Digital Twins in a Federated Architecture

UNCEFACT 11 November 2020

Technology Developments : Potential for impacting Cross-Border Trade

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FEDeRATED NETWORK OF PLATFORMS

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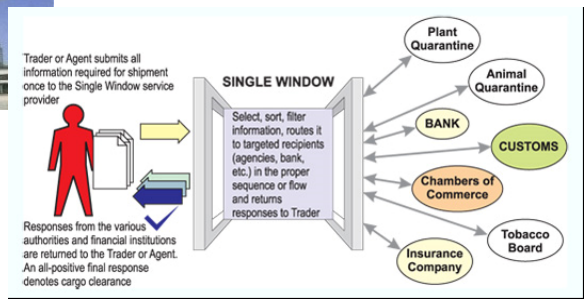
Co-financed by the Connecting Europe Facility of the European Union

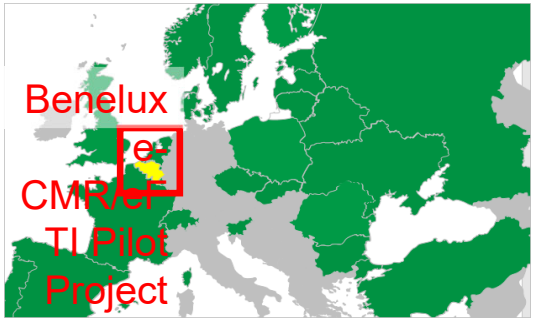
Focus on multi-modal supply chain integration

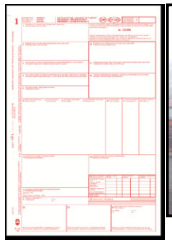
UN/CEFACT, WCO, DG Move DTLF



Fine Art and Luxembourg Freeport

e-CMR BeNeLux, eFTI Luxembourg





Belarus, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Iran, Latvia, Lithuania, Luxembourg, Moldavia, Poland, Portugal, Romania, Slovakia, Slovenia, Netherlands, Norway, Oman, Russia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, UK and Uzbekistan

Digital Europe for Transport and Logistics

EUROPEAN COMMISSION
Directorate-General for Mobility and Transport
INE INLAND NAVIGATION EUROPE
RIS COMEX
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Objectives of this presentation

1. Digital twins: create a common understanding
2. The emerging role of digital twins in cross-border trade and supply chains
3. Digital twins in a federated architecture
4. EU-Gate living lab

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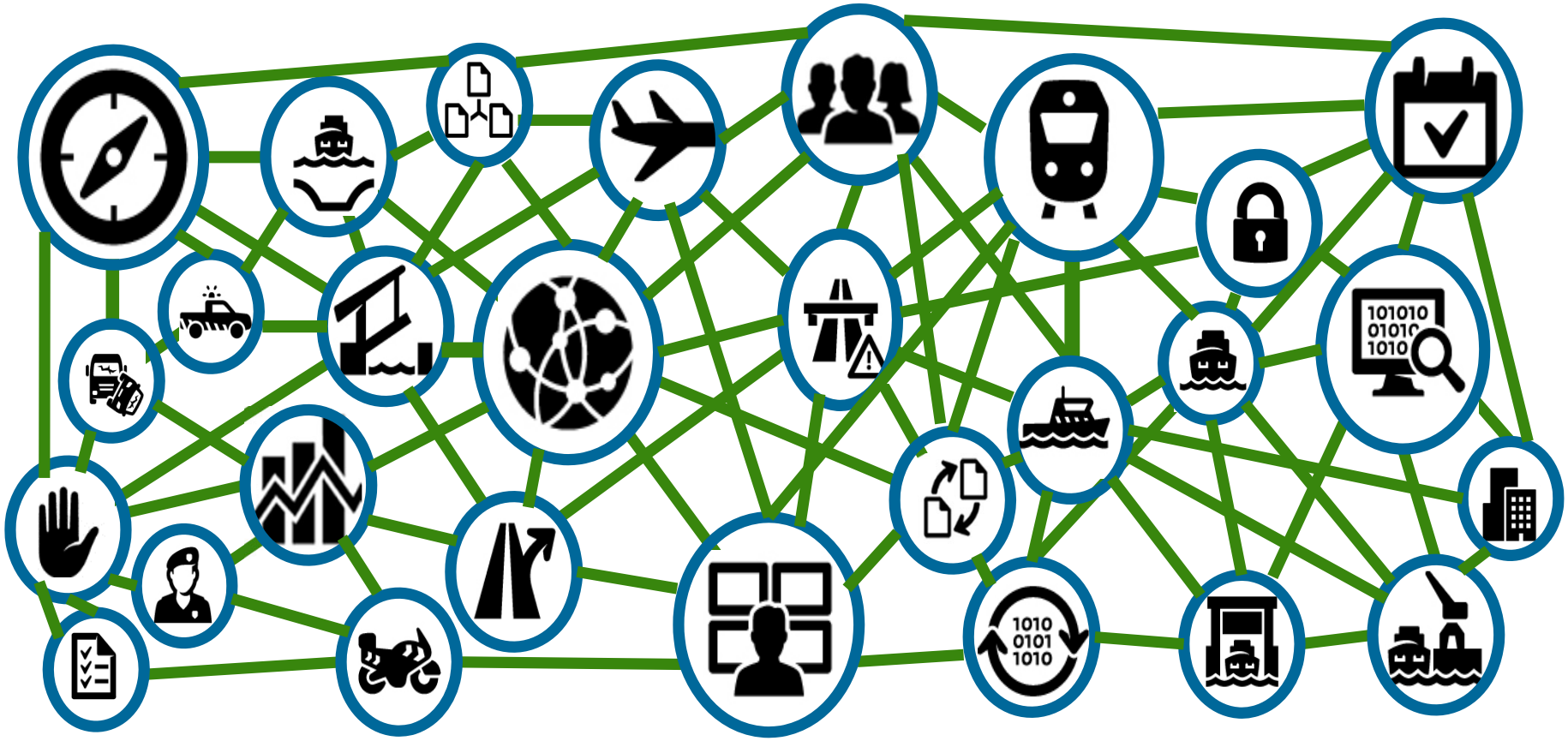
An ideal situation



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Digital twins defined

A digital twin is a digital mirror of a physical entity.

