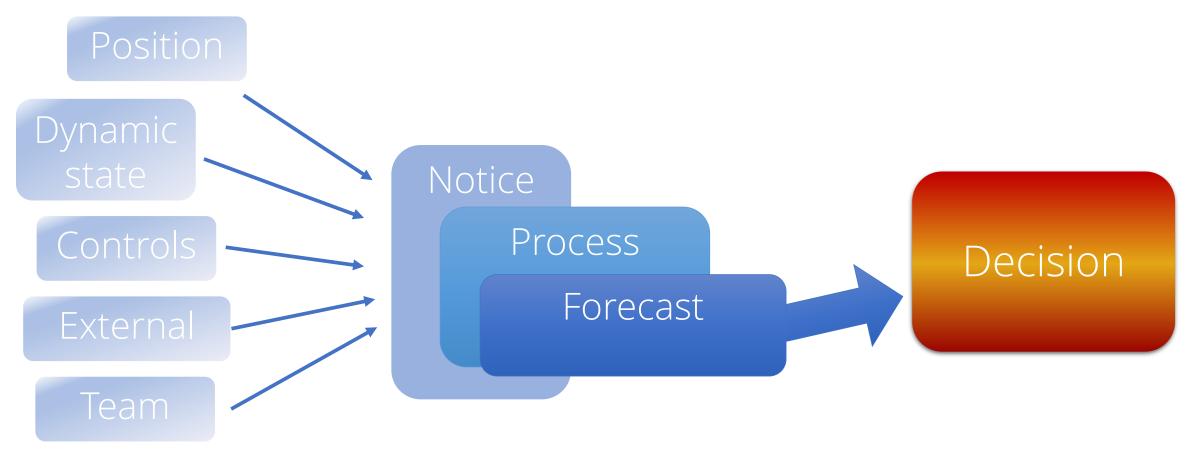


## Critical ship data in remote pilotage

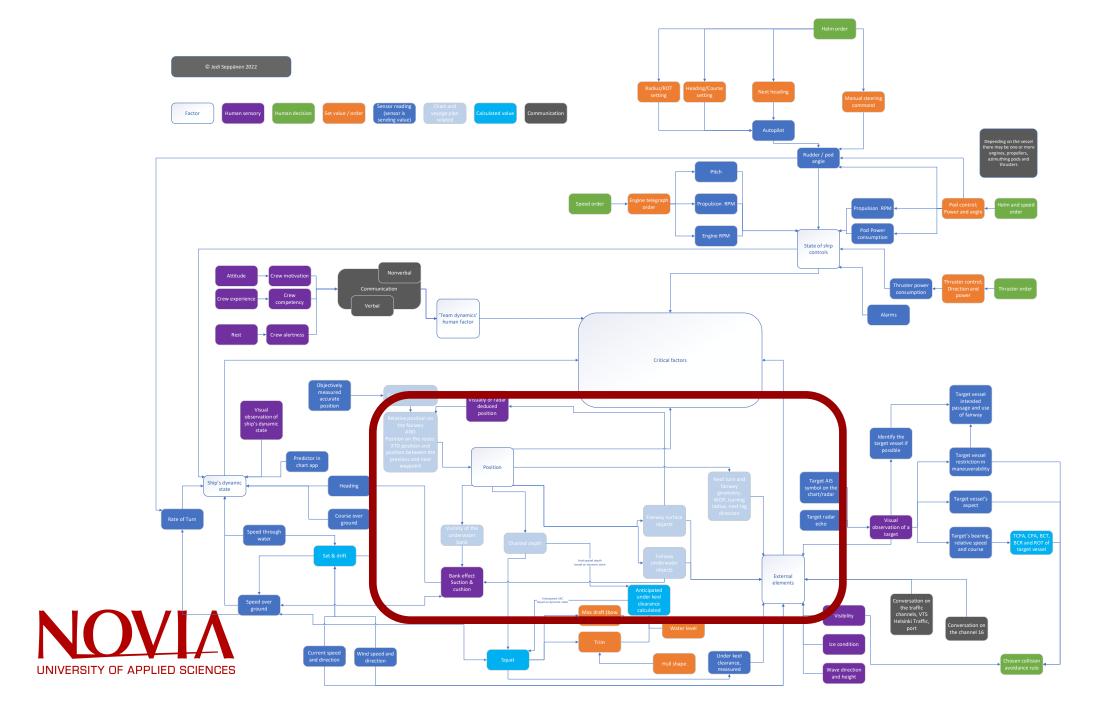
