

# BeGeo 2024

LA CONNEXION A L'ETAT PUR  
DE ULTIEME CONNECTIE



Digital twin in een haven context

*“Hoe samenwerking een droom tot leven bracht.”*

Danny Van Dessel, Port of Antwerp-Bruges

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A global port  
in the heart of Europe

**One port**  
Two sites



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Port of  
Antwerp  
Bruges



2nd largest  
port in **Europe**



Largest **car handling**  
port in Europe  
3,160,000 cars/year



Number one **export**  
port in Europe  
147 mio tons/year



**Total throughput**  
289 mio ton/year



21,400  
**Seagoing ships**/year



Important **cruise**  
port in Benelux  
80,000 passengers (covid-19)  
300,000 passengers



Largest **chemical**  
hub in Europe



15% of EU **gas** market



**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



**Energy transition**  
frontrunner

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A virtual representation  
of a physical object, system, or entity  
that provides real-time data  
and simulations  
for analysis and monitoring.

What is a **Digital Twin**?

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# Need for Twins

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Need for Twins



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# What were we aiming for?

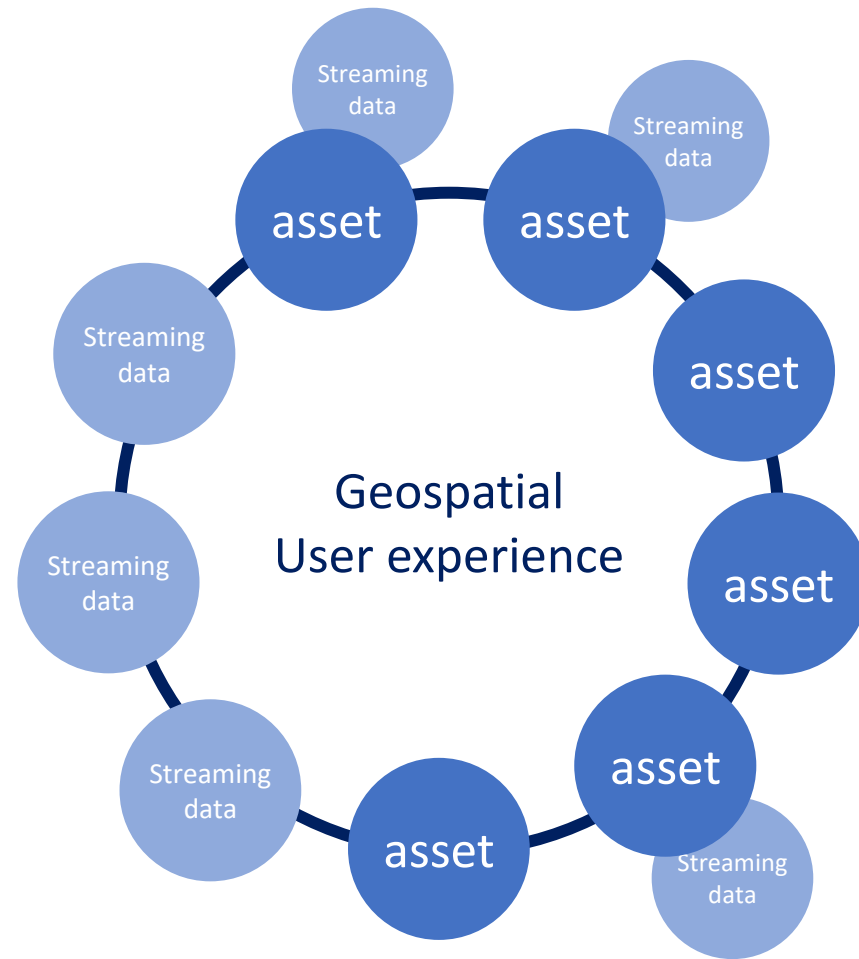
Situational & geospatial awareness





- 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**

*Maverick research ID G00769406, 8 July 2022*



DREAM

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”I have never tried that before, so I think I should definitely be able to do that.”

*- Pippi Longstocking*



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“We must dare to pioneer”

Jacques Vandermeiren,  
CEO Port of Antwerp-Bruges

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# Digital nervous system

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HUMAN SENSES

DIGITAL SENSORS

Touch

UI & IoT

Vision

Cameras

Hearing

VHF

Smell

iNoses

Taste

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.

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Sensors



Drones



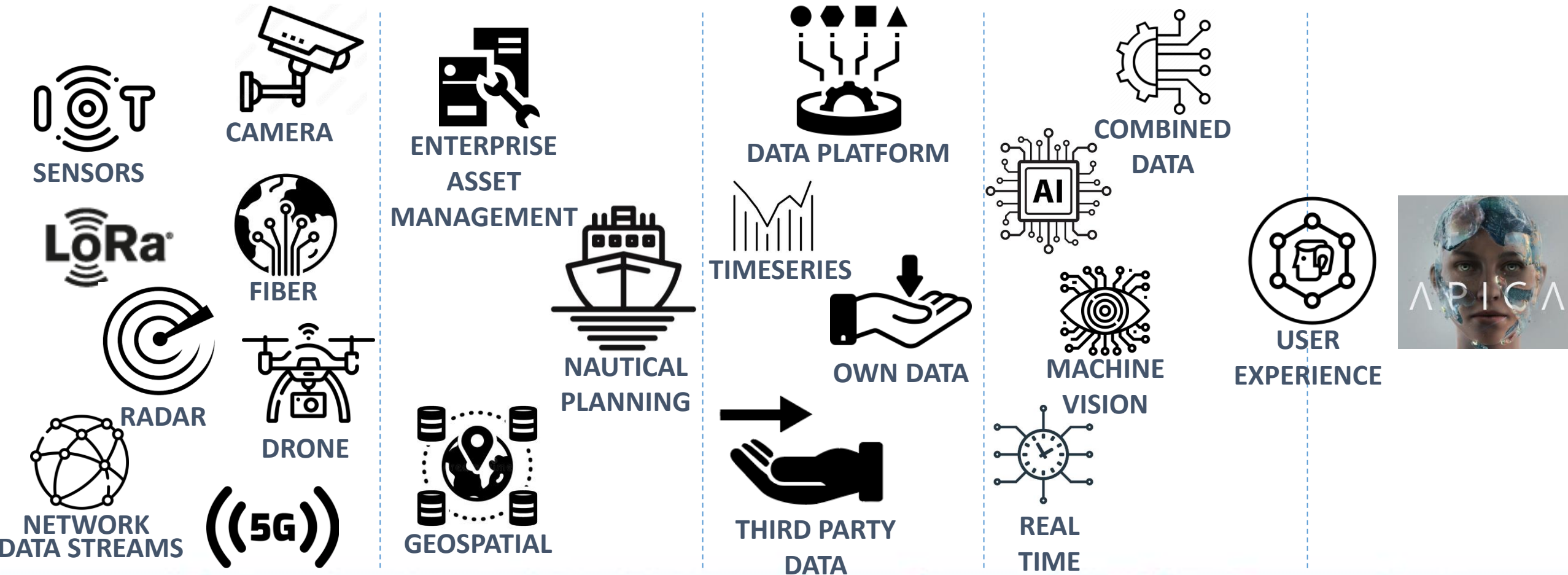
5G



Digital Twin

# Digital network

# Capstone project – bringing all effort together





DRONES

# Drones als extra ogen in industrieel gebied zijn Belgische wereldprimeur

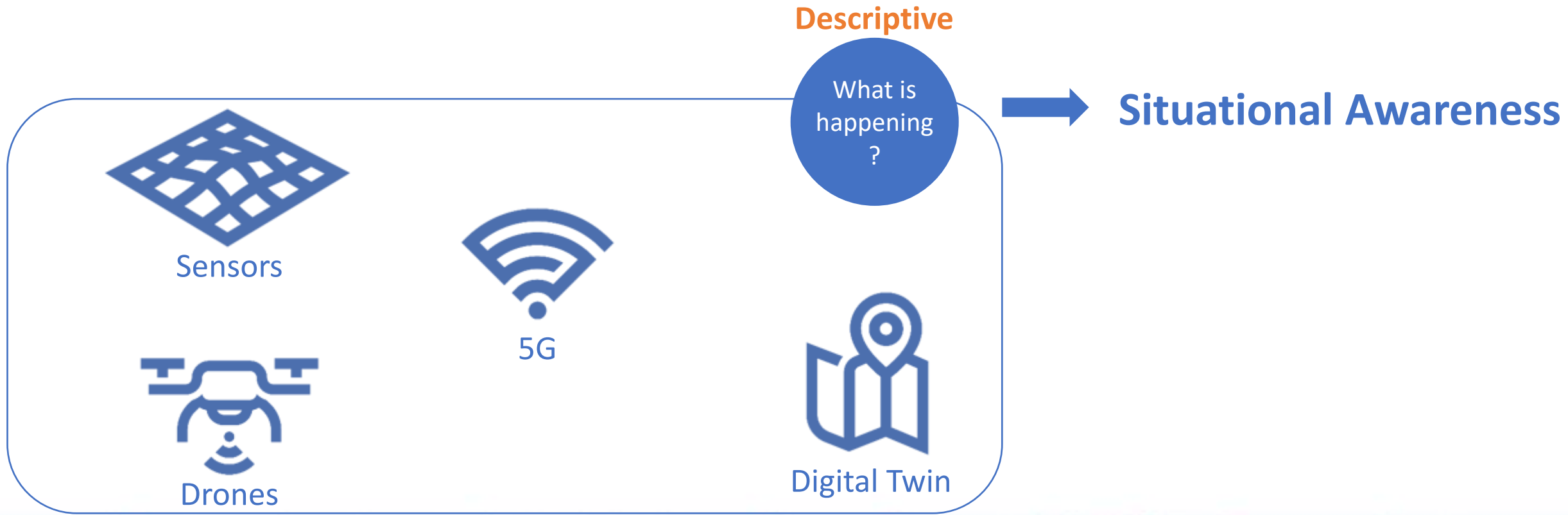
Port of Antwerp-Bruges stapte mee in een Europees proefproject, dat de veiligheid van autonome drones en BVLOS-vluchten moest onderzoeken. 'Op basis van die studies zet Europa stapjes naar een nieuw regelgevend kader. De wetgeving werd al een eerste keer aangepast, waardoor ons pilootproject eindelijk kon worden opgeschaald naar het operationele niveau.'