By combining the physical and the virtual world, data is provided enabling the virtual entity to exist at the same time with the physical entity.

- *Share data with multiple eco systems*
- *Real-time analysis, prediction and exception management*
- *IoT, big data and could computing, AI, augmented reality provide intelligence to simulate and steer the behavior physical objects*

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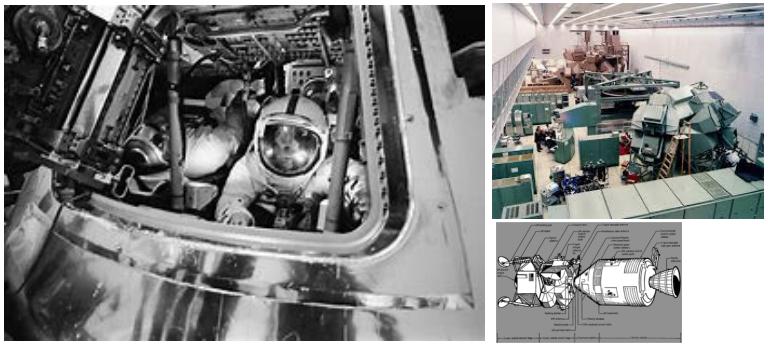
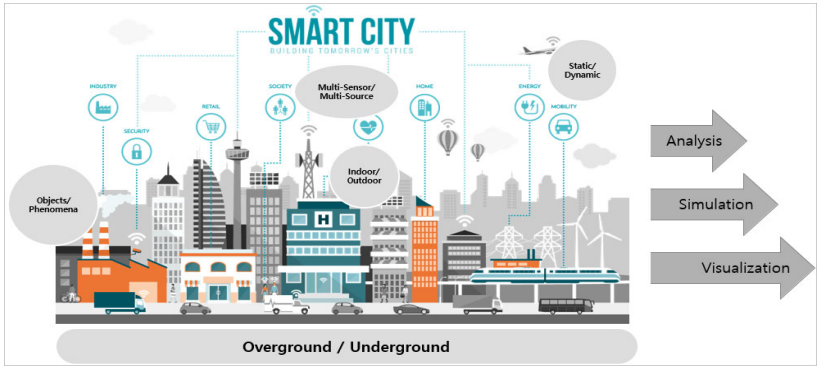
digital twins are evolving over time

Apollo 13 : the first digital twin



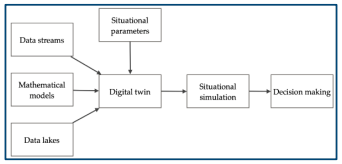
https://blogs.sw.siemens.com/simcenter/apollo-13-the-first-digital-twin/

Smart City as a Digital Twin



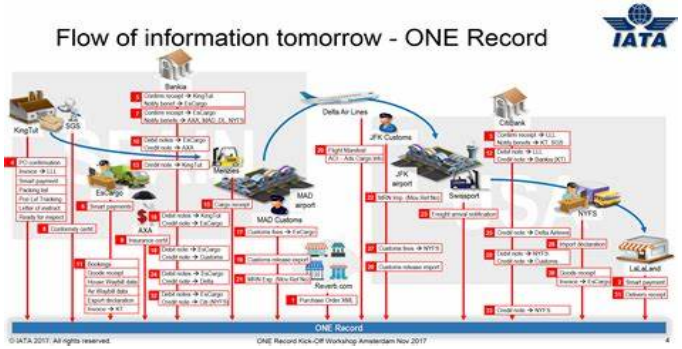
<Source: https://www.arcweb.com/ja/node/149>

