JOKI.

Maritime Data Space

Value creation through data sharing

Fintraffic

The mission of Fintraffic is to ensure safe, smooth and environmentally friendly mobility in Finland by road, by rail, by sea and by air. We help people and things get where they are going, safely, smoothly and with care for the environment

Railway Traffic

- 500,000 trains per year
- 82 million passengers per year
- Rail network 6,000 km
- 470 professionals

Air Navigation Services

- Air traffic control services at 22 airports
- 280,000 aircraft movements per year (190,000 at Helsinki-Vantaa)
- 440 professionals

Road Traffic

- Roads carry 90% of passenger transport in Finland
- More than 120 million km driven in vehicles every day
- Road network 78,000 km
- 90 professionals

Vessel Traffic Services

- Shipping carries 90% of exports and 80% of imports
- 30,000 visits by foreign vessels per year
- 29 ports
- 100 professionals

We produce digital services and up-to-date open-source traffic data for operators and end users in the transport ecosystem

Fintraffic VTS – what do we do

- DIGITALIZATION OF MARITIME LOGISTICS
- MARITIME SINGLE WINDOW
- PORT AND COASTAL VTS OPERATIONS
- eNAVIGATION SERVICES

Sensor type	Number of sensors
VHF radio base stations	80
Radars	100
AIS base stations	60
Cameras	44
DGPS reference stations	9
Sea level altimeter	13
Weather stations	82

Slower at sea and faster in port

- Over 90% of Finland's trade is conducted by sea
- Globally Shipping is undergoing a major change, and the pace is historically fast
- Regulatory and customer requirements for low-emission shipping are growing
- The shift to alternative fuels, though necessary, is challenged by their high cost and limited availability
- In Global Shipping, up to 50% - 80% of the ship's operating costs already come from bunker
- A better situational awareness, connectivity and the ability to optimize operations are the key to success
- Reduced logistics costs directly impact domestic product prices and are essential for maintaining a competitive edge

Fintraffic as an enabler for information sharing

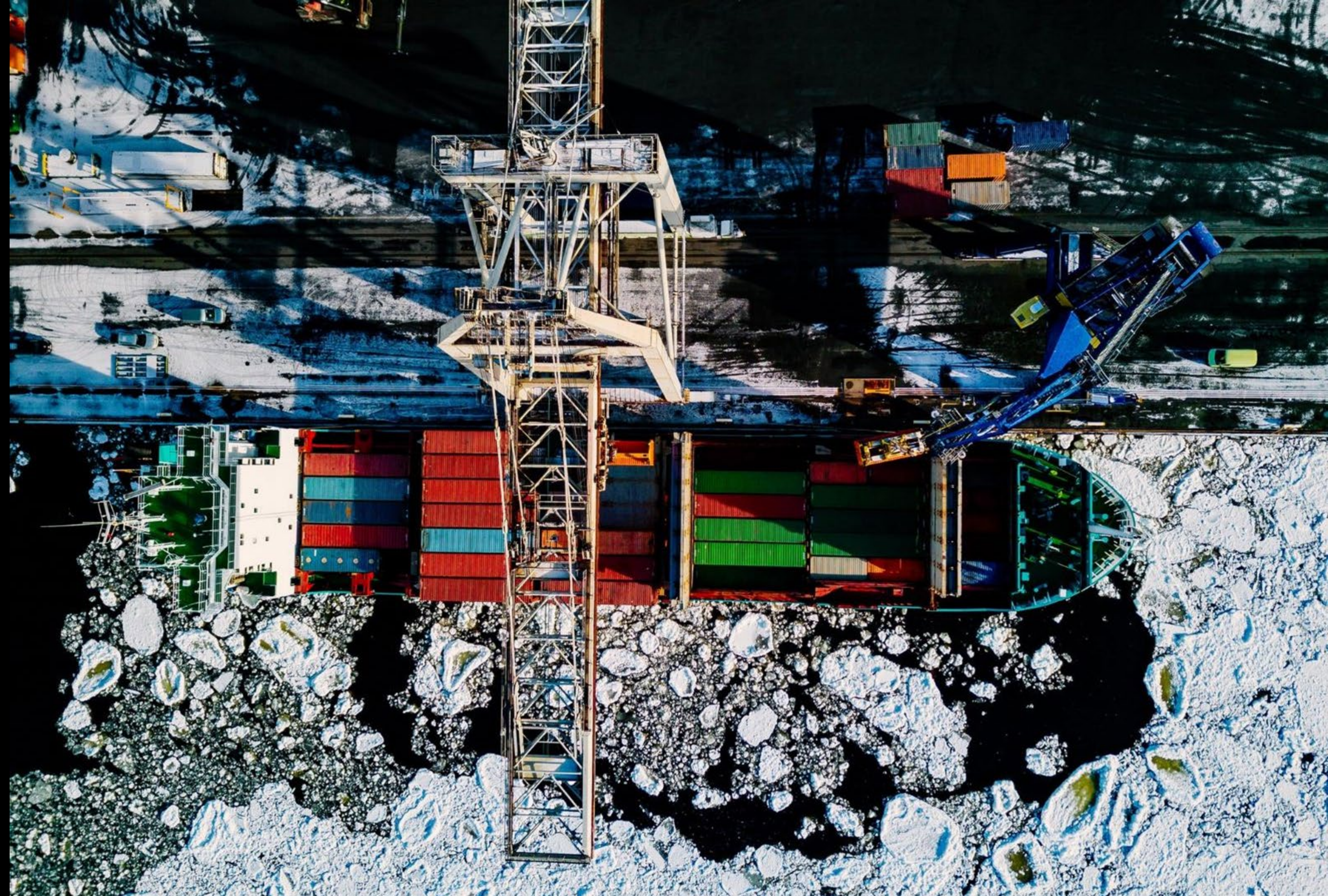
Intelligent maritime vessel traffic service as part of the logistics chain

Promoting the safety of maritime traffic and the smoothness of maritime logistics by supporting digitalization and enabling the exchange of information between different operators