**Vier jaar geleden was dit pure fantasie. We waren dingen aan het uitspreken waarvan we wisten dat er zelfs geen wetgevend kader voor was.**

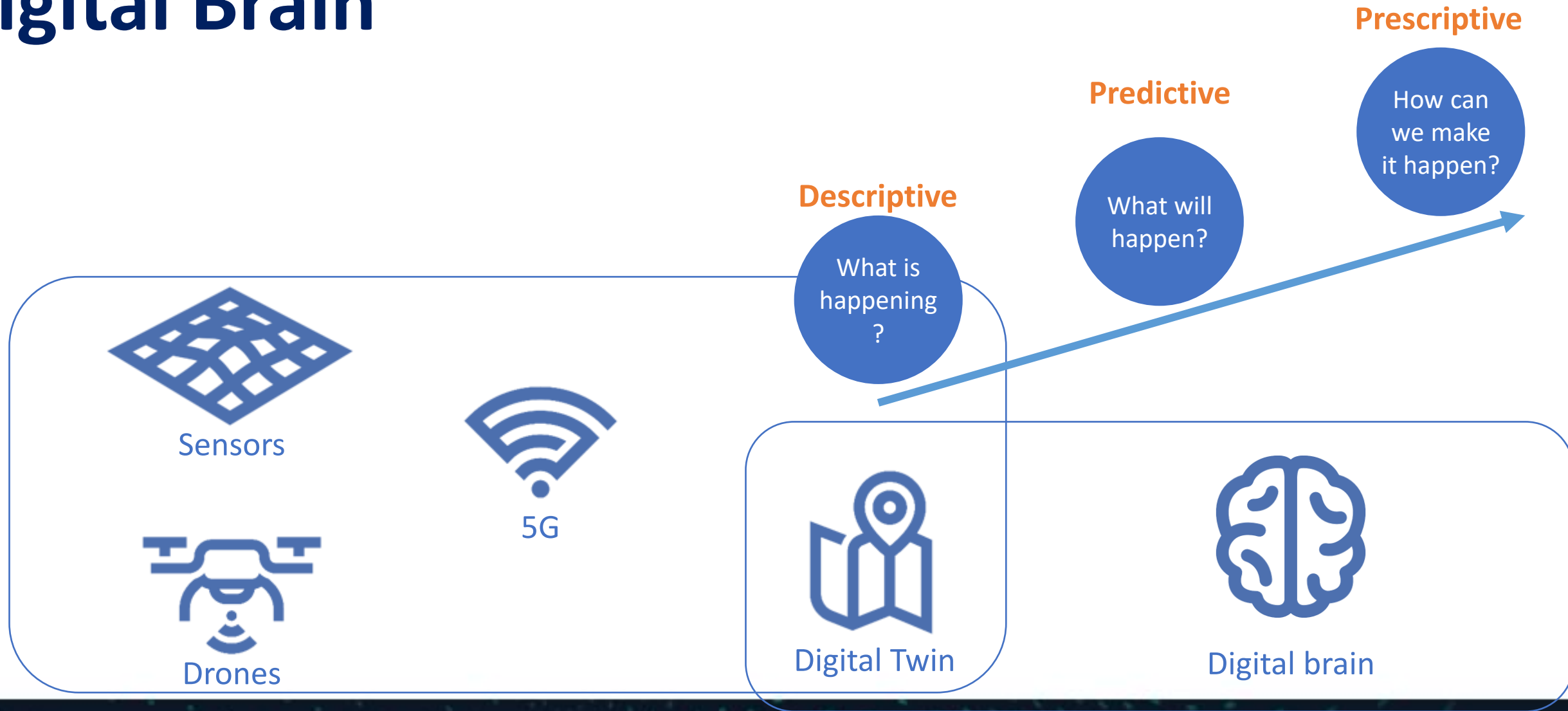
ERWIN VERSTRAELEN  
INNOVATIEMANAGER PORT OF ANTWERP-BRUGES



# Digital Twin

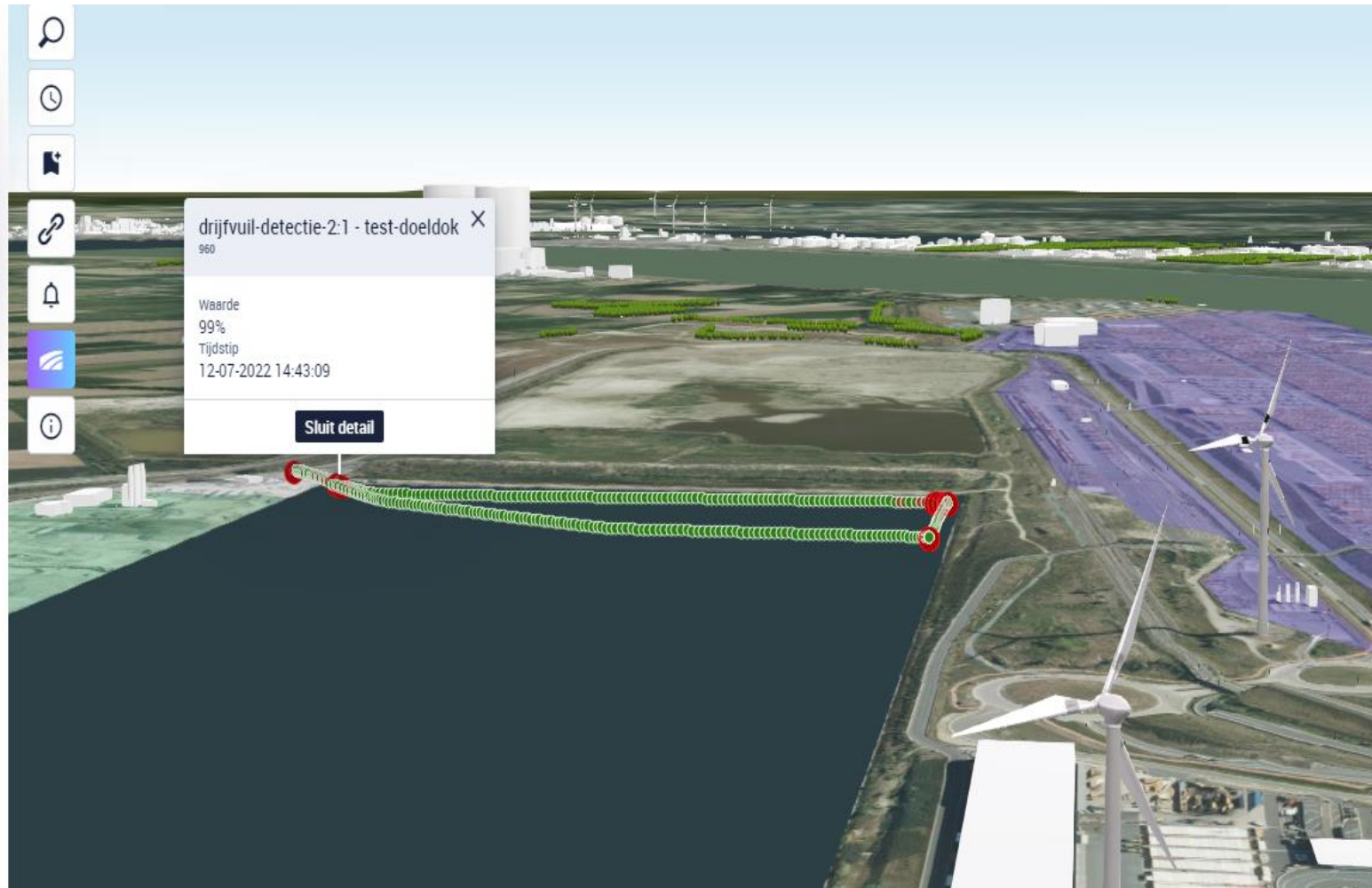


# Digital Brain



# Everything is data

- Chemie
- Raffinage
- Industrie
- Natte bulk
- Droge bulk
- conventioneel stukgoed
- Roro