Digital Twins for the Maritime Sector



https://maritime-executive.com/editorials/digital-twins-for-the-maritime-sector

IATA OneRecord Virtual Shipment Record



IATA OneRecord Portal

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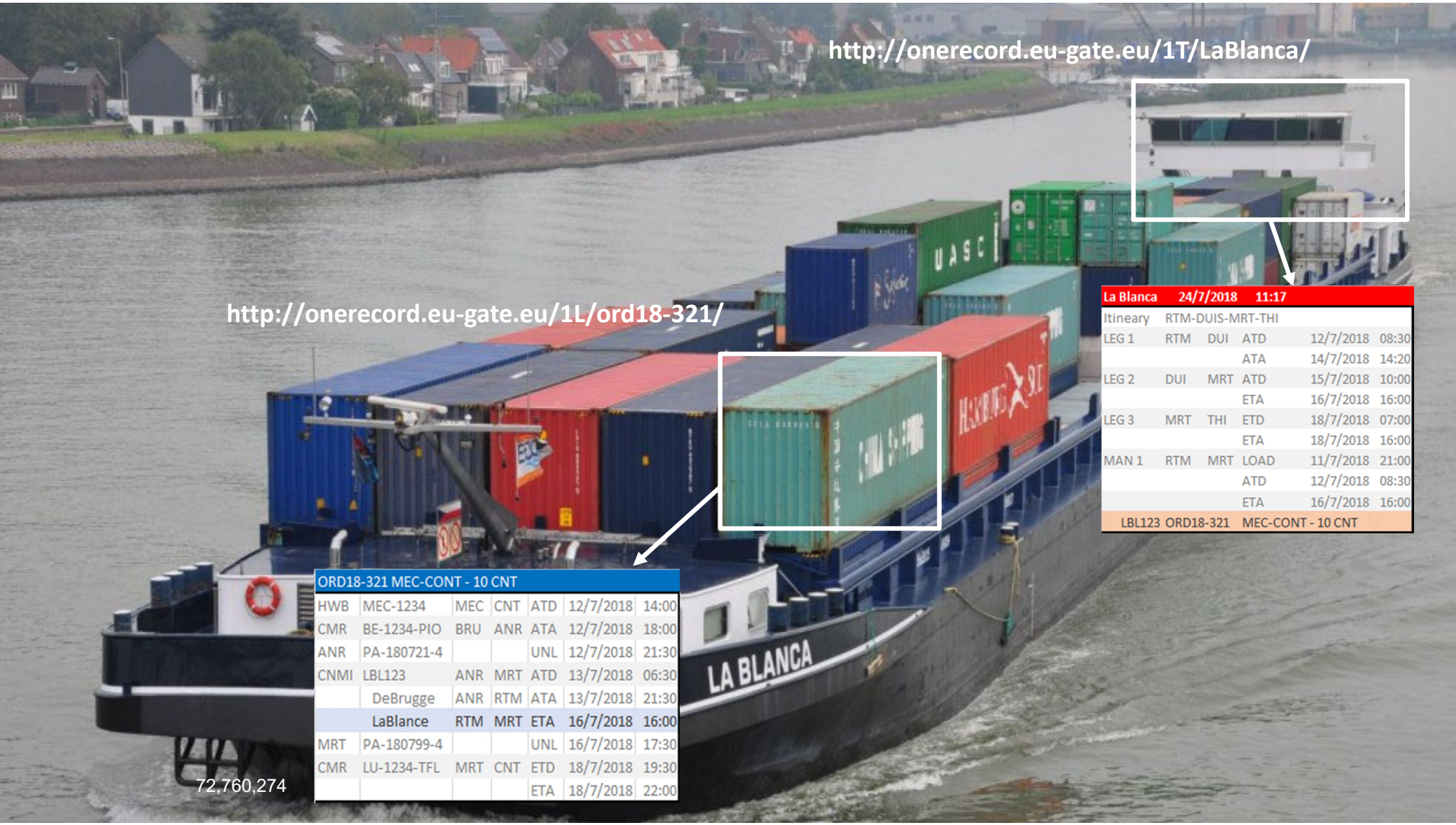

La Blanca	24/7/2018	11:17			
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LEG 1	RTM	DUI	ATD	12/7/2018	08:30
			ATA	14/7/2018	14:20
LEG 2	DUI	MRT	ATD	15/7/2018	10:00
			ETA	16/7/2018	16:00
LEG 3	MRT	THI	ETD	18/7/2018	07:00
			ETA	18/7/2018	16:00
MAN 1	RTM	MRT	LOAD	11/7/2018	21:00
			ATD	12/7/2018	08:30
			ETA	16/7/2018	16:00
LBL123	ORD18-321		MEC-CONT - 10 CNT		

