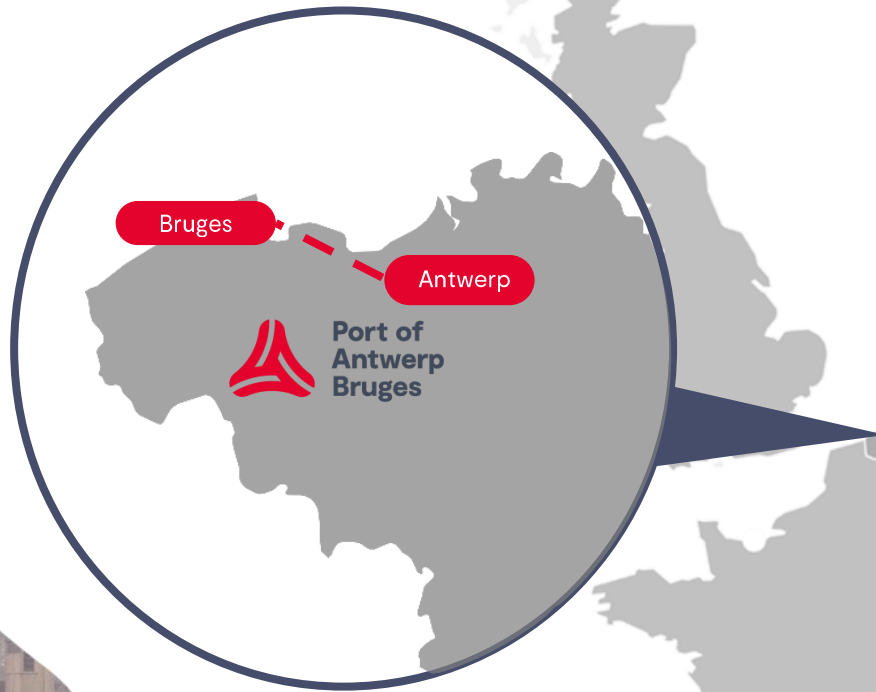


NAVIGATING COMPLEXITY

Harnessing the Power of
Emerging Technologies
in a Port Environment



Port of
Antwerp
Bruges



**A global port
in the heart of Europe**

One port
Two sites



**Port of
Antwerp
Bruges**





2nd largest port in Europe

Transport



20,195
seagoing vessels/year



60k
barges/year



42k
loaded **cargo trains**/year



1,000 km
pipelines



187 **cruise** vessels
1 mio passenger movements

Cargo



Main **chemistry**
hub in Europe

15% of the EU **gas** market



Largest **car handling** port in
Europe

3.2 mio new cars/year



Second **container** port
in Europe



Expertise in **breakbulk**



Belgium's most important
economic driver



14,322

Hectares



