



BETTER SHIPS, BLUE OCEANS

Work as done versus work as imagined 

Hans Huisman

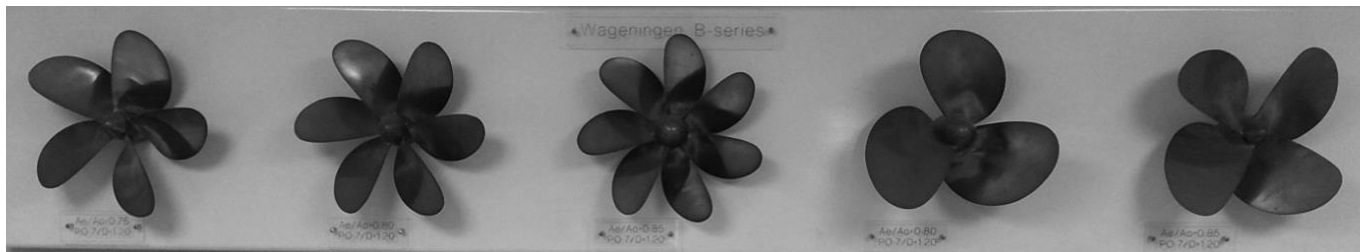
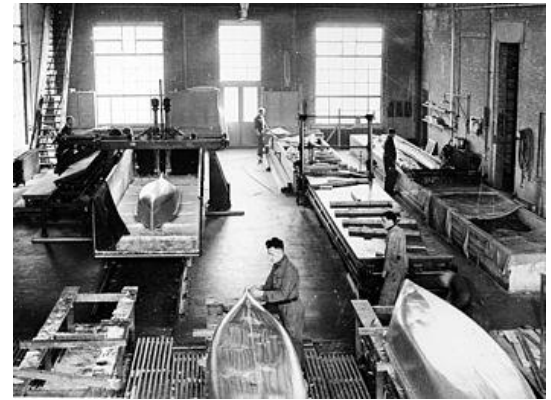
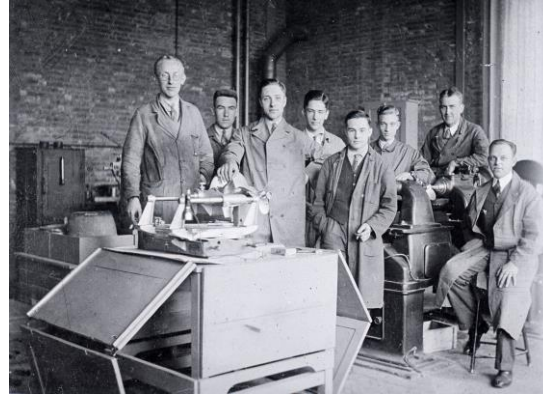
Hans Huisman

- Studied electrical engineering at University of Technology, Delft
- 1991-2006 NLR, National Aerospace Lab
- 2006-2019 LVNL, Air Traffic Control, The Netherlands
- 2019-now, MARIN, Maritime Research Institute Netherlands

