



# Prepare Ships

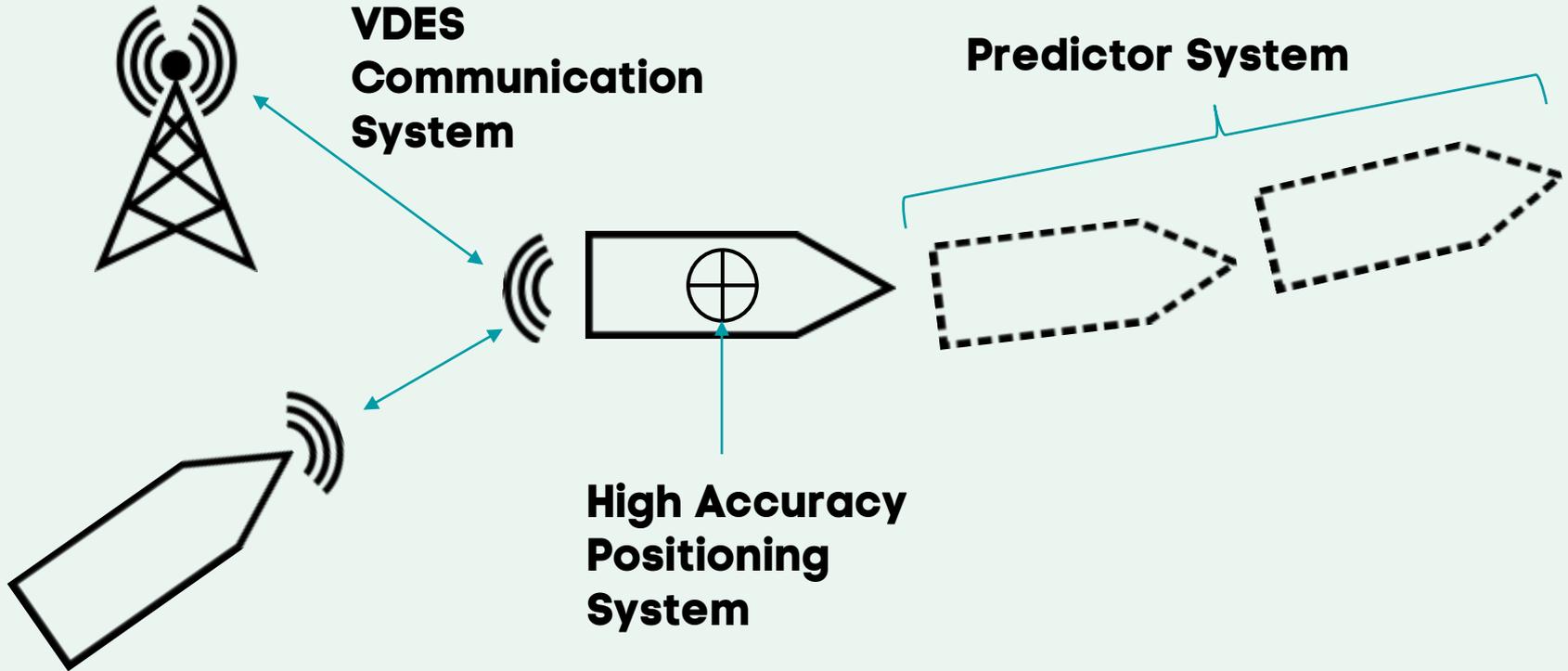


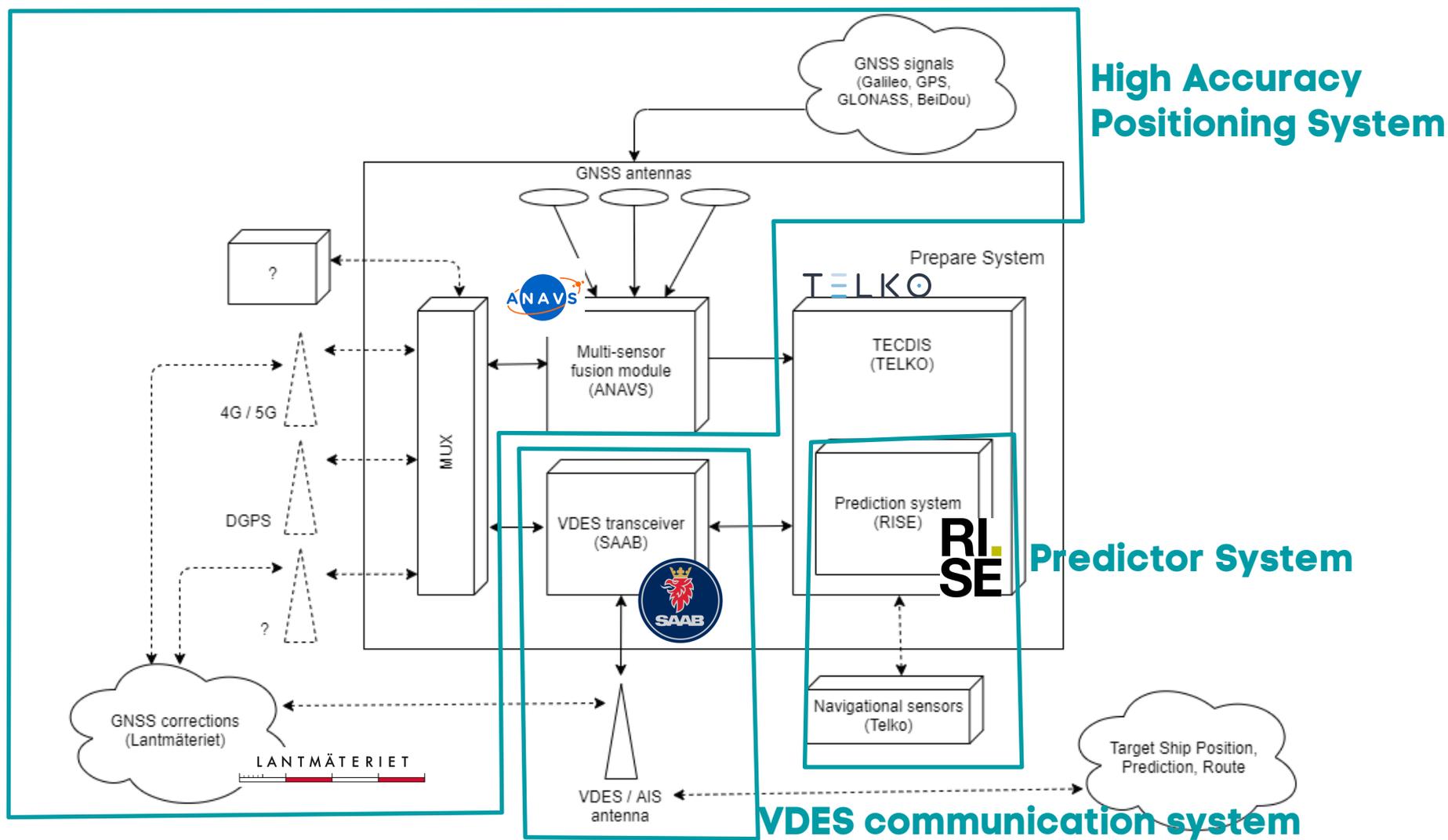
Prepare Ships

Financed by



# What is Prepare Ships?





# Why a High Accuracy Positioning System?



# Ever Given gets stuck in the Suez canal

- Stuck for 6 days.
- Approximated cost of 54 billion dollars.
- Caused by "technical and human errors" during a sandstorm.