1,400

Companies



€ 20,8 billion

Added value



4.5%

GDP

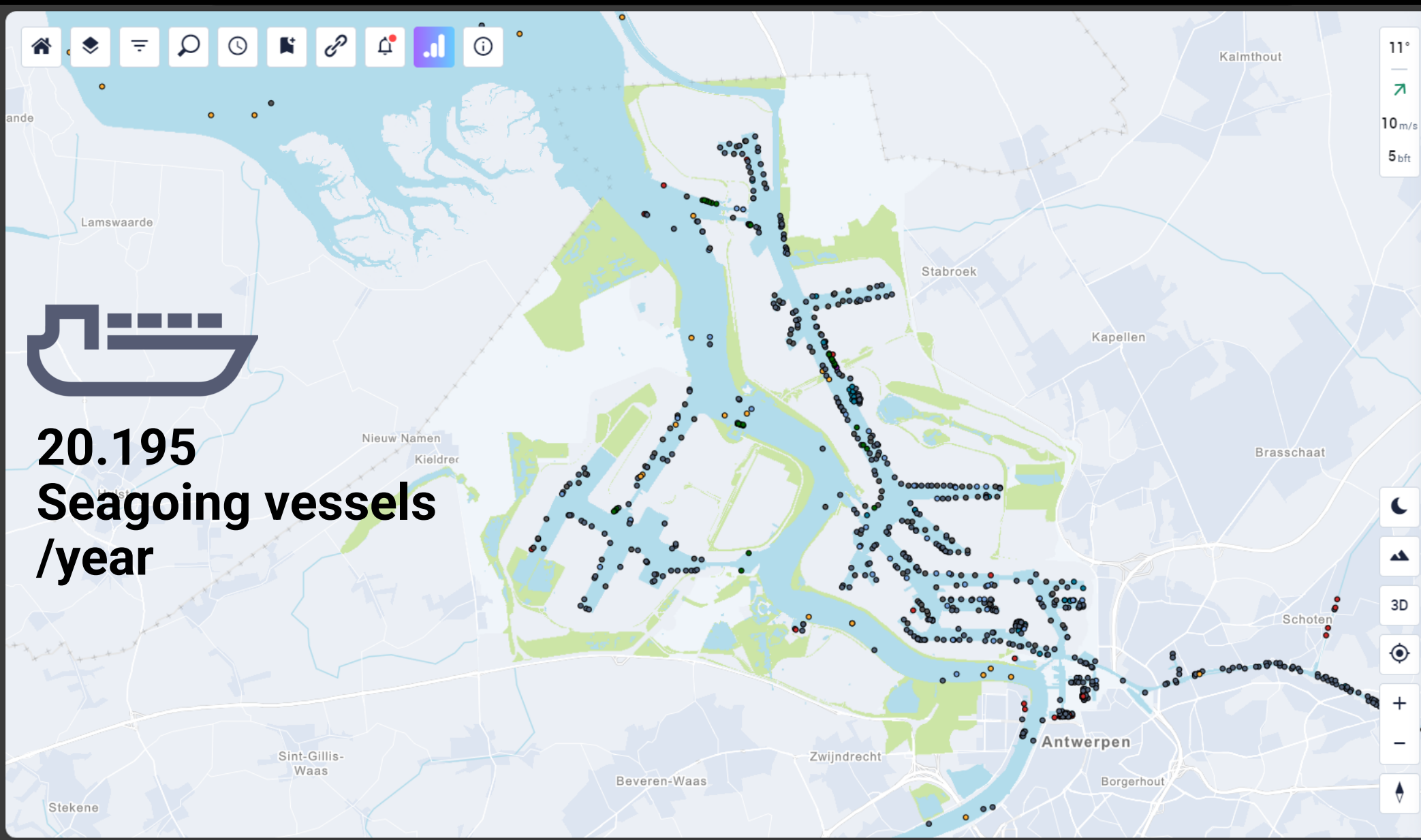


164,000 **jobs**

Direct and indirect



20.195
Seagoing vessels
/year



11°
10 m/s
5 bft



Schepen

Totaal

Mijn view

Zeebrugge

Antwerpen

Totaal

602

Schepen in totaal

Er zijn 26 onbekende schepen

33

Sleepboten

96

Zeeschepen

390

Binnenschepen

53

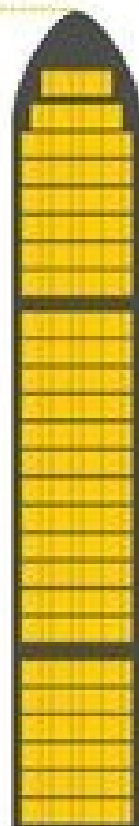
Bunkerschepen

4

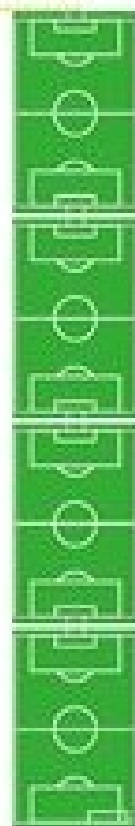
Vrachtduwbakken

IMPRESSIVE DIMENSIONS

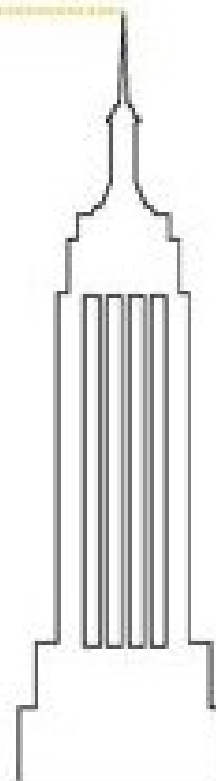
61.5m x 399.9m
MSC GÜLSÜN



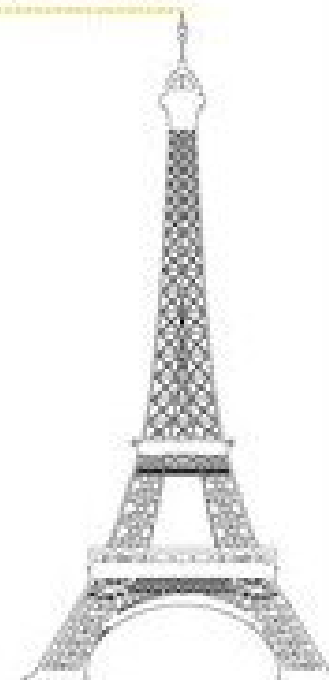
4x (60m x 100m)
4X FOOTBALL FIELDS



381m
EMPIRE STATE BUILDING



324m
EIFFEL TOWER





FACT
Complexity exists.