Jedi Seppänen



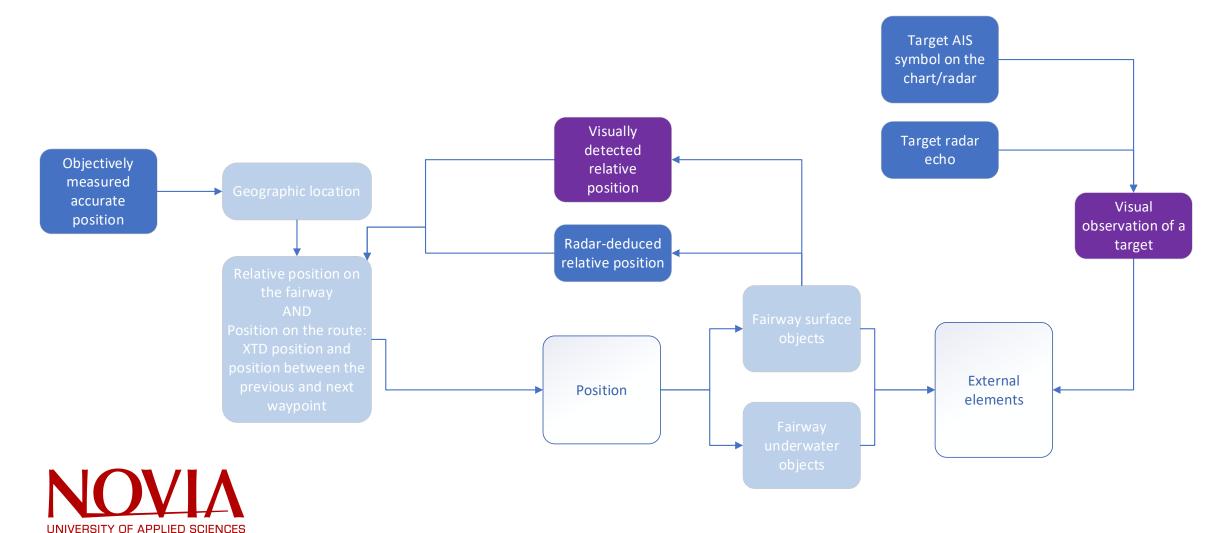
## Five critical factors form situational awareness