ORD18-321 MEC-CONT - 10 CNT						
HWB	MEC-1234	MEC	CNT	ATD	12/7/2018	14:00
CMR	BE-1234-PIO	BRU	ANR	ATA	12/7/2018	18:00
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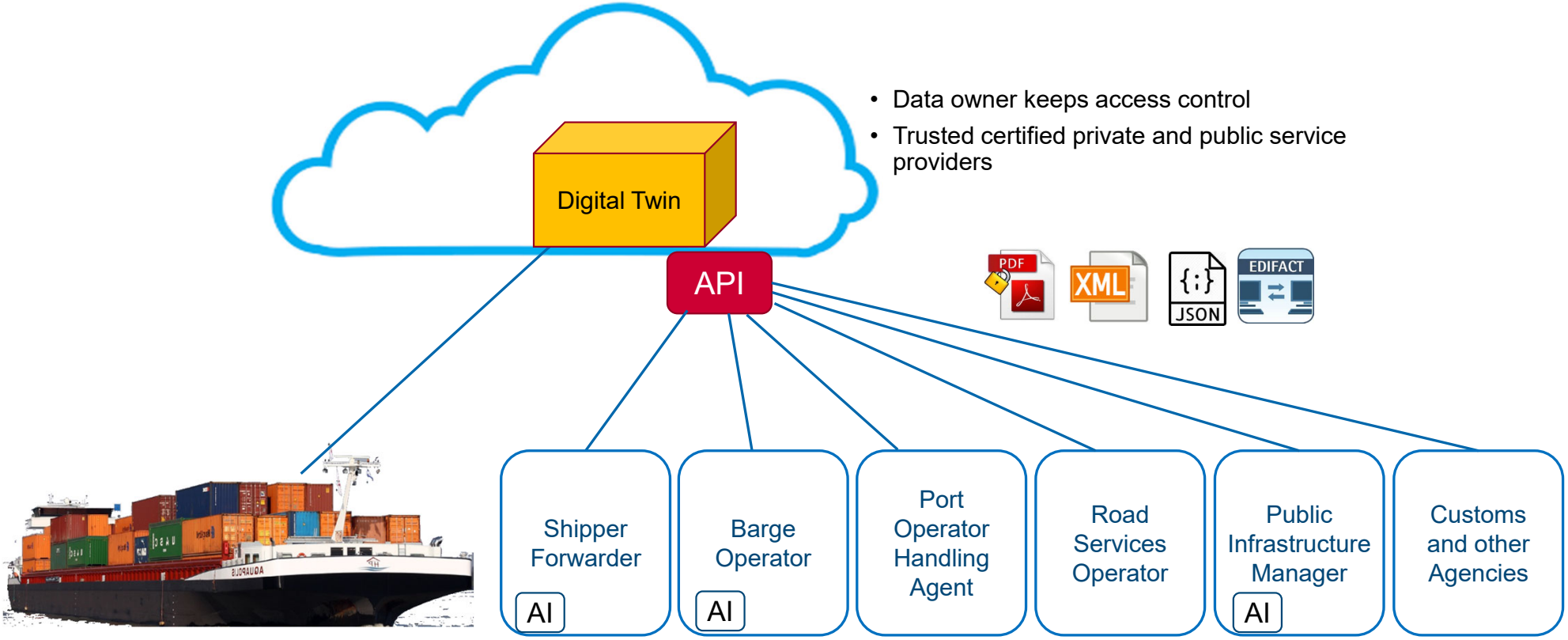
CNMI	LBL123	ANR	MRT	ATD	13/7/2018	06:30
	DeBrugge	ANR	RTM	ATA	13/7/2018	21:30
	LaBlance	RTM	MRT	ETA	16/7/2018	16:00
MRT	PA-180799-4			UNL	16/7/2018	17:30
CMR	LU-1234-TFL	MRT	CNT	ETD	18/7/2018	19:30
				ETA	18/7/2018	22:00

A digital twin for inland navigation

A digital twin dataset to capture all data that will be shared between the barge operator, trusted supply chain partners and government authorities



- Data owner keeps access control
- Trusted certified private and public service providers

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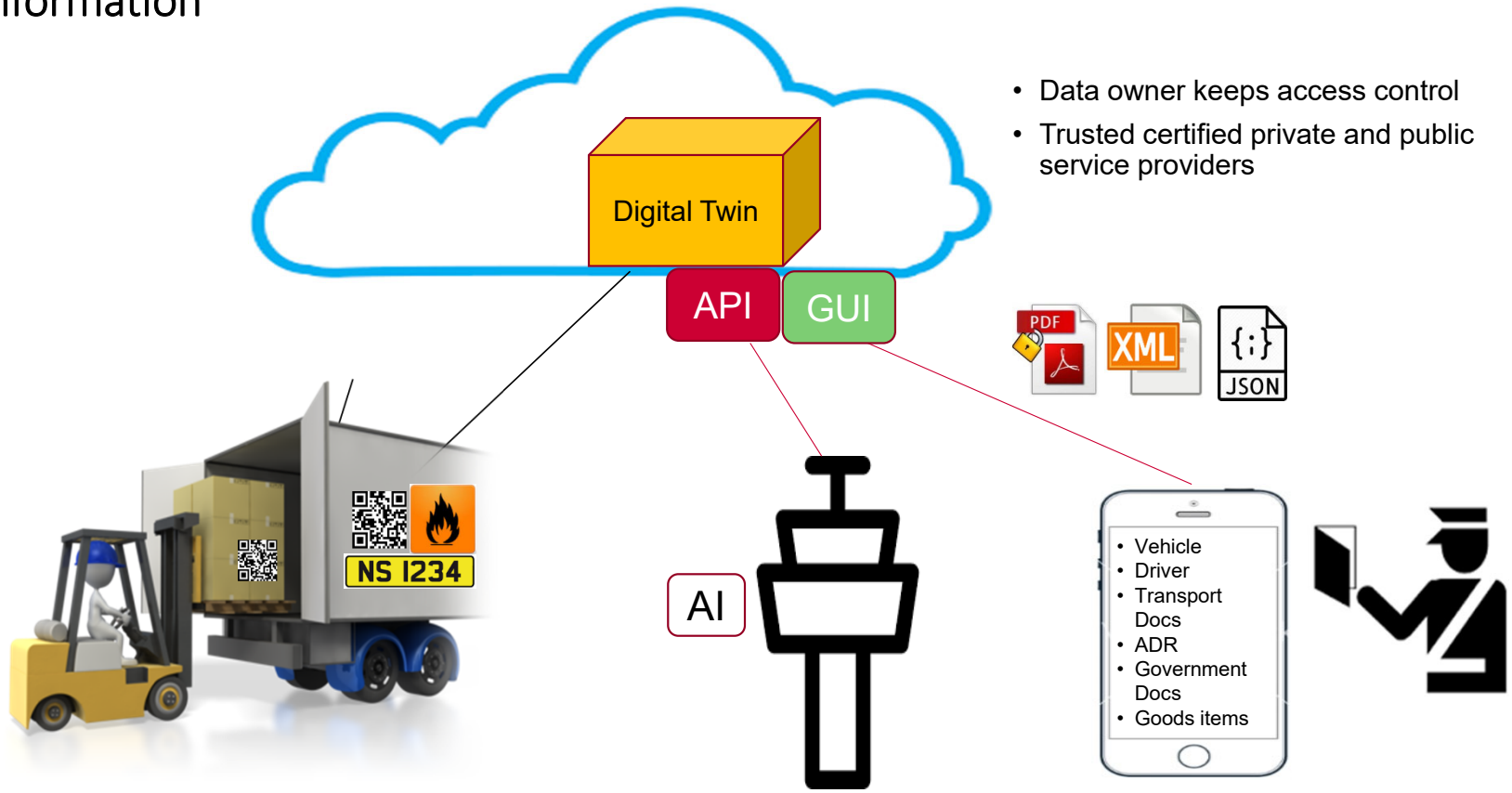
A digital twin for road transport

e-CMR service providers offer their customers with a direct online access to latest updated information