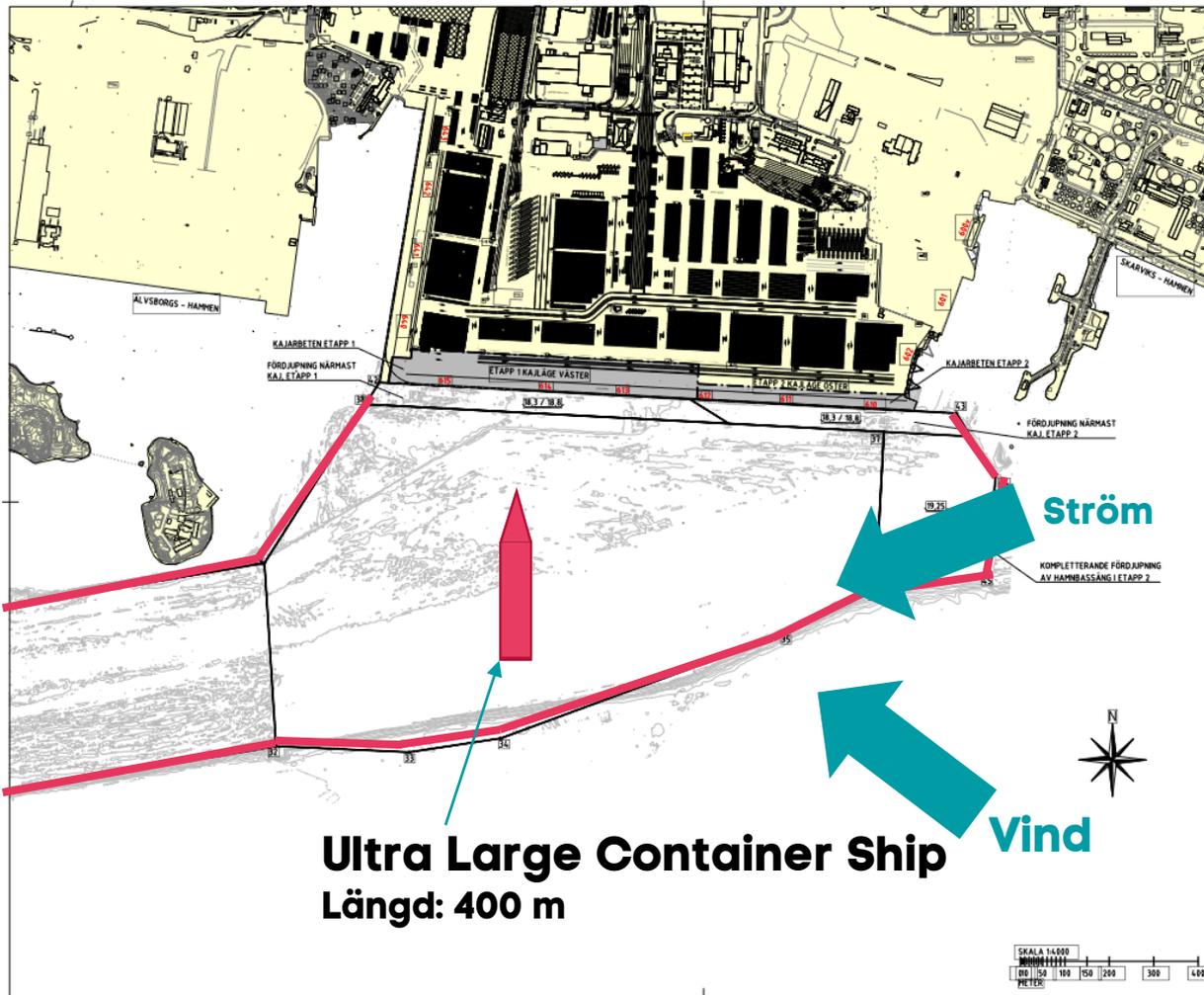
**A stuck ship is expensive  
(and embarrassing)**



## Widening and deepening of the fairway to the Port of Gothenburg

- Must be done to be able to receive the largest ships.
- Approximated cost of 2.5 billion crowns.
- 13,5 milion cubic meters of soil must be dragged.

**To widen and deepen a fairway is expensive (and cumbersome)**



Fully lasted  
"Ultra Large  
Container Ship"