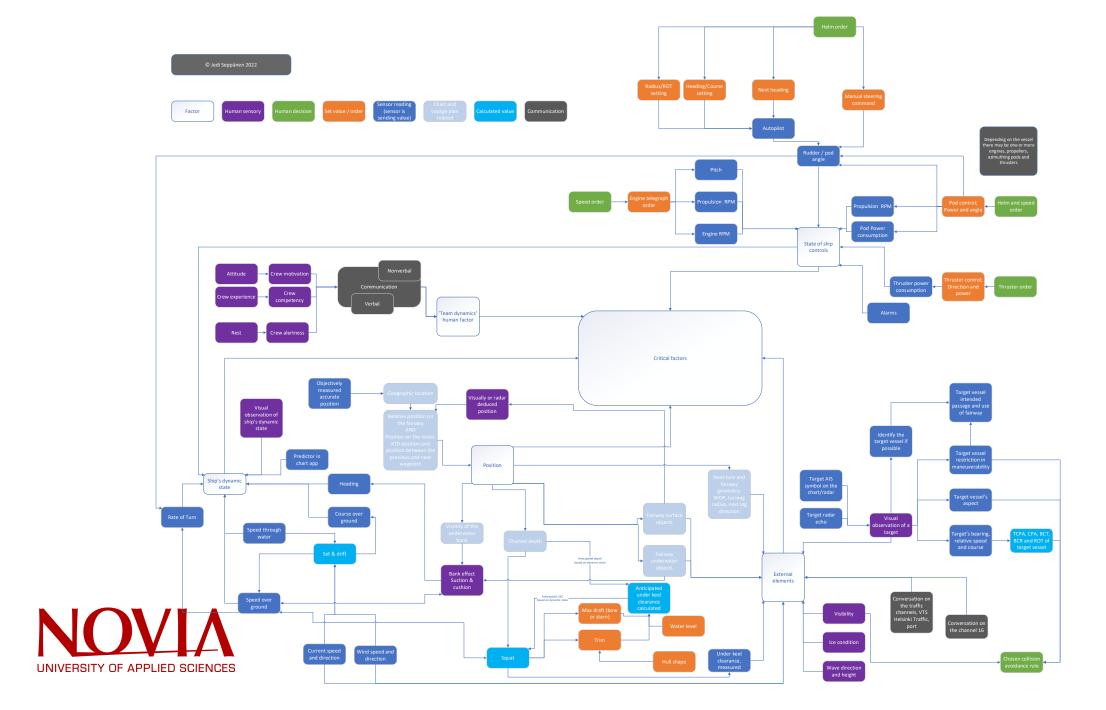






### Some components of 'position' and 'external element'





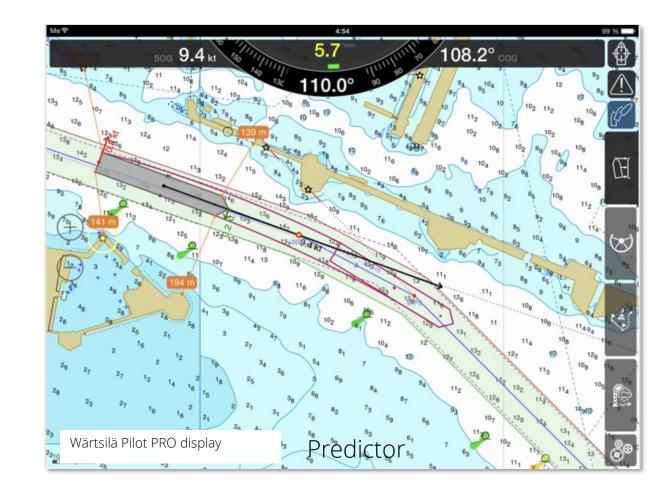
#### Takeaway 1 Positioning

- Position evaluation is challenging
- GPS & AIS vulnerability
- Onboard, there are alternatives
- Electronic navigation is based on GPS positioning



#### Takeaways 2 Dynamic state

- ROT = heading change
  - degrees/min
- Predictor
  - Shows future path
  - Depends on ROT and speed over ground
  - Must be correct to navigate electronically

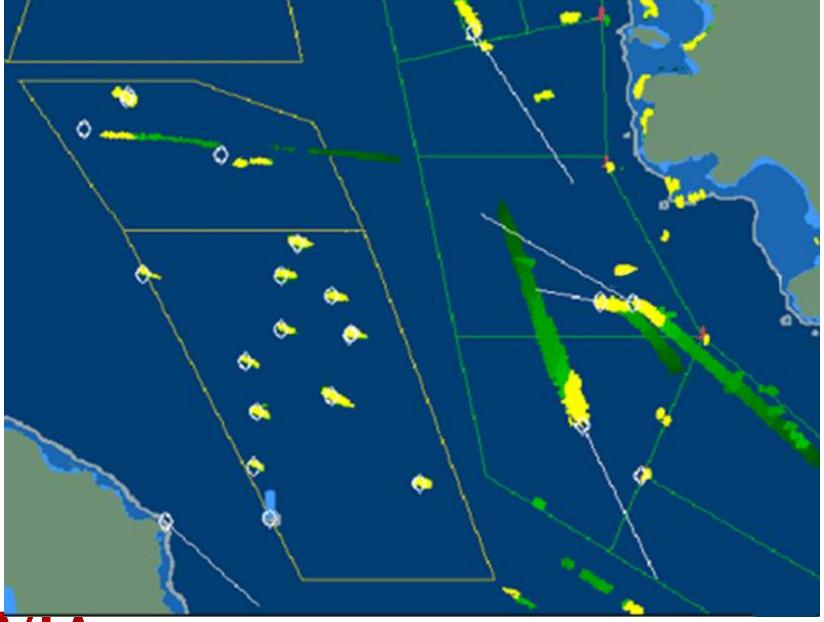




#### Takeaway 3 External elements

How to detect all traffic?