Tijdstip  
12-07-2022 14:43:09

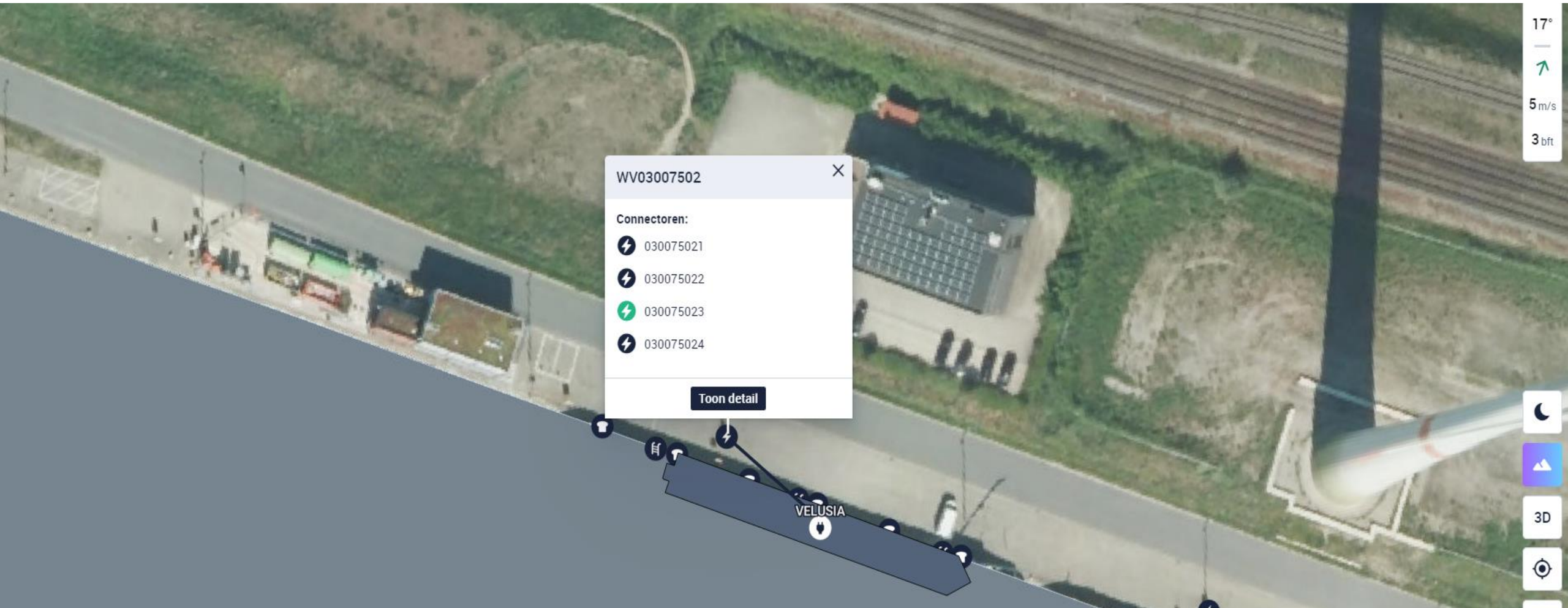
Frame  
960



Locatie  
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Longitude : 4,235523

Laatste update  
12-07-2022 14:43:09

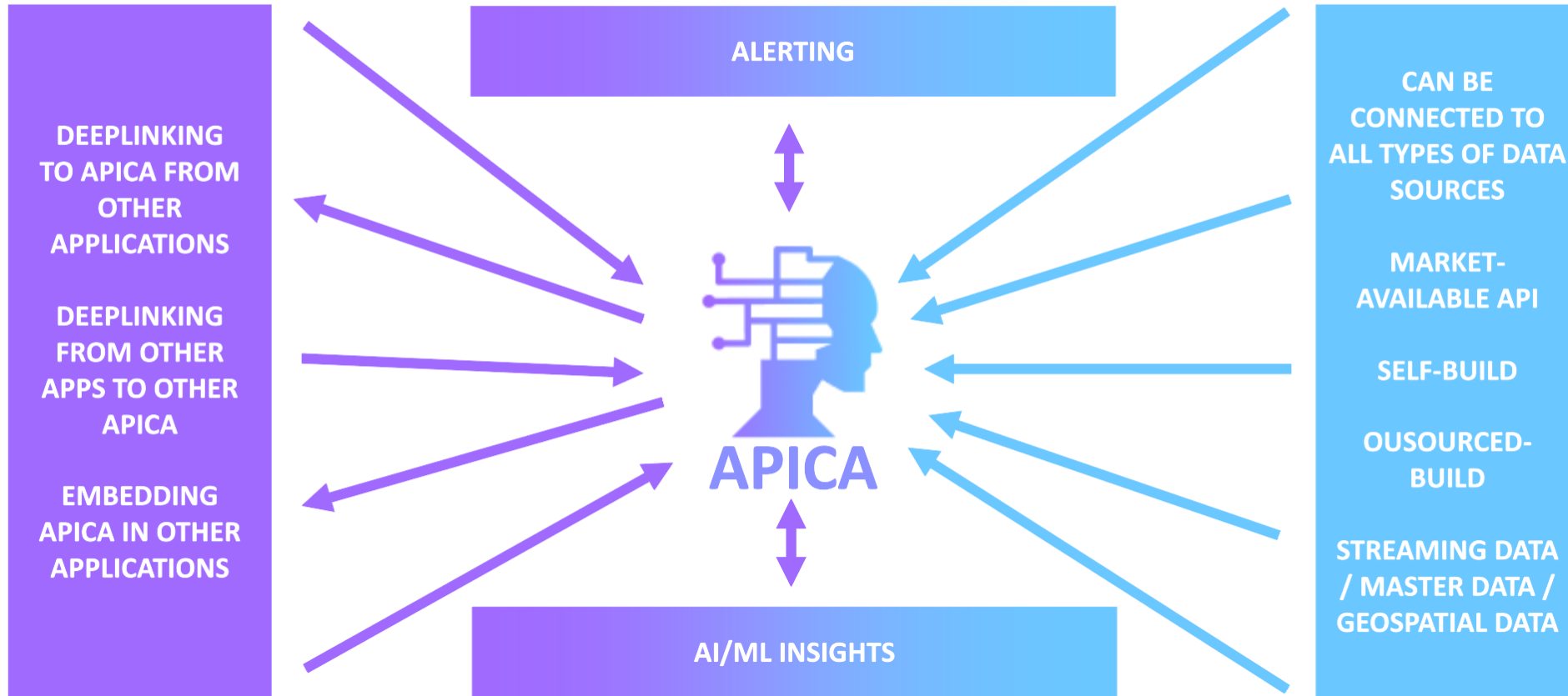
# “Any product that needs a manual is broken” – E.Musk





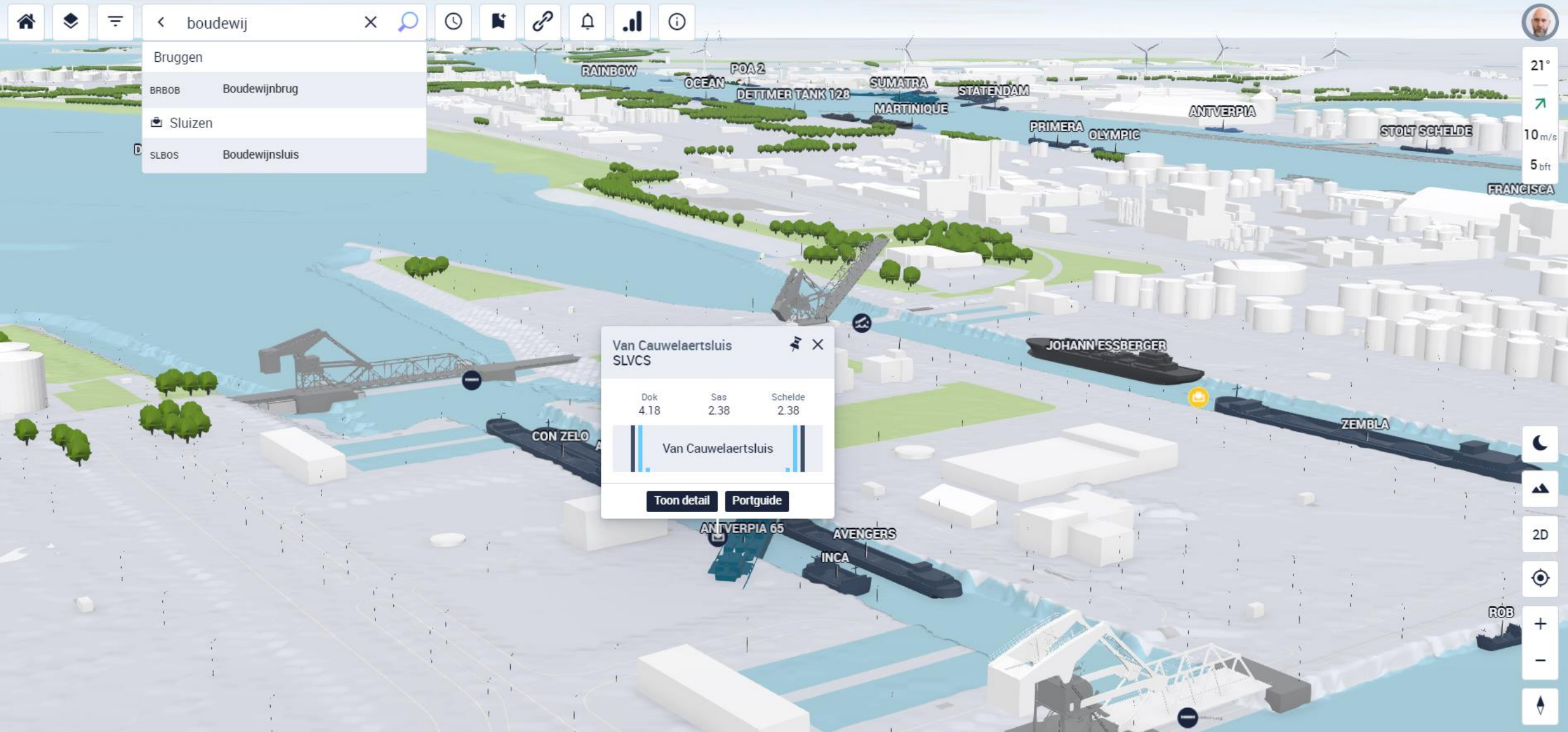
# Architecture

Open architecture on all sides.





