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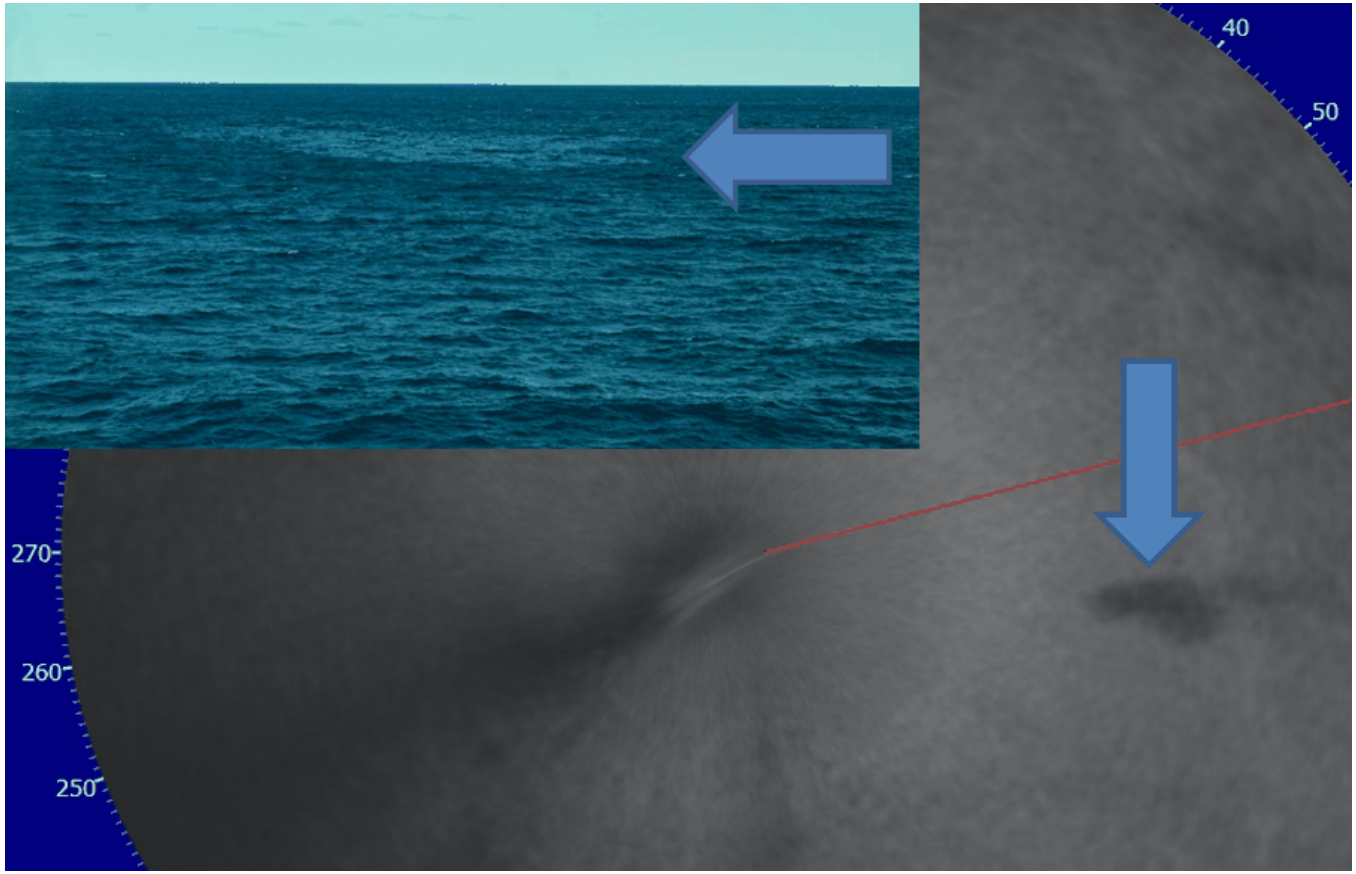
Oil Recovery
+
Integrated Coastal Surveillance Systems

Oil Spill Detection and Recovery

- Questions:
  - How to detect oil spills with maximum efficiency and reliability?
    - Oil spill detection radars on ships vs. on fixed surveillance positions vs. via other methods and sources
  - How to communicate and coordinate detection findings and recovery work efficiently?
    - Rapid start of real recovery work needed to minimize damage
  - When oil spills are detected how to perform recovery work efficiently?

