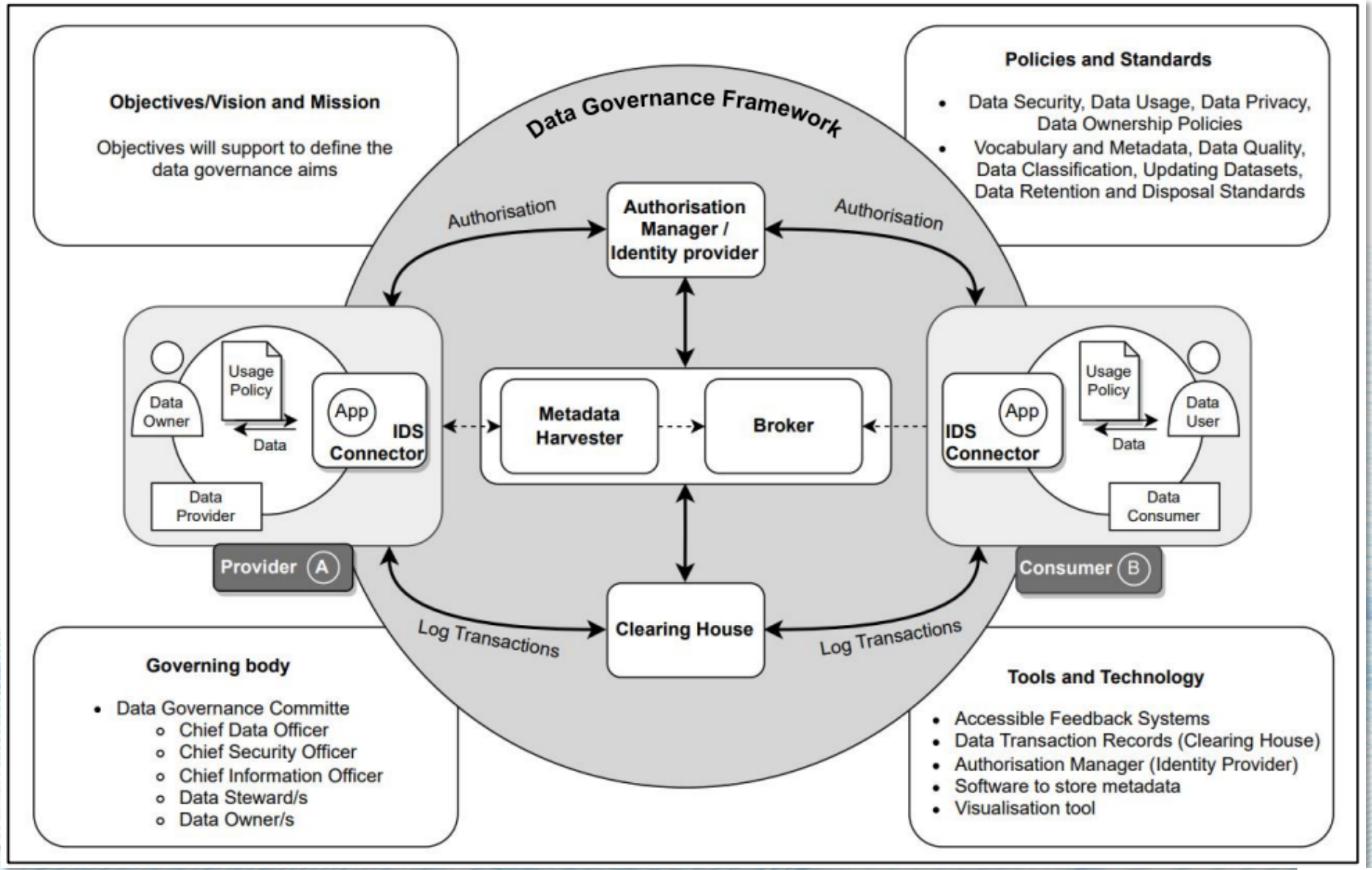

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