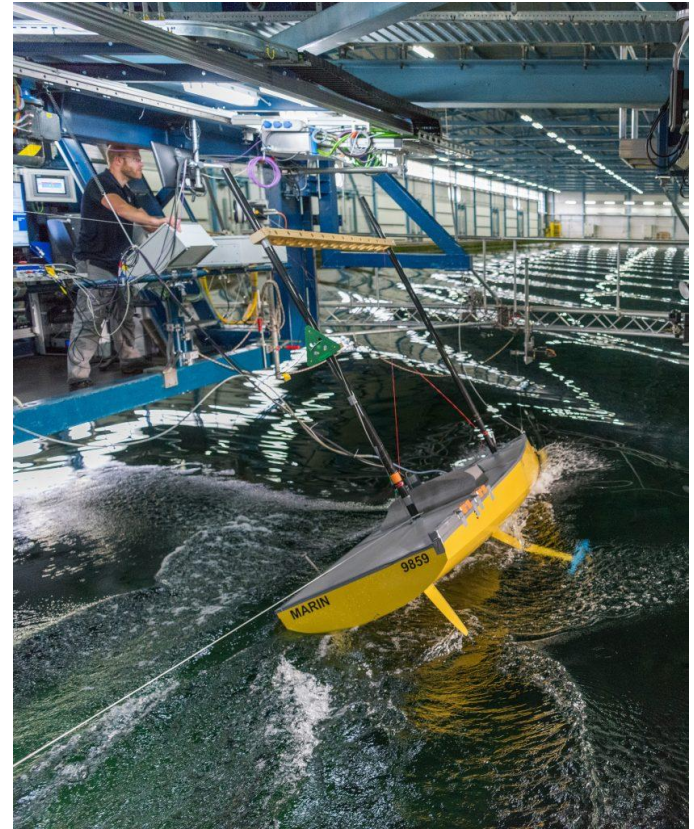
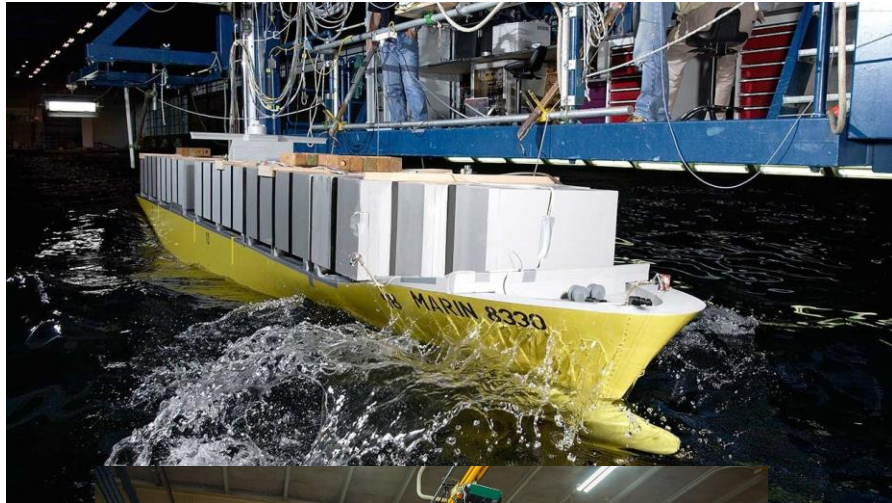
'MARIN' Founded by Dutch shipping companies & Navy



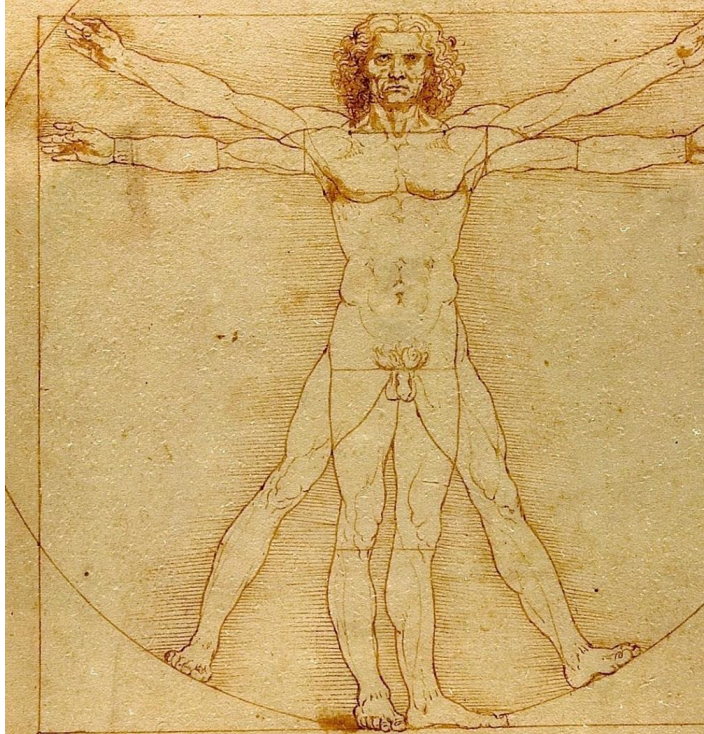
- 1929 Stichting **Nederlandsch Scheepsbouwkundig Proefstation** (NSP).
- 1932 Ingebruikname sleeptanks
- 1980 Samenvoeging NSP en Nederlands Maritiem Instituut (Rotterdam)
Ontstaan van het huidige **MARIN**



You might us from ship models in basins







Human Factors: use knowledge of human abilities and limitations to design systems, organizations, jobs, machines and tools for safe, efficient, and comfortable human use.



Human Factors and
Ergonomics Society

- Human operator, the strongest and the weakest link
- What is it going to be in a future operation?



- A new bridge, in Rotterdam





☰ SCHUTTEVAER

Havenmeester Rotterdam vindt nieuwe brug over Nieuwe Maas gevaarlijk

De derde brug die Rotterdam over de Nieuwe Maas wil bouwen, heeft nadelige economische en nautische consequenties, stelt havenmeester René de Vries in een brief aan het gemeentebestuur.