Port of
Antwerp
Bruges



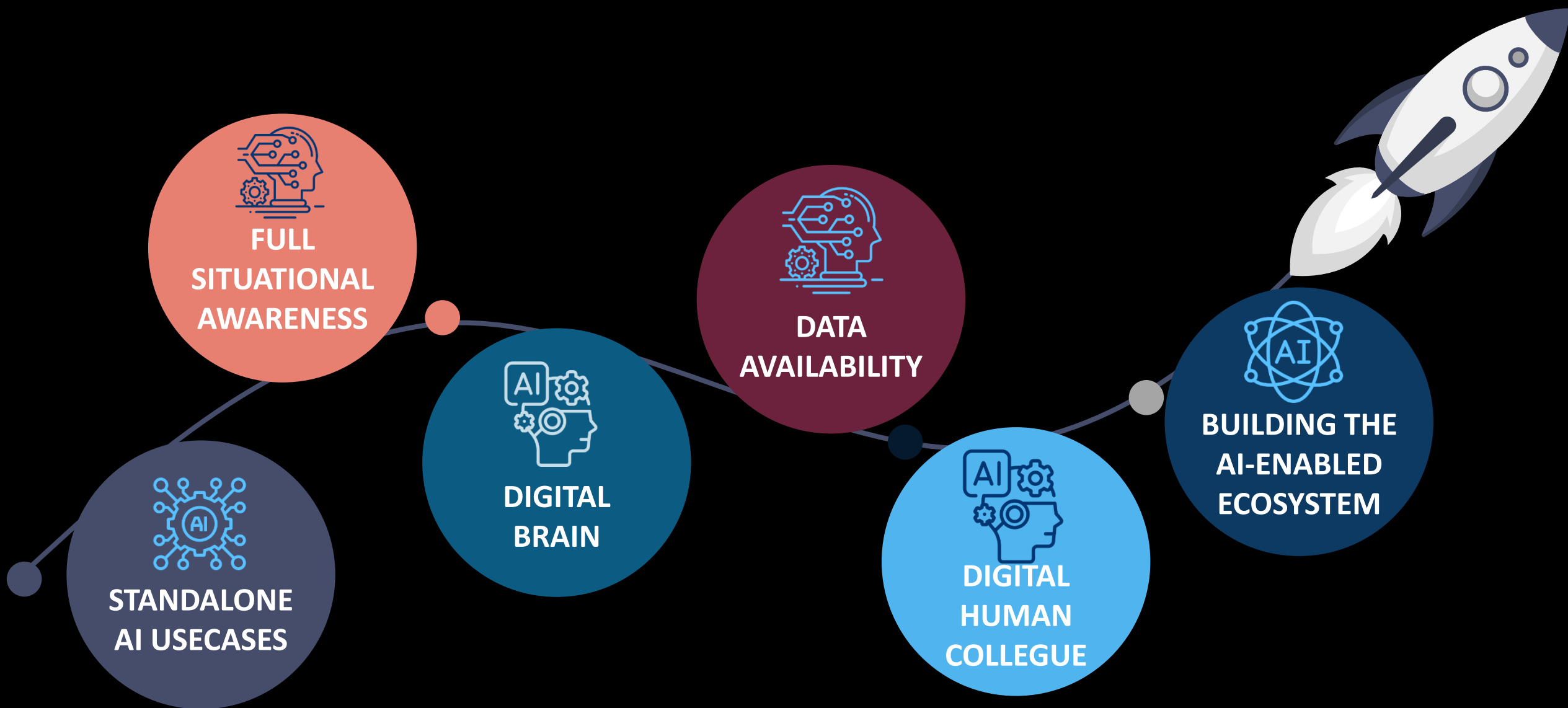
GREAT NEWS

Simplicity is well-managed complexity



Port of
Antwerp
Bruges

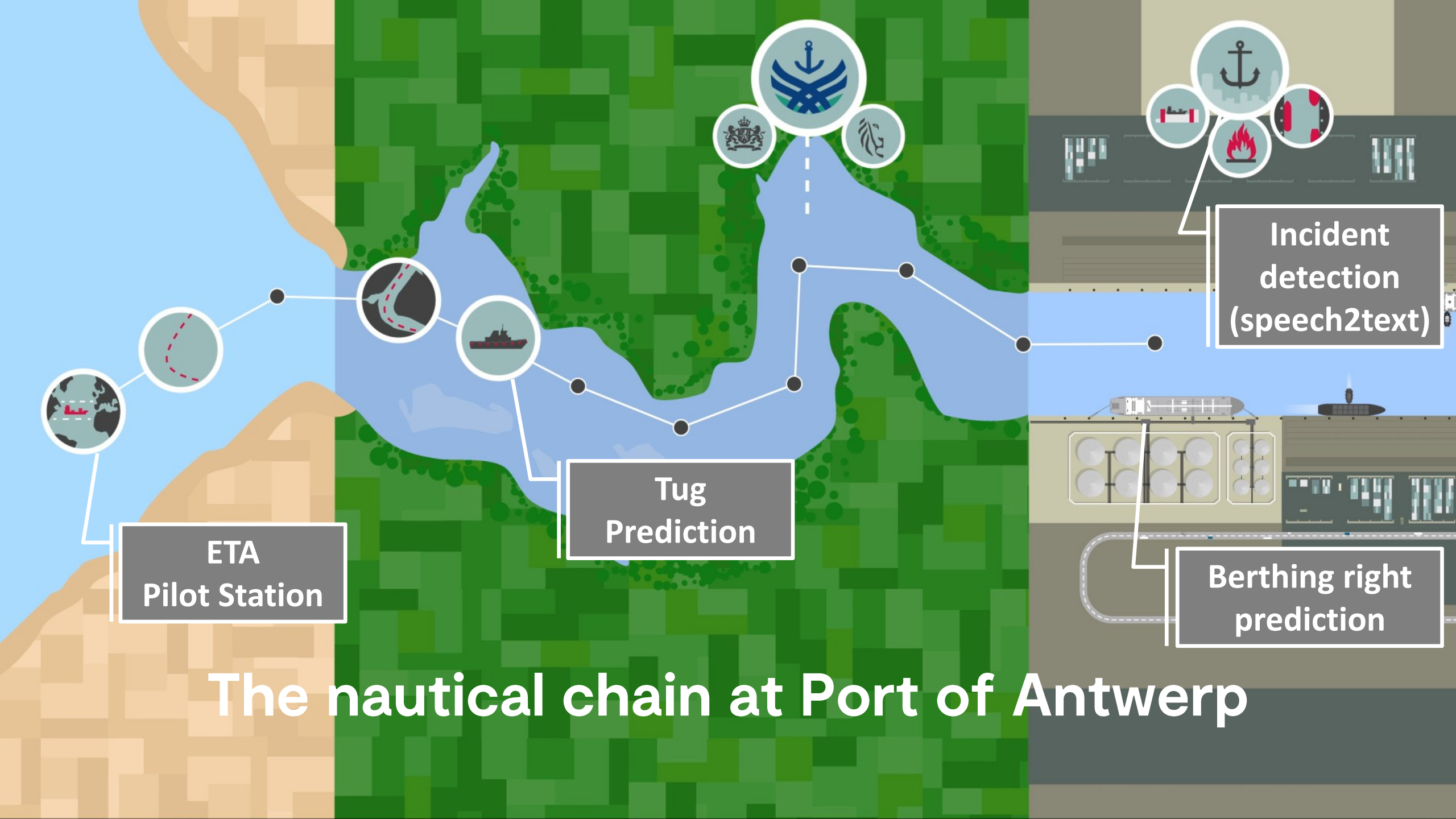
Gartner Top of Mind, episode 27, Chris Howard – Gartner Distinguished VP Analyst



Standalone usecases



Port of
Antwerp
Bruges



The nautical chain at Port of Antwerp

**Predictive
dredging**



**(Tanker)
Terminal
occupancy**



**Detection of
abnormal sailing
movements**



**Tug planning
optimization**



Digital Twin

ARICA



Port of
Antwerp
Bruges

Need for Twins



Need for Twins



Port of
Antwerp
Bruges

Data is deeply subjective because it represents only a small part of reality

The universe of things that can be measured, or sensed, is infinite

The more perspectives offered on the data, the more it will approximate truthfulness

HUMAN SENSES

Touch

Vision

Hearing

Smell

Taste

DIGITAL SENSORS

UI & IoT

Cameras

VHF

iNoses

Sensors

A smart port in progress

To this day, our understanding of the human brain is still very incomplete, yet we've already managed to replicate an impressive amount of its functions throughout the years. And throughout the port, for that matter.

What were we aiming for?

Situational & geospatial awareness



INTRODUCING APICA Digital Twin

A Vision of Full
Situational
Awareness

APICA



10°
←
2 m/s
2 bft

INOSE044



Air quality		Weather conditions	
O3	134.00 ppb	☀	100%
PM2.5	5.63 µg/m³	☁	1017.41 hPa
VOS	209.90 #	⬆	9.8°C
NO2	819.00 ppb	⌚	163°
		🌬	

Status
✅ Battery level ✅ Heartbeat

Show detail



Everything is data

INOSE044

Air quality		Weather conditions	
O3	134.00 ppb	☀	100%
PM2.5	5.63 µg/m³	☁	1017.41hPa
VOS	209.90 #	⬆	9.8°C
CO2	819.00 ppb	⌚	163°

Status

✓ Battery level ✓ Heartbeat

Show detail



Digital Brain

ARICA



Port of
Antwerp
Bruges

Digital Twin

Descriptive

What is
happening
?