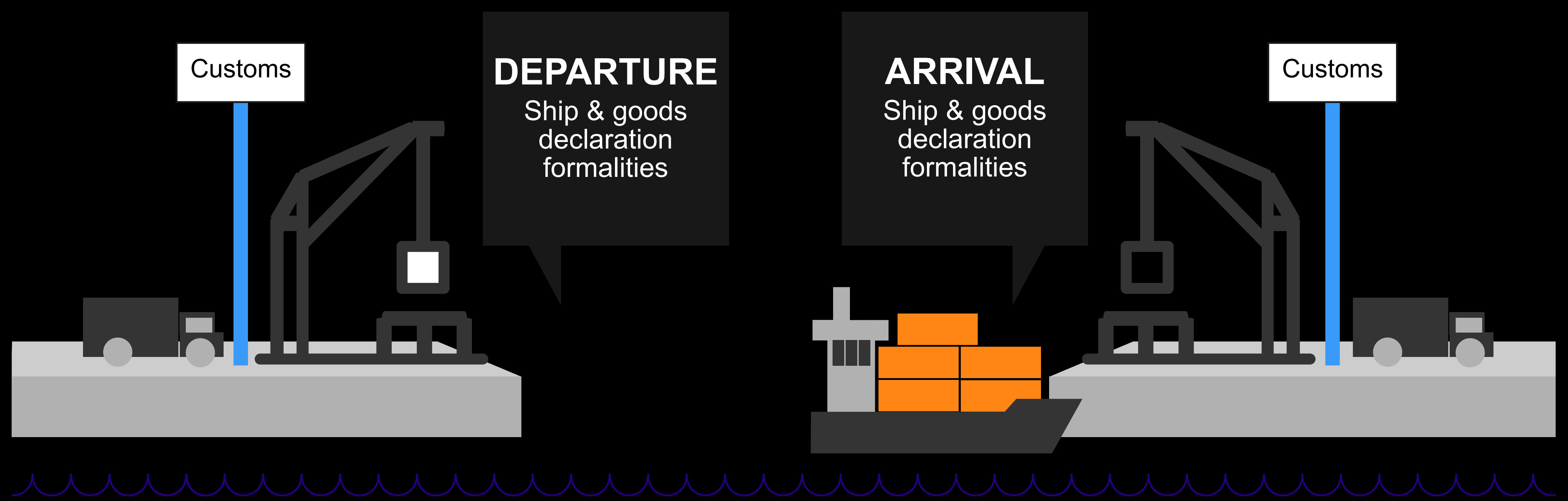
Taking into account exchange of information between different modes of transport

NEMO system implementation, which operates as a national Maritime Single Window (MSW) service

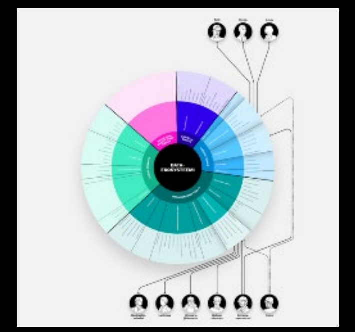
Fintraffic's Port Activity application functions as a digitalization platform for ports and as an end-user application for merchant vessel time information (time information service) provided by Fintraffic global exports



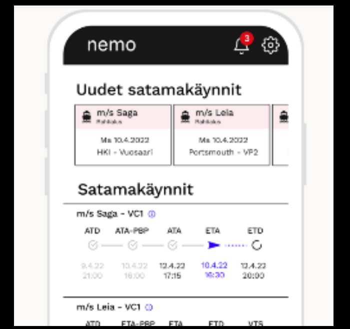
Development of NEMO system began through conceptualization



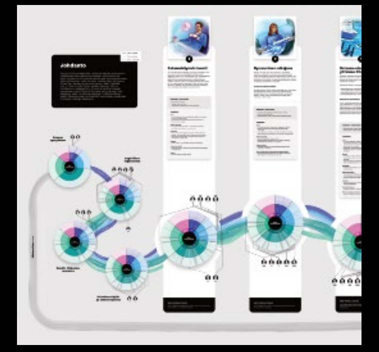
Concept story
A story set in the future about the different stages of a ship's port call, the benefit achieved by different actors and the value produced.



Data journey
Tasks, rights and responsibilities of actors in the concept story, utilization of data in the ecosystem



UI proto
A conceptual prototype of a possible future user experience



Blueprint
Summary of the concept story and data journey

Data producers
Data processors
Data users

Introduction

In 2030, maritime logistics will utilize real-time information sharing and process automation through digitalization. The seller Harding signs a trade agreement with the buyer Aronen for raw materials for the paper industry. Harding makes a charter agreement with shipping company Nova's Eva that utilizes Just in Time Arrival. The data is exported to Nemo, which is a maritime traffic data platform. Aronen and Harding are able to follow the movements of the cargo from Nemo. Nemo offers Eva useful dynamic fairway and port guidance to support route planning. The special conditions for winter navigation are taken into account, because the ship is coming to the Port of Helsinki.