ca 17,0 m

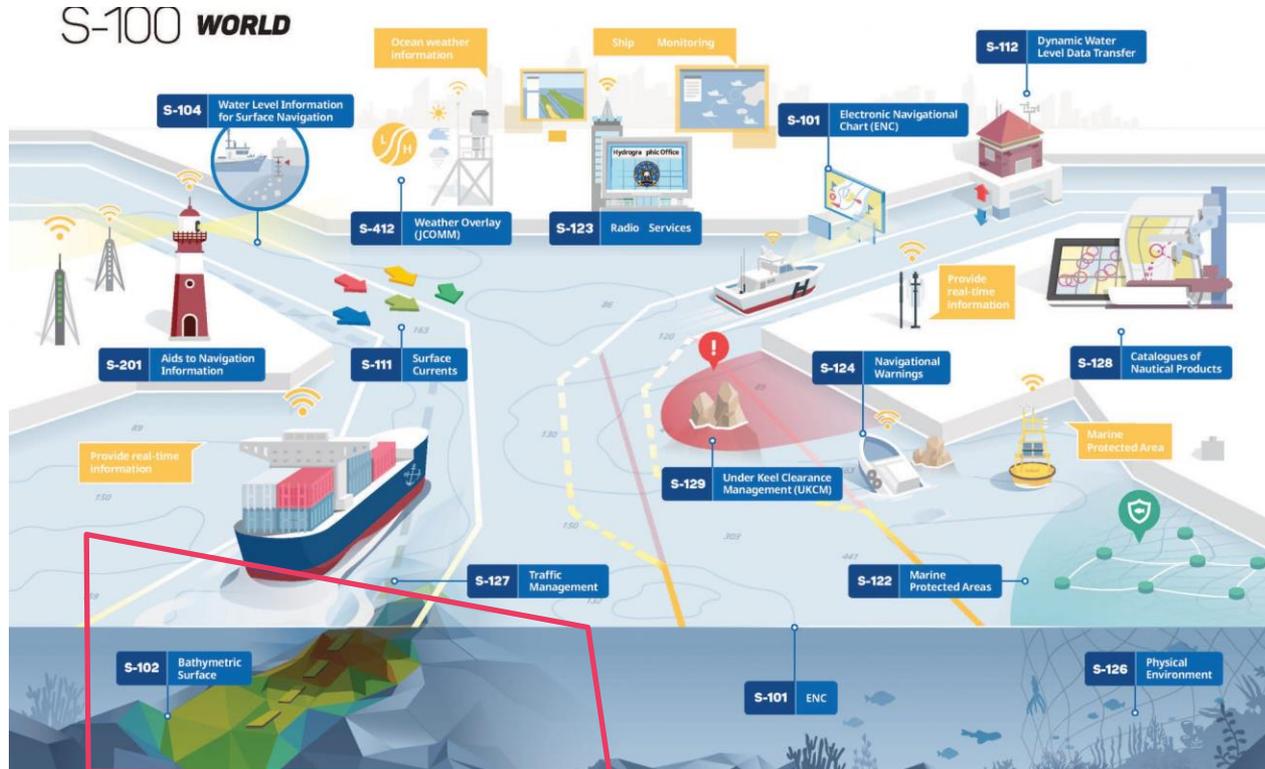
ca 0,5 m

Seabed

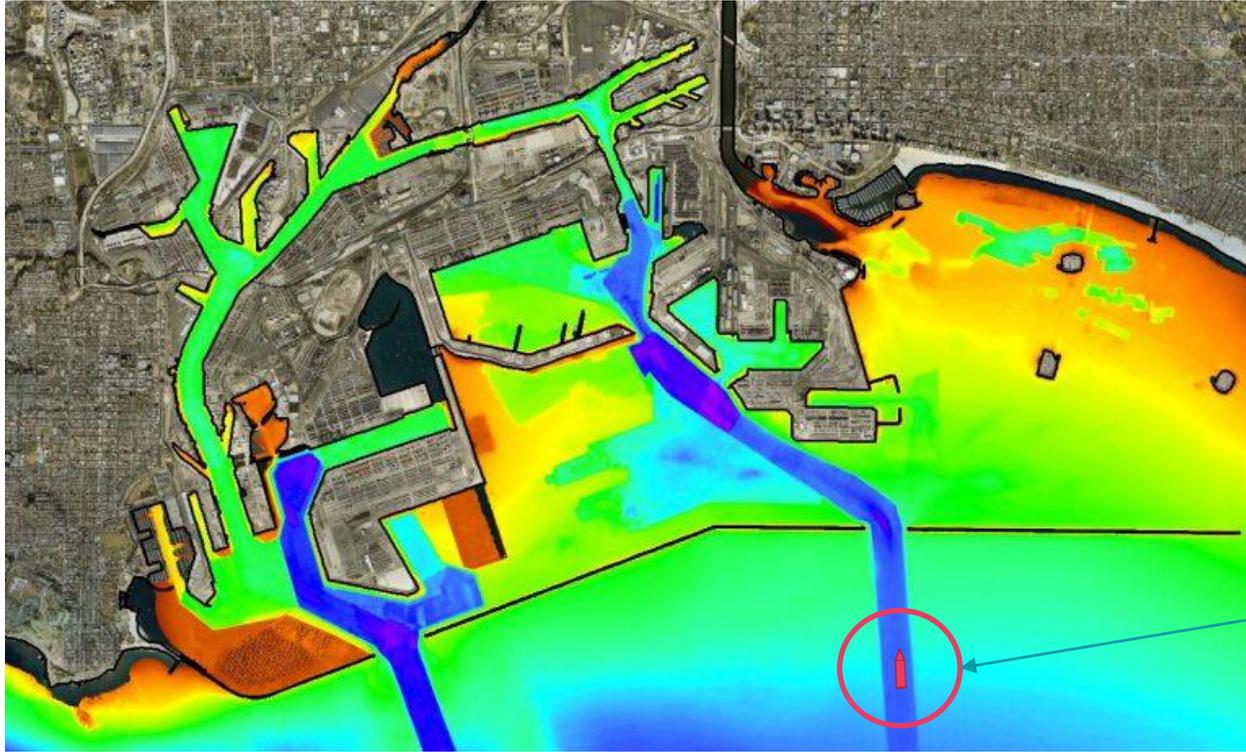
Despite of the  
changes there wont  
be a "lot of space"  
for manoeuvring