 Jelmer Bastiaans

 Rotterdam, 28 september 2022, 13:32



- The city of Rotterdam wants to have an additional bridge near the “bocht van De Esch”.
- Amongst other to reduce the amount of traffic on the highway A16.
- The safety assessment is part of the so called MIRT (meerjaren infrastructuur ruimte en transport).

Question to MARIN: perform a nautical safety assessment.

Where?



- First assessment based on guidelines waterways (Richtlijnen Vaarwegen)

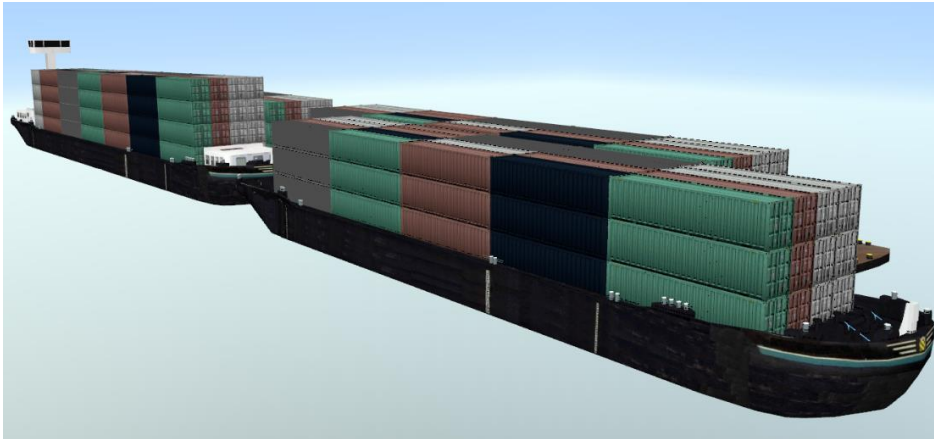
Zone 'West'



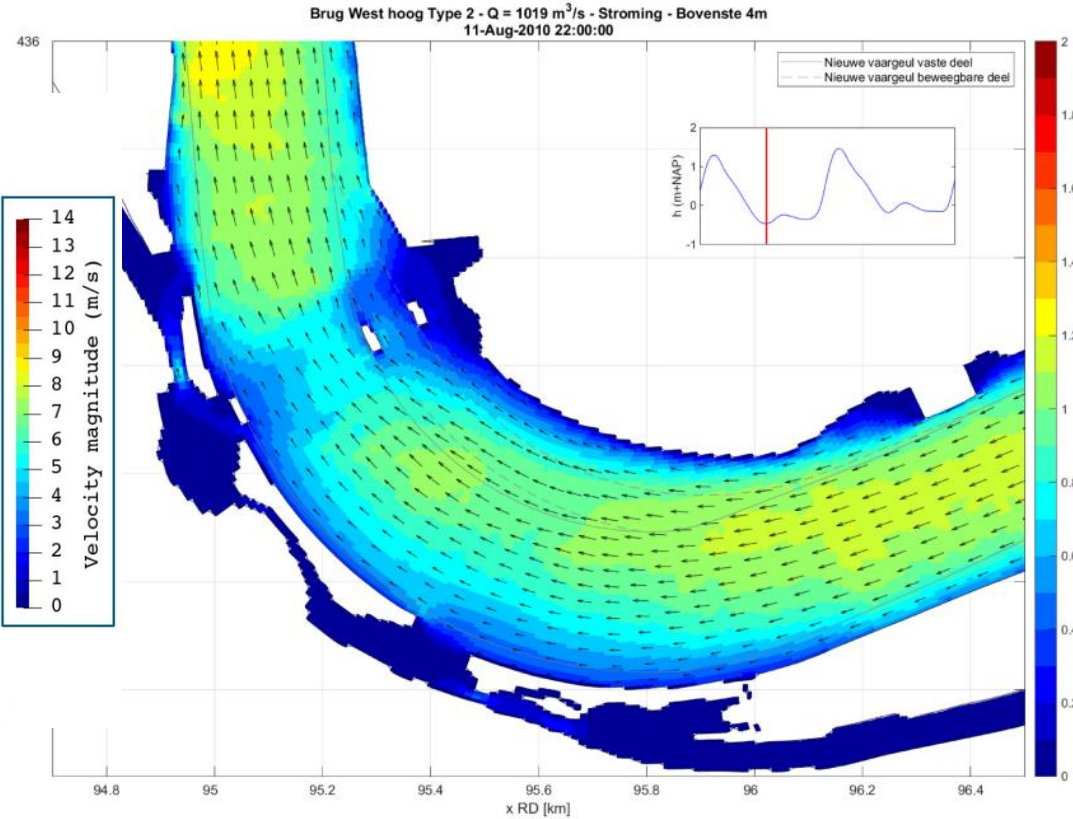
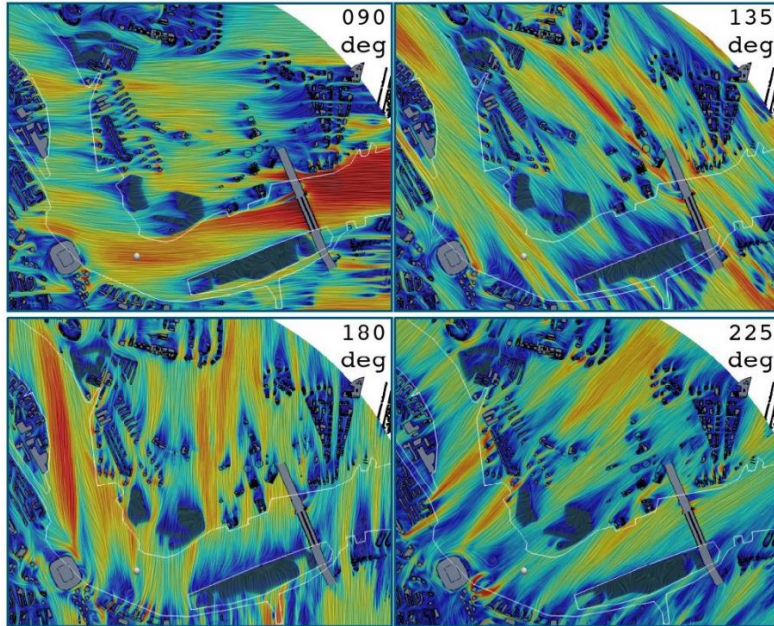
Zone 'Bocht'