Establishment of trade

Organization of logistics

Tracking of freight movements

Fairway and port guidance with service

Historical data

1 Creating a port call

2 Dynamic timeline

3 Port shared situational picture

4 Updating the smart fairway and harbor guidance

5 Updating preliminary information and waste management planning

6 Sending a notification of arrival

7 Port services

8 Port traffic shared situational picture

9 Virtual Arrival and change communications

10 Arrival at the port of Helsinki

11 Cargo flow optimization

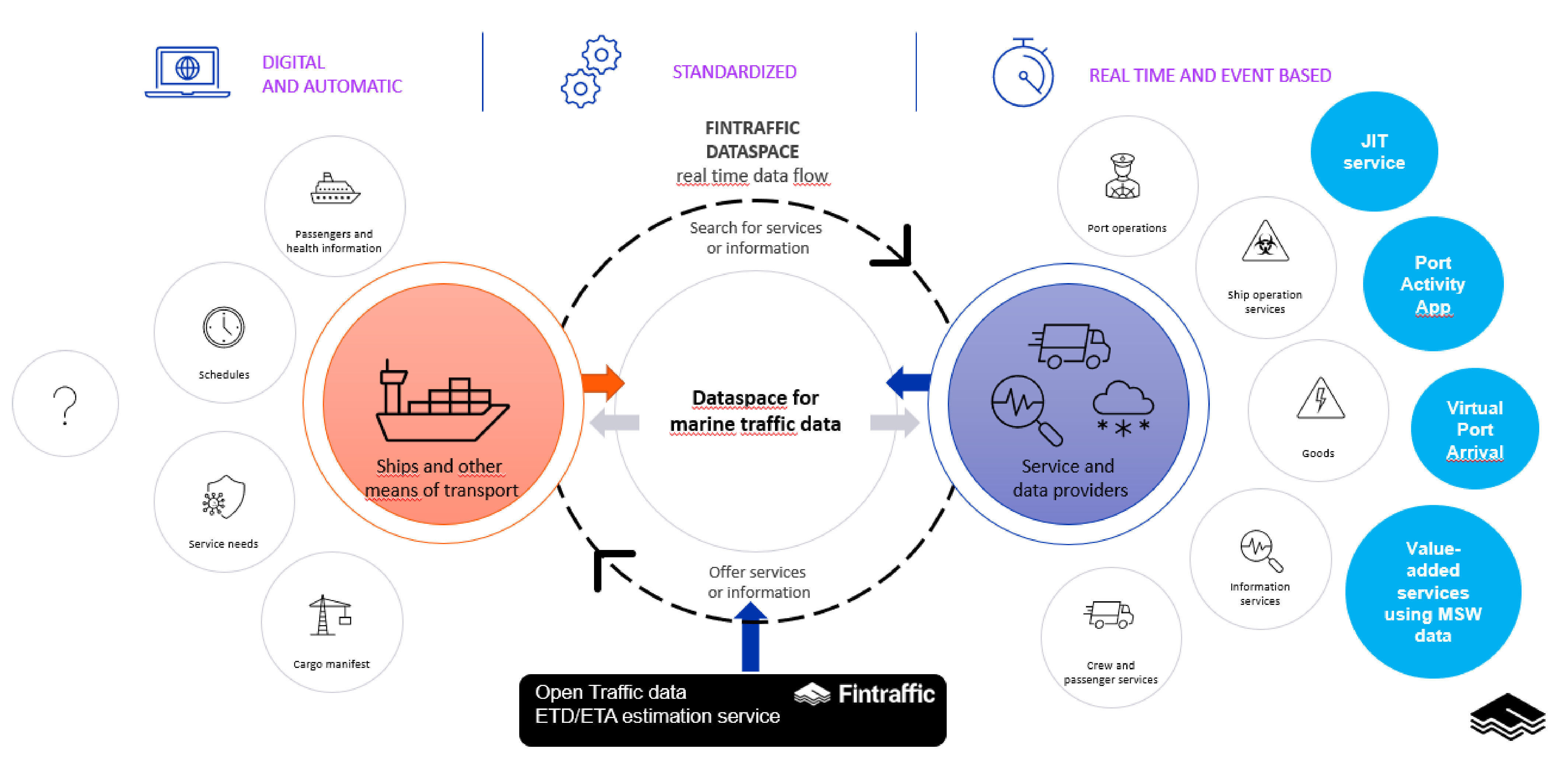
12 Integrations with authorities

13 Optimized departure time

14 Utilization of data products

15 Increasing productivity

Data space for marine traffic and logistics data



Ship port control

- Ship mooring, unmooring and hauling services
- Pilot order
- Tug order
- Harbor icebreaking
- Information on restrictions on port assistance

METOC and port information

- Weather data: Water level, Wind data
- Pier information: minimum length and draft
- Preliminary information on the port: situation and schedule of berths, moorings
- Winter shipping materials (ice charts, etc.)

Crew related services

- Crew transportation
- Crew changes (customs)
- Crew accommodation services
- Catering orders
- Health testing and COVID testing
- Making a maritime health declaration
- Comprehensive crew lists for authorities (PTR)
- FAL Supplementing passenger and crew information with shipping company information

Passenger related services

- Passenger transport
- Subscription for assisted passenger (disabled) assistance service
- Health testing and COVID testing

Ship operation services

- Maintenance - related services
- Sanitation inspection order
- Ship security services, eg law enforcement
- Orders for various inspections
- Up-to-date ship depth information
- Icebreaking assistance plans
- Billing services for paid services
- Various reporting services (waste, security screening)
- Preliminary inquiries and instructions / restrictions for VA cargoes
- Receipt of dangerous goods
- Time of service deliveries
- Time information services for various events: VTS area, pilot station, pier, etc.
- Announcements of registration numbers of future cars

Commodities and waste

- Water sales
- Waste collection or receipt
- Bunker order
- Shore power

Transmission of ship and cargo information to port operators

- Desired lead time window related to ship deliveries
- Continuous transmission of real-time vessel time data (intelligent EEA times)
- Port-specific ISPS formalities: driving licenses, security regulations, route signs, port maps
- Transmission of unloading time information to all ro-ro units (currently only for trailers)
- Ro-ro traffic: a standard database for ship traffic for professional traffic
- From land to sea: land consignment note (eFTI) linked to the cargo unit in question
- Messaging service between the land freight side and the shipping companies
- Port billing information - freight charge discounts, congestion charges, etc. information needs
- Comprehensive (more accurate) cargo, ie cargo manifest information for Customs

Value-added services for land logistics operators

- Real-time scheduling information related to the arrival of the vessel for land transport operators
- Traffic light rhythm and traffic control solutions
- Maps and routes of the port area compiled for land transport operators
- Preliminary information on traffic disruptions and estimated additional time, eg by SMS message
- Route guidance optimized for conditions for freight traffic
- Land cargo tracking data to port: time of arrival of cargo or unloading equipment at port.
- Cargo tracking solution in port: the time

General information services and functionalities

- Interfaces to historical data
- Communication services between actors
- Alarm function related to NEMO data
- Age of assessment data and providing authority
- Wolt-like service for goods obtained from outside the port
- Automation of bus charges