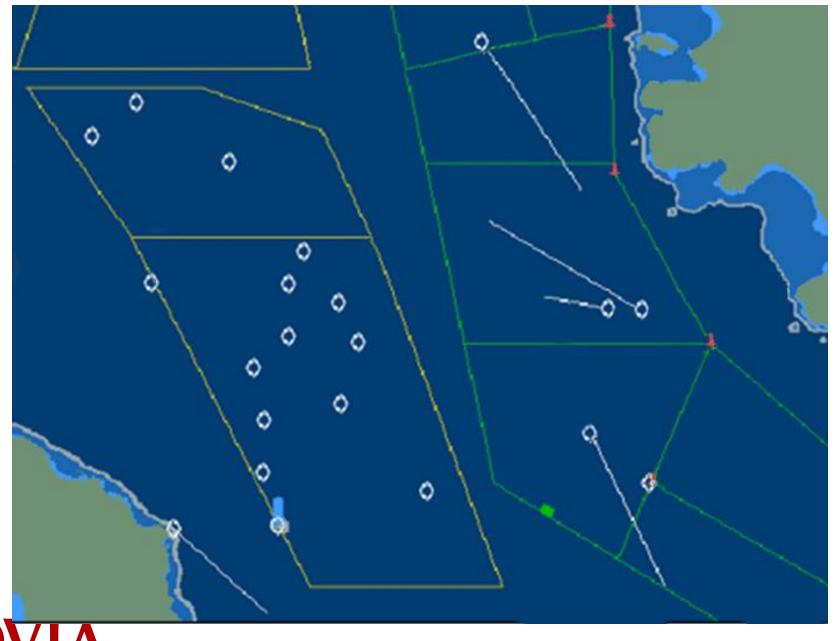




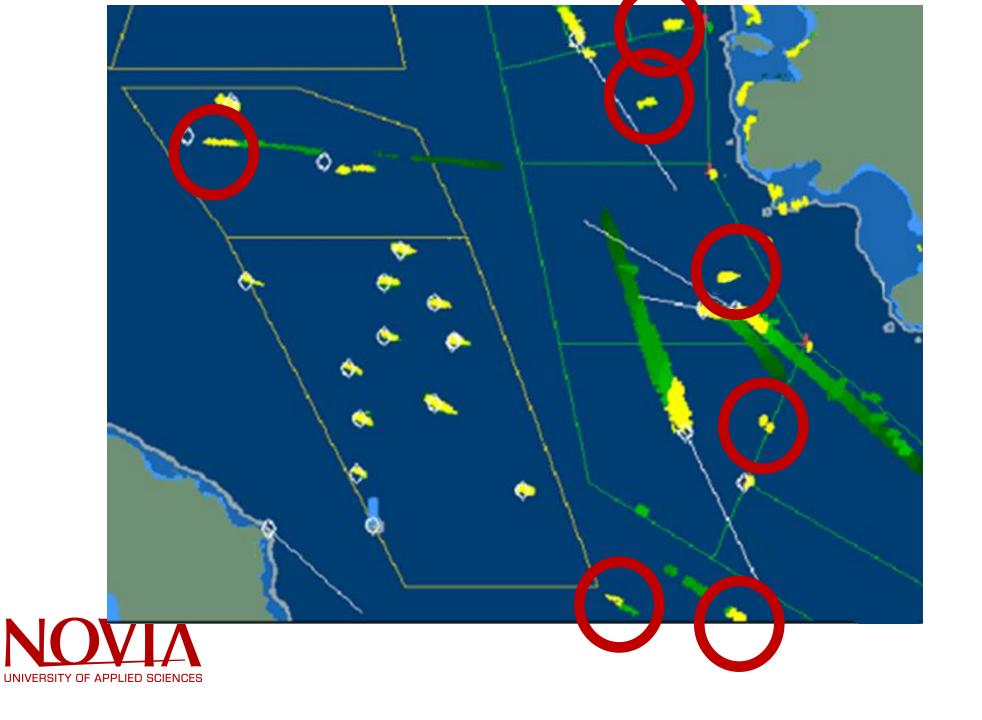


Source: Kim, Lee: Adaptive Information Visualization for Maritime Traffic Stream Sensor Data with Parallel Context Acquisition and Machine Learning © 2019 by the authors.. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).

Attribution 4.0 International (CC BY 4.0)







#### Future work for remote pilotage

- Standardizing ship-remote center communication
- Positioning
- Recognizing all traffic



# UNIVERSITY OF APPLIED SCIENCES