- Data owner keeps access control
- Trusted certified private and public service providers

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Business Opportunity

Belgian e-CMR Survey (2019)

link to analysis of survey

VBO Verbond van Belgische Ondernemingen | FEB Fédération des Entreprises de Belgique

ASA DAV

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€ 13,11

Paper CMR	e-CMR
€ 22,83	**€ 9,72**
€ 8,95	**€ 2,51**
€ 11,56	**€ 6,04**
€ 2,32	**€ 1,16**

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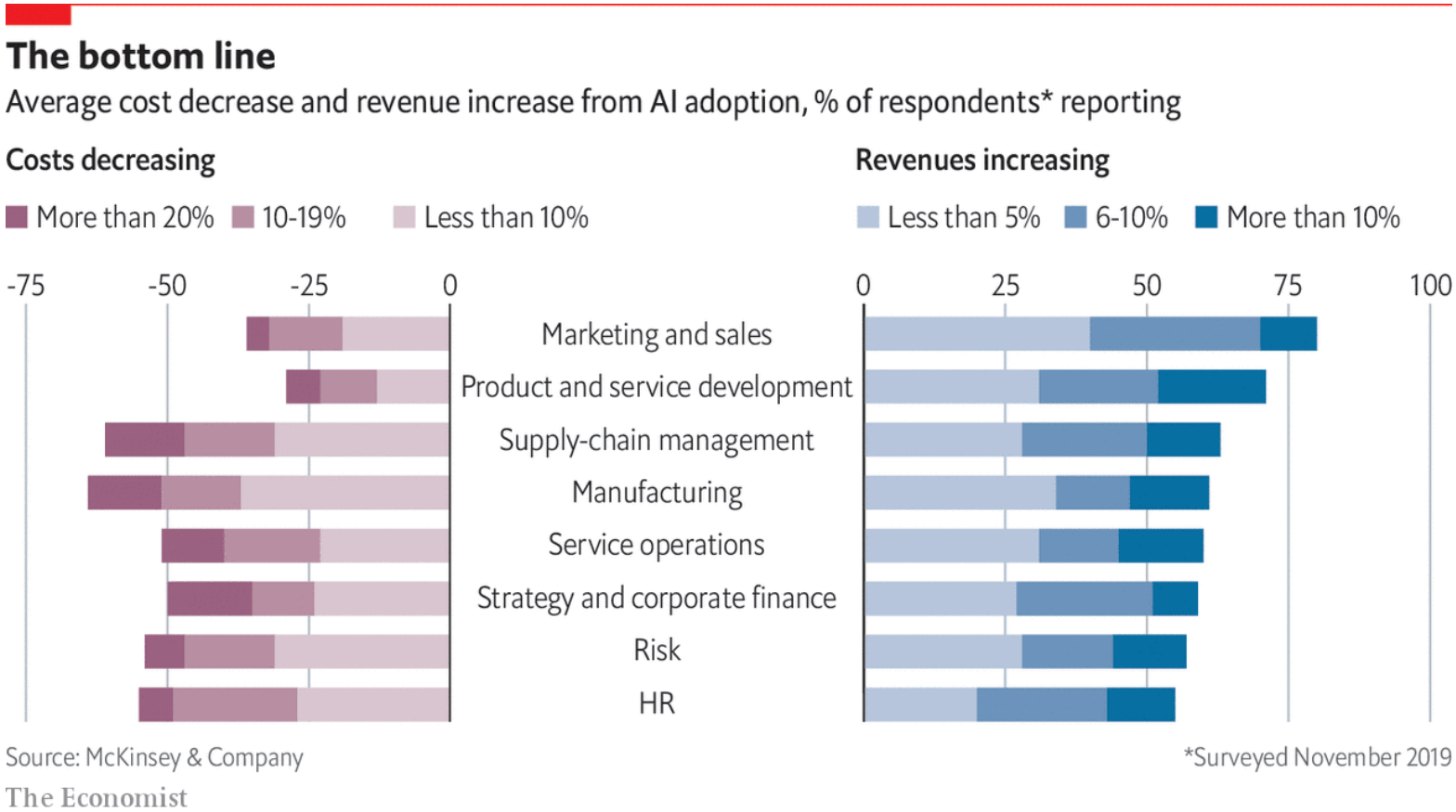
The impact from AI adoption