Maritime Data Space

Data Spaces Start-up Checklist

DATA SPACES SUPPORT CENTRE

- Business
  - How does the data space create value?
  - Who are the active stakeholders or participants of the data space?
  - What is the business and governance model of the data space?
  - What are the individual and collaborative business models (Incentives) for actors in the data space?
- Legal
  - What legal aspects are relevant to navigate when setting up a data space?
  - What are the legal requirements and challenges?
  - What are the legal dimensions of data governance?
  - How can data spaces ensure the full uptake of EU values?
- Operational
  - What is the operational governance framework for the data space?
  - What day-to-day activities and processes are essential for sustaining a data space?
- Functional
  - What core functionality should a data space offer?
  - What are the essential building blocks that make up each functionality?
- Technical
  - What are the formal and de-facto standards that should be followed when deploying a data space?
  - What software requirement specifications to use as references when implementing a data space?
  - Which open source software implementations are compliant with the recommended standards and specifications?

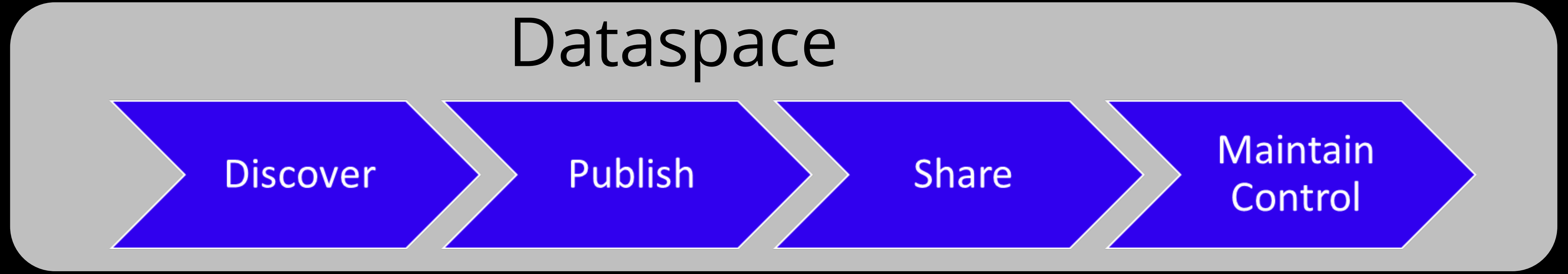
Data Space operator

Fintraffic

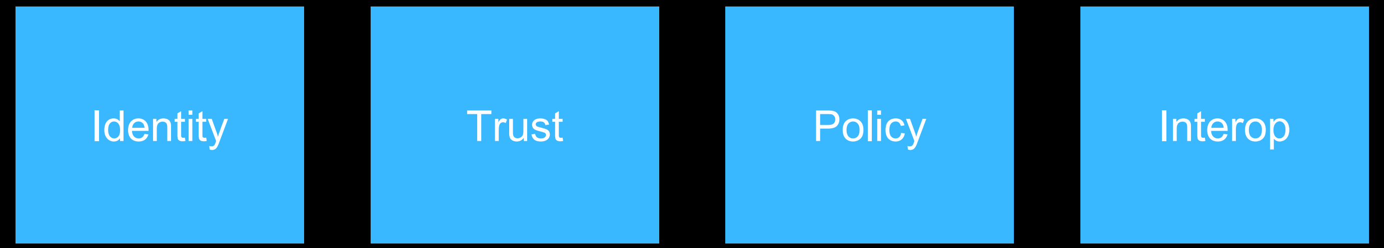
Just-in-Time arrivals Optimizing the arrival and departure times in port visits based on predictive analysis.	Virtual port arrival Agree vessel line-up and schedule port arrivals through data-focused collaboration and information sharing among stakeholders.	gaia-x	
Business case: Reduce time at port Optimise fuel consumption			
awake.ai	SIILI	**Data space Partner**	
E&S Tankers	ESL Shipping	**Shipping company**	
BOREALIS	SSAB, YARA	**Cargo owner**	
	Oxelösunds Hamn AB PORT OF RAAHE RAAHEN SATAMA	**Port**	

The four technology pillars of a dataspace

- A dataspace is a way for organizations to securely share with other participants
- Dataspaces are built on identity, truest, policy and interoperability