- Double inland vessel (*koppelverband*)
- 185m length, 22.8m wide, CEMT class Va vessel with 3 barges, 5 layers of containers on the vessel, 4 layers in the barges.

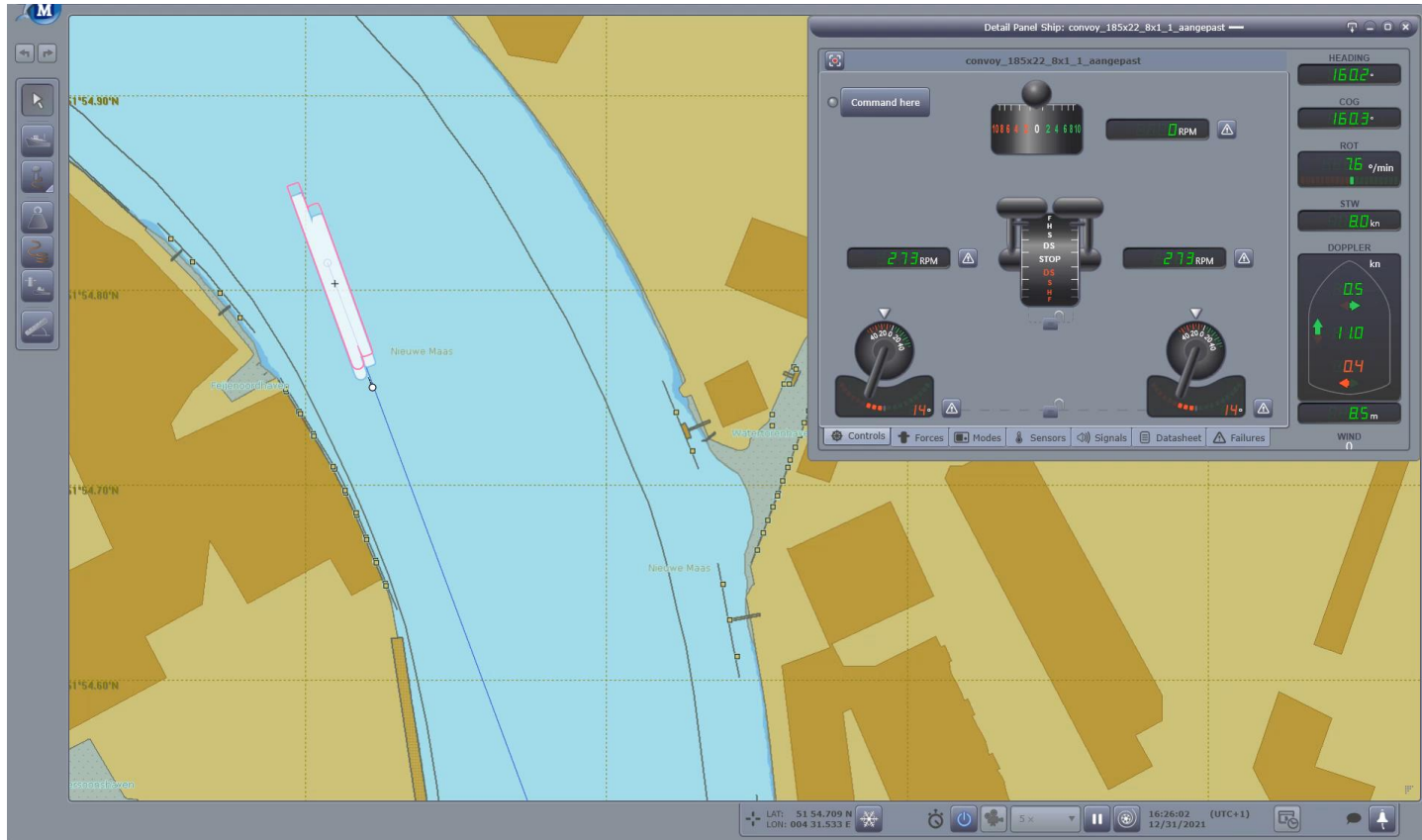


Fast time simulation with wind and current

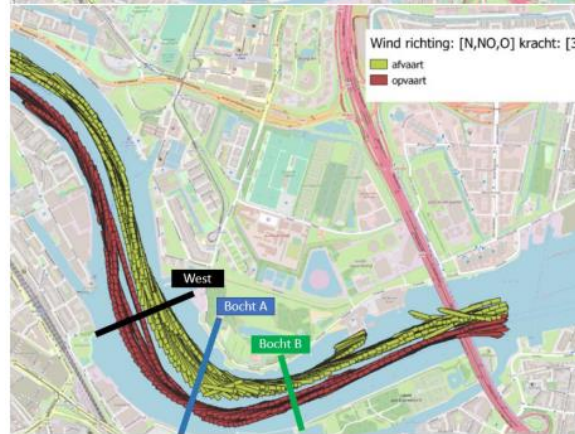
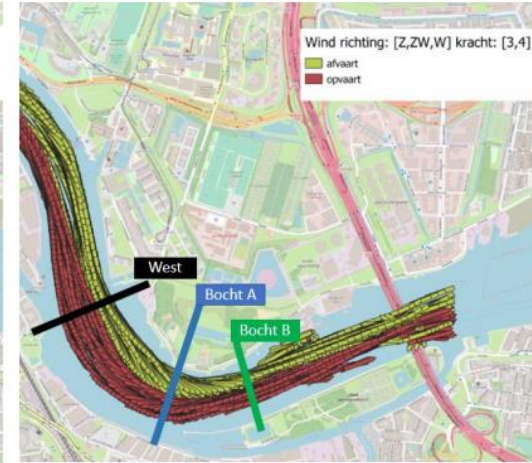
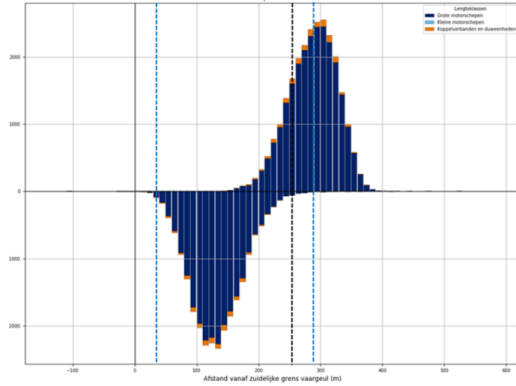




Fast-time simulation with wind and current



AIS data analysis current distribution on waterway



- Clear insight in the theoretical possibilities
- Assuming perfect human behaviour:
 - Vigilant, full attention
 - All information taken into account and understood (wind, current, traffic, position bridge etc)
 - Correct decision making
 - Correct action taken at the correct moment.