# IHO's Universal Hydrographic Data Model

## A geospatial data standard



# Precision navigation



High  
precision  
positioning

**S-102 Bathymetry surface  
(raster data)**

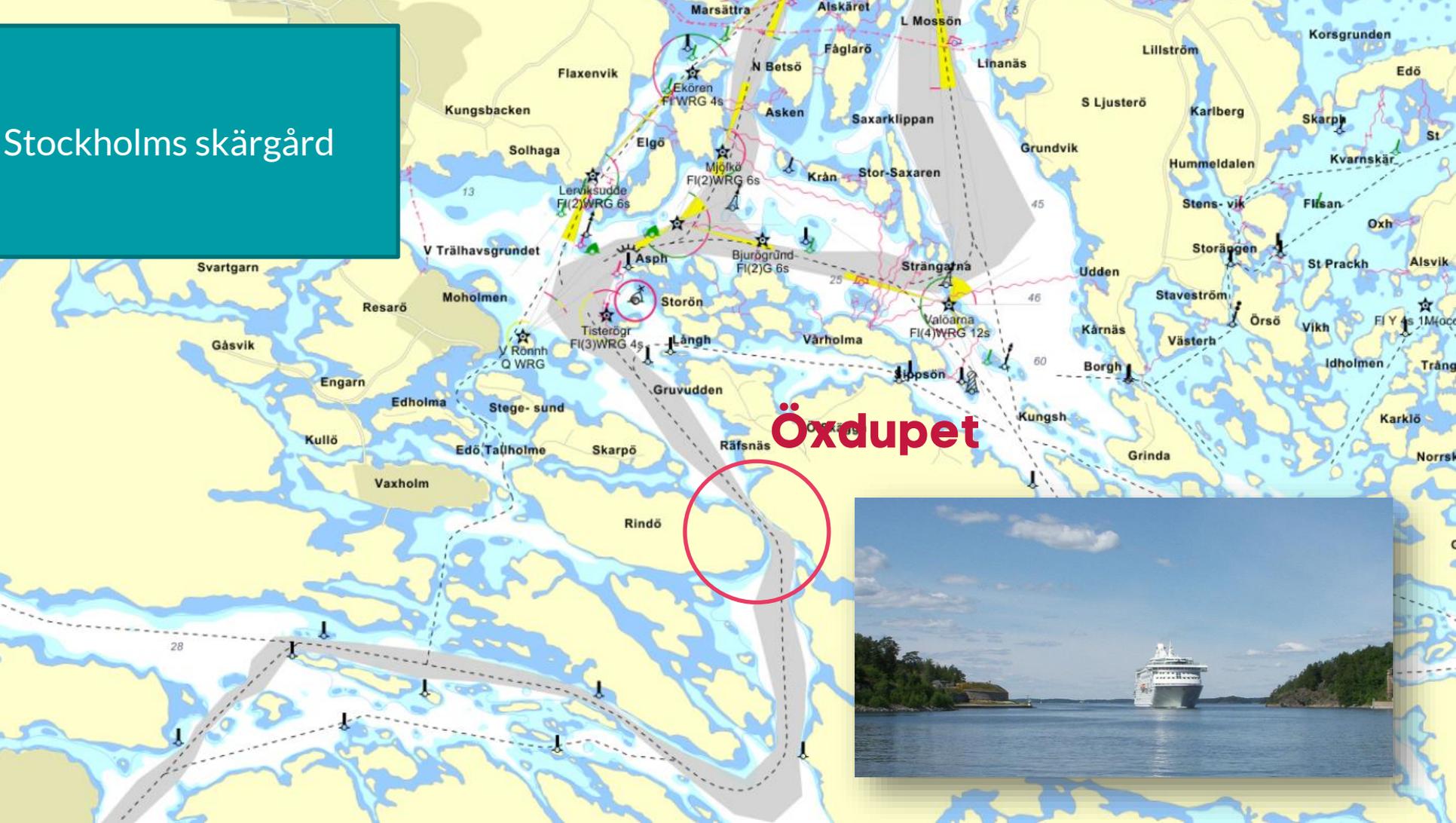
# Conclusion

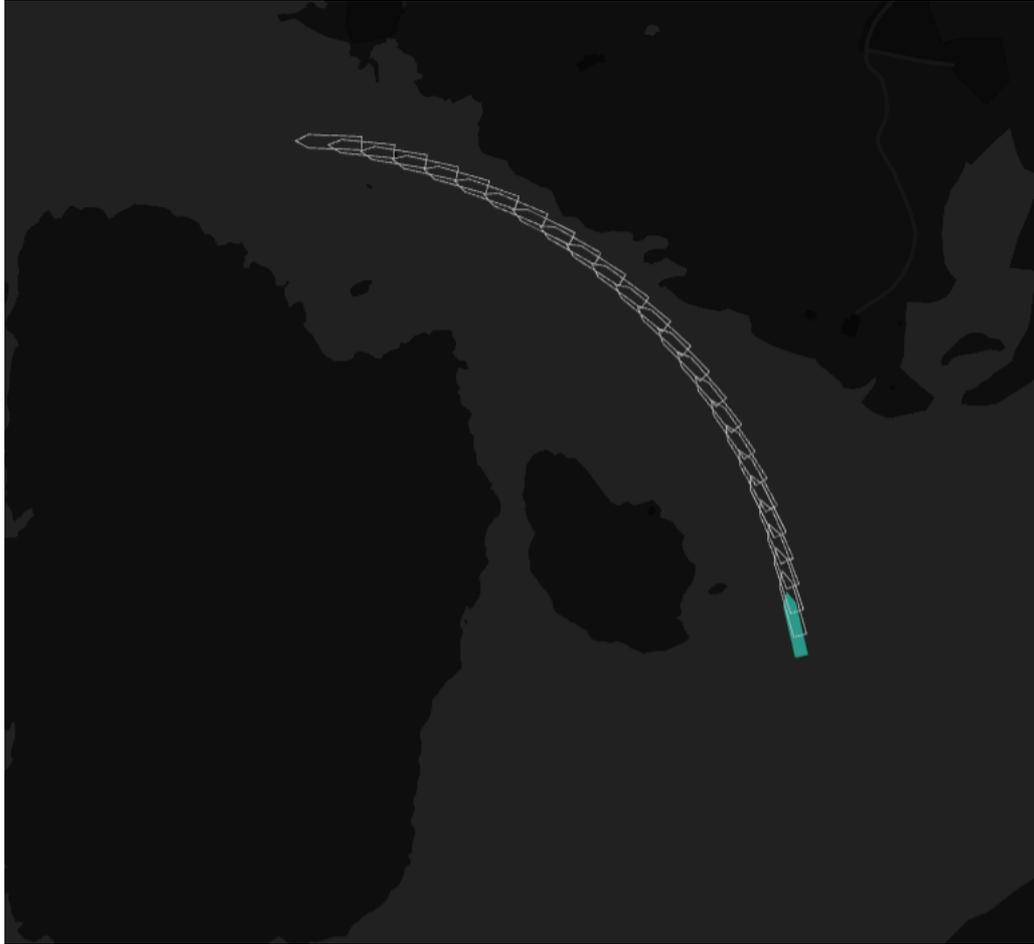
**High precision positioning and bathymetry raster data support safe and effective navigation**

Safe distances can be precisely determined enabling maximum use of the resources within the safety boundaries.

# Why a Predictor System?

# Stockholms skärgård





# Conclusion

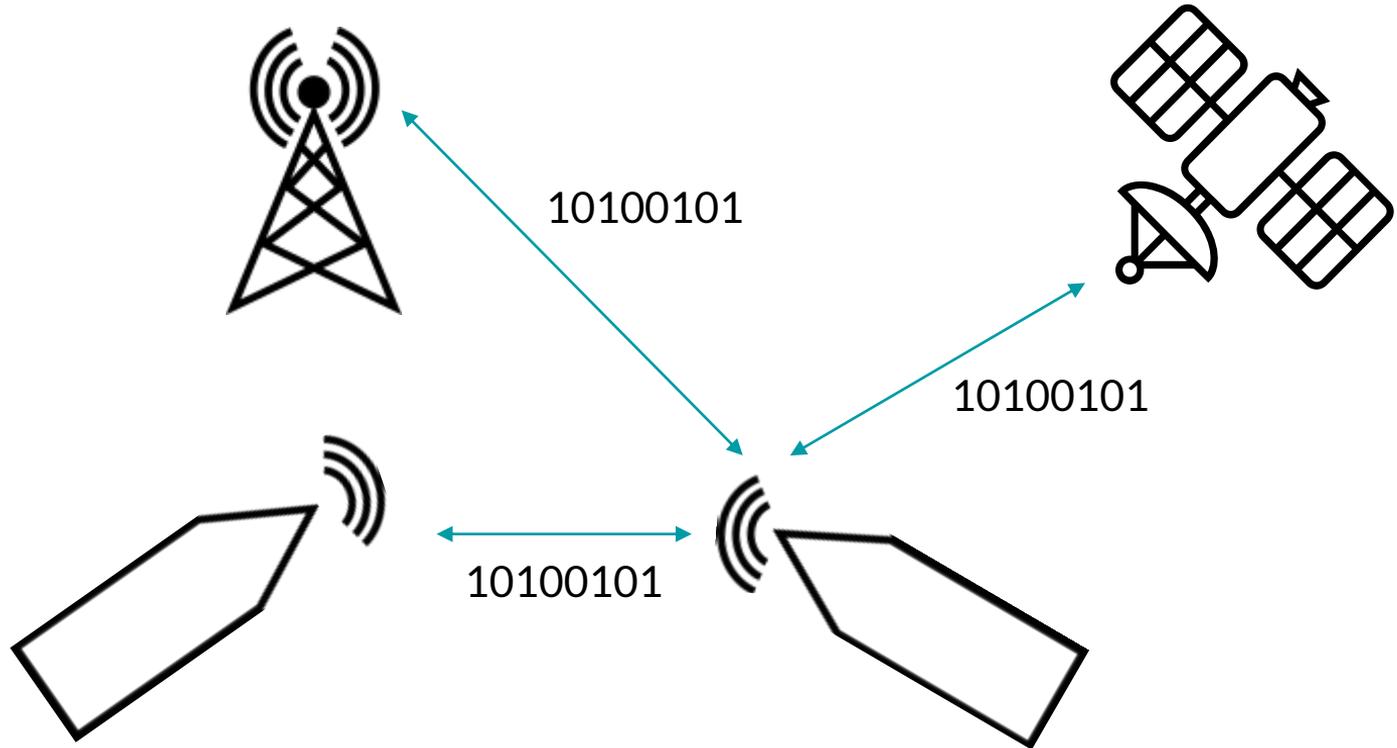
**High precision positioning and a predictor system support safe navigation**

Future position predictions are based on the precise current position.

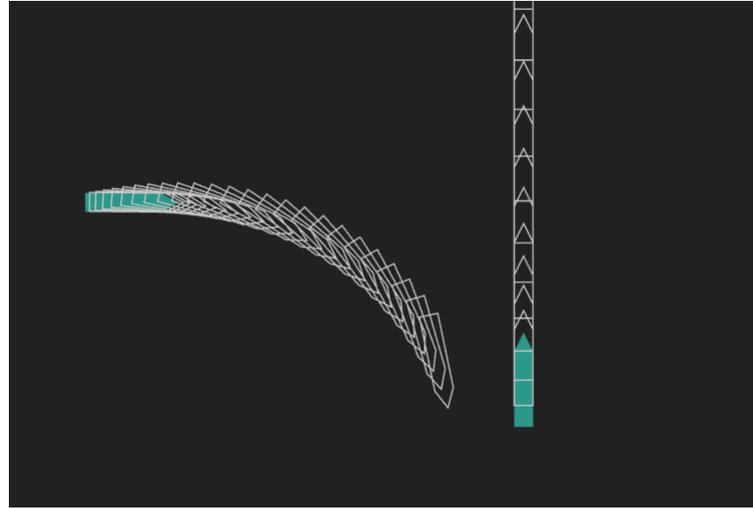
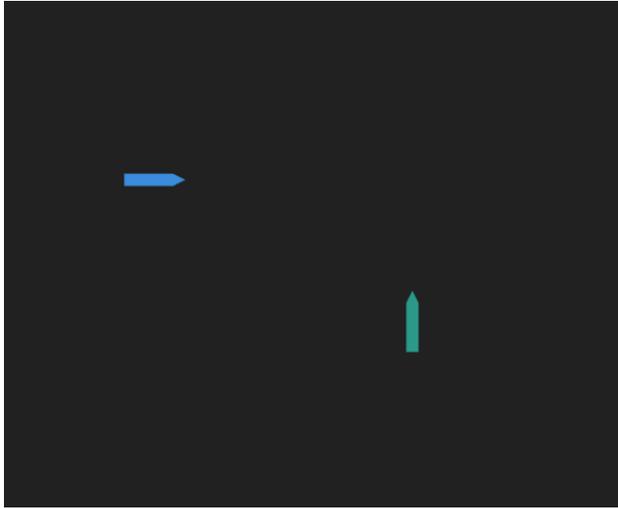
Future position predictions aids manoeuvring.

