

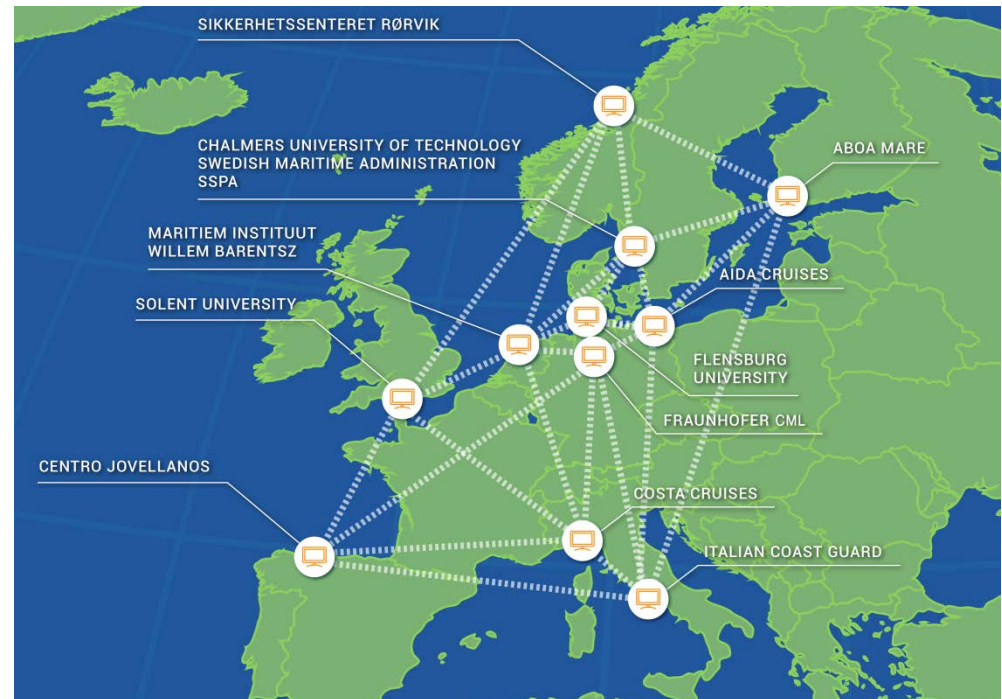
# EMSN: VIRTUAL LARGE-SCALE TEST FACILITY FOR E-NAV/SHIP AUTONOMY DEVELOPMENT

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07.02.2019 – e-Navigation underway



Co-financed by the European Union  
Trans-European Transport Network (TEN-T)



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# AGENDA

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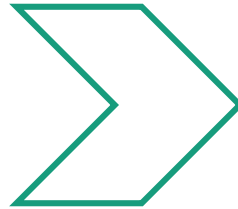
1. EMSN Motivation
2. STM Validation Act. 3
3. EMSN-Connect
4. Outlook

# EMSN Motivation

Concept requires cost-efficient large-scale validation



## Concept development



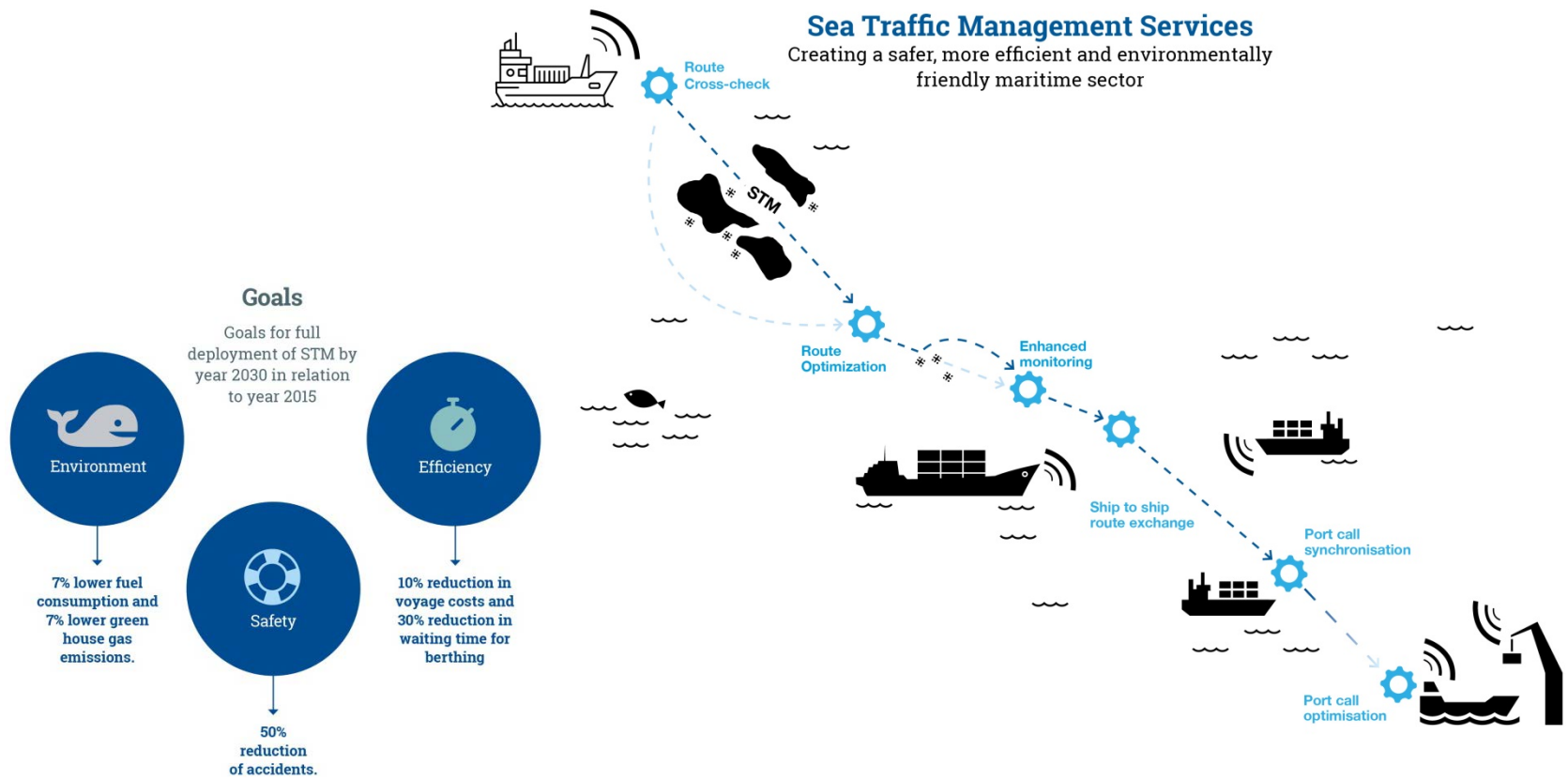
## Concept validation

- Voyage planning process
- Ship-to-shore-route exchange
- STM route optimization
- STM active traffic monitoring