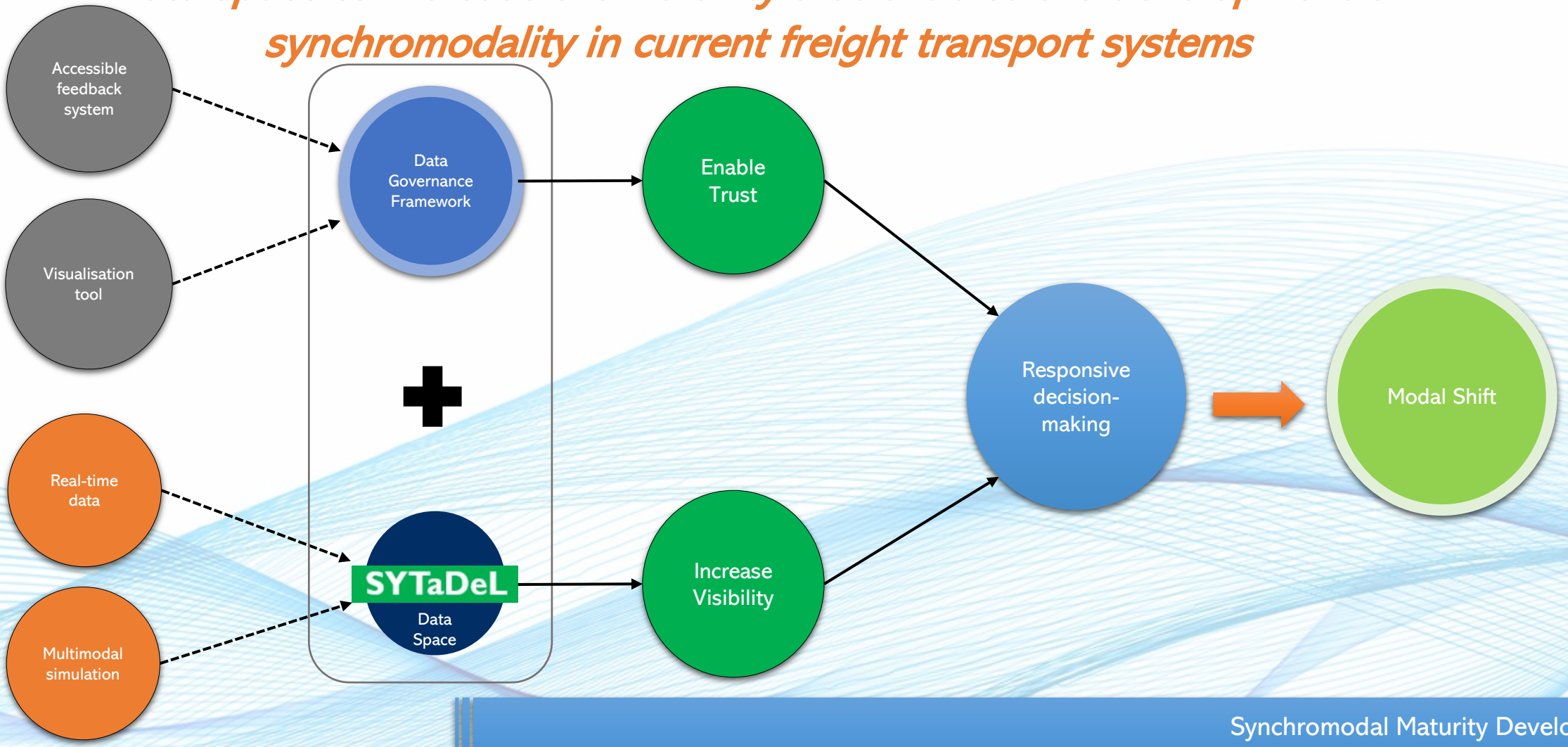
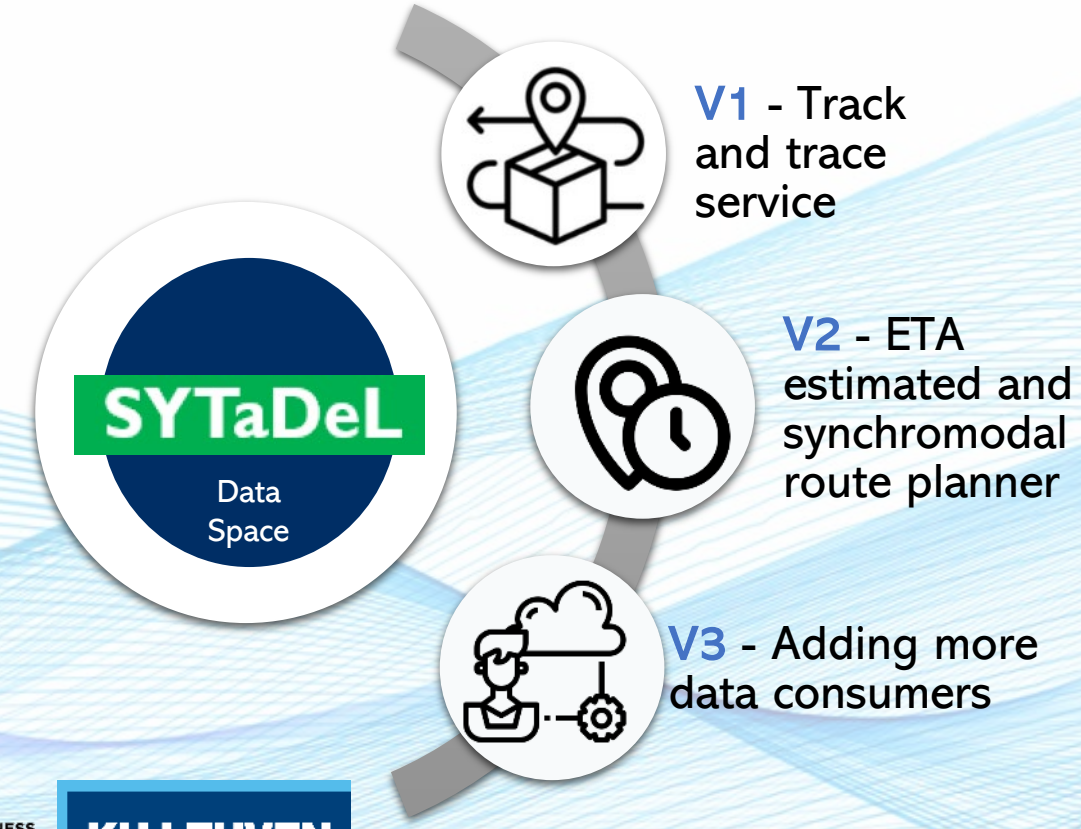
Overview of Federated Logistics data space