# Why a VDES Communication System?

# VDES: Vessel Data Exchange System via *Marine mobile VHF*

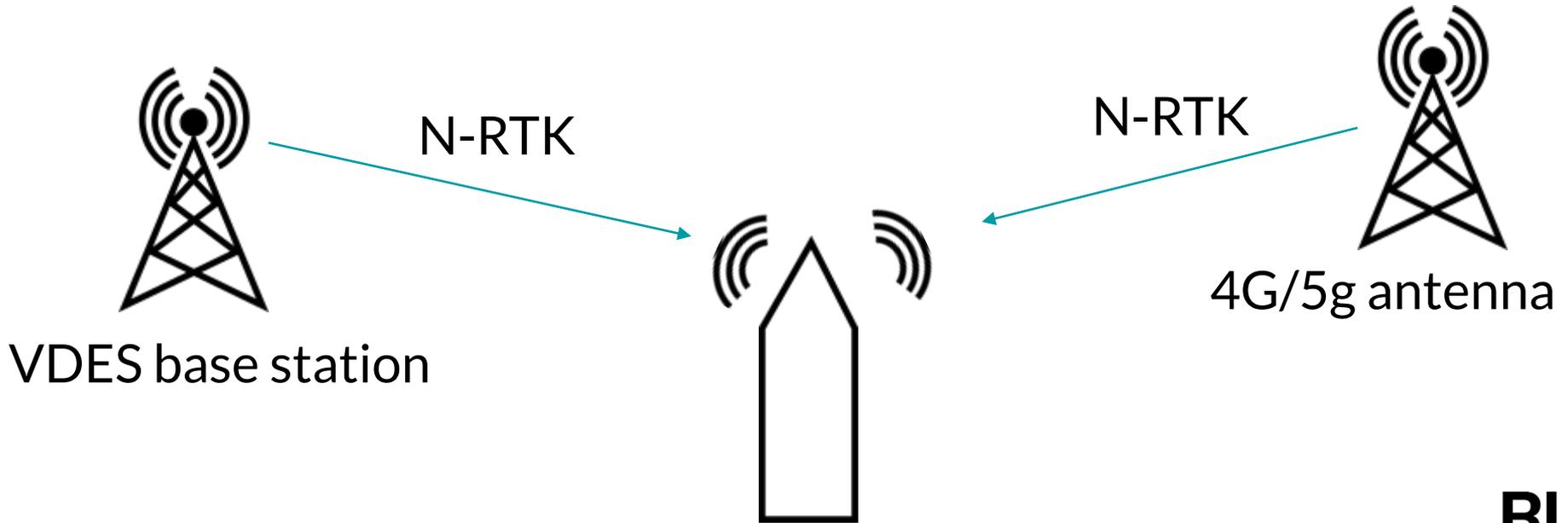


# 1:a reason: Share *the predictions* with other ships via VDES



## 2: reason

Send *Network RTK corrections* to a ship



**Deeper dive into the  
High accuracy  
positioning system**

# High Accuracy Positioning System

Developed by 

Tested by  and

**RI  
SE**

# High Accuracy Positioning System

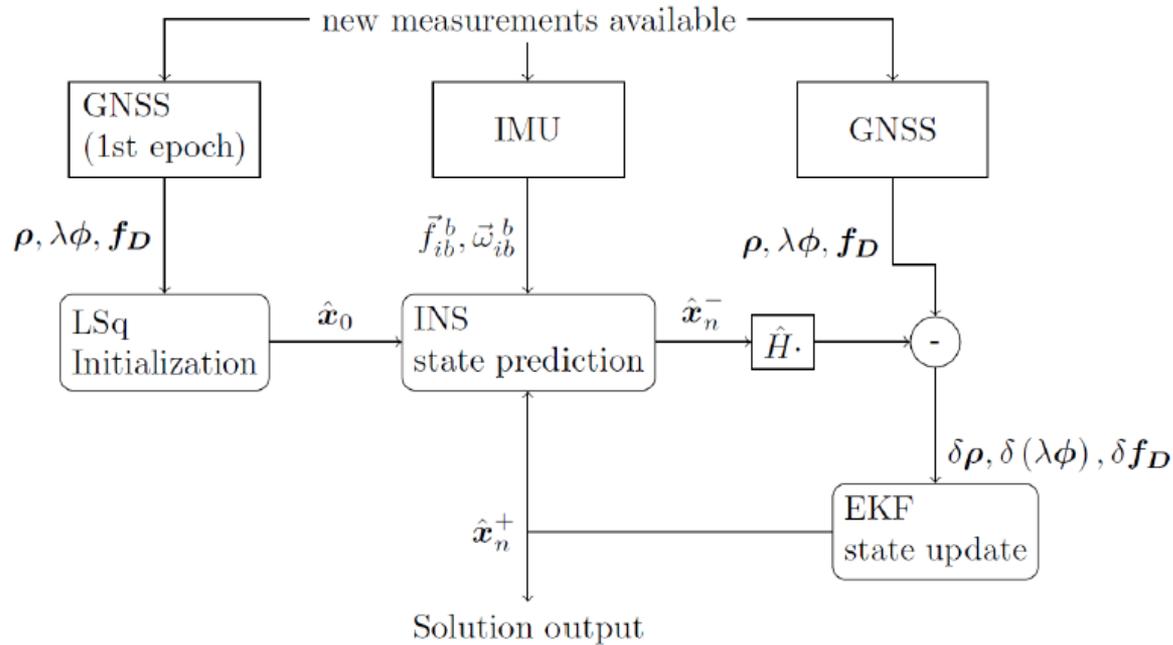
Developed by 

Tested by  and 

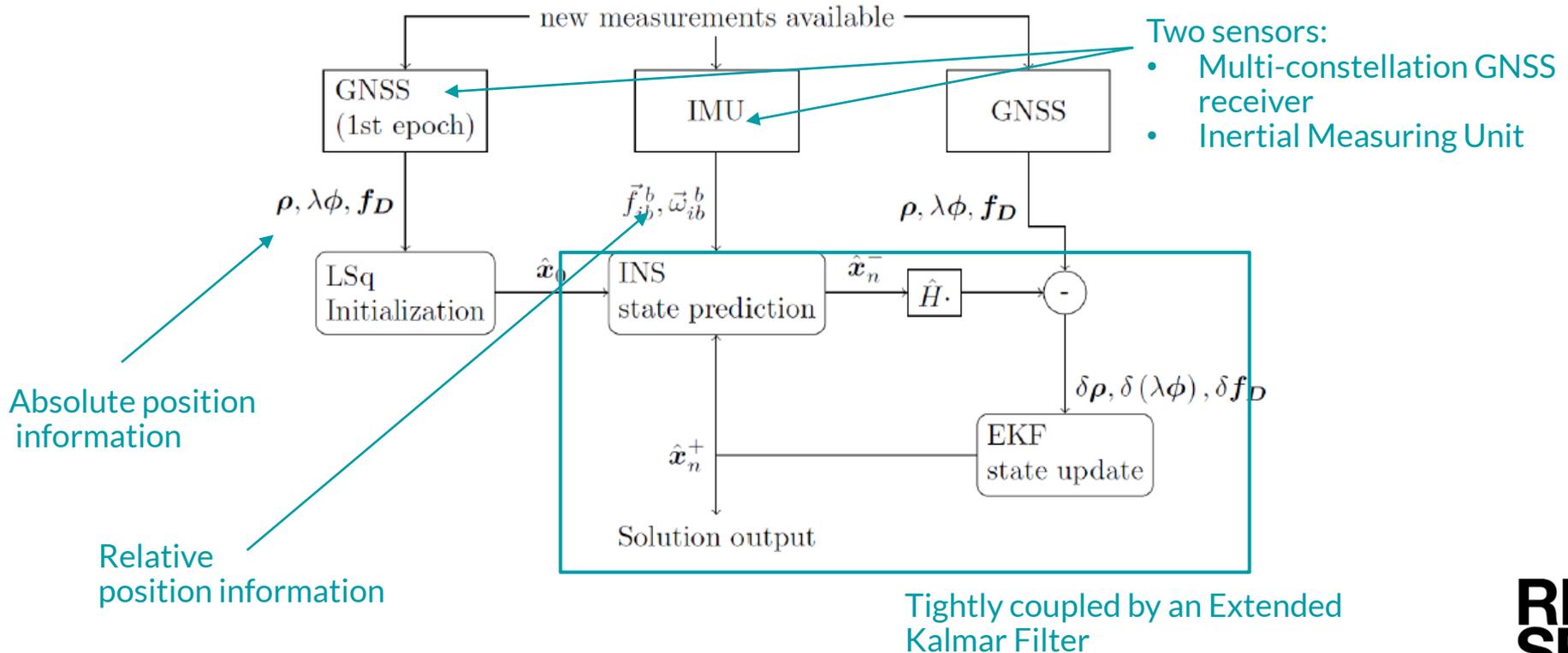
# High Accuracy Positioning System

A precise and resilient position and attitude determination system, that uses a **tightly coupled Multi-Sensor RTK** positioning in coastal areas close to reference stations and a tightly coupled Multi-Sensor PPP in areas that are more far away from reference stations.