Oil Spill Detection

- Oil spill detected with the ship radar

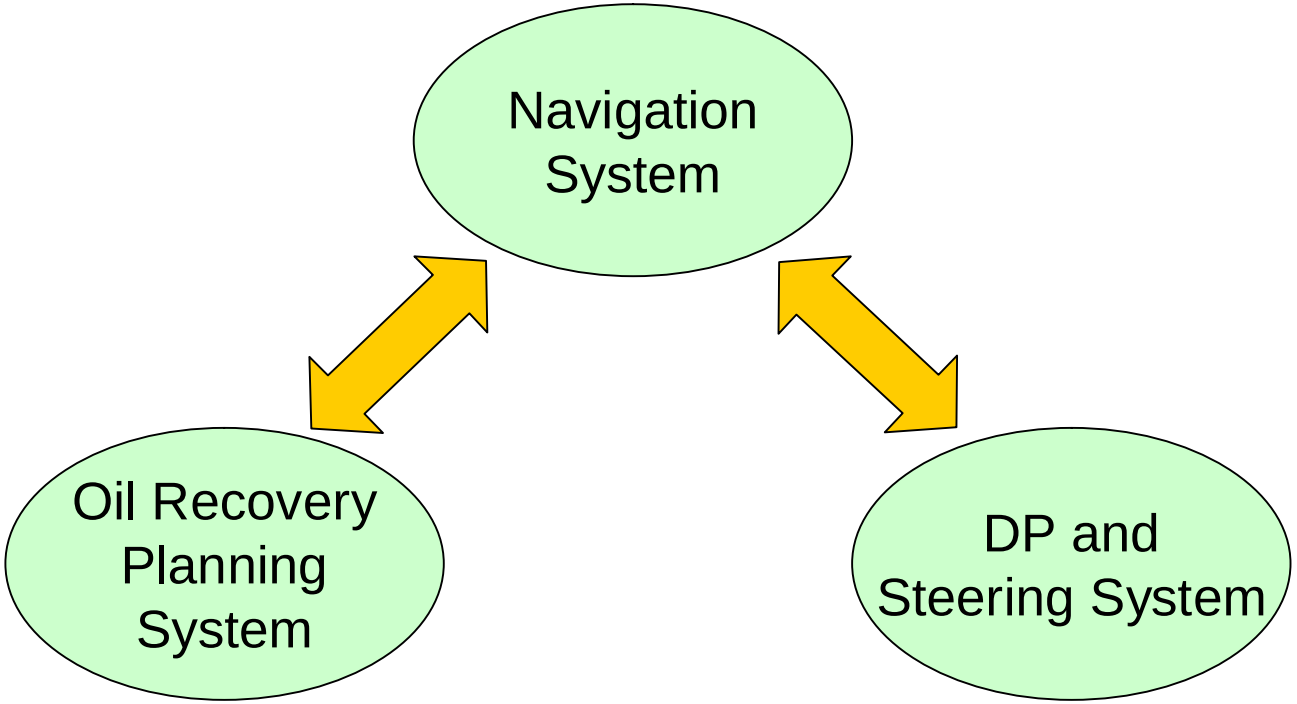


- What are oil spill recovery vessels requirements on system level?