Work as imagined

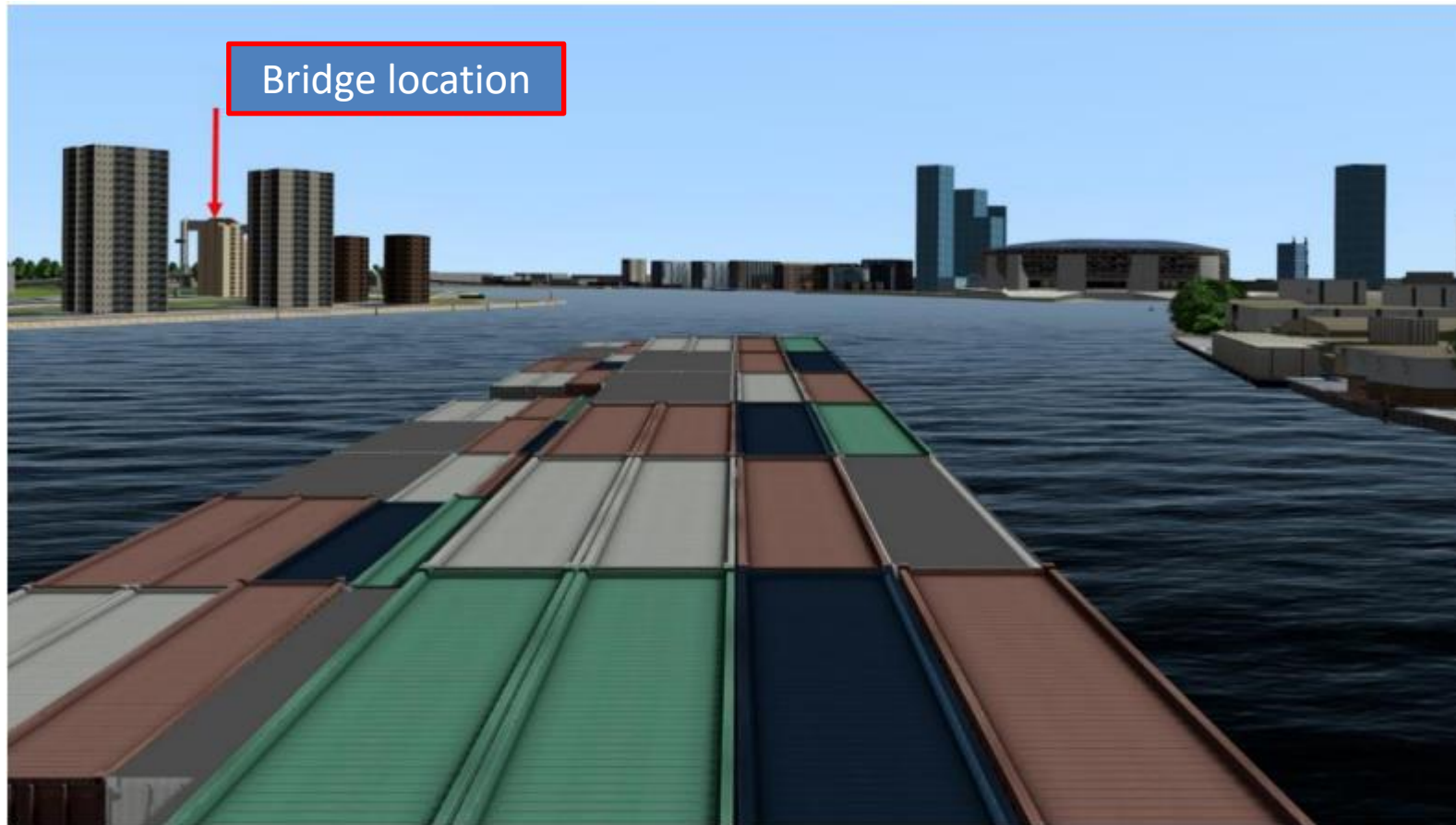
Real-time simulation, human in the loop.