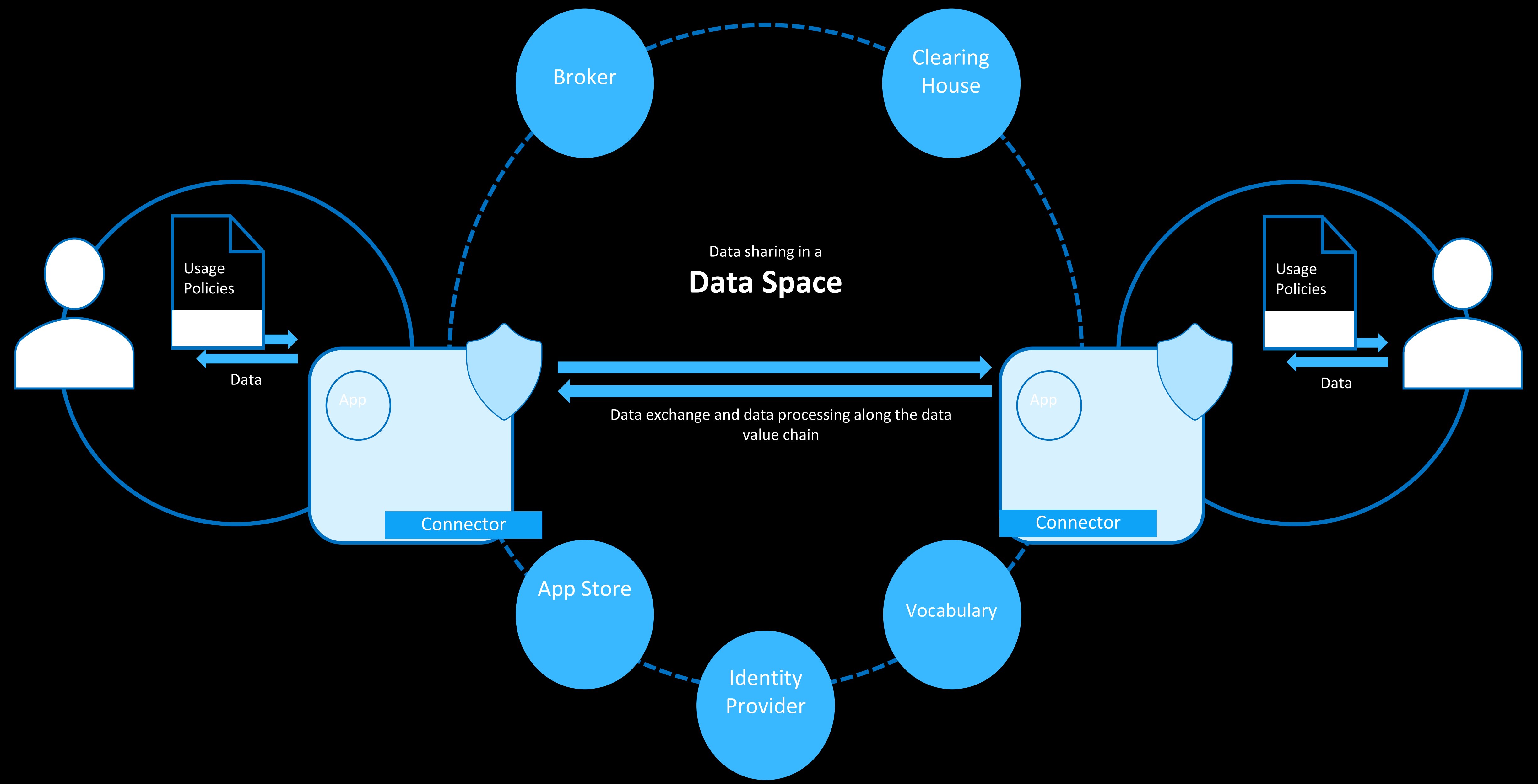


Each participant remains in control of their identity
Each participant decides who to trust



Each participant decides under what policies data is shared
Each participant remains in control of their infrastructure