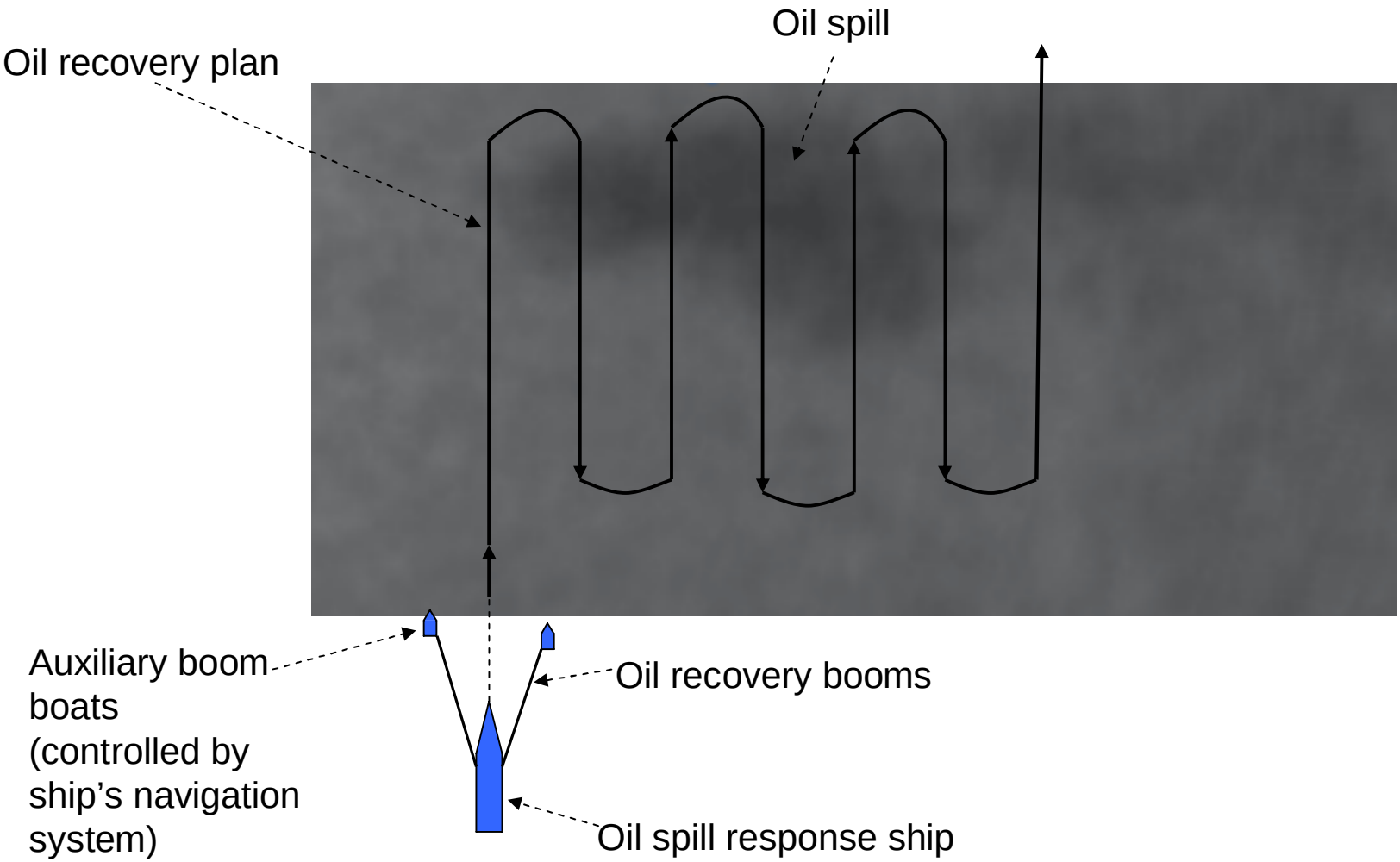
Ship Systems for Efficient Oil Recovery

- High performance oil spill detection radar
  - Integration with ship's navigation system (ECDIS and/or radar)
- Communication systems
  - Information sharing (ship to shore, ship to ship, shore to ship)
- Navigation system
  - When damage detected or information received -> rapid and safe transfer into oil spill area
  - Navigation system controls DP- and steering system
  - Navigation system communicates with oil recovery planning system
- DP (dynamic positioning)- and steering system
  - Slow speed track control capable DP-system needed for recovery operations
- Oil recovery planning systems
  - Integration with navigation system
  - Recovery plan route transfered to ECDIS for slow speed DP drive