Data space to increase the visibility that enables the development of synchromodality in current freight transport systems



Validation of proposed framework – Pilot case

- A steel manufacturer
- A multimodal origin-destination corridor



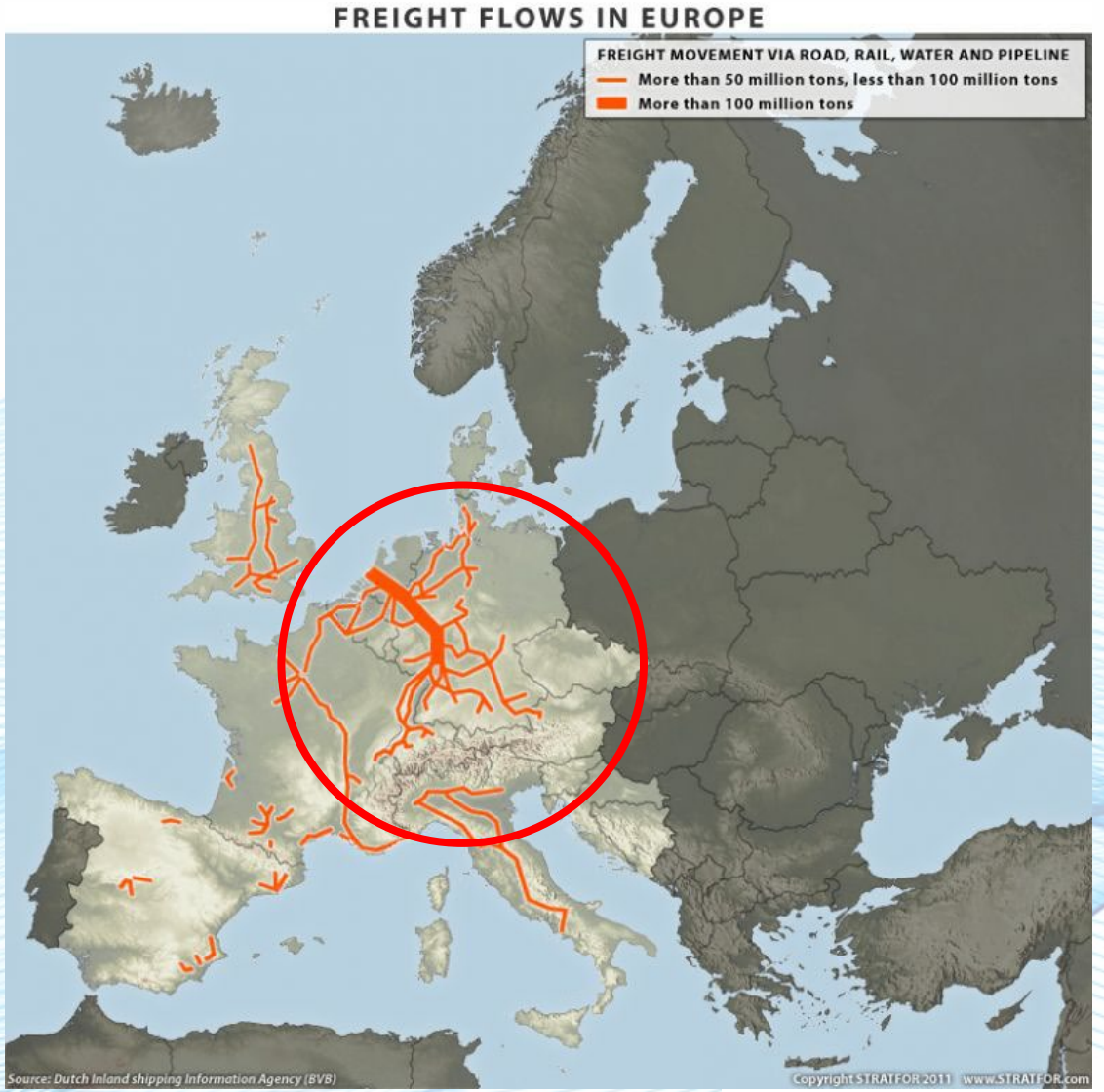


Figure 3: Freight flows in Europe (Source: Dutch Inland shipping information agency (BVB))