# AMERICAN



- Bruggen
  - BRBOB Boudewijnbrug
- Sluizen
  - SLBOS Boudewijnsluis

Van Cauwelaertsluis SLVCS

Dok	Sas	Schelde
4.18	2.38	2.38

Van Cauwelaertsluis

Toon detail Portguide





# Gartner Research Case Study

Gartner®

## 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

# Figures

- Port territory of **14.322 hectares**
- **Number one export port** in Europe
- **45+ million streaming data messages/week** of which 35+ million ship positions in APICA
- **55K+ assets** in APICA, of 30+ asset types

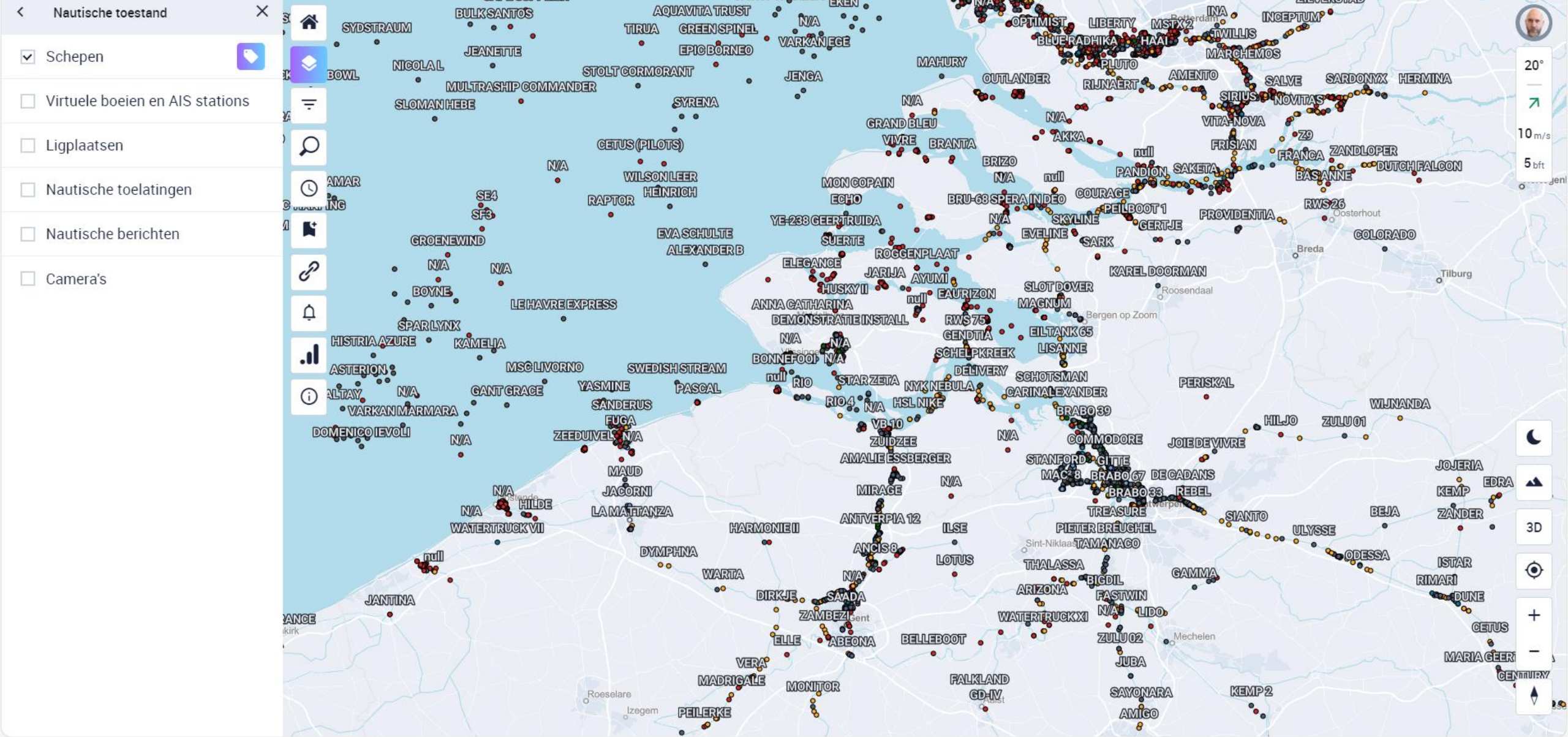


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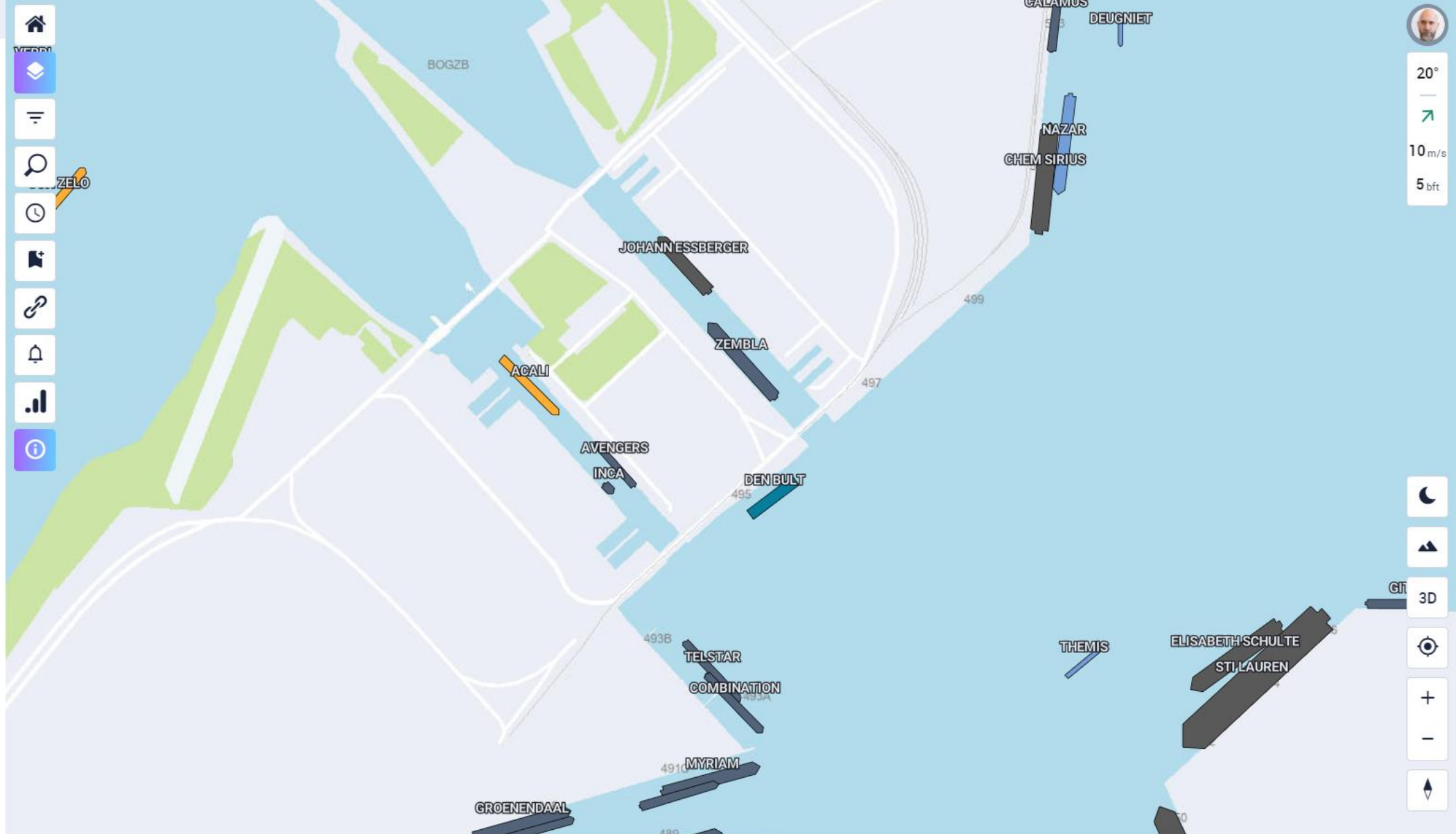