- HMI and operations test
- Large-scale evaluation test
- Final demonstration

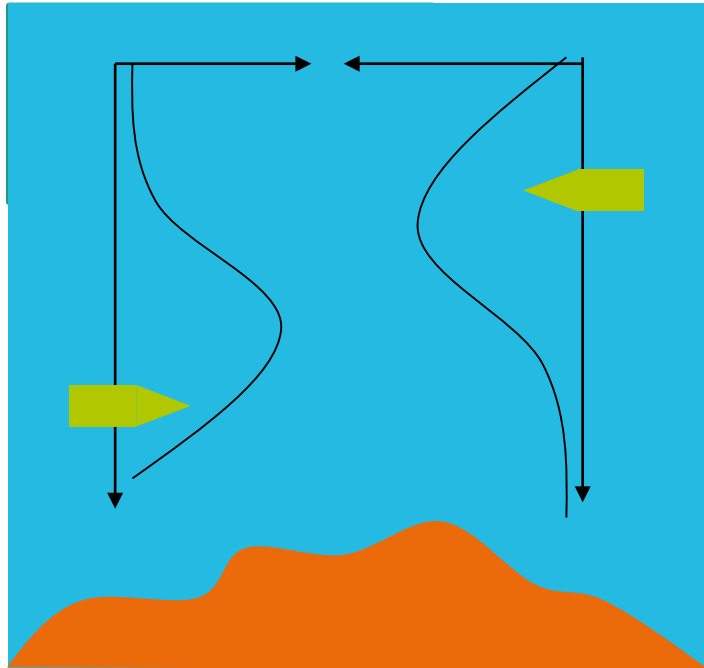
# EMSN Motivation

## Services according to the STM Validation project

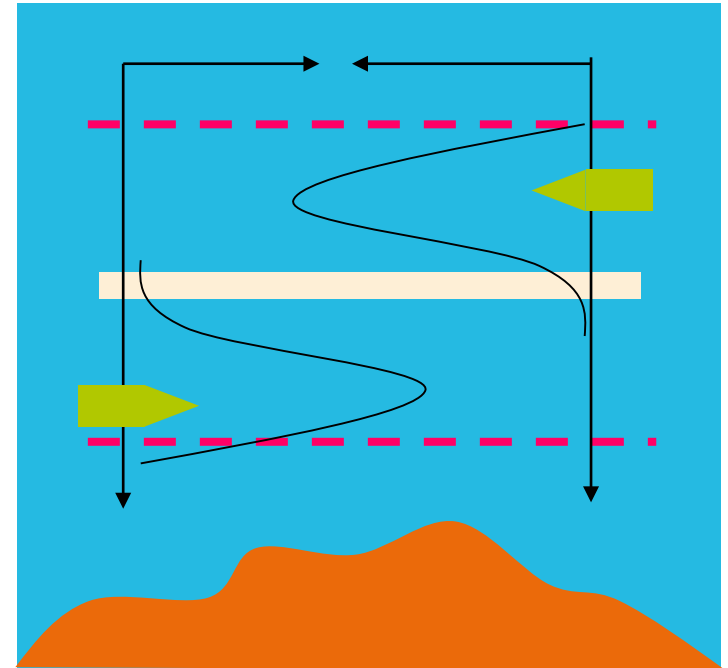


# Today's approach: New TSS in iWrap MkII (Example)

Method useful for geometrical changes



Step 2  
Risk  
Assessment

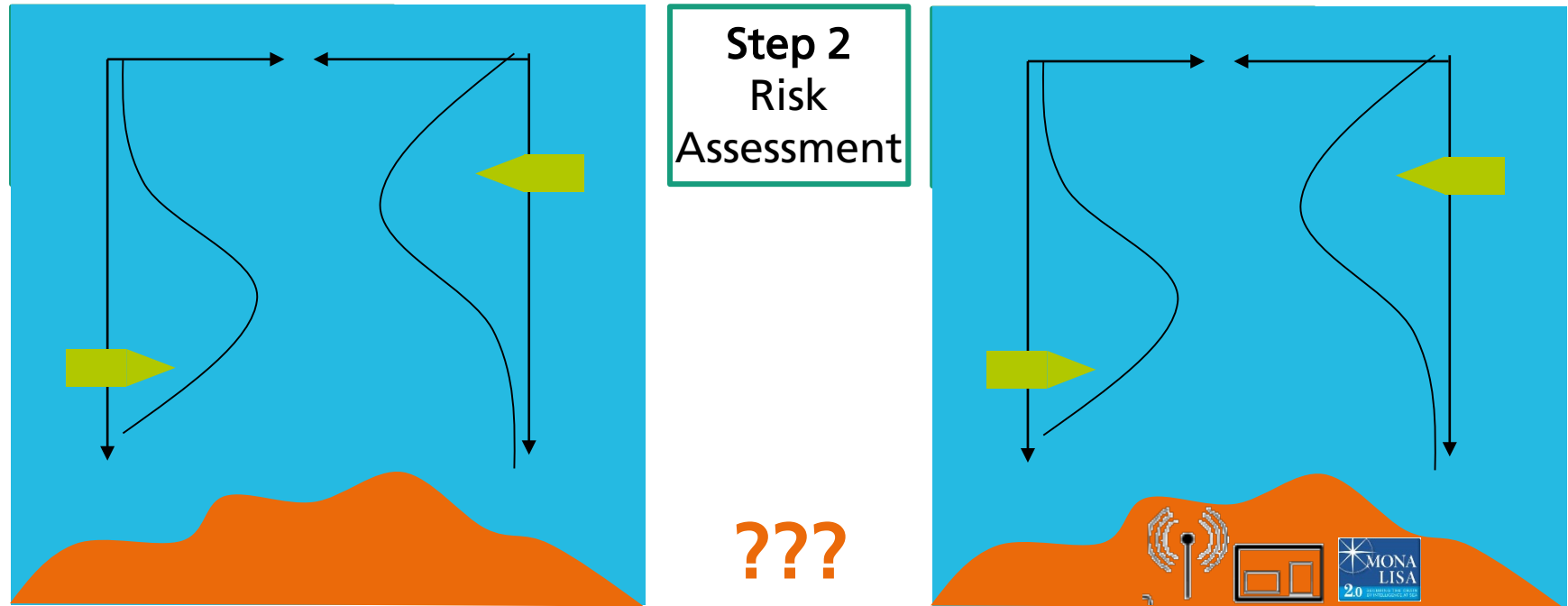


**We know how geometry changes!**

**Risk = Collision Candidates x Causation Factor x Consequence**

# Today's approach: STM in iWrap MkII (Example)

Organisational changes hard to assess by suggested methods



**We hardly know how humans behave!**

$$\text{Risk} = \text{Collision Candidates} \times \text{Causation Factor} \times \text{Consequence}$$