Future Work

- For future work, We intend to develop a business model and implement it in a pilot case to test the viability, gather the results and validate the proposed framework of the federated logistics data space for data sharing.

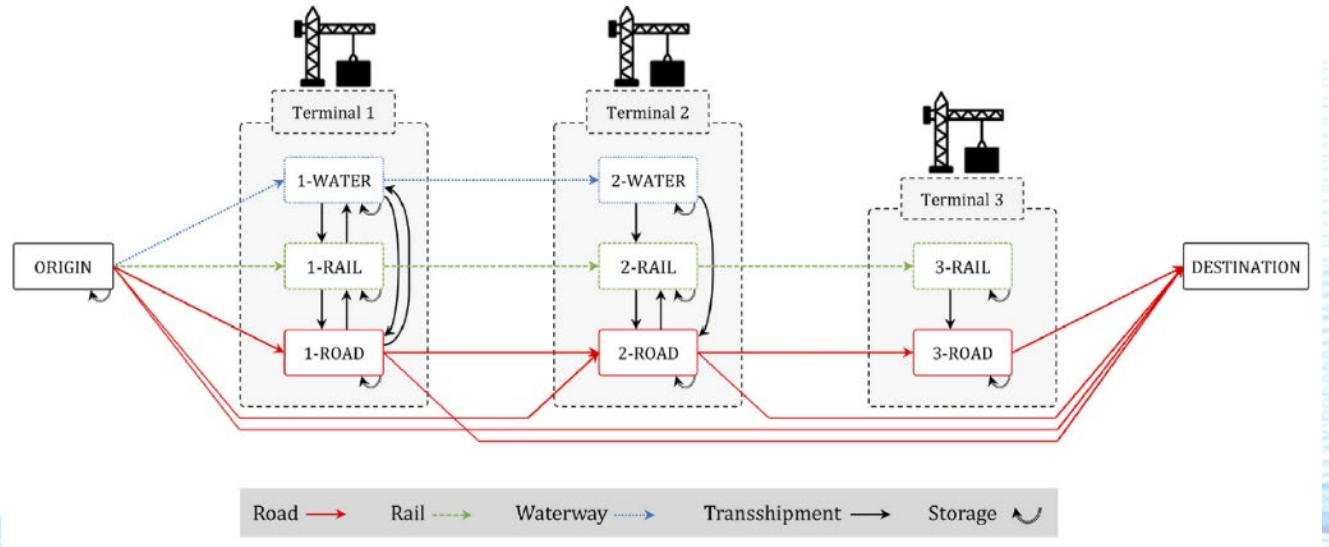
- Target: Write literature on the business model and present it in IPIC 2024.