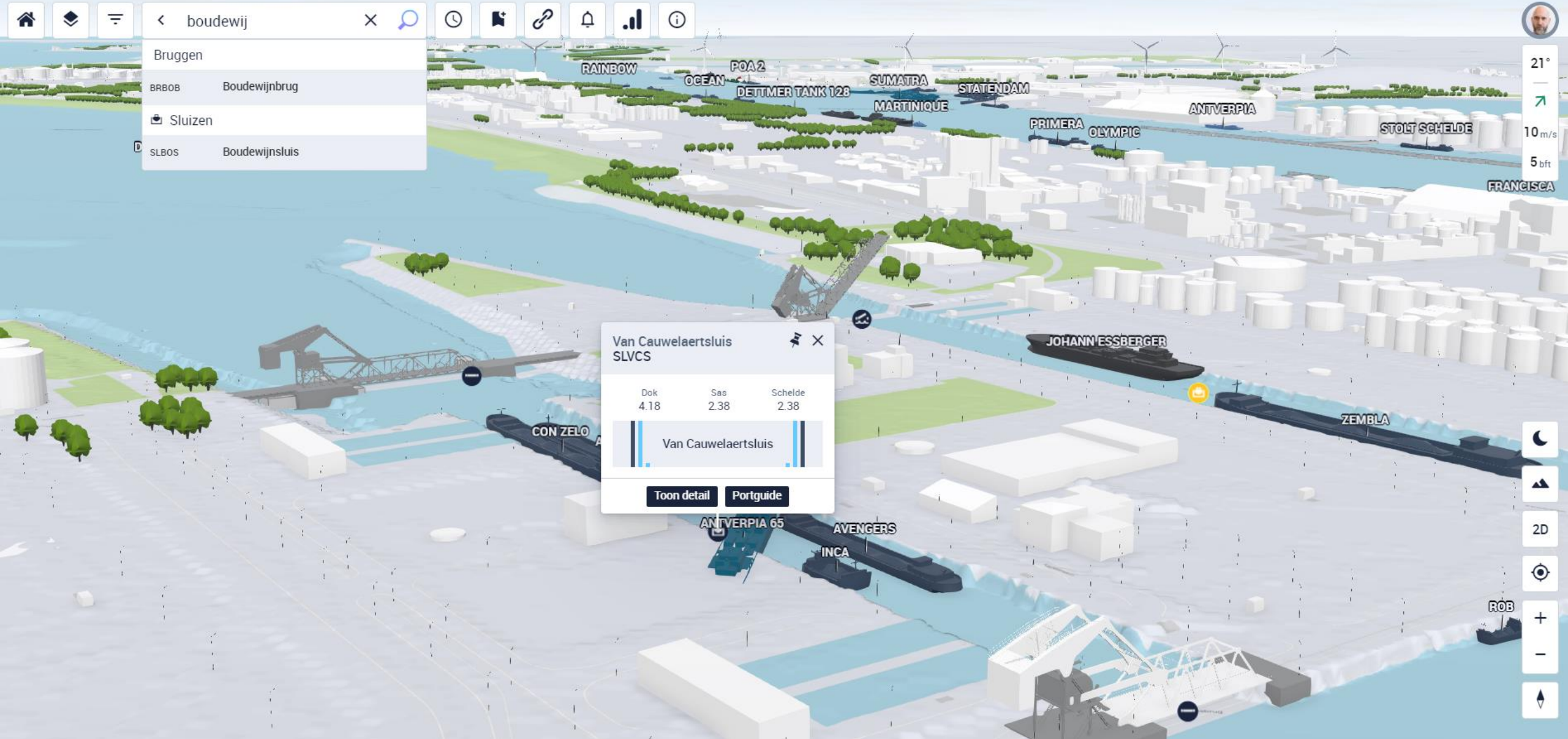
Legende

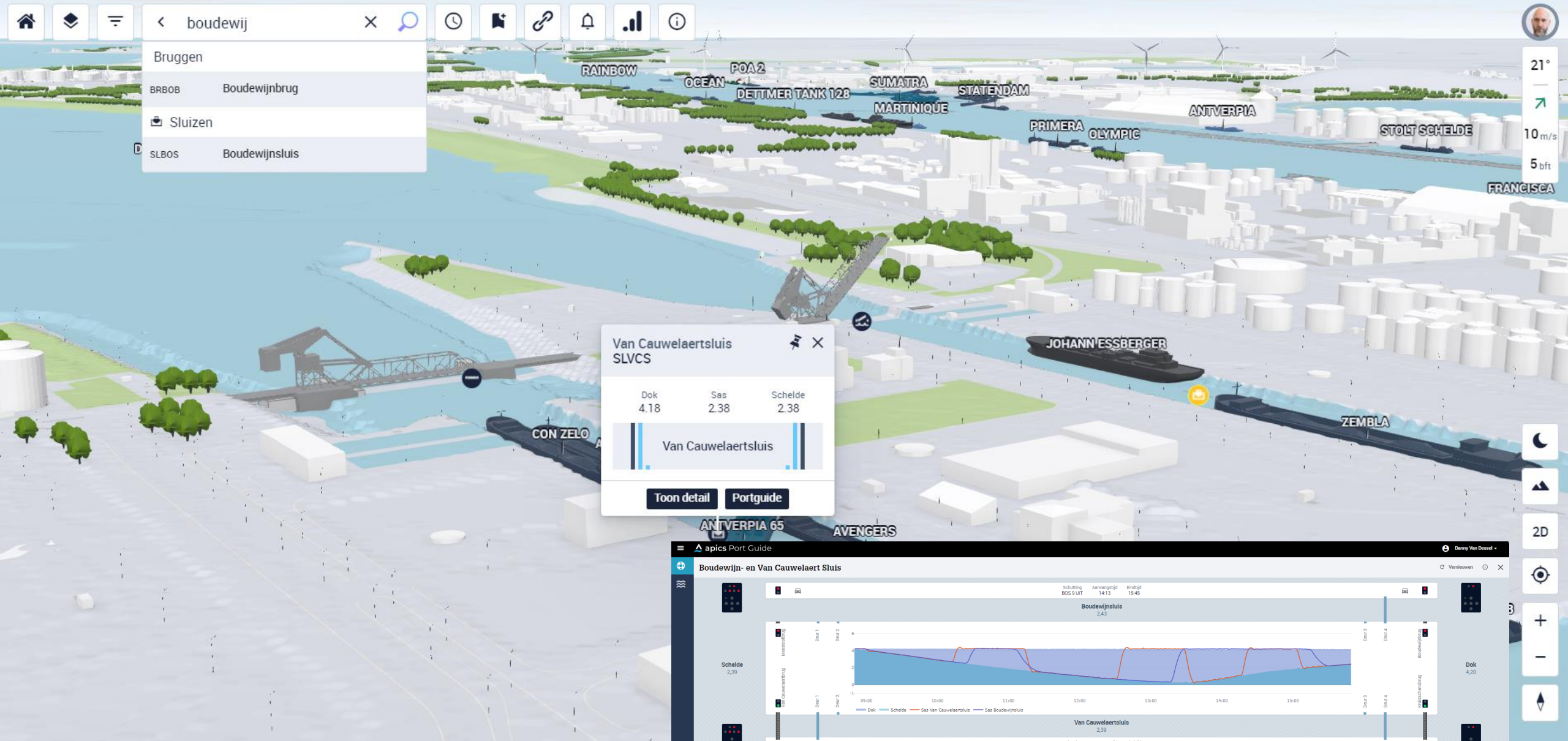
Schip

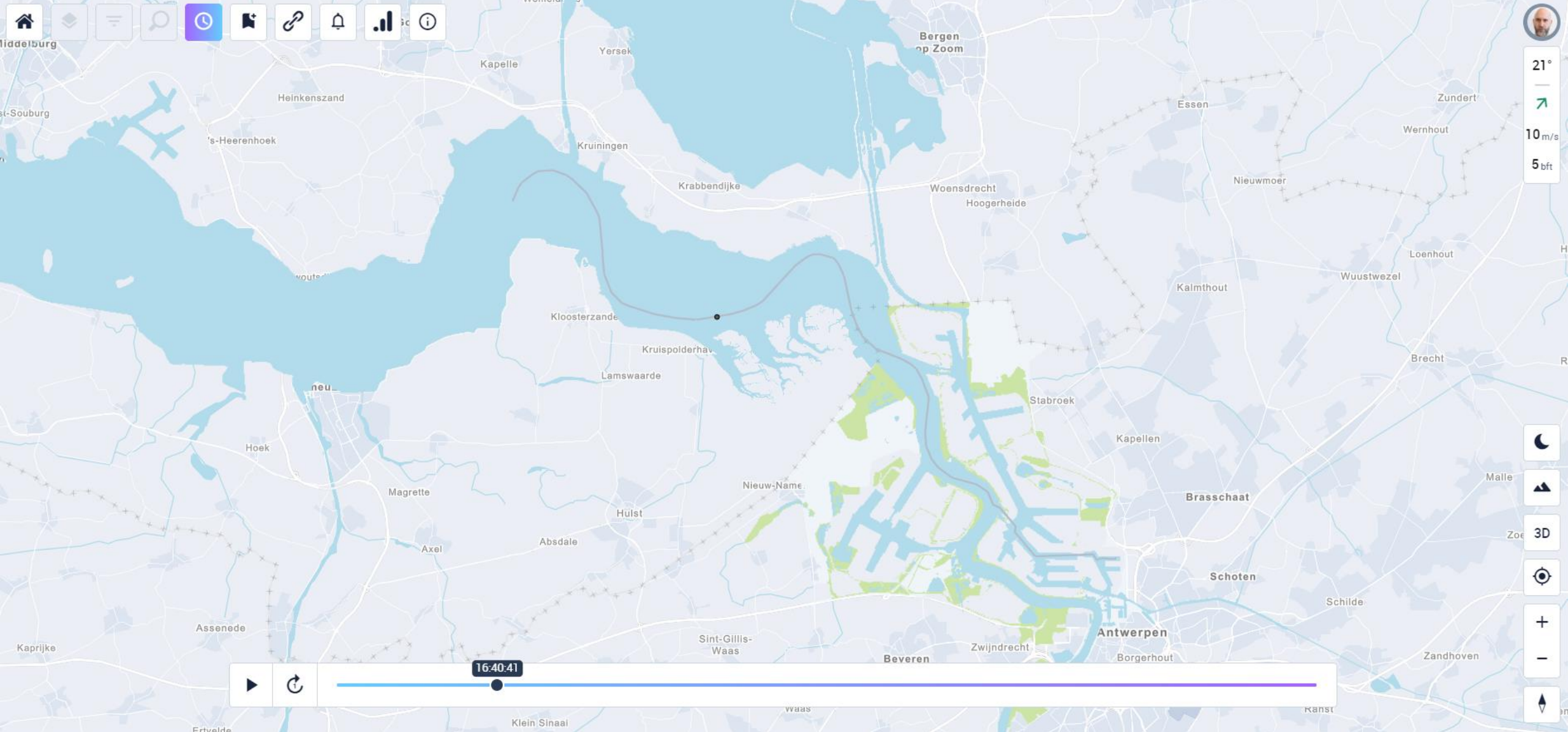
- Onbekend
- Binnenschip
- Zeeschip
- Bunkerschip
- Sleepboot
- Handhavingsvoertuig
- Vaarrichting onbekend
- AIS transponder positie buiten schip
- Vrachtduwbak