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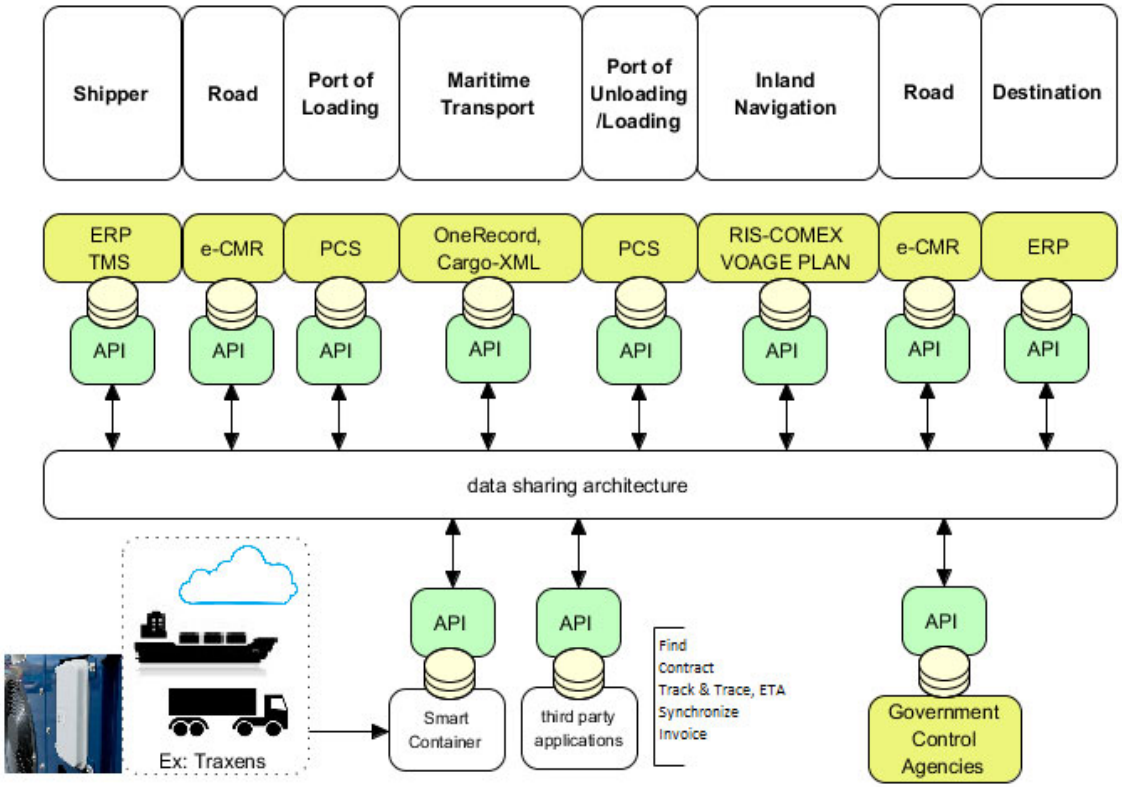
The role of a data sharing infrastructure

Sharing data between the logistics chain, barge operator and IWT infrastructure managers.
We need standards that are global, open, neutral and multimodal



eFTI dataset
API
Publish/subscribe events
Authorisation

Authentication
Service registry

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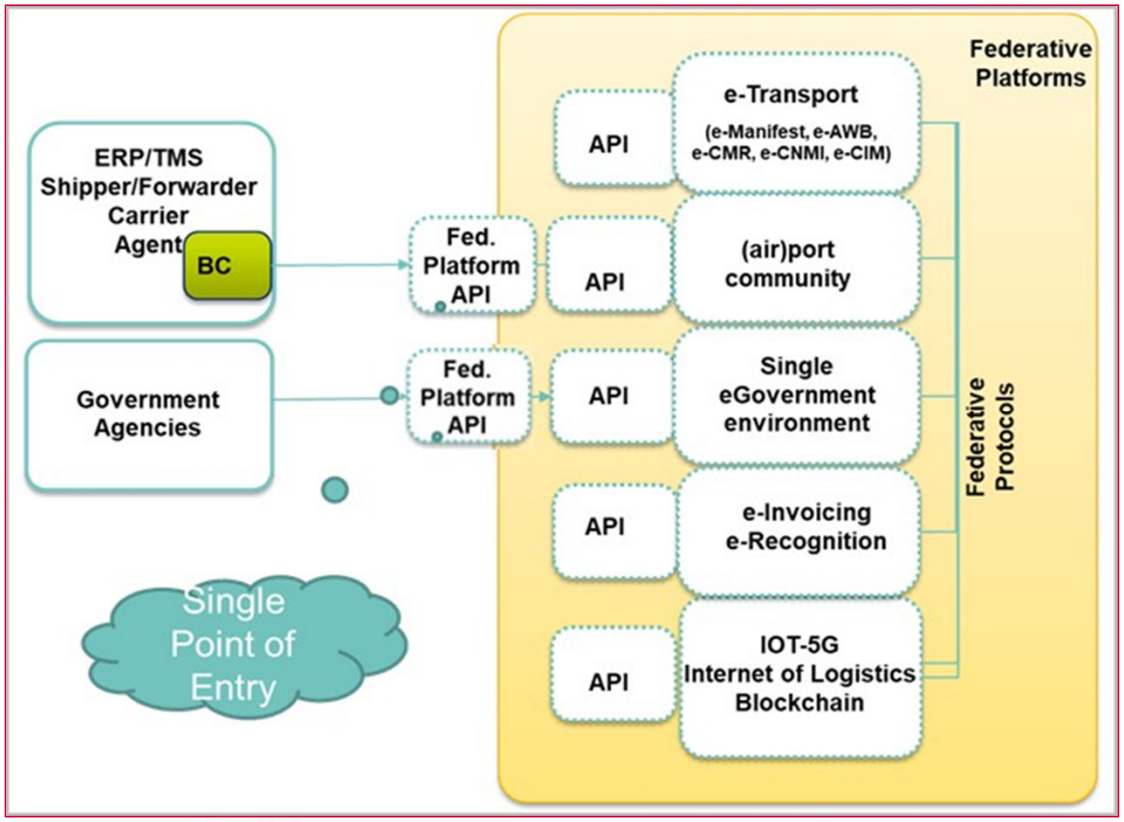
EU-CEF Funded Consortium (2019-2023)