THANK YOU

QUESTIONS?

Appendix

Concept of synchromodality



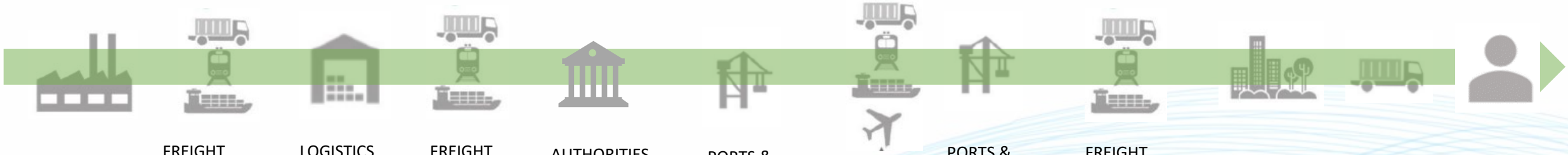
Synchromodality = *intermodality* + flexible mode choice + decision-making based on real-time data

→ **Intermodality** = *multimodality* + same load unit + door-to-door + integration

→ **Multimodality** = using ≥ 2 modes

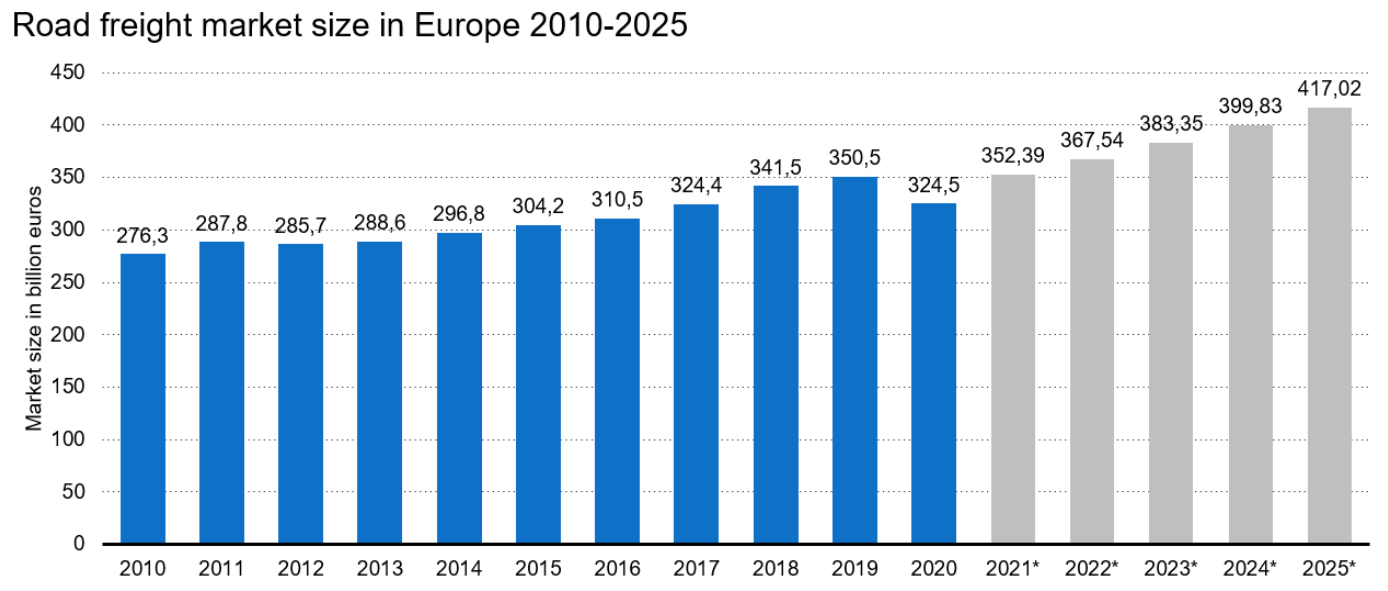
Source: Yee, H., Gijsbrechts, J., & Boute, R. (2021); Khakdaman, M., Rezaei, J., & Tavasszy, L. A. (2020).