Sensors



5G

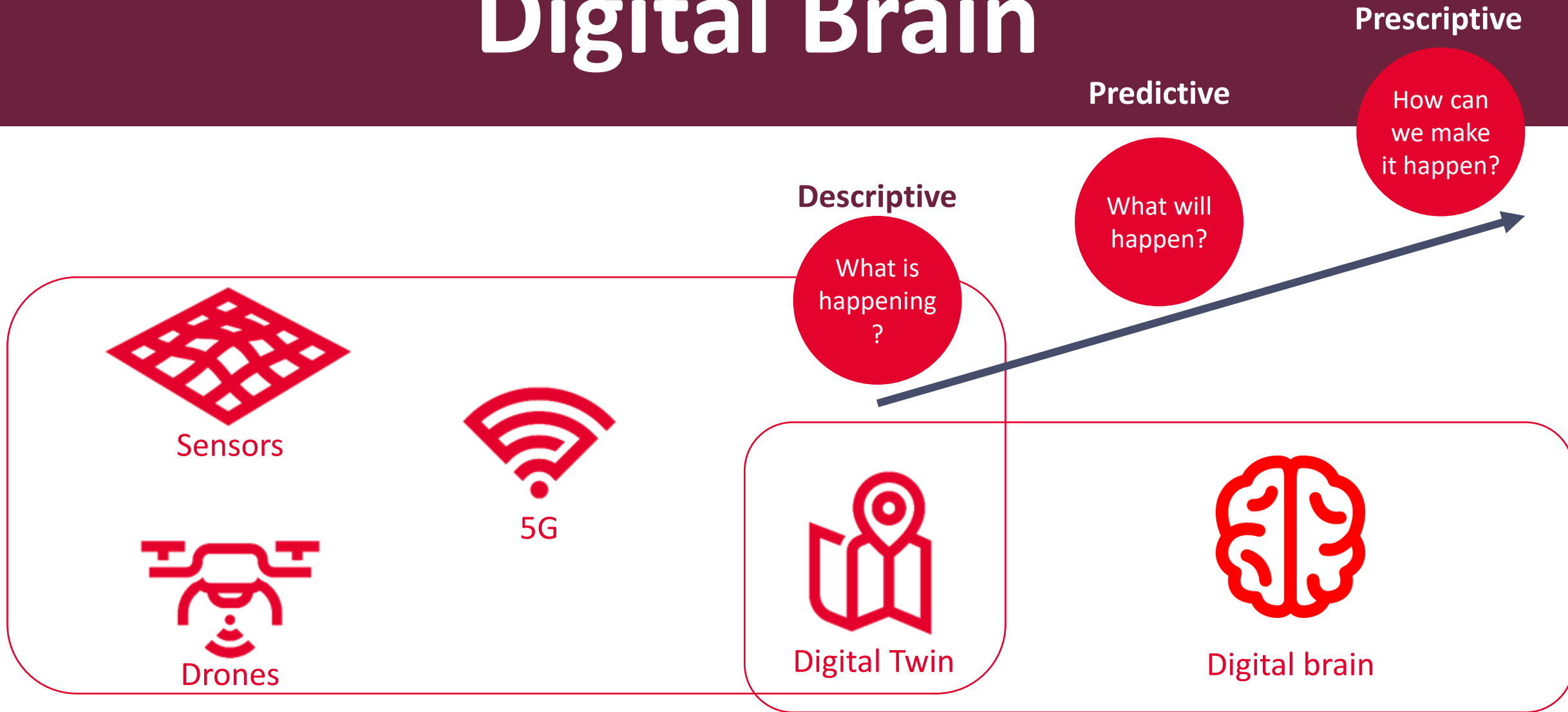


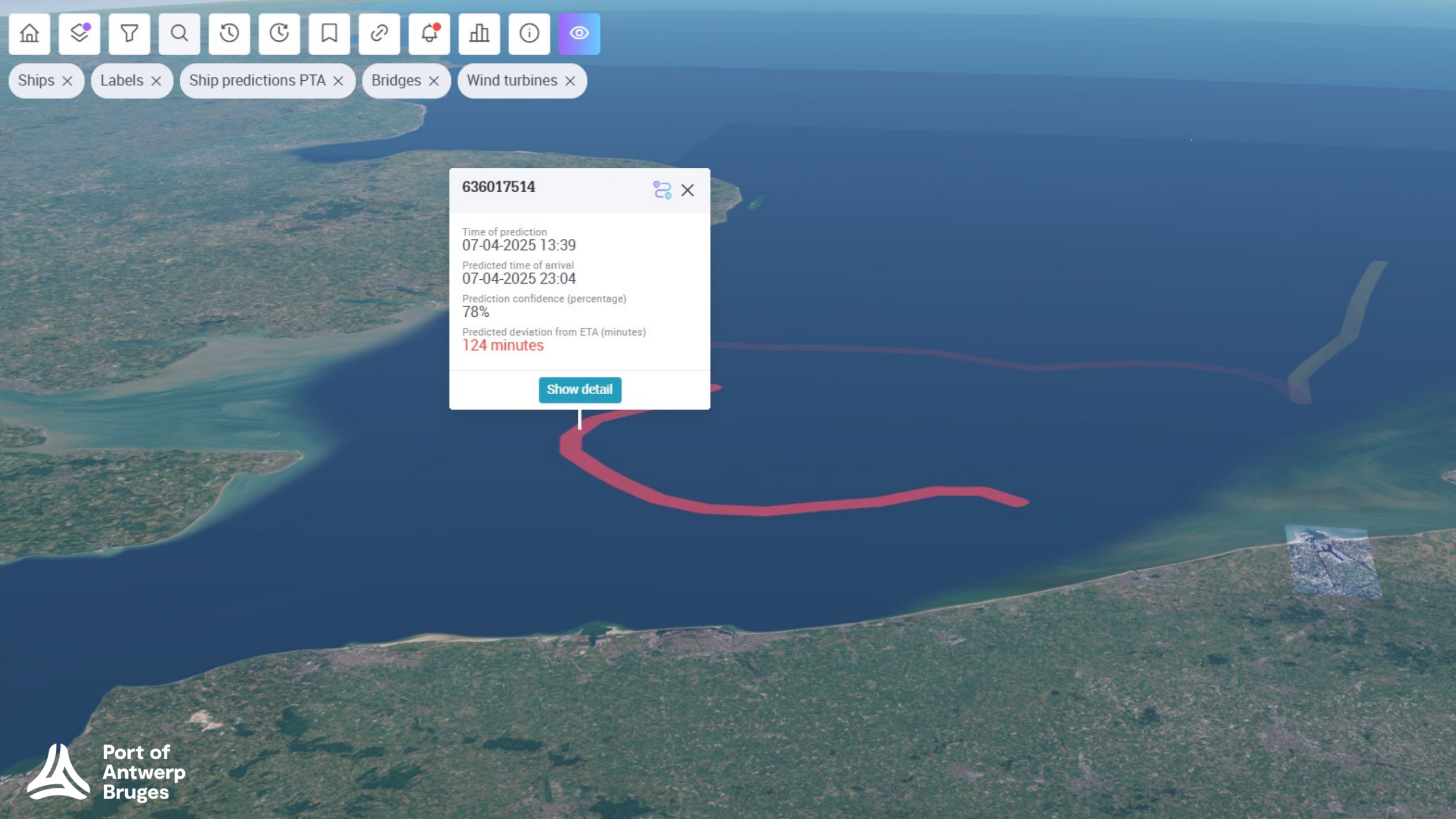
Drones



Digital Twin

Digital Brain





Ships × Labels × Ship predictions PTA × Bridges × Wind turbines ×

636017514



Time of prediction
07-04-2025 13:39

Predicted time of arrival
07-04-2025 23:04

Prediction confidence (percentage)
78%

Predicted deviation from ETA (minutes)
124 minutes

Show detail



Port of
Antwerp
Bruges

Case Study: Digital Twin Optimized for Value Delivery With Artificial Intelligence

Peer & Practitioner Research | Published 15 November 2023 - ID G00796696 - 17 min read

Auria Asadsangabi

Initiatives: [Digital Future](#)

Technology innovation leaders struggle to monitor complex operational contexts and respond to disruptions in real time. The Port of Antwerp-Bruges uses an AI-enabled digital twin to build situational awareness, predict and prevent incidents and deliver business value.