# EMSN Motivation

Several SHS available in the EU, but only internal connected

## ■ Enough simulators available, but integration is missing

- Swedish Maritime Administration
- Chalmers University of Technology
- Fraunhofer CML
- Carnival Corporation
- AIDA
- Centro Jovellanos

## ➔ Involvement of manufactures

- TRANSAS
- Rheinmetall
- Kongsberg

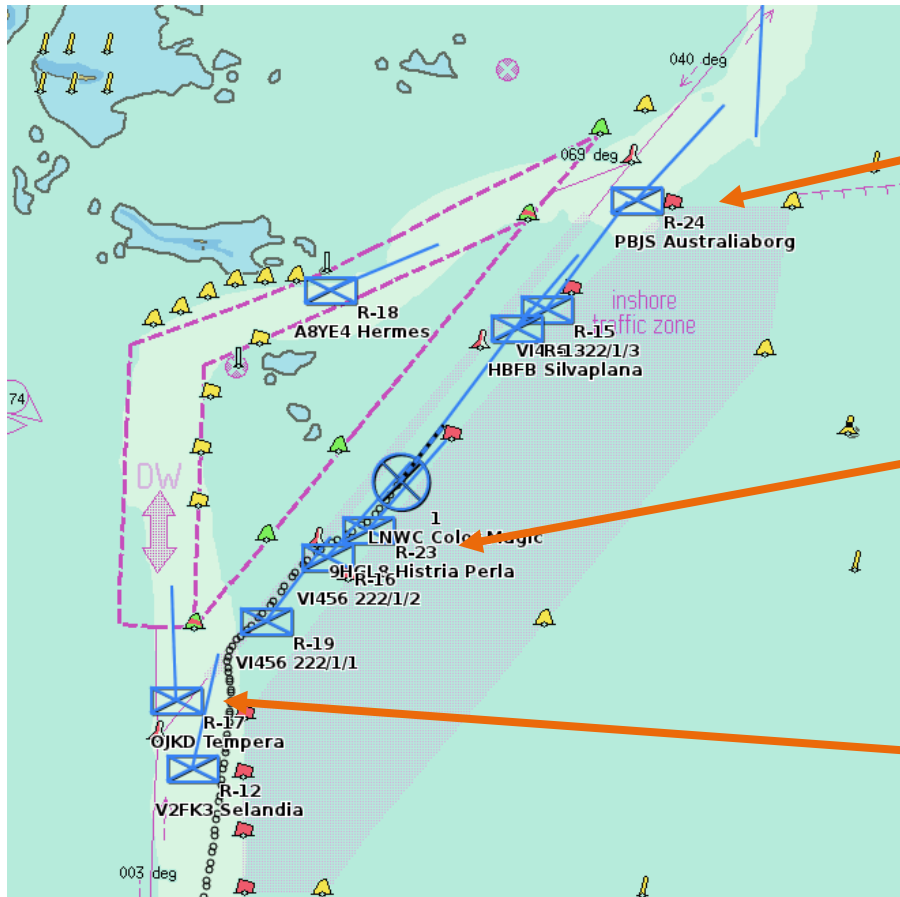


Create a virtual ocean  
*European Maritime  
Simulator Network*



# EMSN Motivation

First full-scale tests held in December 2014 with 13 Own-ships





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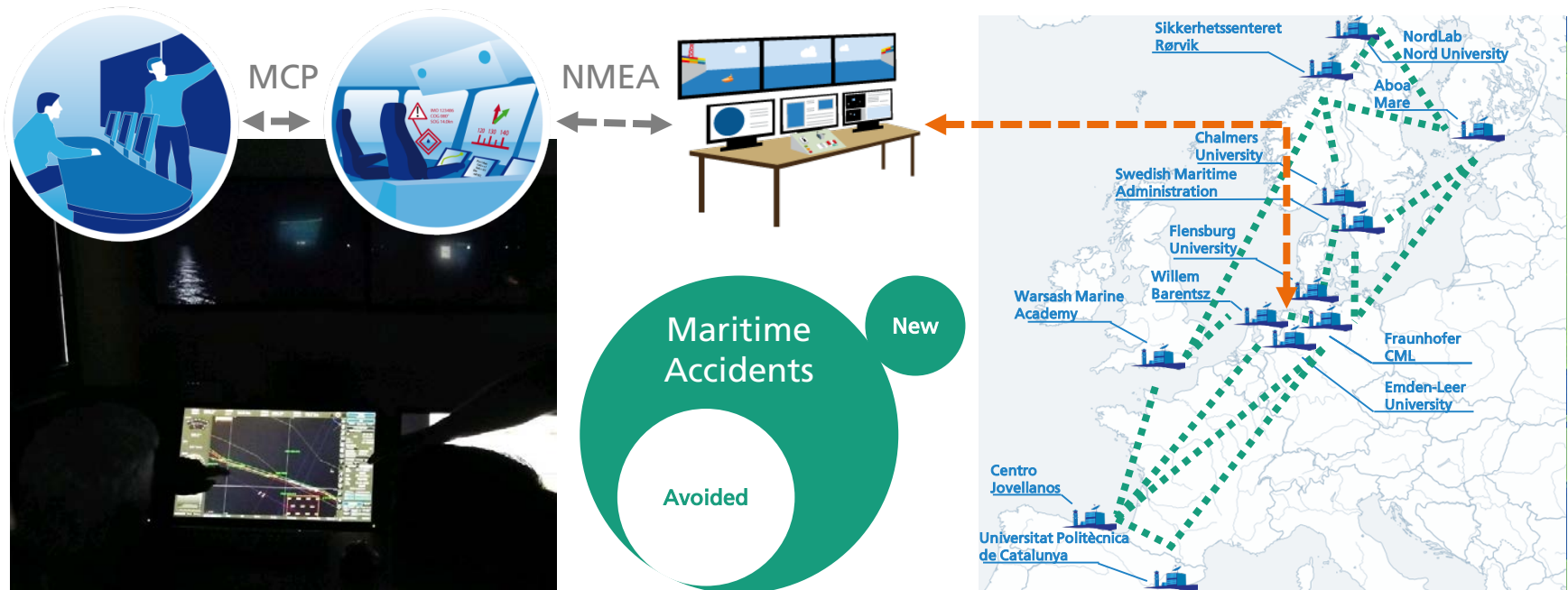
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# STM Validation Act 3