Ship's Integrated Oil Recovery System



Oil Recovery Actions

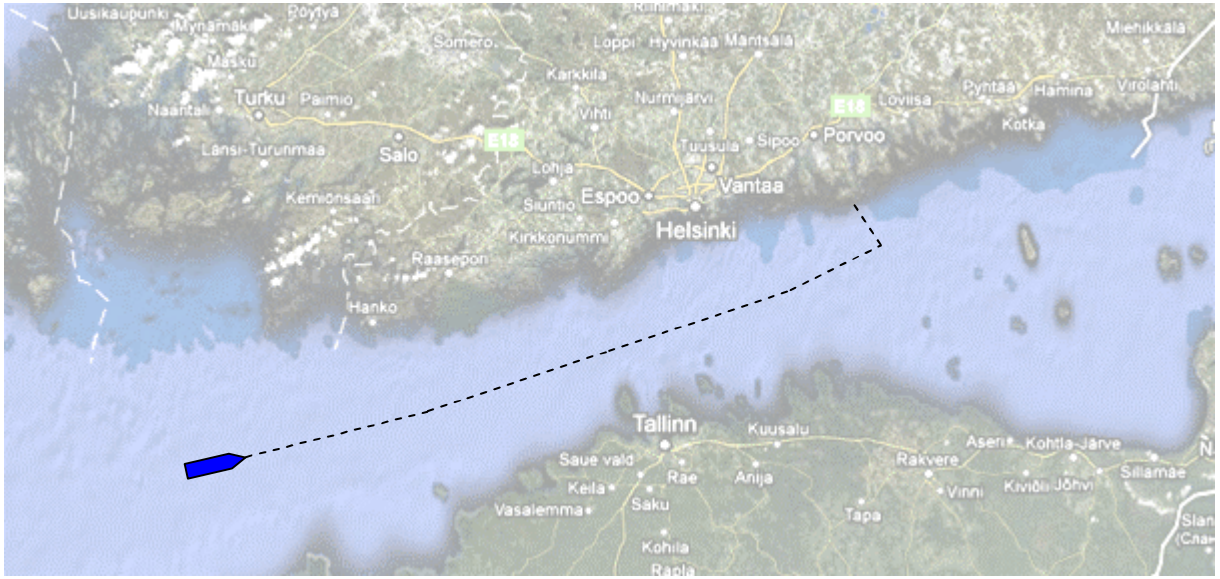


Oil Spill Recovery Ships - Conclusions

- High performance oil spill detection radars needed (integrated with navigation system)
  - Future needs better integration with ECDIS and navigation radar
- Good communication equipment and methods needed
- Ship controls and steering must have slow speed track control capable DP system highly integrated with navigation system
- Oil recovery planning system must have good integration with navigation system of the ship
- Navigation system must be capable of controlling auxiliary boom boats

Oil Tanker Route File Transfer

- In the Gulf of Finland is currently in test usage new additional safety concept of transferring planned routes from oil tankers to VTS for checking and follow-up