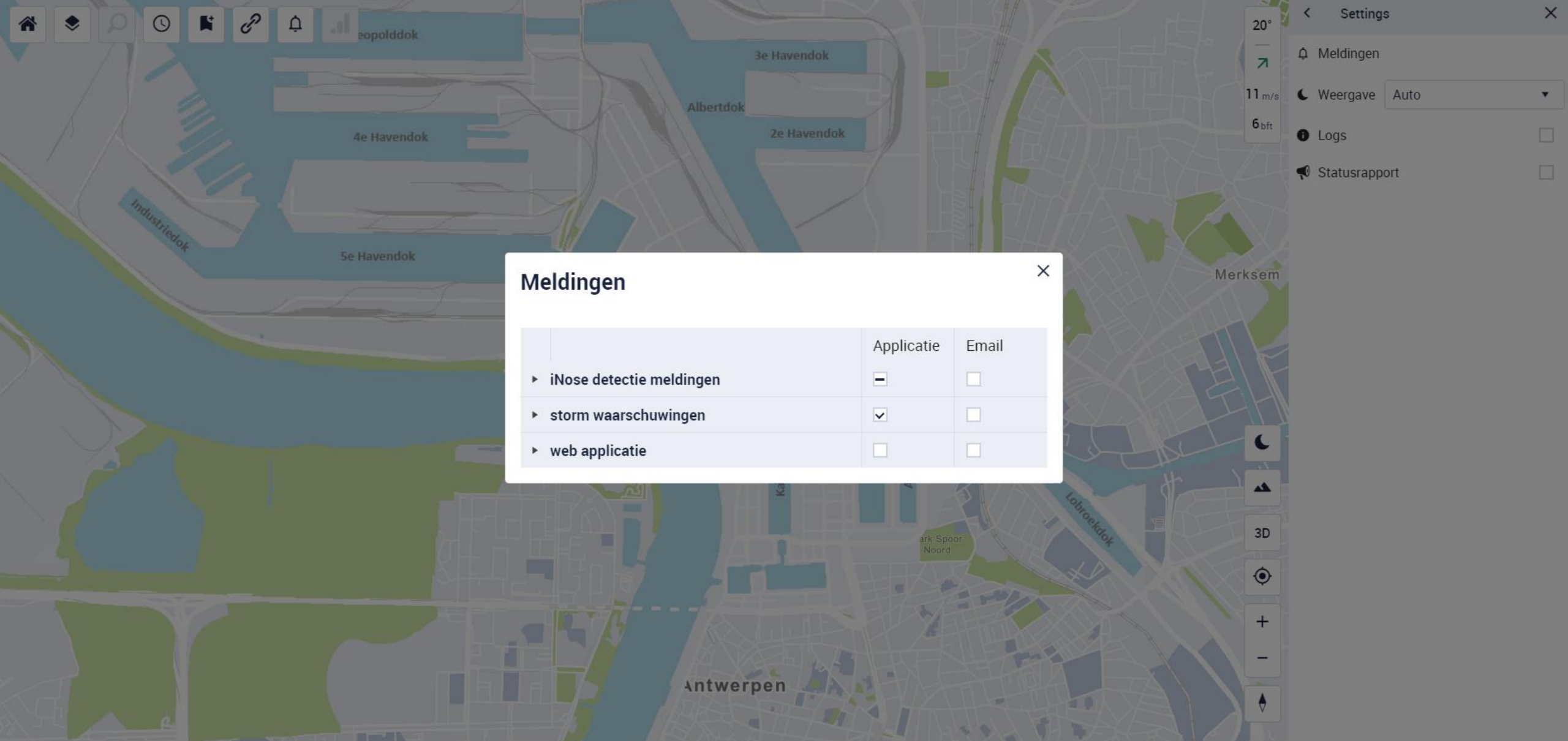


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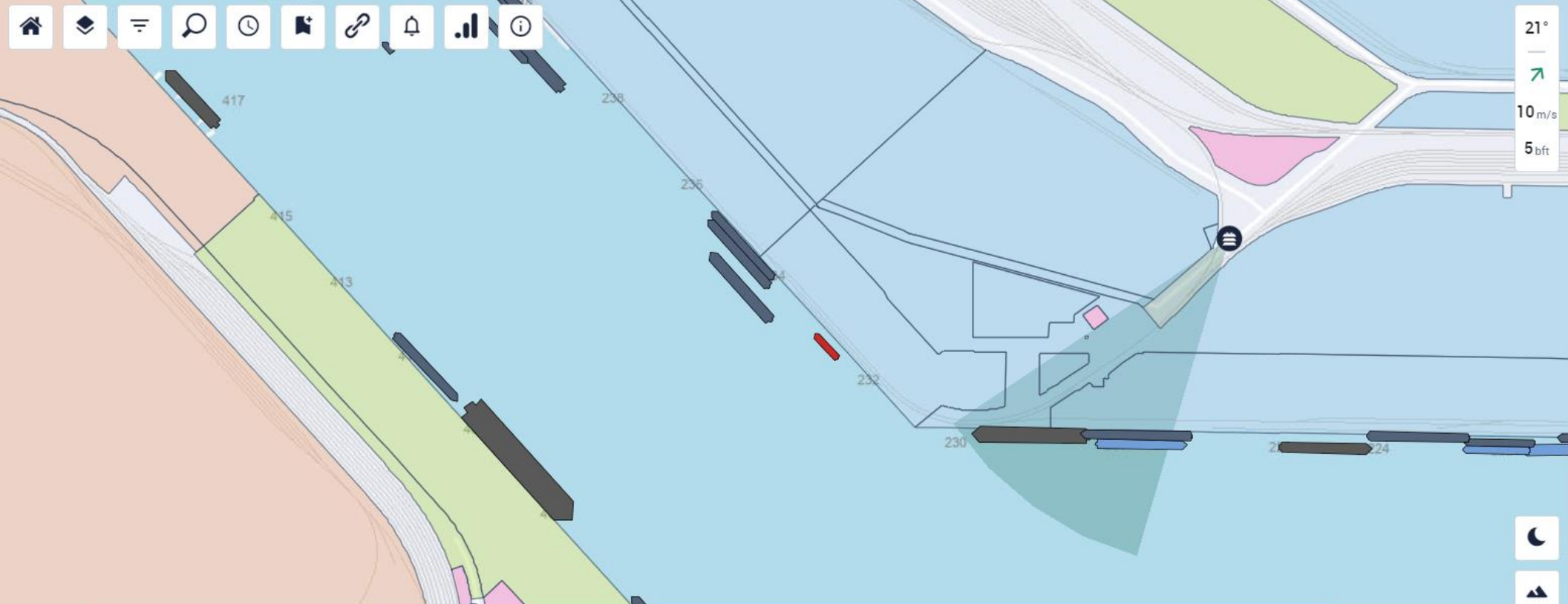
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## Meldingen

	Applicatie	Email
▶ iNose detectie meldingen	<input type="checkbox"/>	<input type="checkbox"/>
▶ storm waarschuwingen	<input checked="" type="checkbox"/>	<input type="checkbox"/>
▶ web applicatie	<input type="checkbox"/>	<input type="checkbox"/>



21°  
10 m/s  
5 bft

### INOSE029

Id  
INOSE029

Locatie id

Omschrijving

Soort locatie  
Vast

Bron  
INOSE

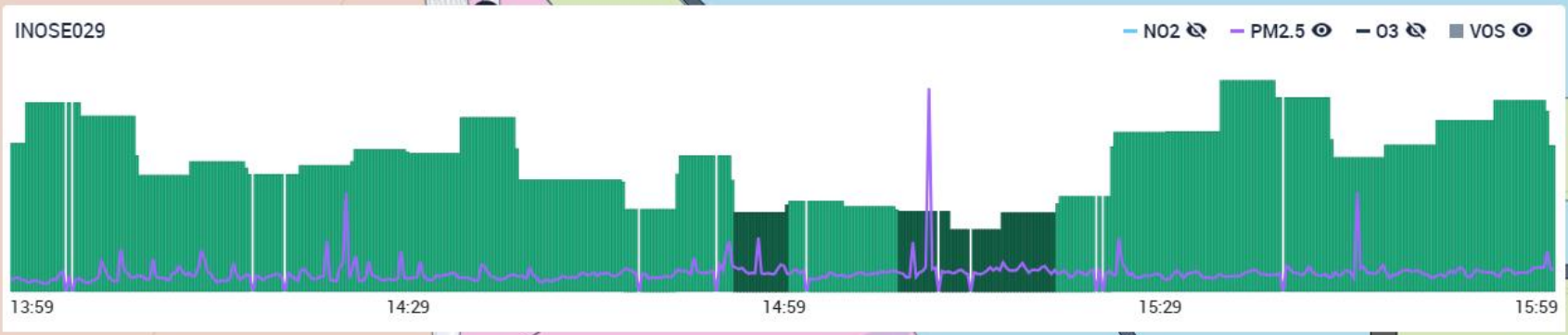
### Luchtkwaliteit

Substantie  
O3

Meting

Luchtkwaliteitsindex

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3D  
+  
-  
Map navigation icons