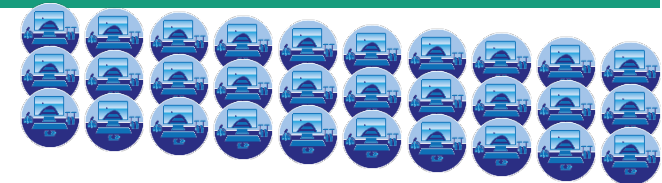
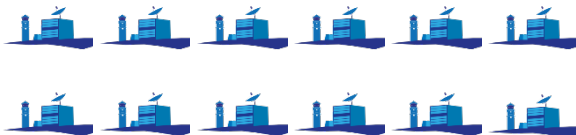
## European Maritime Simulator Network



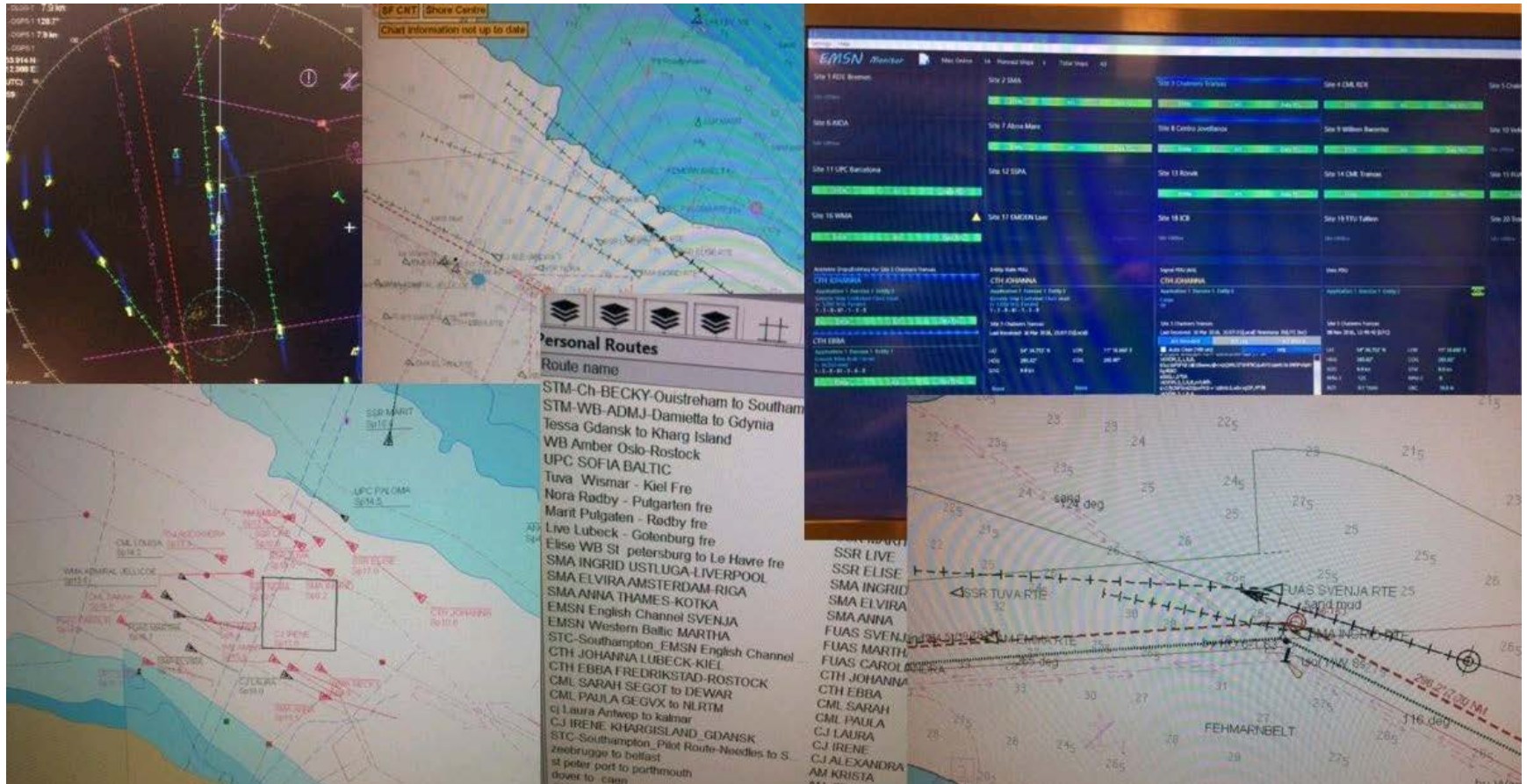
12 Centers

3 Manufacturer

30+ Bridges

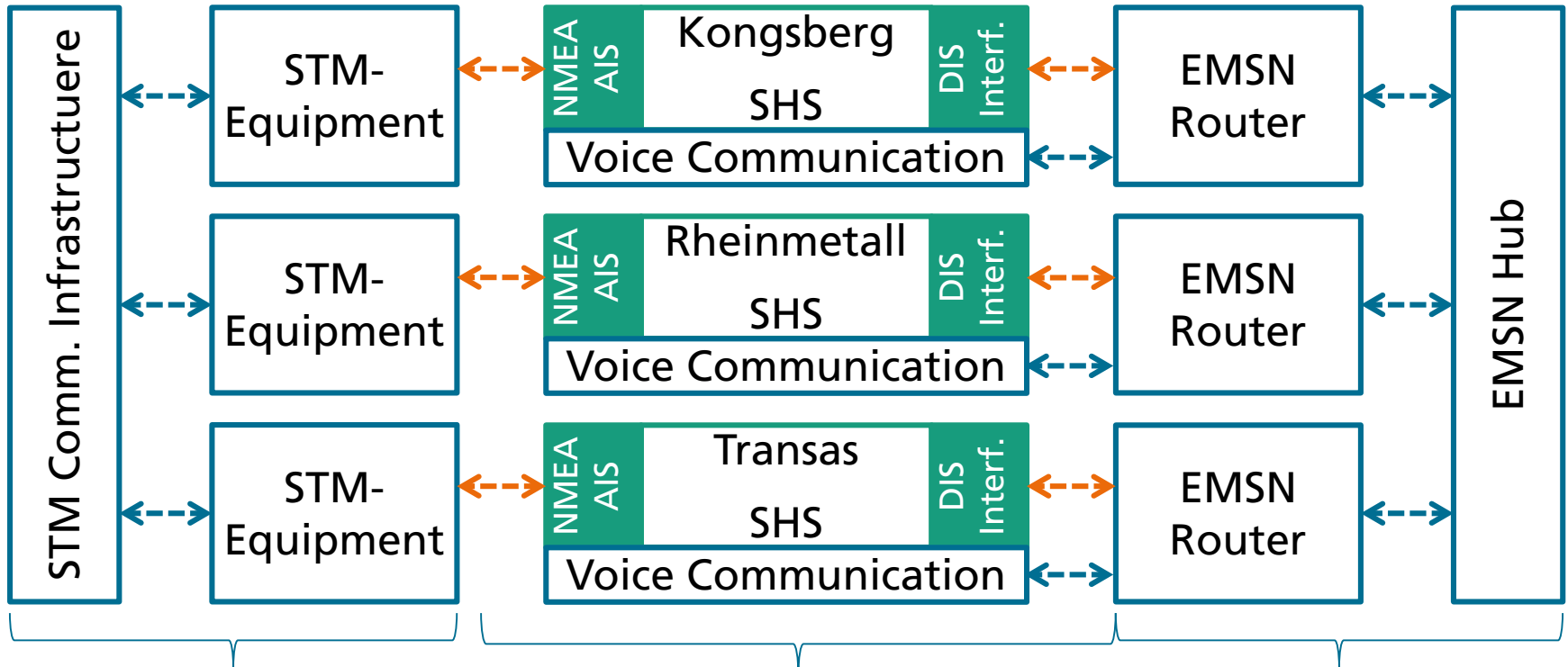


Full-scale tests held in 2017/2018 with up to 30 Own-ships



# STM Validation Act 3

## Technical background



Act 2 / Act 4  