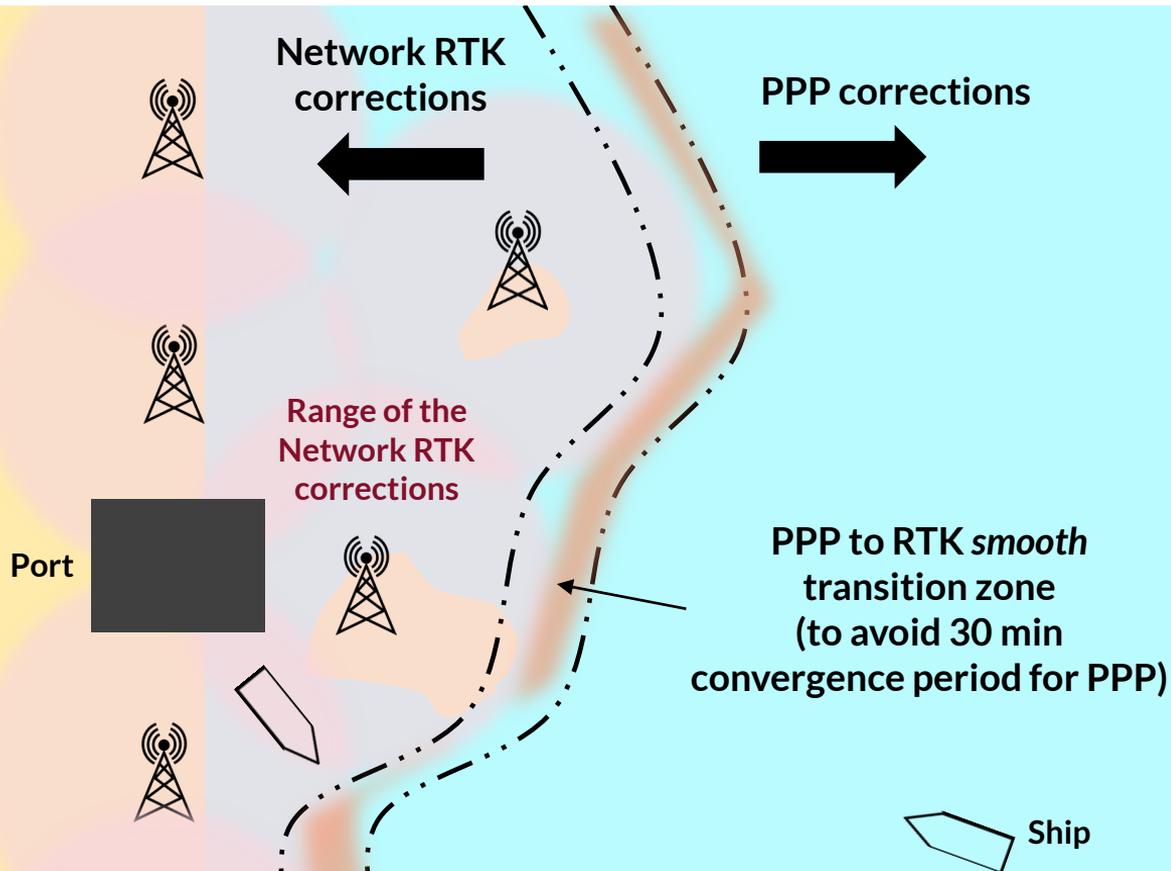
# Tightly coupled and multi-sensor



# Tightly coupled and multi-sensor



# RTK and PPP positioning



4G/5G coverage

No mobile coverage



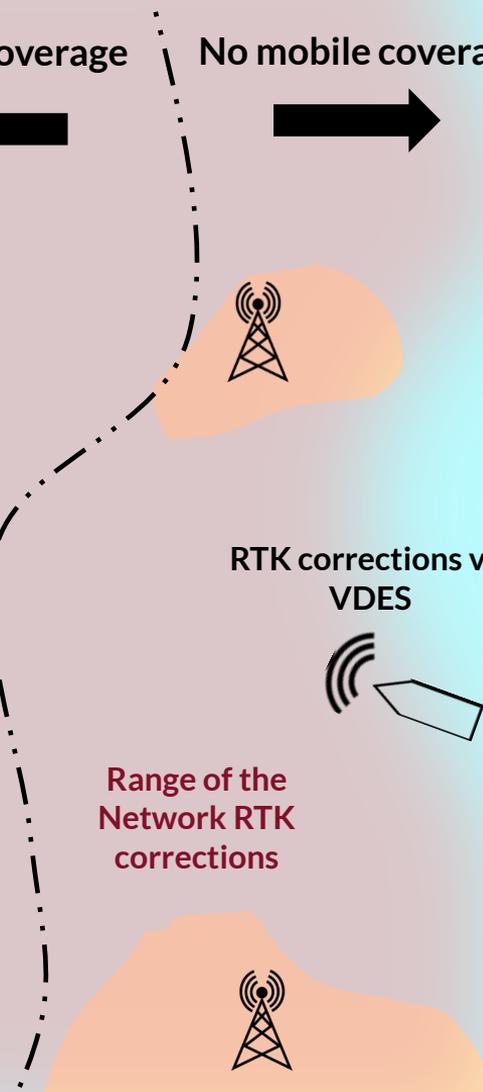
RTK corrections via  
VDES or 4G/5G



RTK corrections via  
VDES



Range of the  
Network RTK  
corrections



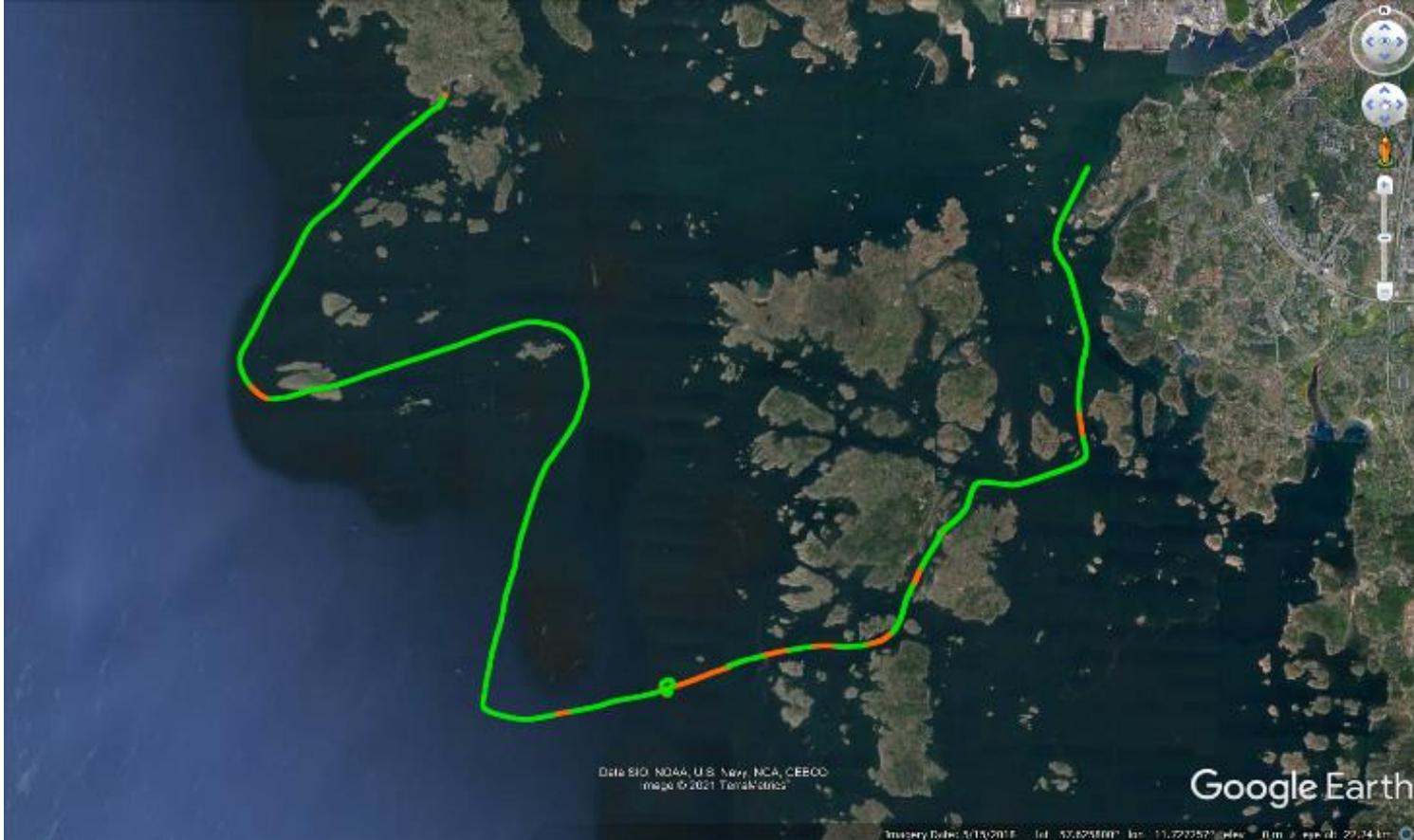
# Reference stations i Göteborgs skärgården



# Lotsbåten 729

**GNSS  
antennas**