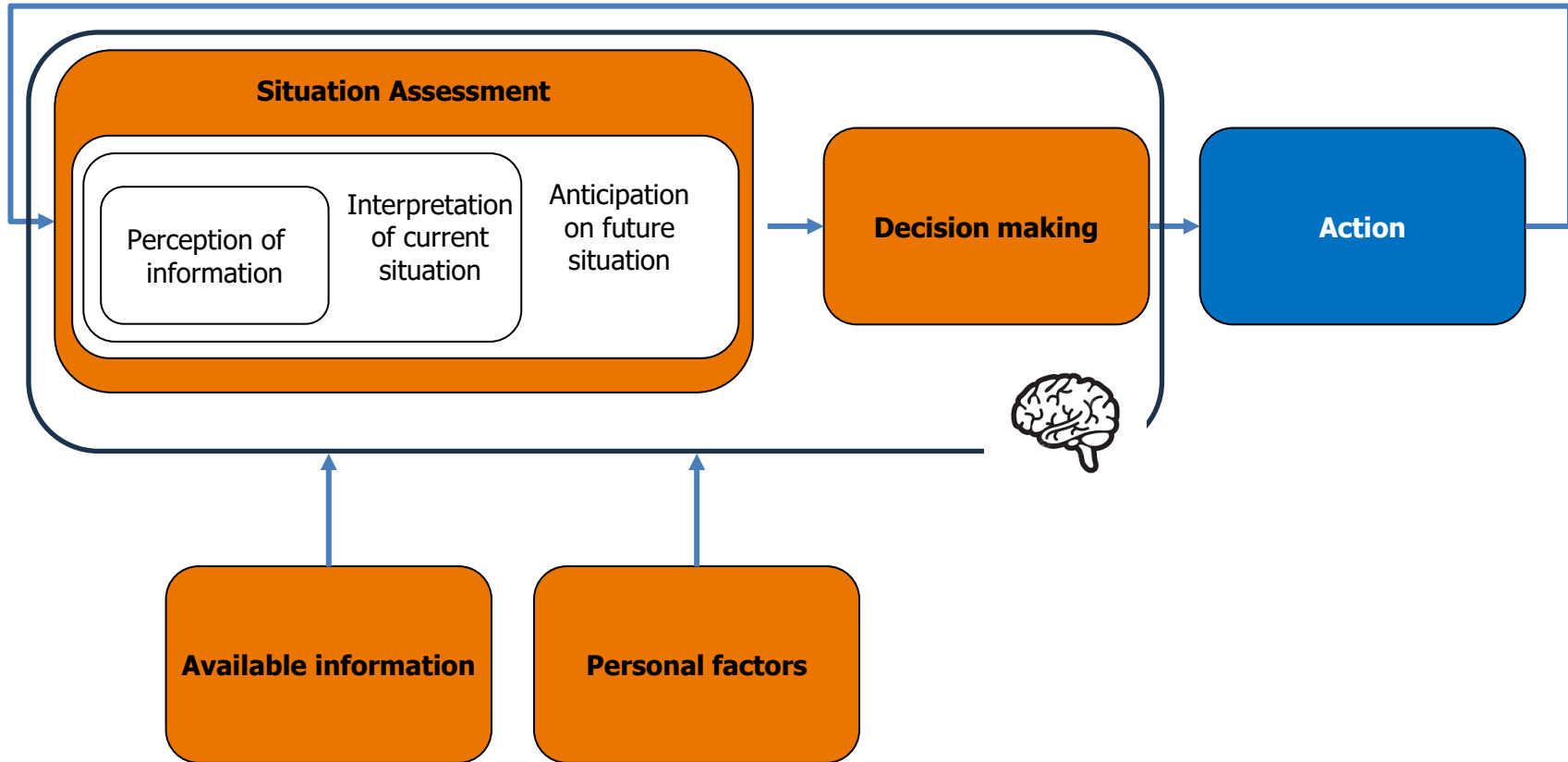




Bridge design, fixed and open part







- Starting with paper truth (a.o. “*Richtlijnen vaarwegen*”).
- Next mathematical reality (fast time).
- Finally human in the loop, operators in a future reality.

Risk assessment as input for decision makers.

Work as done

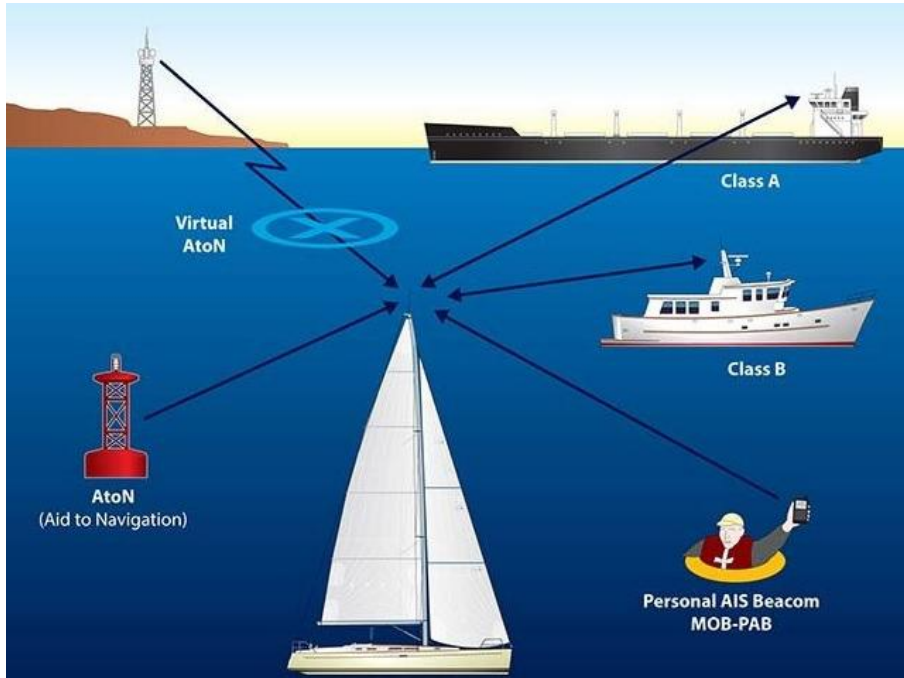
Case 2: Intent sharing, technical innovation example



Research question to MARIN

- Would sharing of sailing intentions digitally be beneficial for the safety and efficiency on inland waterways?
- Assumption is that this innovation will bring a safety benefit.