Act 3 EMSN

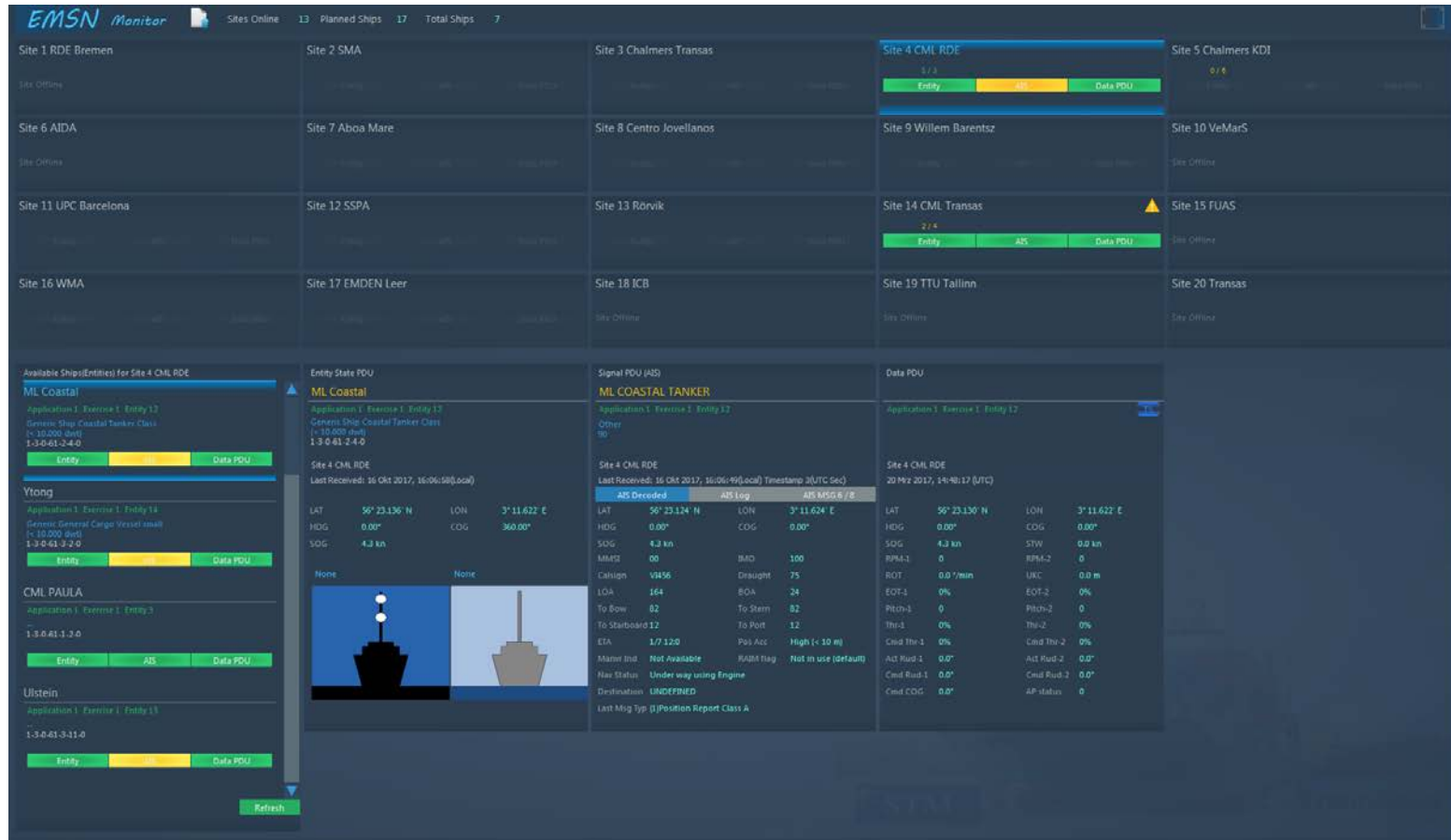


Act 3 EMSN



# STM Validation Act 3

## Data Tracking and Network tracing from the EMSN Monitor



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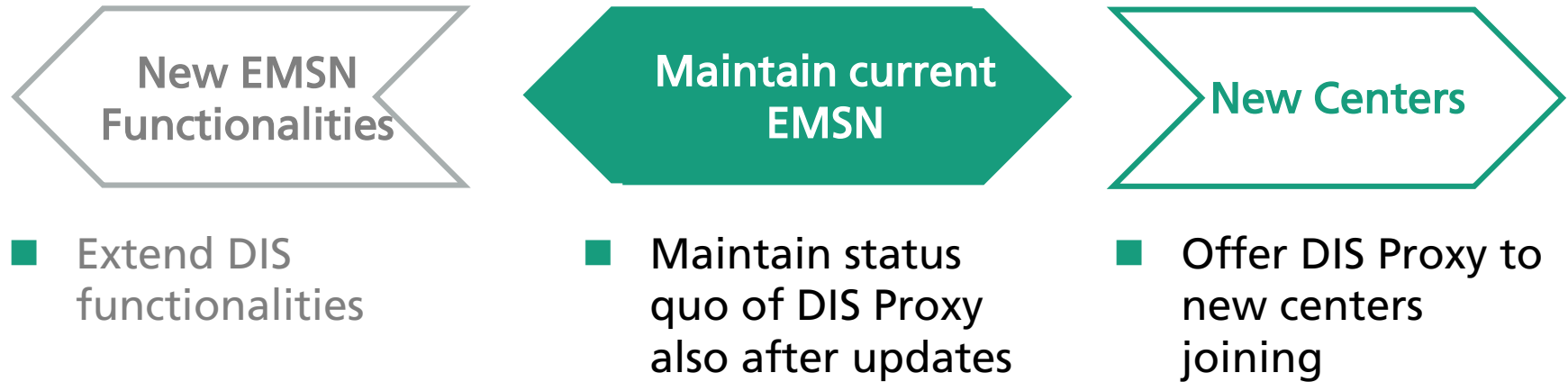
# AGENDA

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# Overview

## Scope of EMSN-Connect



# EMSN-Connect

When should you be interested?