The Port of Antwerp-Bruges



Industry: Transportation

Headquarters: Antwerp, Belgium

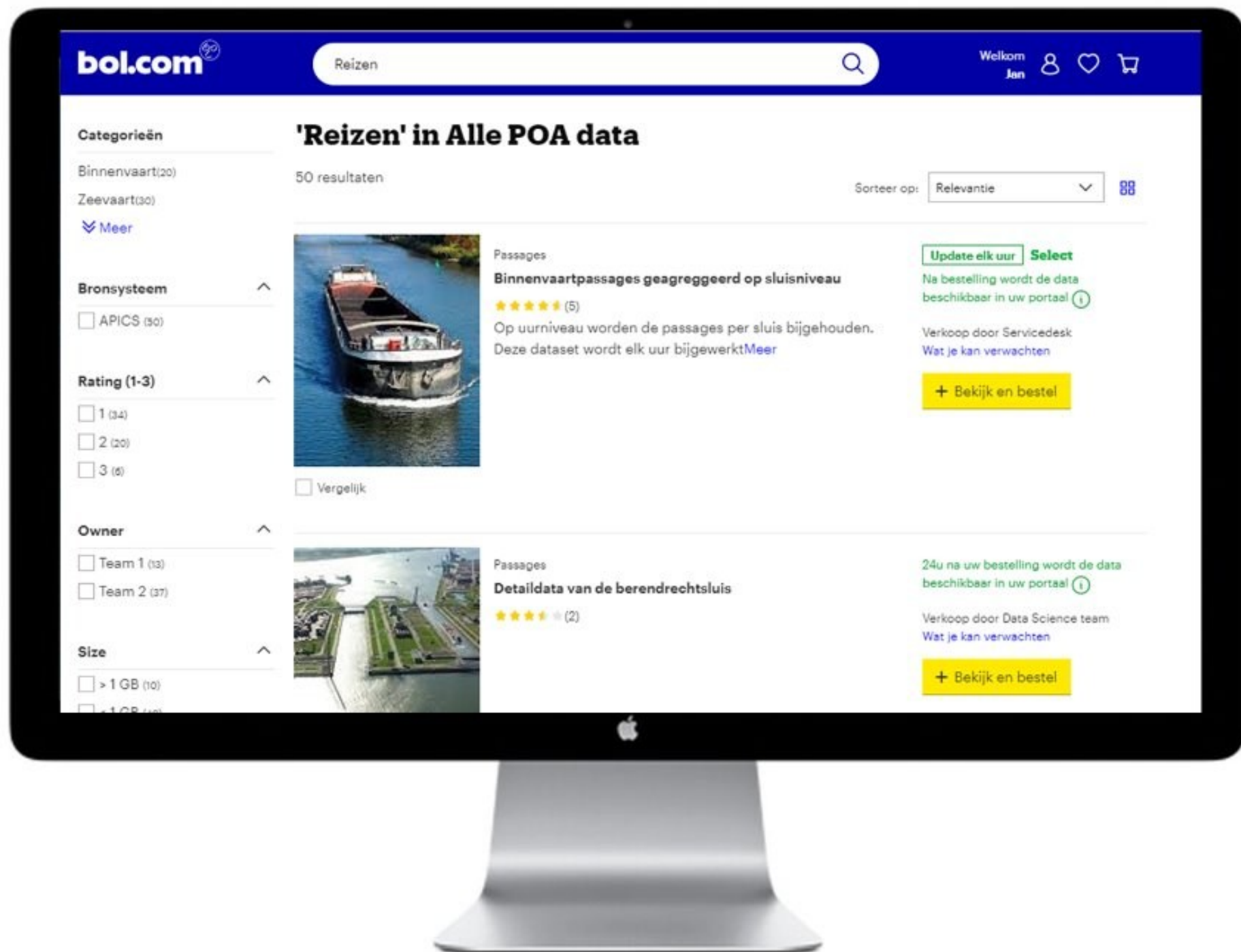
Data Fabric



Port of
Antwerp
Bruges



**Data in the hands of a few provides insights
Data in the hands of many drives
transformation**



Runner-up Data Maturity Awards 2024



Digital human colleague

APICA
Chat

&

APICA

Digital Twin



Port of
Antwerp
Bruges

Building the AI-enabled ecosystem



Port of
Antwerp
Bruges



APICA

Port Intelligence



APICA
Chat



APICA
Digital Twin



APICA
Navigator



APICA
Planner



APICA
Vision



Port of
Antwerp
Bruges

Key takeaways



Port of
Antwerp
Bruges

Takeaway 1: Moonshot Thinking approach

Moonshot thinking is a big and bold approach to innovation that aims to tackle large-scale challenges by pursuing transformative solutions, rather than incremental improvements. Inspired by the Apollo 11 mission, it encourages 10x leaps, **interdisciplinary collaboration** and **emerging technologies exploitation**. Moonshot thinking **embraces risk and the possibility of failure**, with the ultimate goal of creating significant, positive impact on the world through breakthrough innovations.