Substantie  
PM2.5

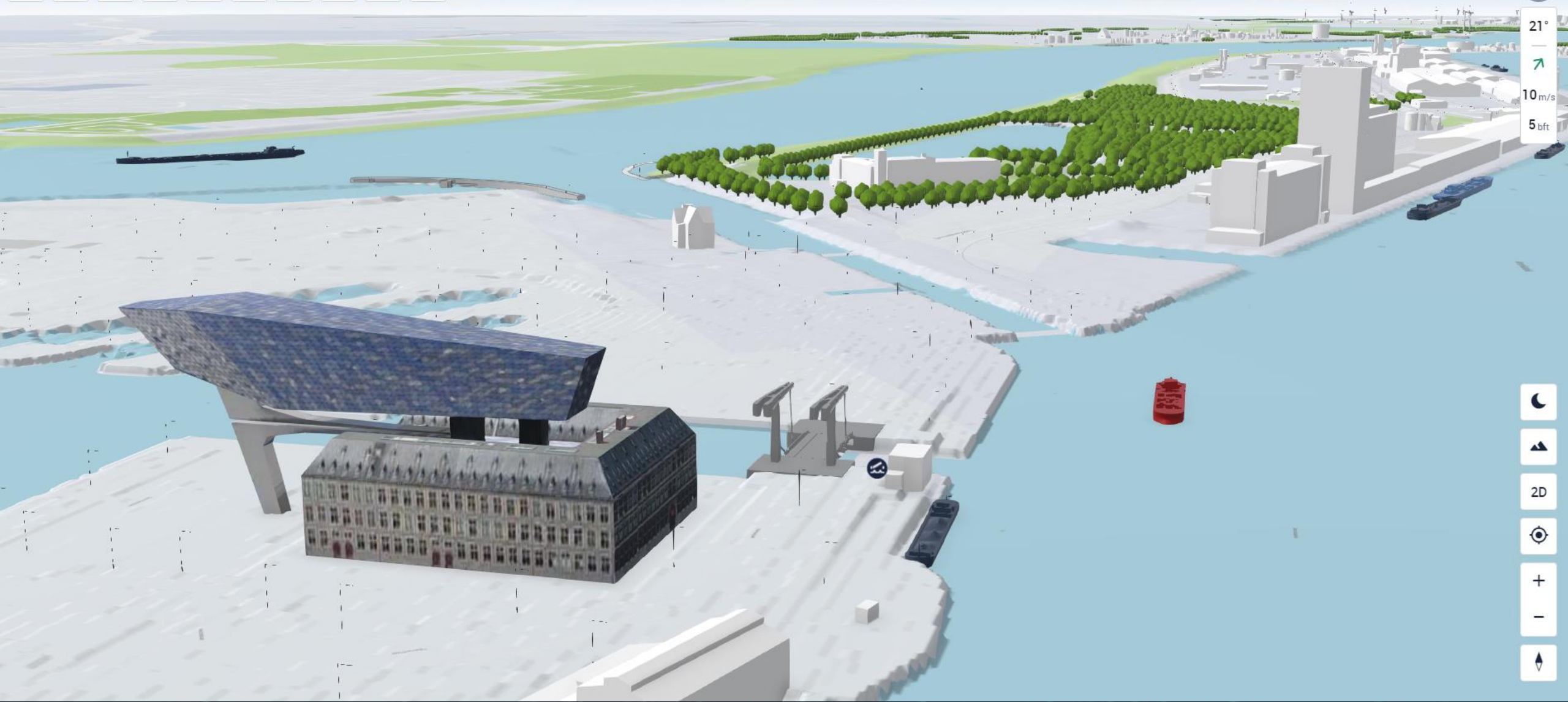
Meting  
2.15 µg/m³

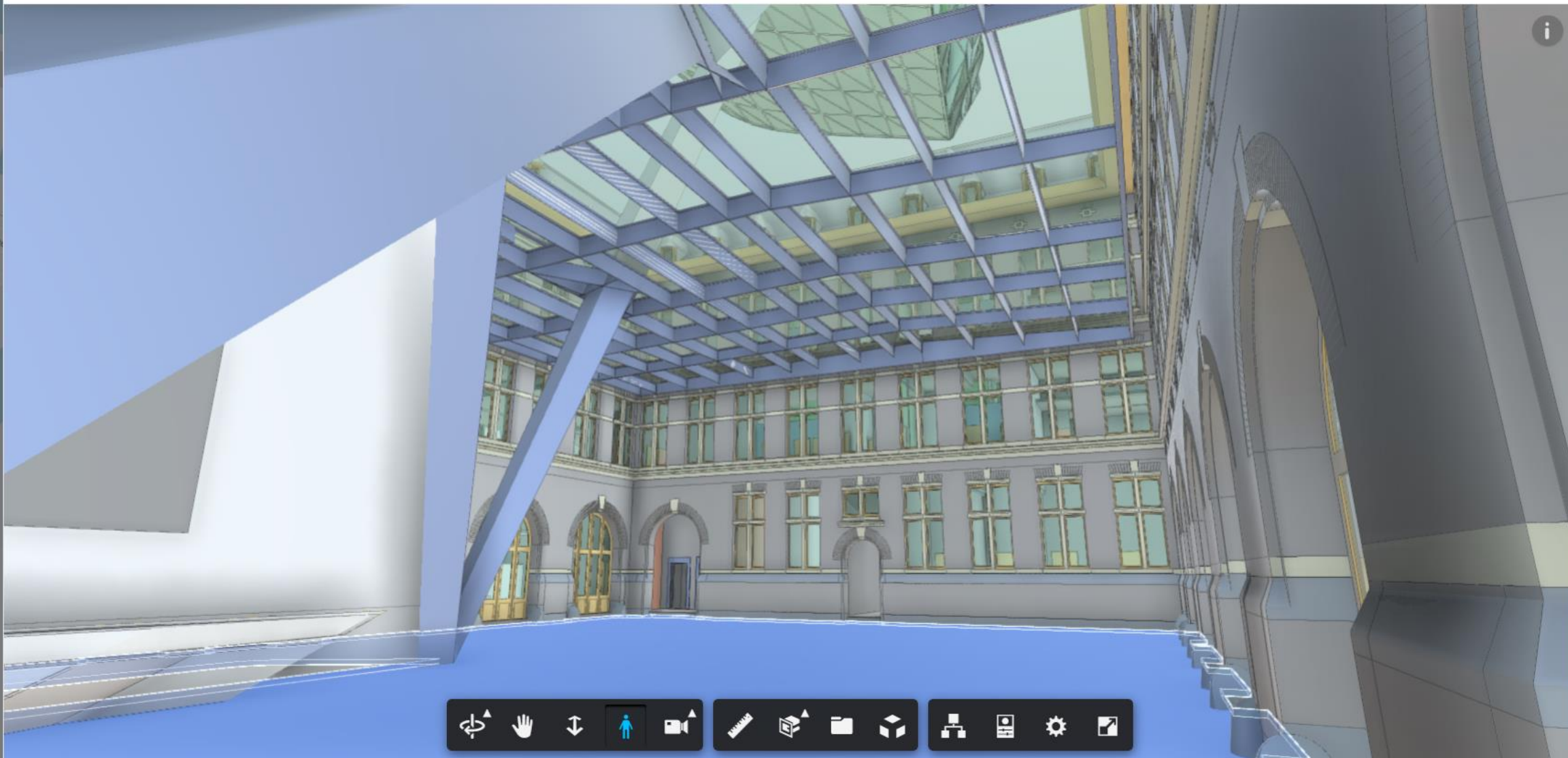
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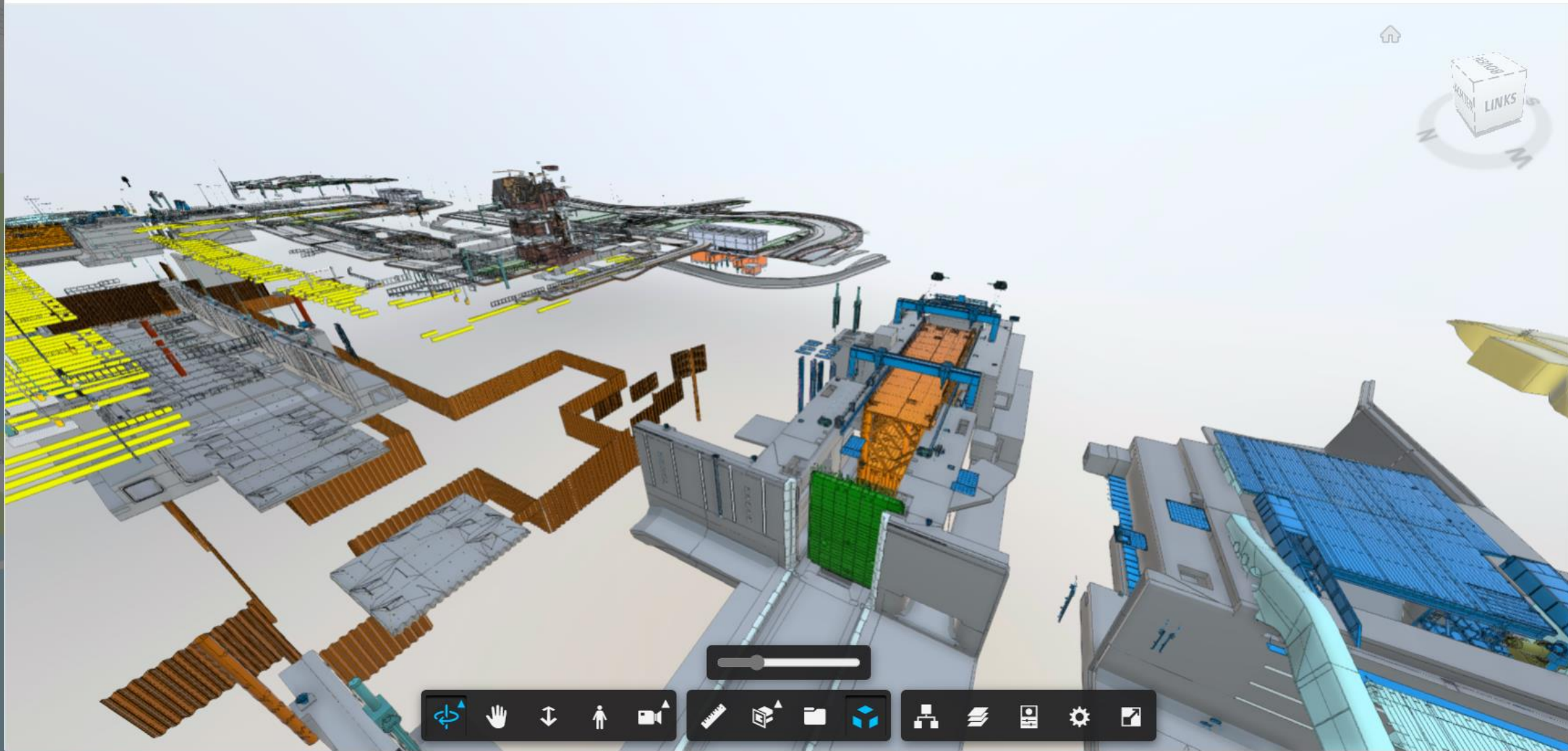
Substantie  
VOS