Do you want to

1. Maintain connectivity beyond STM-V
2. Use EMSN Simulations as part of research proposals
3. Use EMSN for ordinary training purposes (students, refresher as well as SAR)

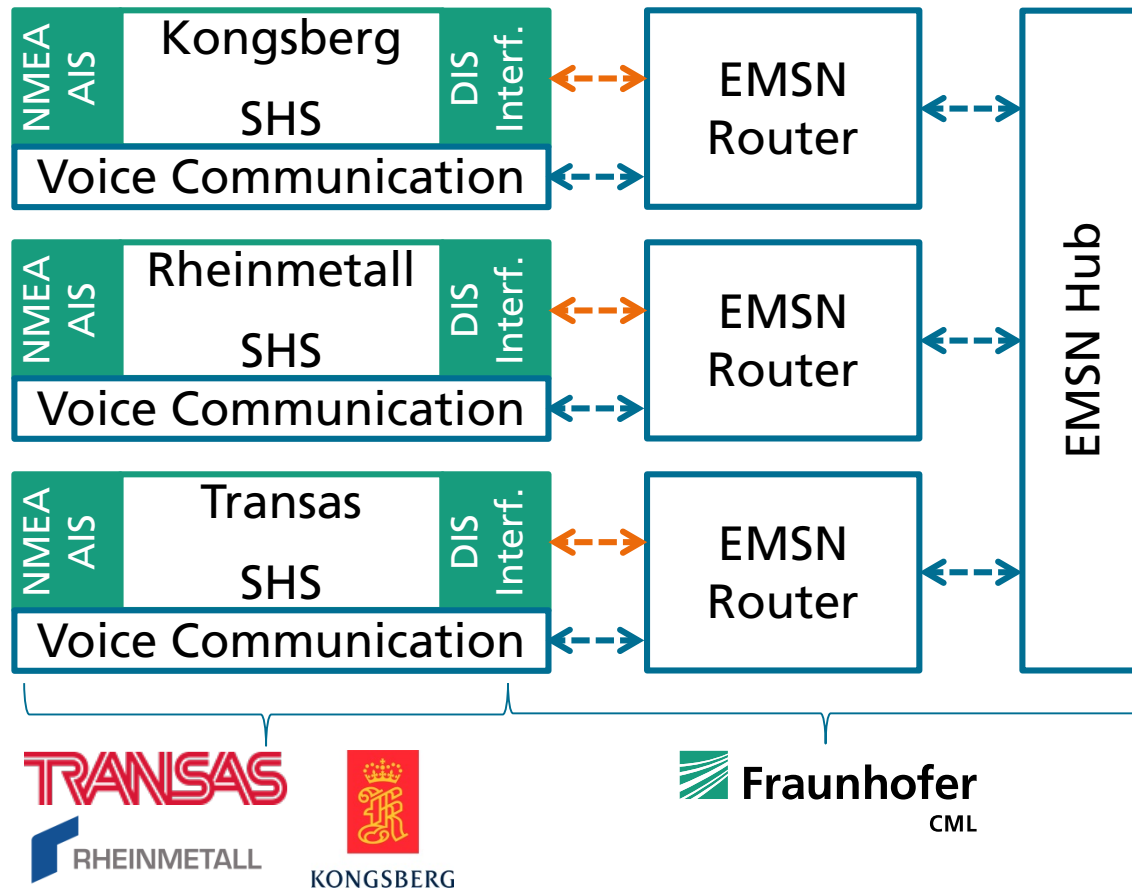


EMSN-Connect allows all partners to continue using EMSN with keeping the administrative costs low for everybody