Data Space Basic Flow

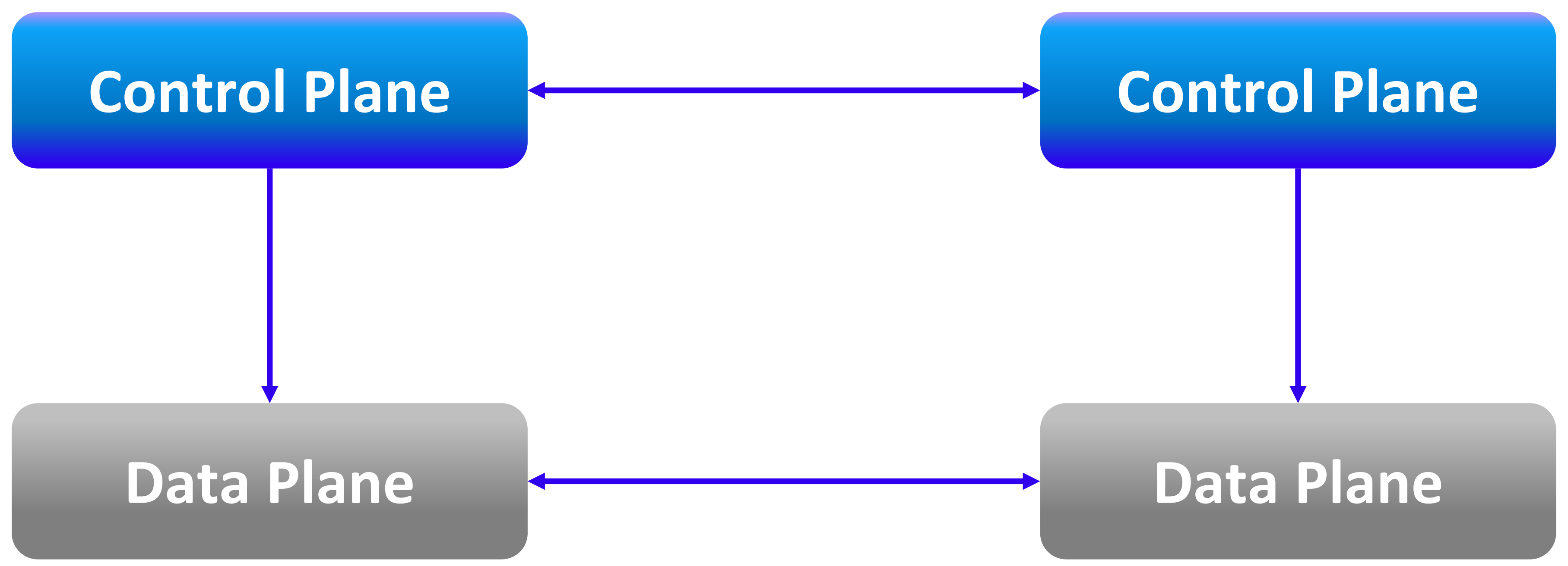


CORE PARTICIPANT	Data Owner	Legal entity or natural person creating data and/or executing control over it.
	Data Provider	Data Provider makes data available for being exchanged between a Data Owner and a Data Consumer. Data Provider is in most cases identical with the Data Owner, but not necessarily.
	Data Consumer	A participant that receives data from a Data Provider, in the form of a Data Product. The data is used for query, analysis, reporting or any other data processing.
	Data User	Similar to the Data Owner being the legal entity that has the legal control over its data, the Data User is the legal entity that has the legal right to use the data of a Data Owner as specified by the usage policy. In most cases, the Data User is identical with the Data Consumer.
	App Provider	App Providers develop Data Apps to be used in the Data Spaces. To be deployable, a Data App has to be compliant with the system architecture
INTERMEDIARY	Broker Service Provider	Stores and manages information about the data sources available in the Data Spaces (metadata repository)
	Clearing House	Provides clearing and settlement services for all financial and data exchange transactions. Clearing activities are separated from broker services, since these activities are technically different from maintaining a metadata repository
	Identity Provider	Service to create, maintain, manage, monitor, and validate identity information of and for participants in the Data Spaces. This is imperative for secure operation of the Data Spaces and to avoid unauthorized access to data.
	App Store Provider	The App Store provides Data Apps. These are applications that can be deployed inside the Connector, the core technical component required for a participant to join the Data Spaces. Data Apps facilitate data processing workflows.
	Vocabulary Provider	Manages and offers vocabularies (i.e., ontologies, reference data models) that can be used to annotate and describe datasets
SOFTWARE / SERVICE PROVIDER	Service Provider	If a participant does not deploy the technical infrastructure required for participation in the Data Spaces itself, it may transfer the data to be made available to a Service Provider hosting the required infrastructure for other organizations
	Software Provider	Provides software for implementing the functionality required by the Data Spaces. Unlike Data Apps, software is not provided by the App Store, but delivered over the Software Providers' usual distribution channels
GOVERNANCE BODY	Certification Body	The Certification Body, together with selected Evaluation Facilities, is in charge of the certification of the participants and the core technical components in the Data Spaces. These Governance Bodies make sure that only compliant organizations are granted access to the trusted business ecosystem. In this process, the Certification Body supervises the actions and decisions of the Evaluation Facilities.
	Evaluation Facilities	

One size does not fit all

Control Plane and Data Plane

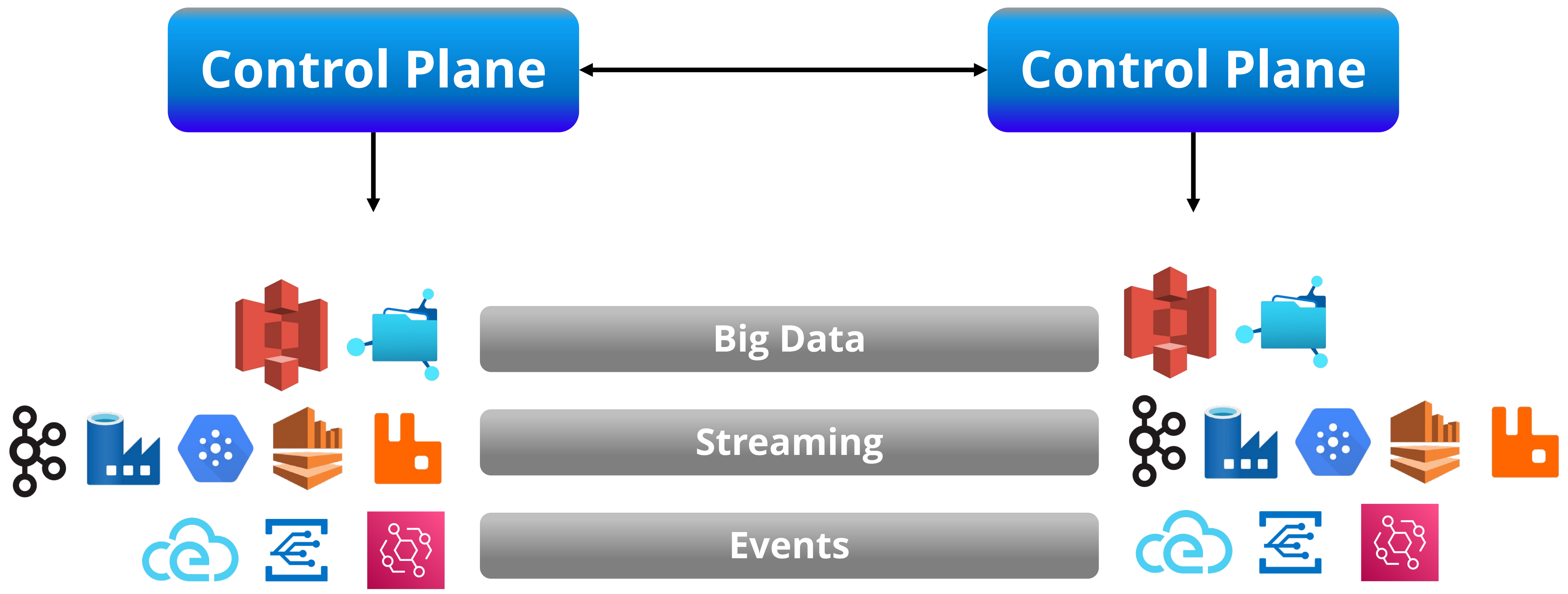
▪ The EDC Connector is divided into two subsystems, a control plane and data plane