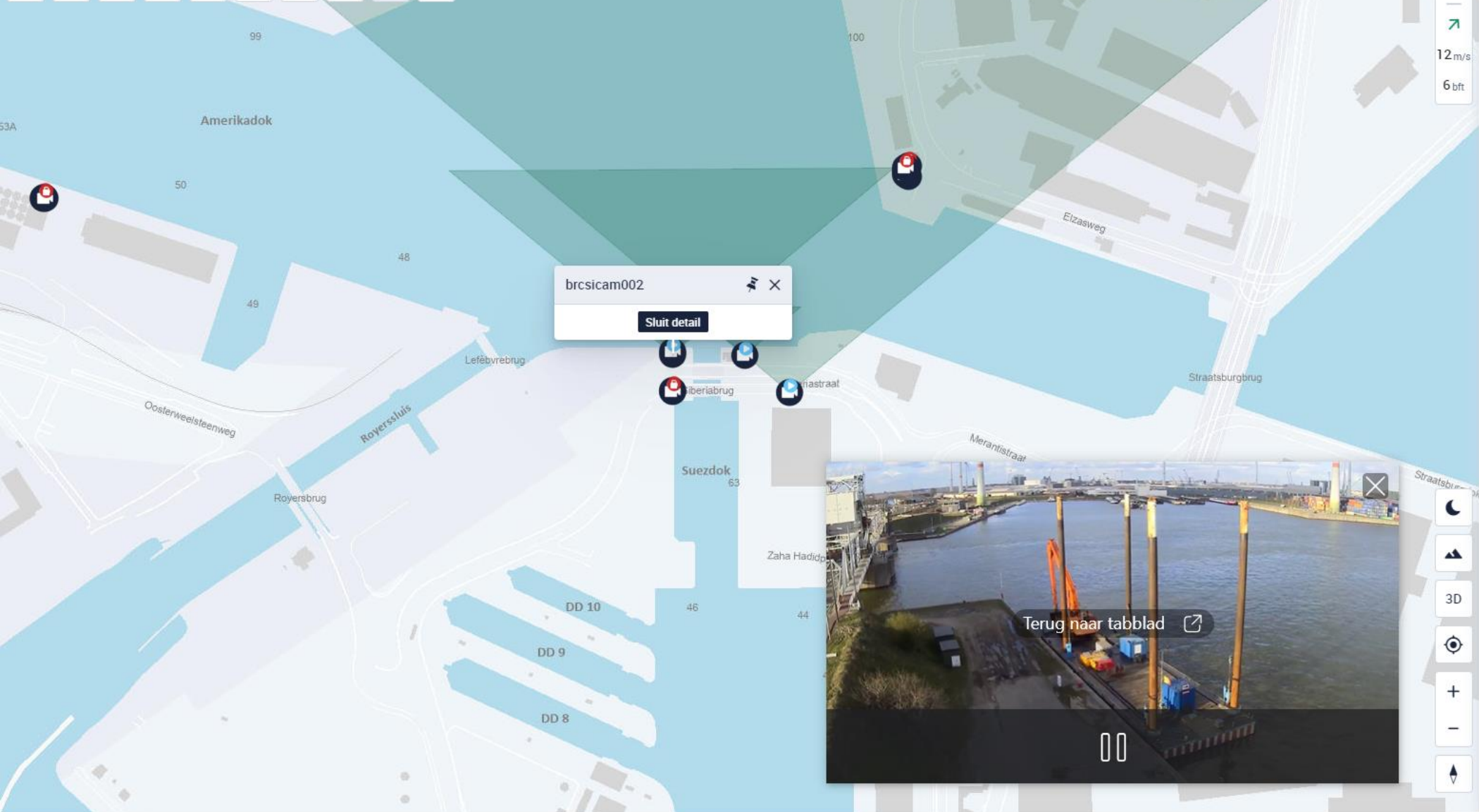






- v2.rvt 37.15 MB
- v2.rvt 147.82 MB
- v4.rvt 284.48 MB





brcsicam002

**Sluit detail**



Terug naar tabblad

brcsicam002

Afspelen in beeld-in-beeld

0:37 / 0:58

Richting (a)  
-0.33961111111111111°

Gezichtsveld (b)  
100°

Diepte (c)  
112.99m

milestone

Locatie  
Latitude : 51,241774  
Longitude : 4,405908

GIS

Laatste update  
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21°  
12 m/s  
6 bft

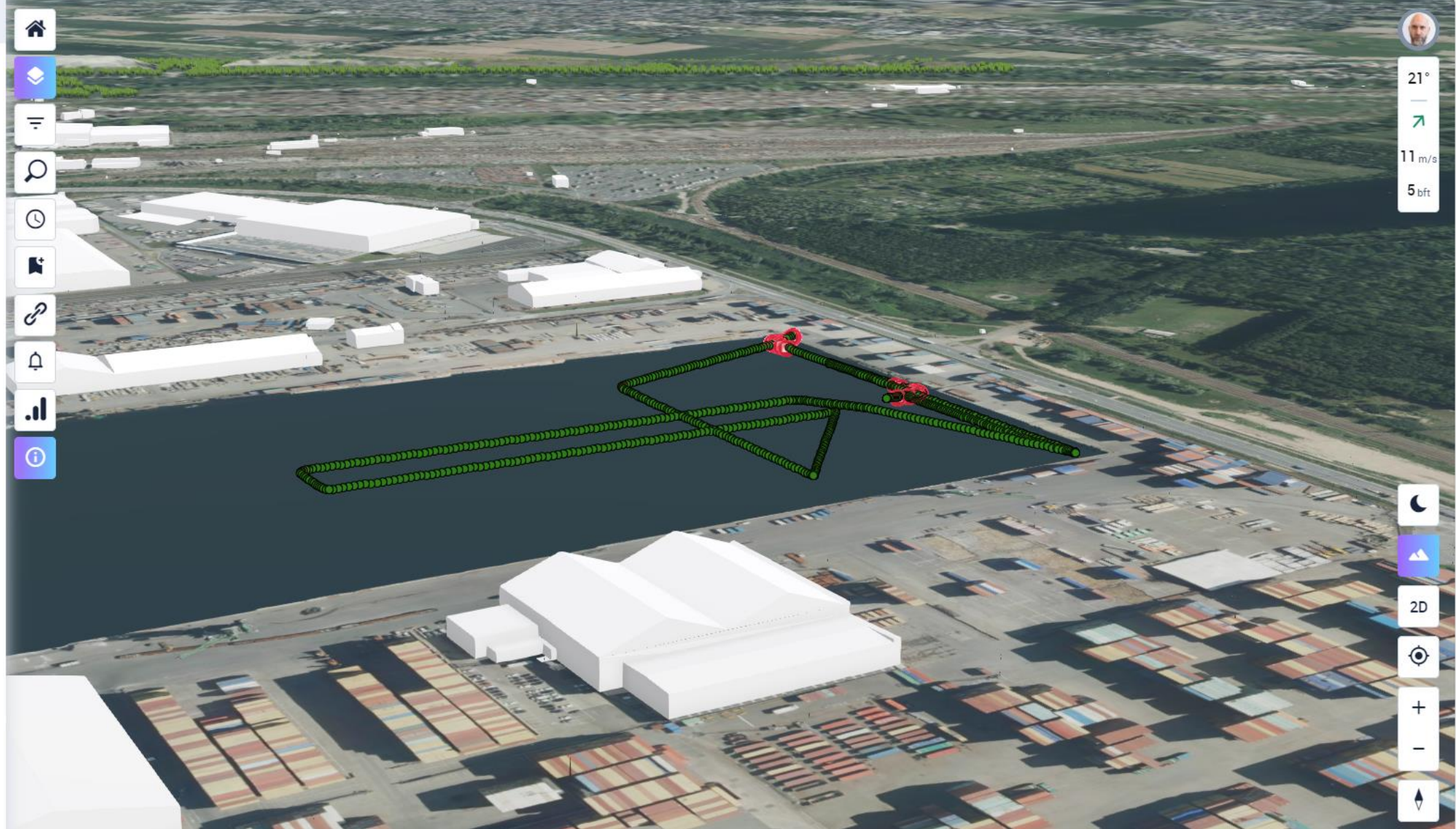
Legende X

Brug >

Drijfvuil v

- 0-50%
- 51-60%
- 61-70%
- 71-80%
- 81-90%
- 91-100%

Windmolen >





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