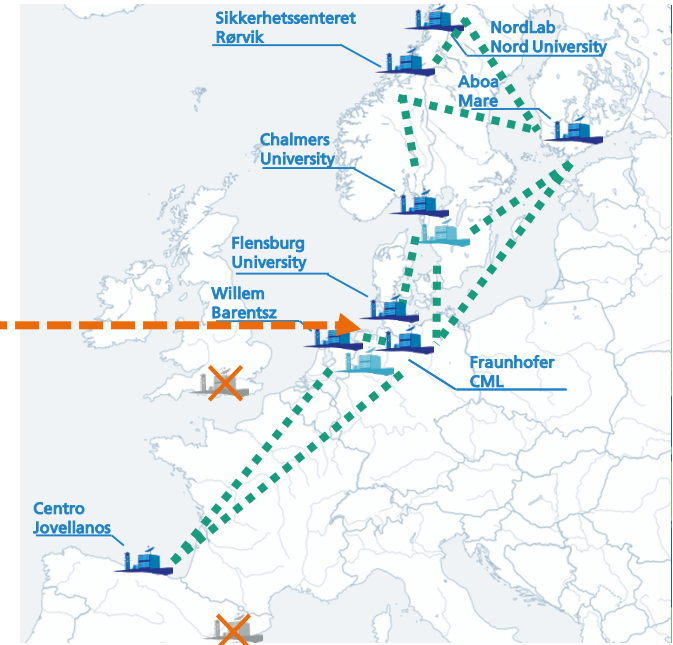
# EMSN-Connect

Use Case training: Only existing technology required



# EMSN-Connect

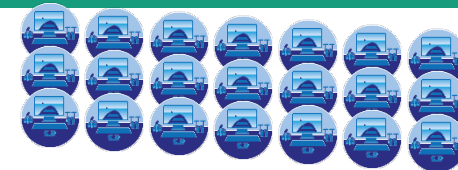
## Partners participating



8 (+2) Centers

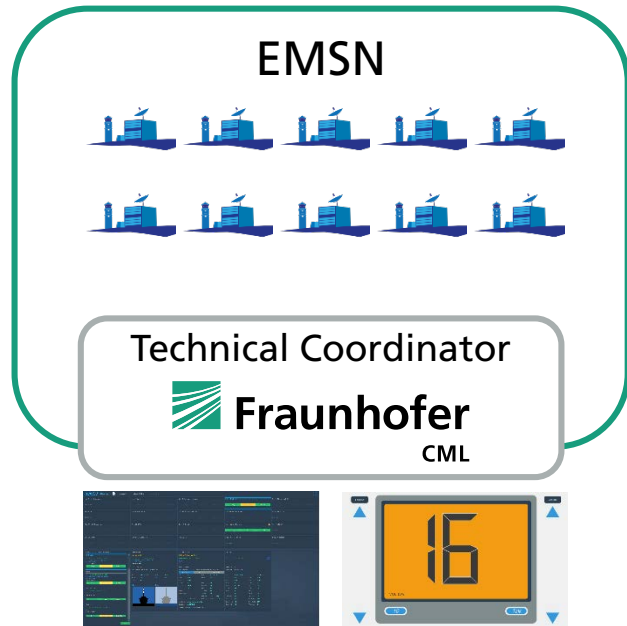
3 Manufacturer

21+ Bridges



# EMSN-Connect

## Technical Coordinator Tasks



The EMSN is free to use for all partners for further own simulations

- Network Stability and Development
  - Server hosting
  - Node Connection
  - TeamSpeak Licences
  - EMSN Technical Specification Maintenance
- Technical Consultancy
  - EMSN Monitor
  - EMSN Data Tracker
  - VHF Client
- Joint Exercise Hosting
  - 3 Campaigns per year
  - EMSN Exchange Event
  - Availability for third party projects

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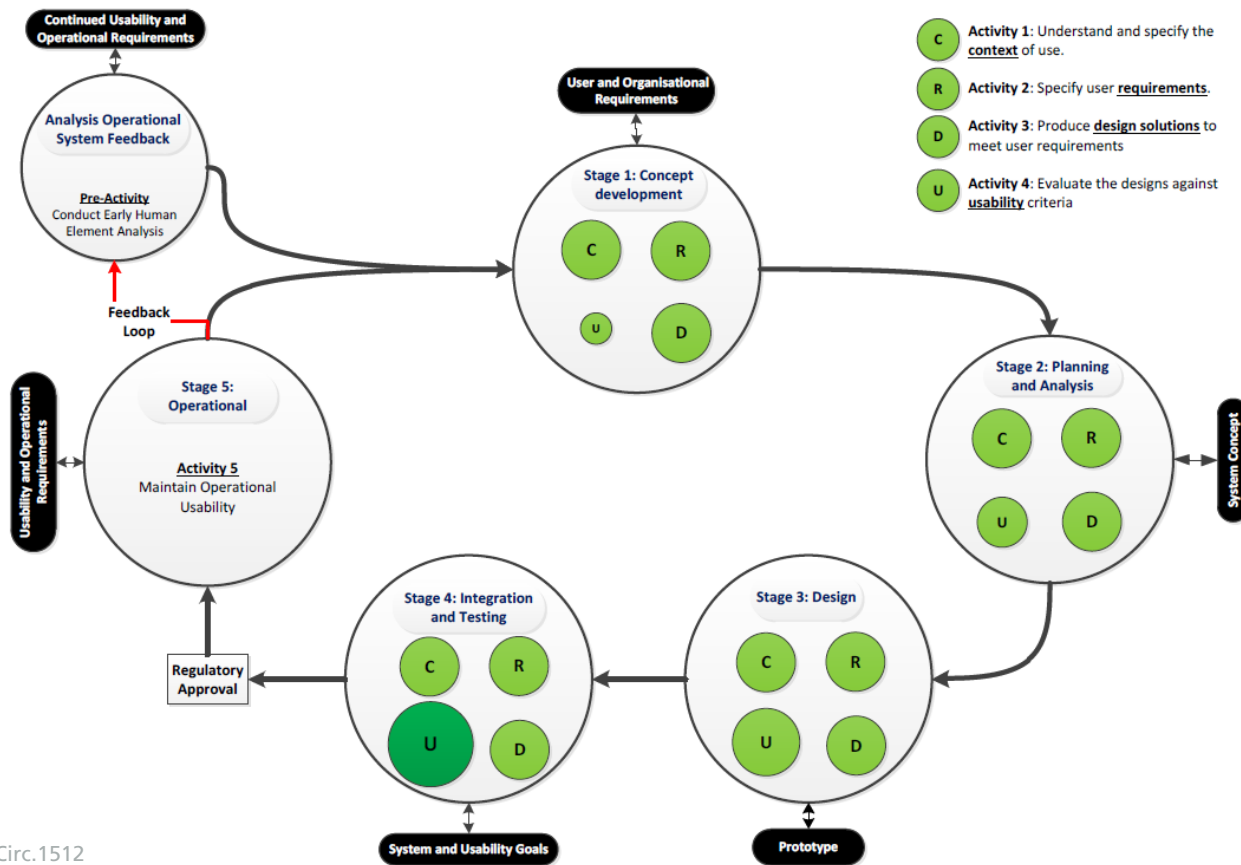
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# Outlook