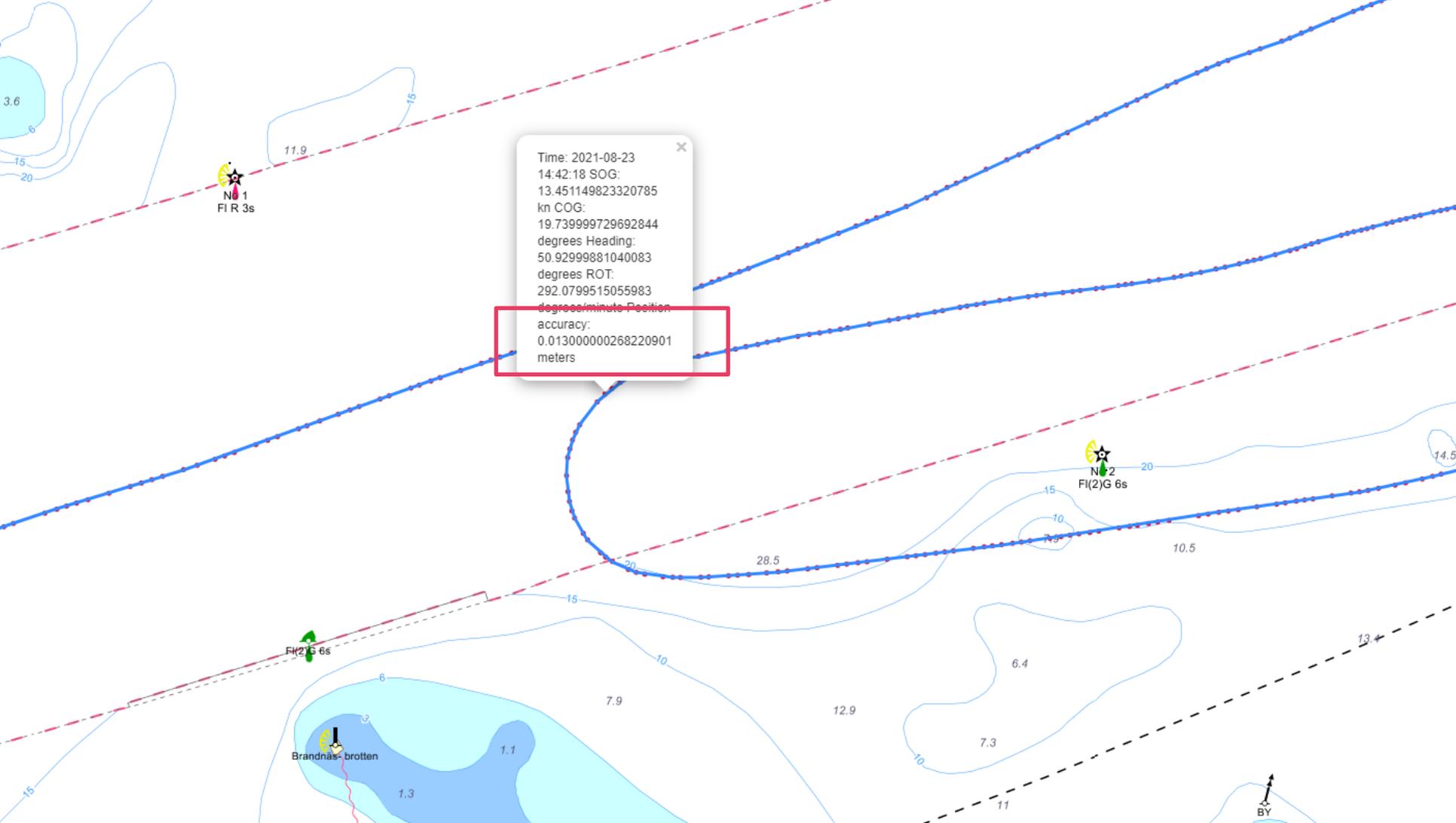




**Float RTK (decimeter level accuracy)**  
**Fixed RTK (centimeter level accuracy)**

# Princess yacht My@Sea





Time: 2021-08-23  
14:42:18 SOG:  
13.451149823320785  
kn COG:  
19.739999729692844  
degrees Heading:  
50.92999881040083  
degrees ROT:  
292.0799515055983  
Degree/minute Position  
accuracy:  
0.013000000268220901  
meters