Project partners

Netherlands
Finland
Sweden
Spain
Italy

IATA
OneRecord

51Biz-PPMB
Luxembourg

Active observers

Germany
Estonia
Latvia
Portugal
Benelux

Non-EU pilots

Norway
Singapore
India
China

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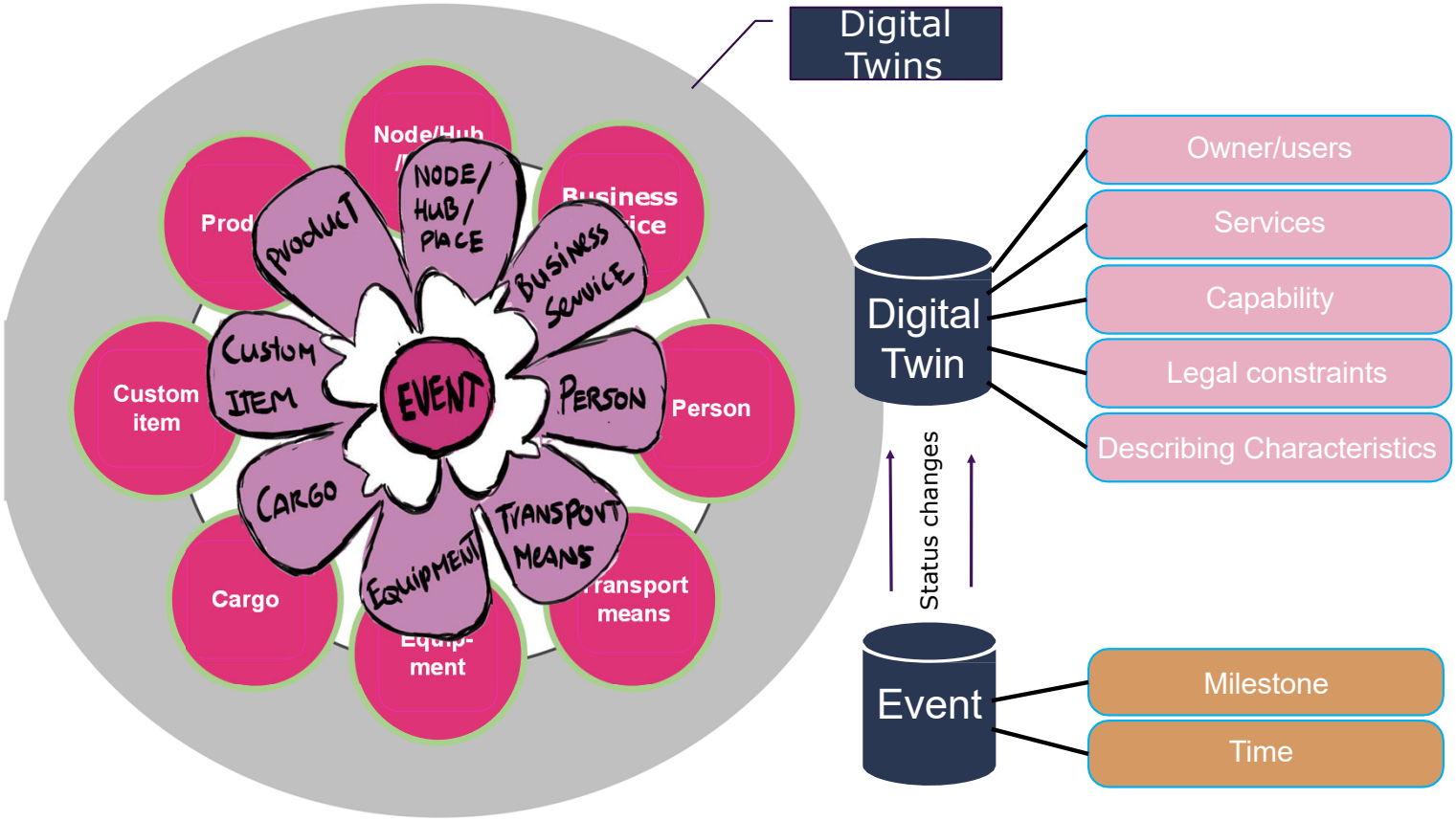
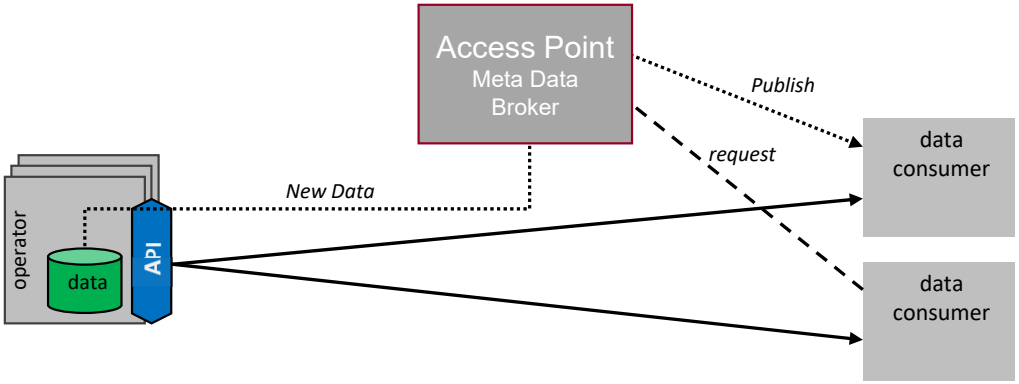
FEDeRATED reference architecture