A COMPLEX REALITY



- Many stakeholders involved
- Large amount of (inefficient) information exchange
- Digital silos
- Legacy IT systems

A GROWING MARKET



Source(s): Transport Intelligence; Statista

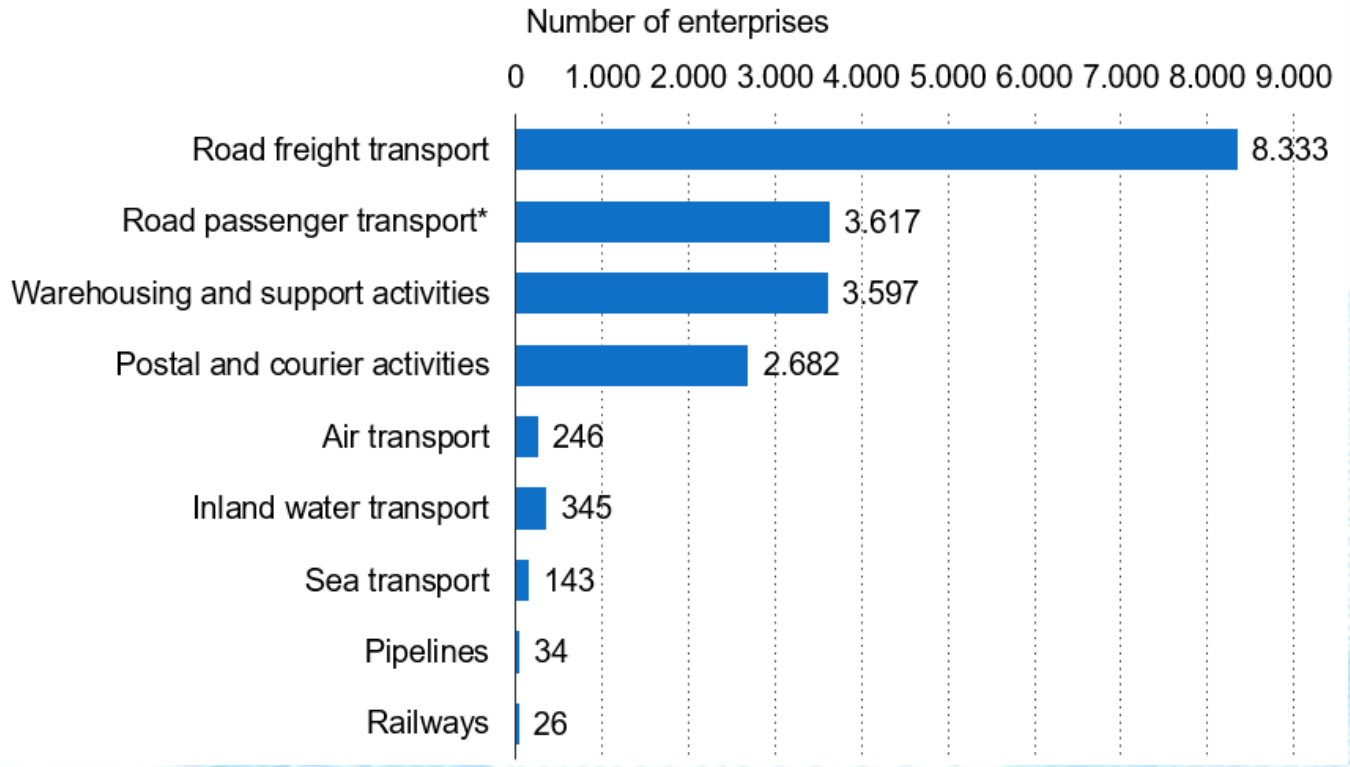
- Average load
- Average speed
- Asset utilization
- Empty runs