- Verification
- Contract negotiation
- Policy enforcement
- Provisioning

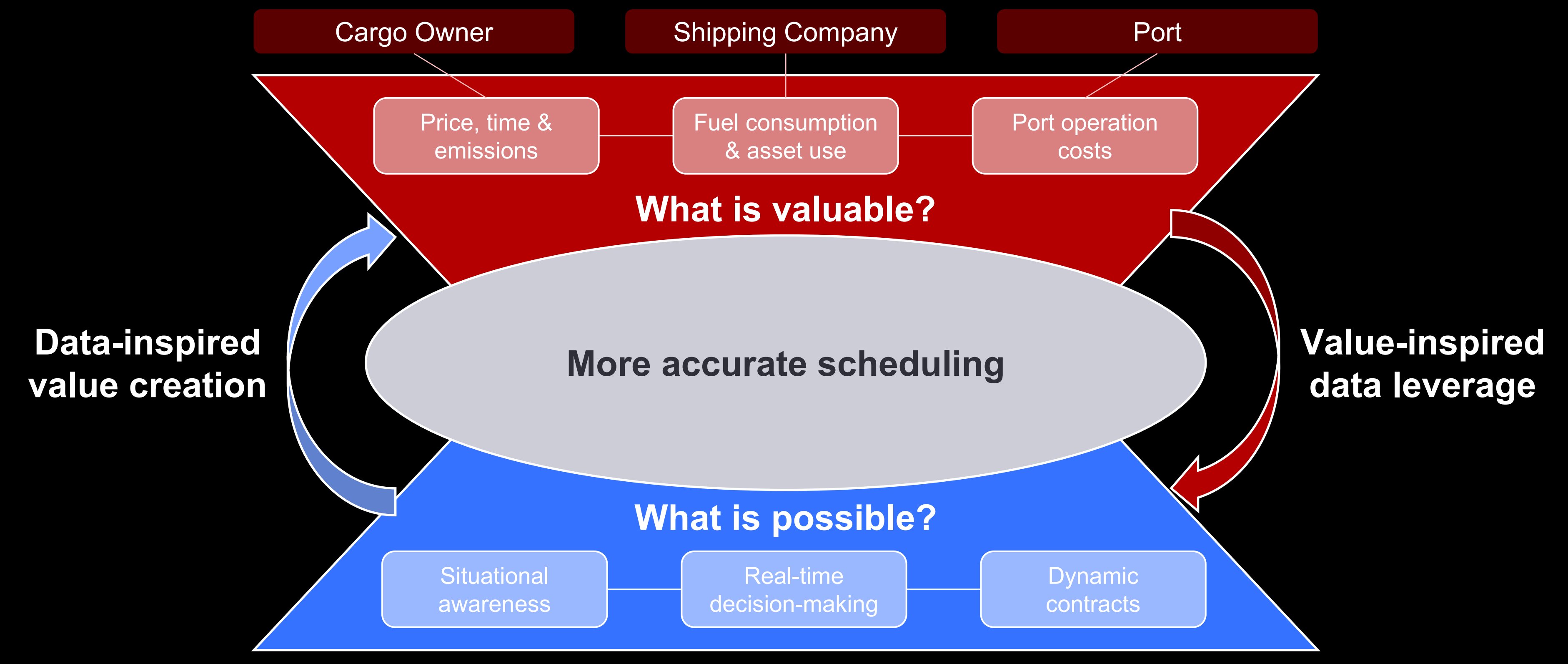
- Moves bits
- Big Data
- Streaming
- Events

▪ Utilize Data Plane technology that best meets the requirements

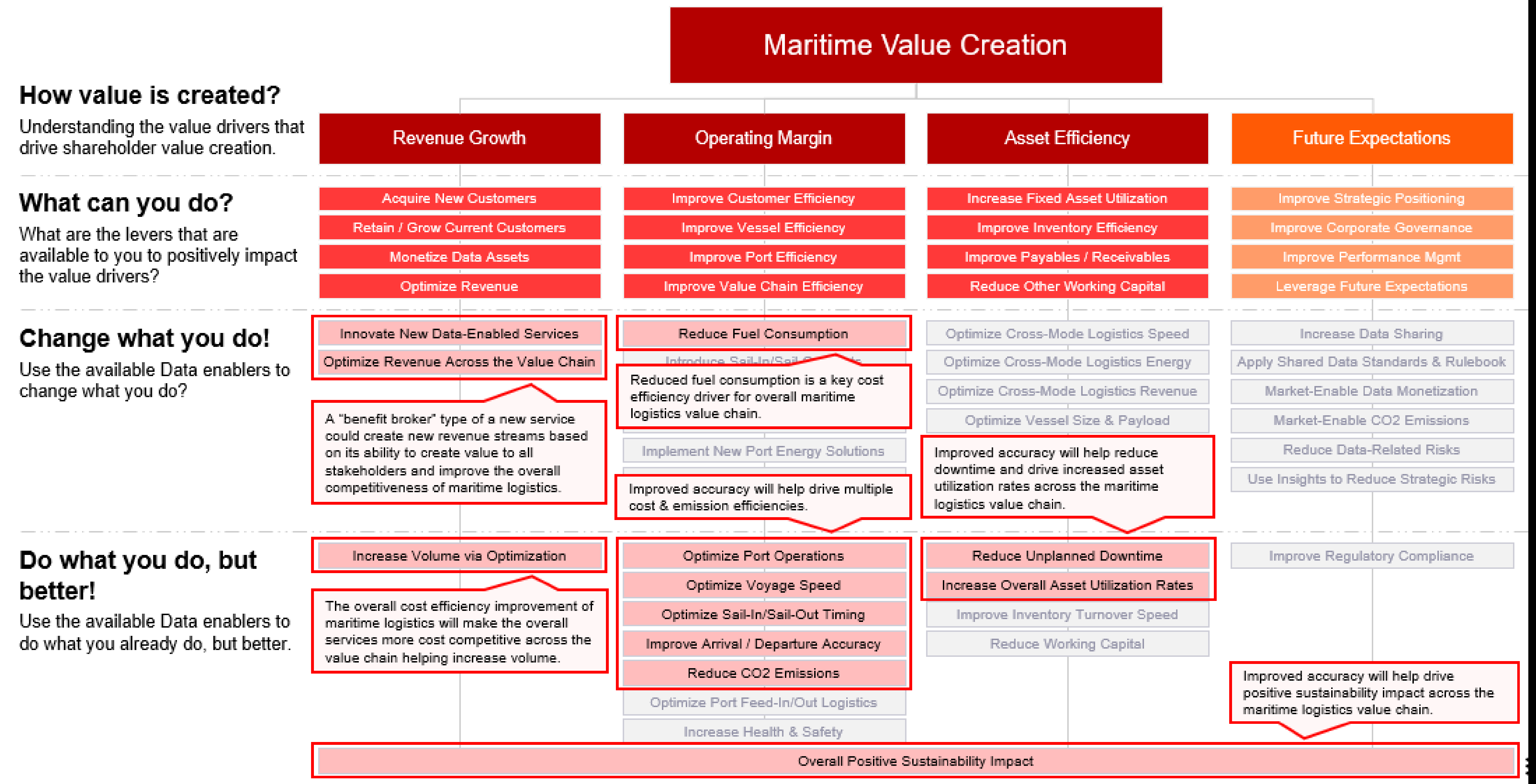


Value potential

Maritime Logistics value chain currently compensates individual parties for inefficiencies resulting in costs and CO2 emissions that could be avoided with more accurate value chain wide scheduling capabilities. Maritime Data Space could act as an overall “benefit broker” using its data capabilities to optimize overall costs and emissions across the different stakeholders.