Towards an Internet of Logistics



GET https://api01.eu-gate.eu/companies/LU51000025/los/cmr_LU123456TFY

ID of document, dataset

Search “logistics objects”

Unique ID of the issuer/owner of a document/dataset

access point storing meta data required to find source of data

Each logistics object has a unique ID and a URI (Unique Resource Index)

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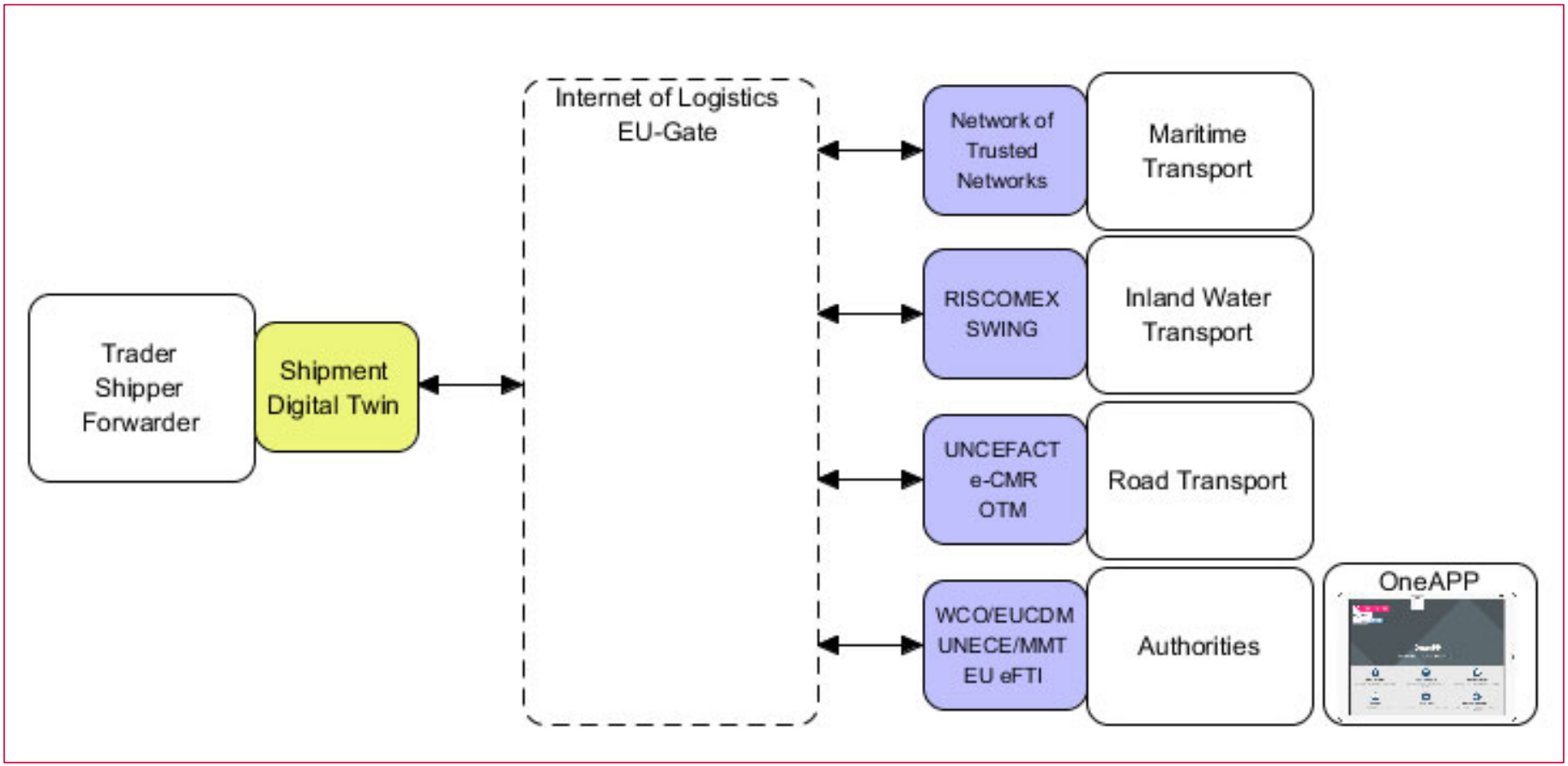
Towards an Internet of Logistics



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EU-Gate e-CMR/eFTI Access Point Living Lab

- EU-Gate Access point
- Living lab of EU-Funded FEDeRATED consortium
- Pilot project of IATA OneRecord
- Use real-world multi-modal reference supply chains
- Create a common understanding about eFTI
- Version “minus 27”

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Conclusions

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http://www.federatedplatforms.eu

1. Digital twins in cross border supply chains
   - Mirror of physical logistics objects
   - Share data with multiple data eco systems
   - Enable intelligent and autonomous transport
   - Share events by publish/subscribe
2. FEDeRATED data sharing infrastructure
   - Internet of logistics
   - Unique ID and IRI
   - API share events by publish/subscribe
   - Common language integrates multiple vocabularies and ontologies