Modal Shift

Road Transport Optimization

Data sharing

A FRAGMENTED MARKET

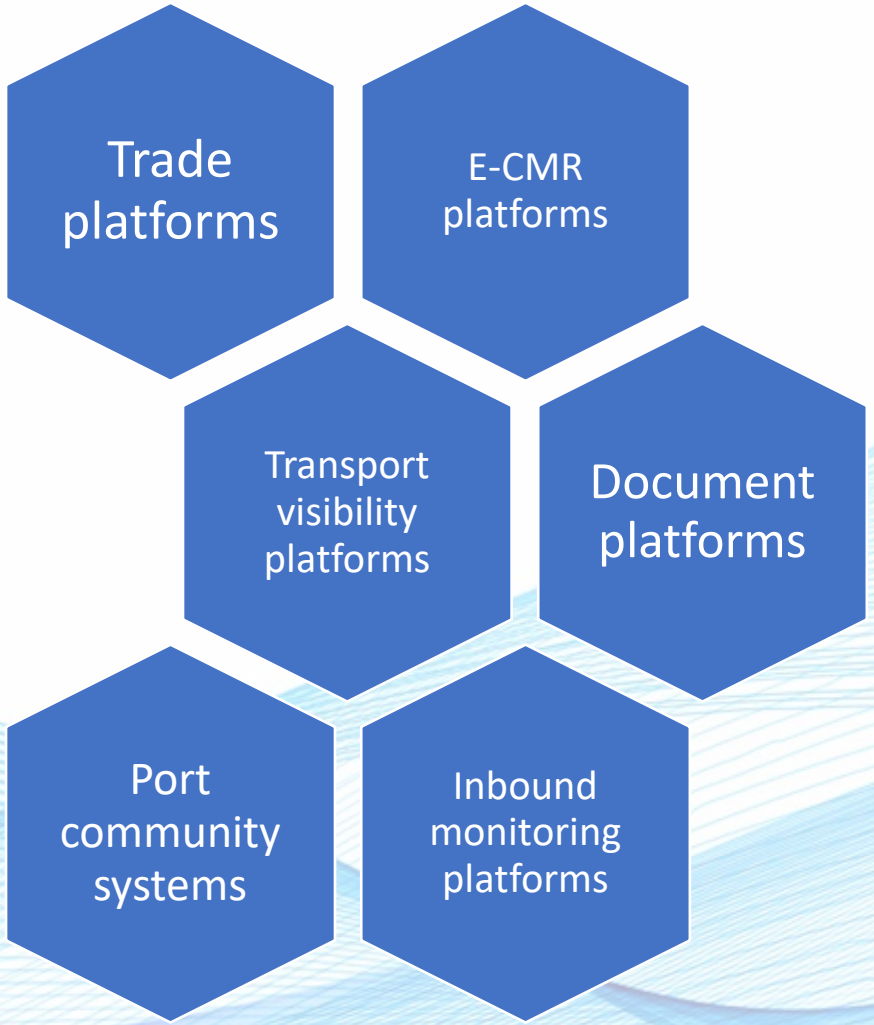


Source Belgium; European Commission; Eurostat; 2018

- Many players
- Low margin operations
- Point-to-point data connections
- Based on old EDI technology

data sharing solutions

THE ISSUE WITH THE CURRENT DATA PLAFORMS



- Multiple providers
- Focus on a specific set of data
- Interoperability
- Business models
- Trust

Trusted data spaces

DATA SHARING: THE MODERN PRISONER'S DILEMMA

Many industries **agree that they would benefit** from a more transparent way of working within their industry. In logistics this is especially important, since your supply chain is connected with and impacted by the operations of all stakeholders in it.

Increasing your collaboration or data sharing across the supply chain can help improve your forecasting, planning optimization or asset utilization. Yet only **few companies are willing to share** their data in order to improve operations.

Understandable of course. What if our competitors would get a hold of our data and use it to outcompete us? Is this GDPR compliant? Who's going to maintain the tech stack & pay for it? Just like in the prisoner's dilemma, we benefit from working together, but refuse out of fear that the other party might misuse our trust and data.

This is why data sharing is expected to be one of the most impactful challenges in logistics of the coming decade. Even more so than AI, since even with an AI you will still need a holistic dataset in the first place!