Just In Time (JIT) & Virtual Port Arrival (VPA) value mapping



JIT Case: Identified value potential

Identified data requirements

Reduced vessel turnaround times and CO2 emissions

Data Enablers

- **Situational awareness** – Shared situational awareness and predictions through user interface and APIs.
- **Smart decisions** – Smarter decision making with AI and machine learning.
- **Effective Communication** – Effective communication across the port community.
- **Dynamic Action** – Proactive actions taken to avoid the problems from materializing.

Data Elements / Models

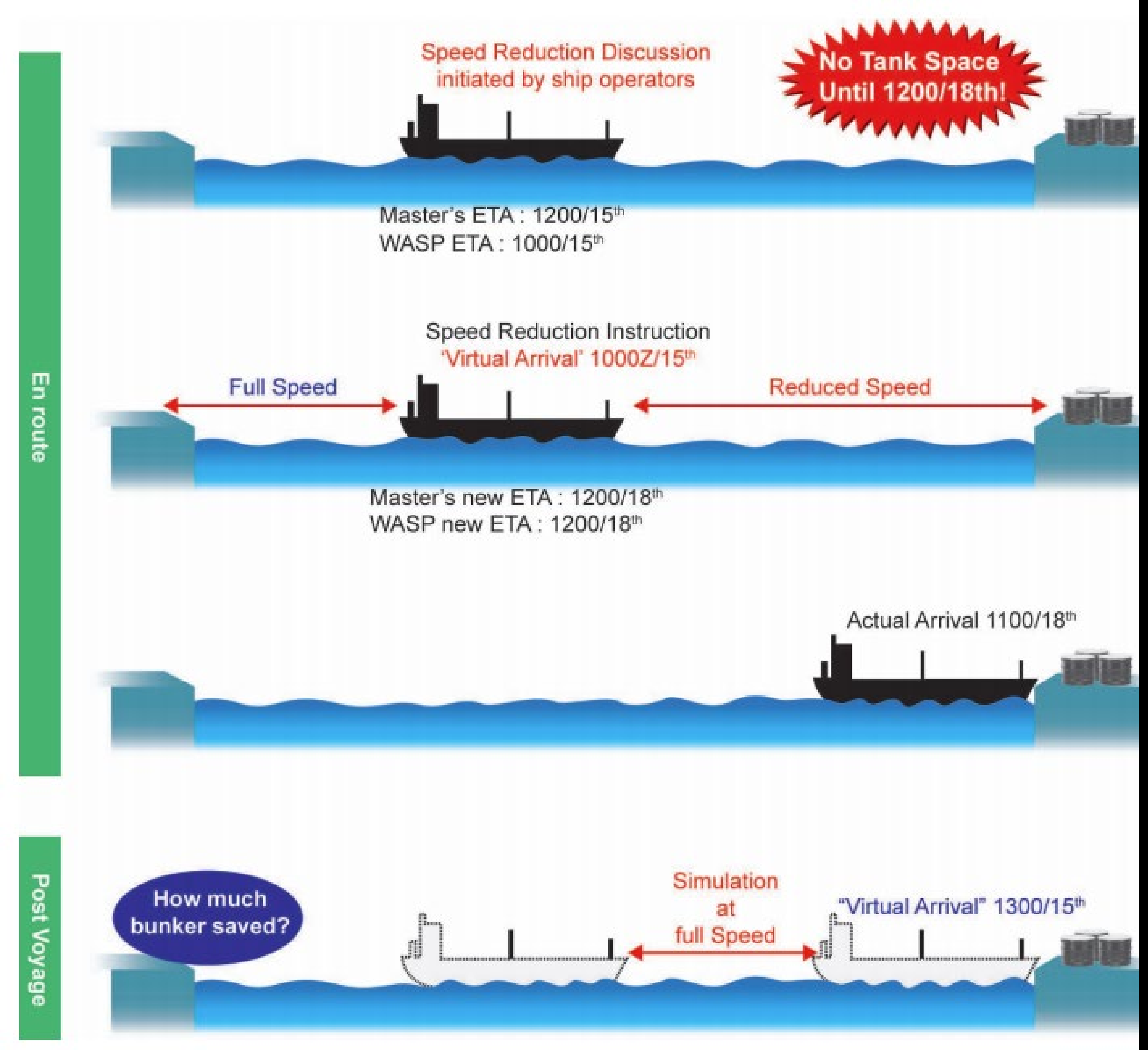
Planned leg schedules	Vessel CO2 emission factor (fixed value for converting bunker consumption to CO2 emissions)
Global vessel location and metadata (terrestrial & satellite AIS)	Reference data for past leg durations, draughts, times, speeds
Global port location and route prediction models	Port congestion models
Vessel bunker consumption data (total consumption + consumption vs leg average draught and speed estimates)	Berth/terminal availability
…	…

JIT Case: Identified value potential

Faster vessel turnaround times and reduced CO2 emissions

	Terminal operator	Port authority	Cargo owner	Ship owner
Value Drivers	27% cost savings in port operations.	21% cost savings with less delays.	20% cost savings with reduced lead times.	20% cost savings with faster turnarounds.
Value Levers	…	…	…	Avoided delays
	…	…	…	Reduced overtime
	…	…	…	Reduced extra port call fees
	…	…	…	Avoided extra chartering costs

Virtual Arrival



Virtual Arrival as a Method to Cut Down Bunker Consumption

Bunker consumption with and without Virtual Arrival based on last 5 legs utilizing VA		
Without VA	With VA	Difference
100 %	82 %	18 %

Credits: ESL Shipping

What next ?

Thank you

Olli Soininen

Head of Programs

Fintraffic VTS

olli.soininen@fintraffic.fi

+358503560611