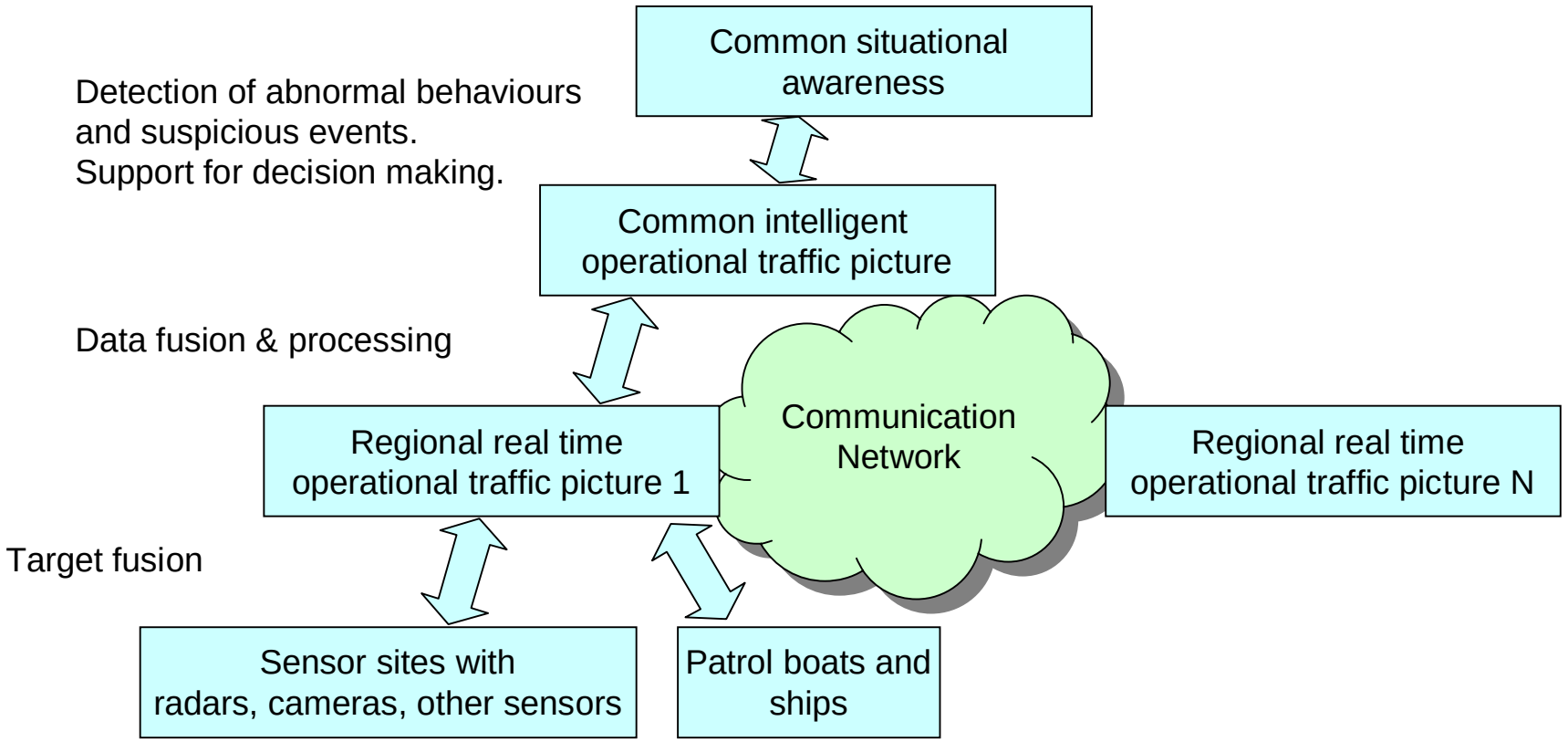


- The concept has been created together with John Nurminen foundation. Target is to expand this concept in the future.

Integrated Coastal Surveillance Systems

- Today's trends in surveillance systems
  - System integration
    - More and more intelligence and automation needed while less and less supervising people are involved
    - Information exchange with ships is increasing
    - All the sensors must support common situational awareness
  - Sensor technology
    - Surveillance radars
      - Oil spill detection, small targets detection
      - More and more COTS technology involved with high level of system integration
    - Surveillance cameras
      - More and more COTS technology involved with with high level of system integration
      - Having great sensor is not enough. System must have additional features like motion detection, pattern recognition, anomalities detection, multidimensional information aggregation etc.
  - Communication
    - IP roaming solutions

System Integration



Video Surveillance

- More and more public ip network used in communication
  - Safety and security is very critical
  - Multiport routing, compression and bandwidth limitation mechanisms are important
- Having good thermal cameras and daylight cameras is not enough – integrated, automated, intelligent functionalities are needed
  - Motion detection, pattern recognition, combined functions like radar or other sensors target follow capabilities
- Mobile bi-directional surveillance needed
  - Patrol boats and ships, cars, helicopters, airplanes, UAVs, ...
  - Ip roaming systems
- User interfaces for services with different profiles must be available
  - Eg. Admin, heavy user, thin/rich client, mobile client etc.

Communication Systems

- Surveillance system communication requirements
  - Reliability
  - Safety and security
  - Multiport routing capability
  - IP roaming support
  - Support for different kind of networks, interfaces and protocols
  - Capability to survive with limited bandwidth
  - Easy integration possibility with different kind of systems
  - Communication system is platform for integrating different sensors and systems into one combined entity

Surveillance Systems - Conclusions

- European Commission project for development of next generation coastal surveillance systems specified and will start soon
  - Finnish companies Furuno Finland Oy and Ajeco Oy are involved in the project
- In Europe surveillance systems are not harmonized very well
  - EC tries to improve situation with development and demonstration projects
- In many countries worldwide politics is highly involved in coastal surveillance building projects
  - Technology, functionalities and cost are not the only affecting factors
- Finland has high level systems and techology for coastal surveillance and continuous development is going on