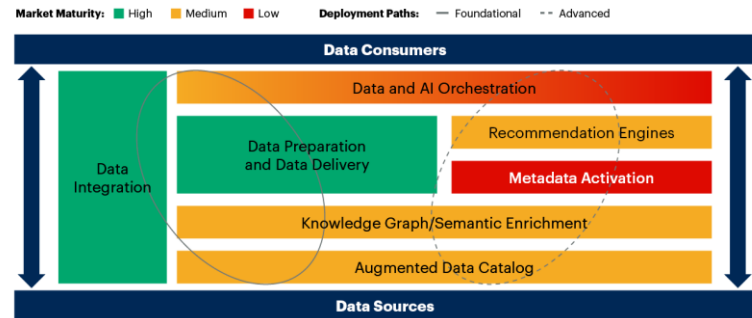
Gartner definition - Hype Cycle for Innovation Practices, 8 July 2024, ID G00813479



Legislation wasn't even ready to realize certain functionalities.



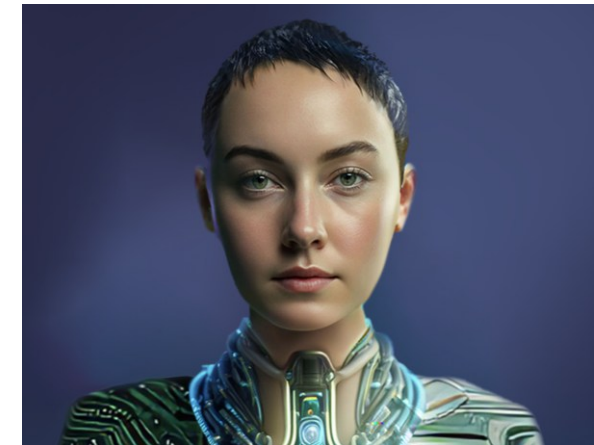
Technology Pillars of Data Fabric



Gartner

The necessary enterprise **maturity** had to be top 5 to 10%. **No significant adoption** by other companies.

Data and Analytics Essentials: Data Fabric and Data Mesh, 19 April 2023, ID G00787119



Generative AI was on the **peak of inflated expectations** on the Hype Cycle. The **time to the plateau of productivity** was estimated at **2 to 5 years**.

Gartner Hype Cycle for Artificial Intelligence, 2023

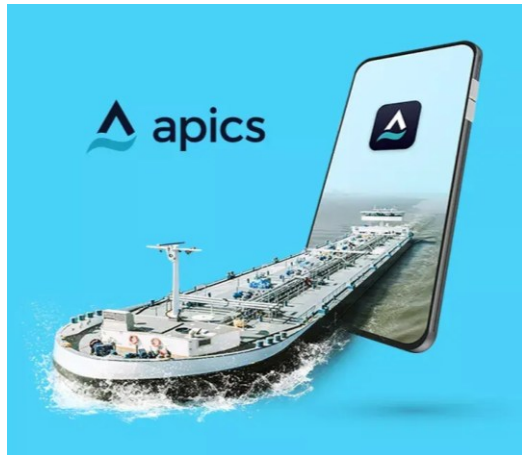
A man, Jacques Vandermeiren, is the central figure. He is wearing a red hard hat with the word 'VISITOR' on it, a bright orange high-visibility jacket with reflective silver stripes, and a yellow safety vest with a 'Drewsaver' logo. He is smiling and looking towards the camera. The background is a blurred industrial port setting with various structures and equipment.

“We must
dare to
pioneer”

Jacques Vandermeiren,
CEO Port of Antwerp-Bruges

Takeaway 2: Words matter

Words hold power,
shape our perceptions and ultimately
define our reality.



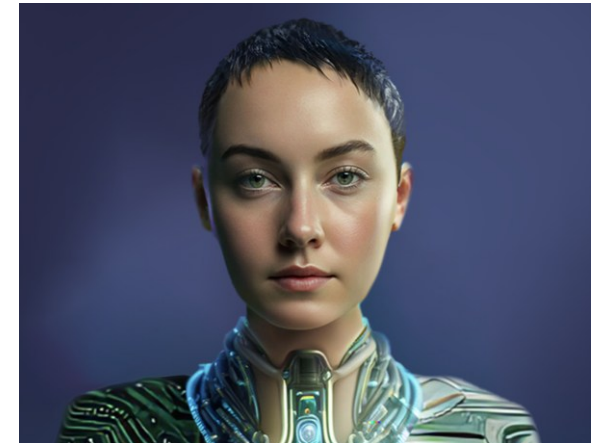
APICS

Antwerp Port Information
& Control System



APICA

Advanced Port Information
& Control **Assistant**



APICA

Advanced Port **Intelligence**
& **Coördination** assistant

Takeaway 3: Inspire

If your actions inspire others to
dream more, learn more, do more and become more,
you are a leader.

WELCOME TO A NEW ERA