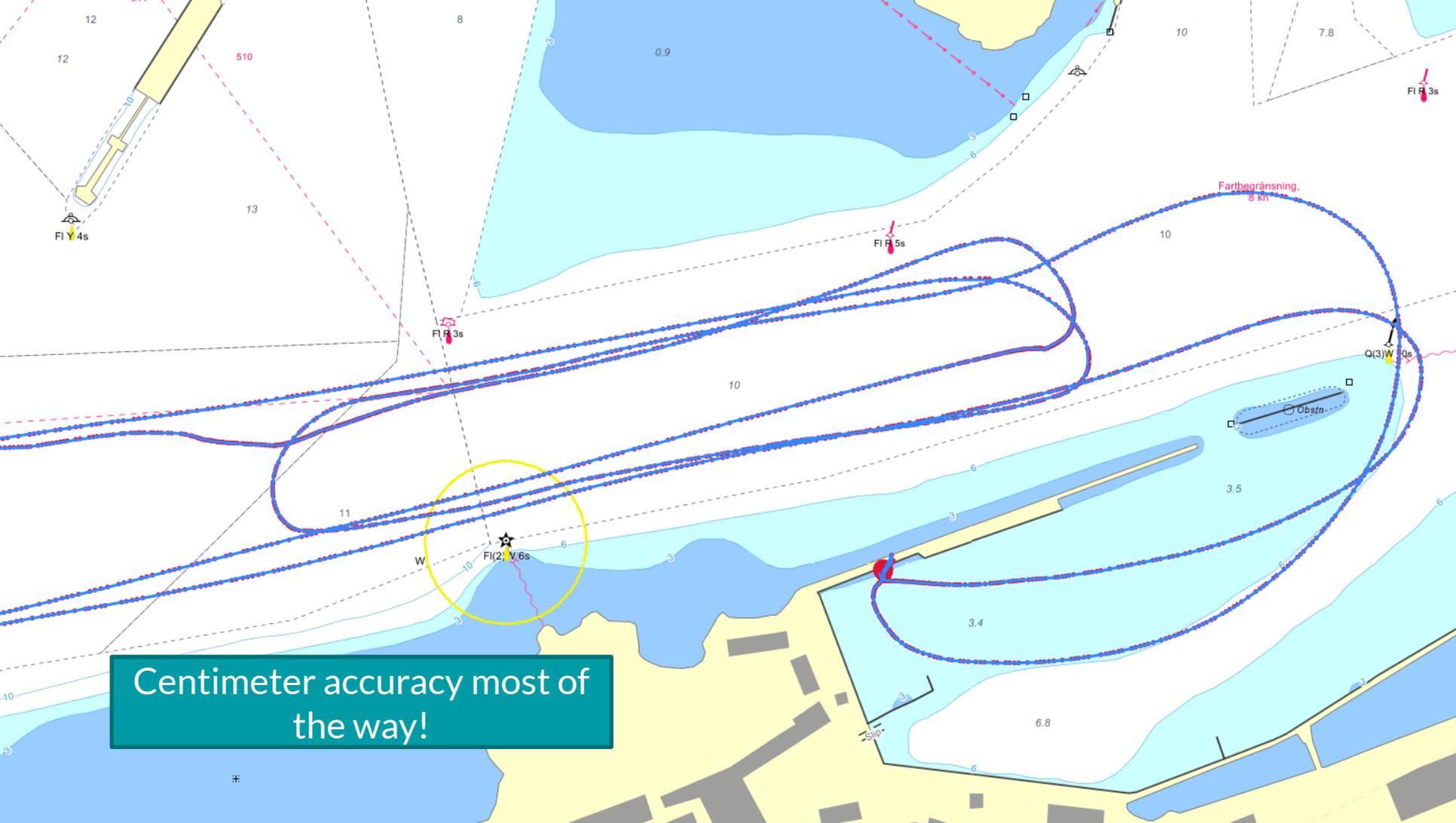
NØ 1  
FI R 3s

NØ 2  
FI(2)G 6s

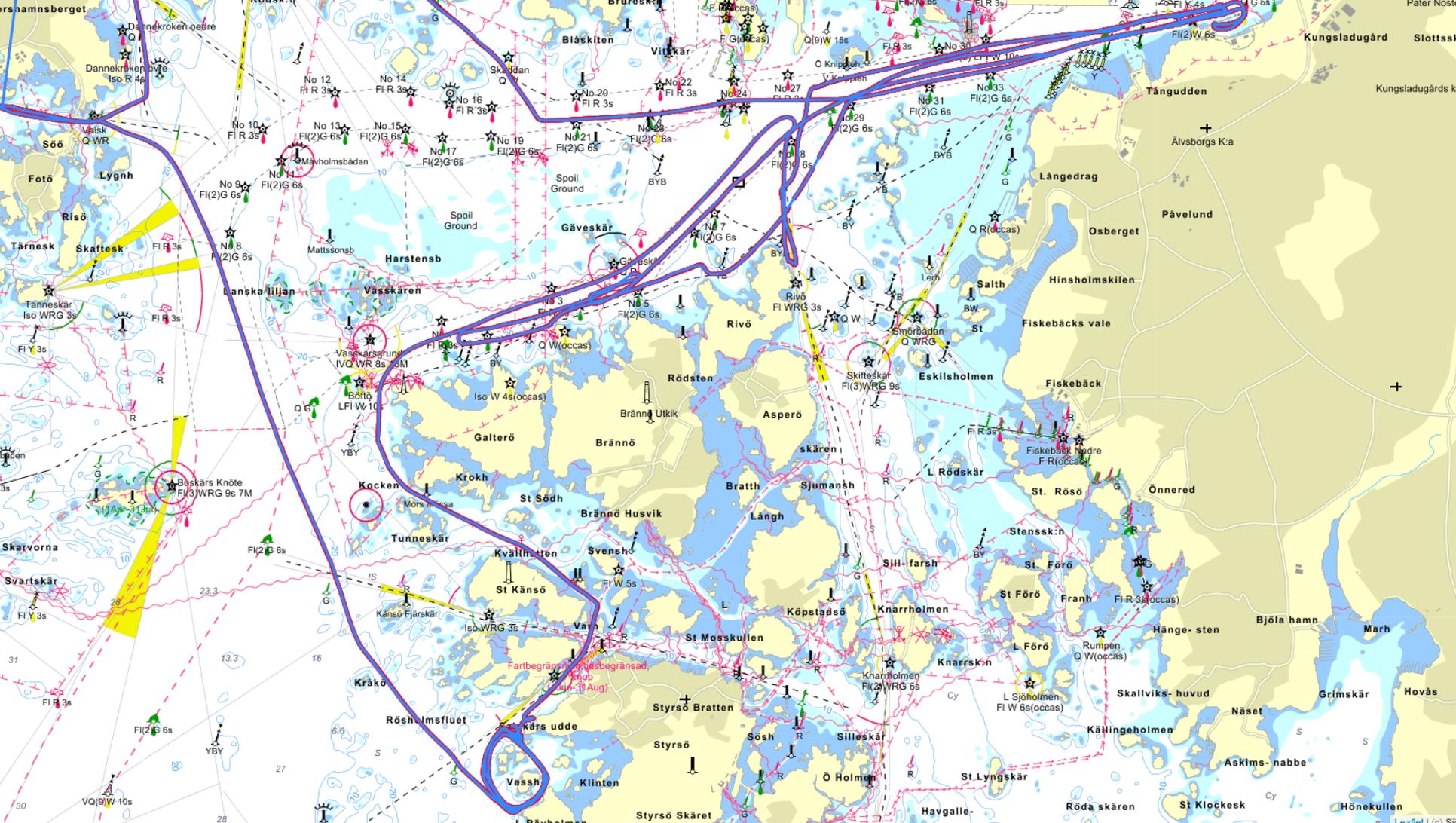
FI(2)S 6s

Brändnäs- botten

BY



Centimeter accuracy most of the way!



**Tack!**  
**Frågor?**