Automatic Identification System, AIS



Trackpilot



- Adding information to an existing task.
- This can only get better.

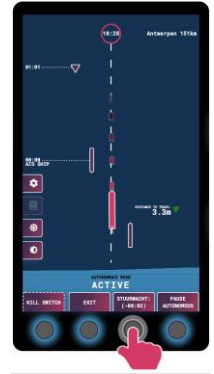
Work as imagined

Starting points:

- Intention sharing on inland waters
- Three trackpilots suppliers
- Testing the concept with real-time simulations at MARIN
- (huidige situatie: afstemmen per VHF)

argonics

SHIPPING
TECHNOLOGY



TRESCO
THE INLAND NAVIGATION SOLUTION



Set up

- 3 simulators
- Surrounding traffic also share intentions
- No Vessel Traffic Service
- Intentions shown on map

Track pilot control

- Track pilot: automatic track following
- Manual speed control



KEYBOARD HELP

F1 Stop following ship motion
J: Reset to initial position at low ship motion

Overview

- 6 skippers
- 3 trackpilots – 3 simulators
- 7 to 8 scenarios of 15 min

Measures

- Observations
- Questionnaires
- Eye-tracking



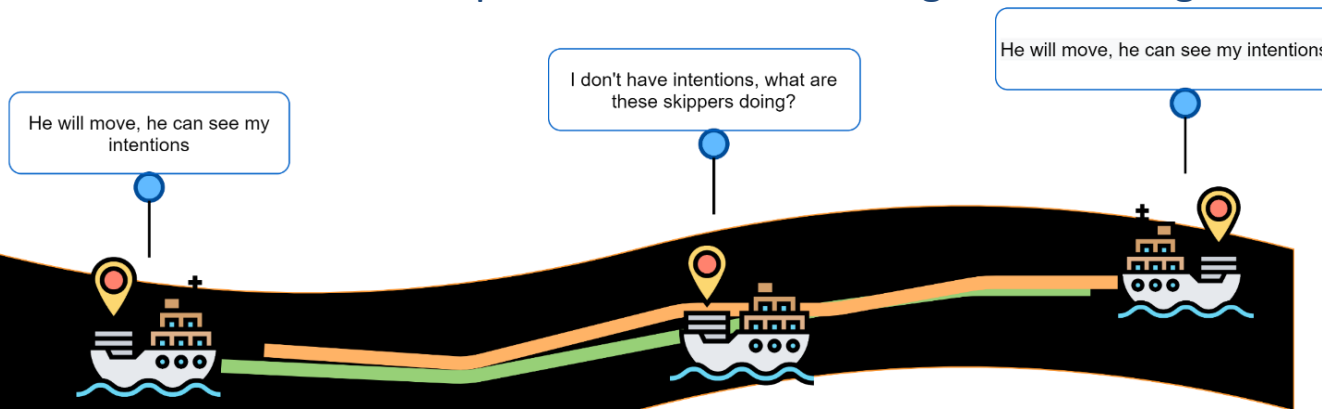
Concept of Intention Sharing

- Intent sharing supports situational awareness.
- Intent sharing provides a new set of eyes: most useful in low visibility conditions.
- It reduces VHF communication
- Intent sharing changes sailing task in a positive way.



Conclusions part 2, side effects

- Remaining on track is easier than changing track, “let him solve the situation, I’ll wait”.
- Seeing a track is believing a track, but is he really following the track?
- Complex user interfaces leading to misinterpretations.
- Skipper can still change its track – how do you know a planned crossing is an agreement?
- When switching to manual sailing, intent is still broadcasted.
- Automation frees up time to do other things than sailing.



Work as done

The background of the slide is a photograph of a paved path leading through a grassy area with trees. The path is made of grey rectangular stones and is bordered by a dark mulch strip. The grass is green and well-maintained. The text "Walk as done" is overlaid on the grassy area, and "Walk as imagined" is overlaid on the paved path.

Walk as
done

Walk as
imagined



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De mens is de grootste risicofactor en is niet te beteugelen.

Human Factors vind ik vaag en ik kan er weinig mee.