## Software Life Cycle (HCD) for e-navigation systems



Reference: IMO MSC.1-Circ.1512

# Outlook

## Relevance of SHS for human factors

- Fatigue,
- Inadequate communications,
- Inadequate general technical knowledge,
- Inadequate knowledge of own ship systems,
- Poor design of automation,
- Decisions based on inadequate information,
- Faulty standards, policies or practices and
- Poor maintenance

**Hum4n  
ErrorR**

*Human element is  
related to 60-95% of all  
accident statistics*

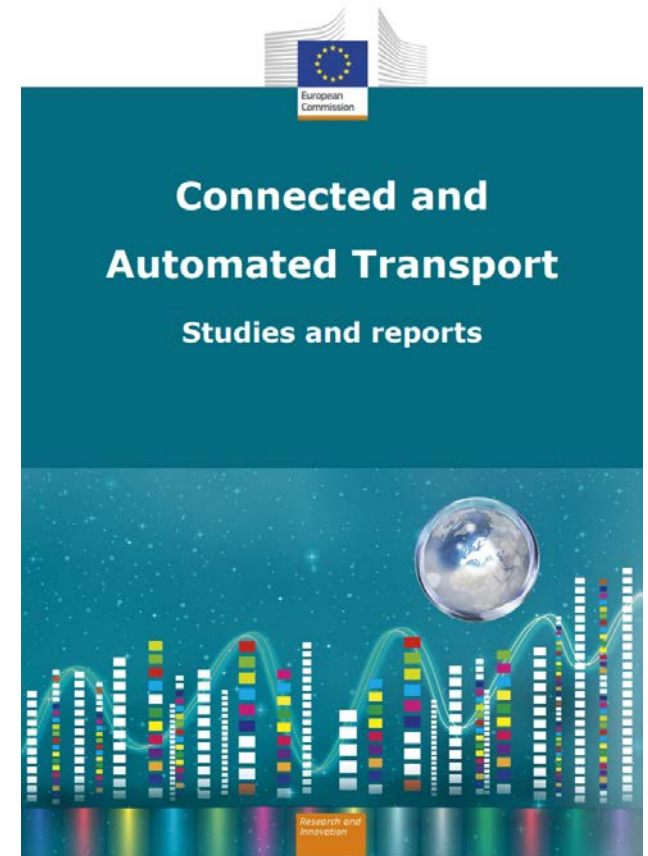
*SHS exercises is "the only way to ensure that technical ship handling and the important human factors, are sufficiently incorporated" (PIANC 121-2014)*

Reference: (Sanquist 1992 & Rothblum n.d)

# Outlook

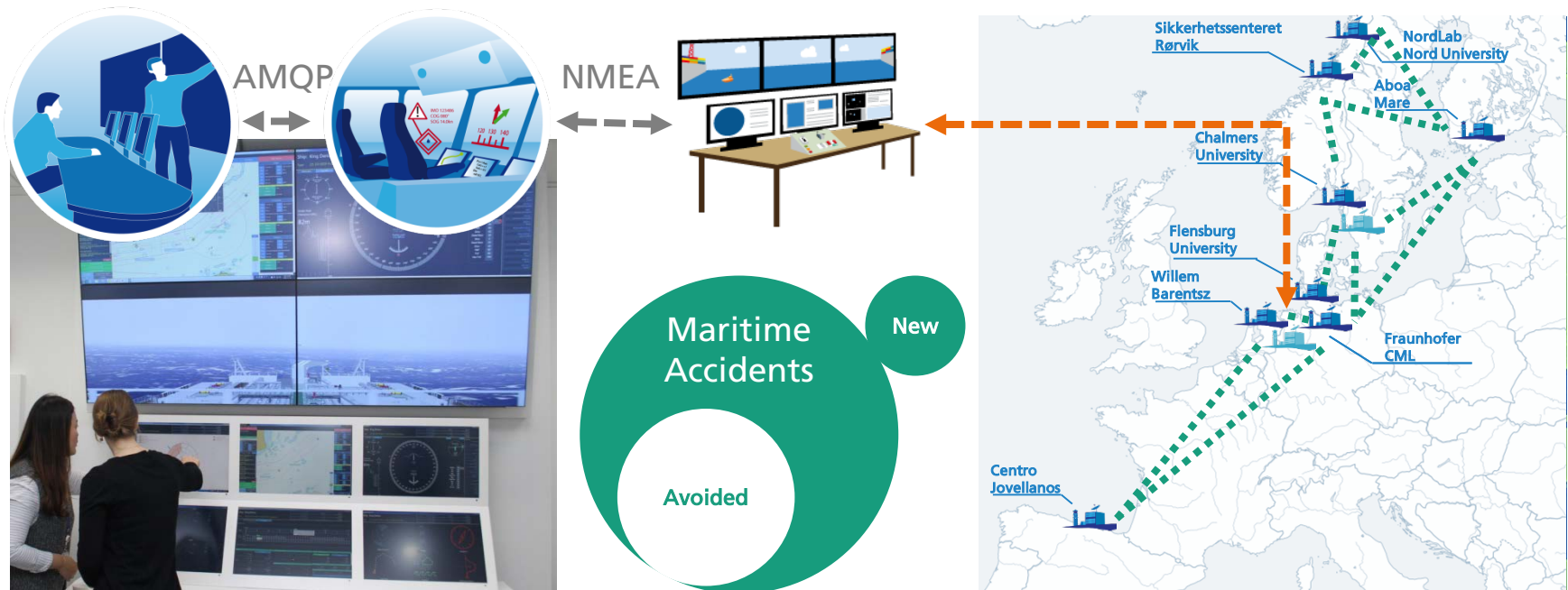
## Acknowledgement on EU level

- *“Large-scale test facilities for autonomous vessels: Large-scale test facilities (in situ through assigned sea areas as well as virtually via EMSN) are major gaps with regards to development of safe waterborne CAT. This can be done on regional or EU level with some public funding”*



# Outlook

MASS integration in EMSN for large-scale studies feasible



8 (+2) Centers

3 Manufacturer

21+ Bridges





# Conclusion

- EMSN-Connect is a tool for modern, connected training of mariners
- EMSN technology provides a unique answer to properly incorporate human factor aspects into marine technical and organisational innovation projects
- EMSN shall become a European Large Scale Research Infrastructure for maritime
- Compared to technical development, proper funding of profound safety analyses remains a challenge

Thank you for your attention  
STM Validation received funding by the EU

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