



On the edge of the AXE ... !

HSBO FORUM, MAY 7 2014, GOTHENBURG SWEDEN

Koninklijke Nederlandse Redding Maatschappij

Short introduction

Gerard Burema

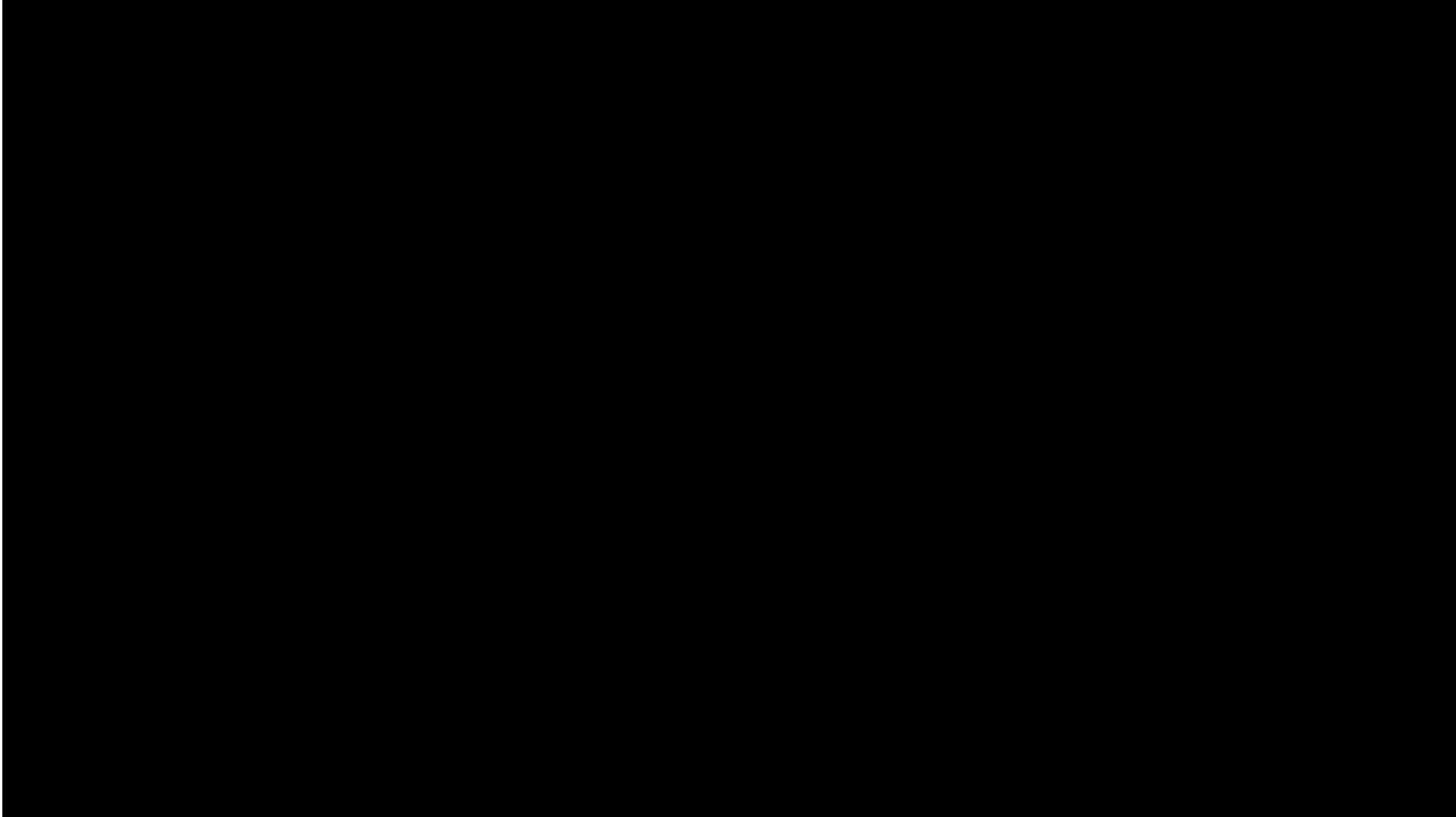
Head of Strategy and Innovation

Carlo Hukema

Naval IT Architect – Head of IT

Royal Netherlands Sea Rescue Institution (KNRM)

Our world and environment...



Evolution is necessary

- Need for reduced vertical accelerations, vibrations and noise
- Need for improved directional stability and manoeuvrability
- Shifting profile volunteer
- Increased availability and quality of information
- Need for improved situational awareness for safety and mission execution

The three Safety Elements

- Hull Design
- Human-Machine Interface in a broad context
- Situational Awareness

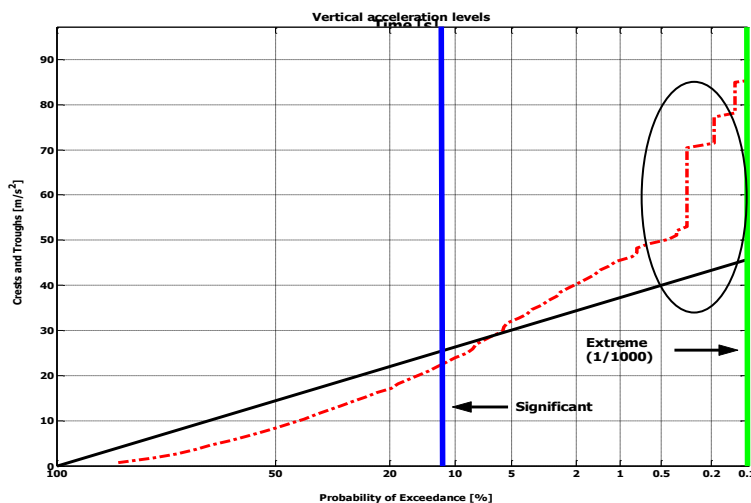
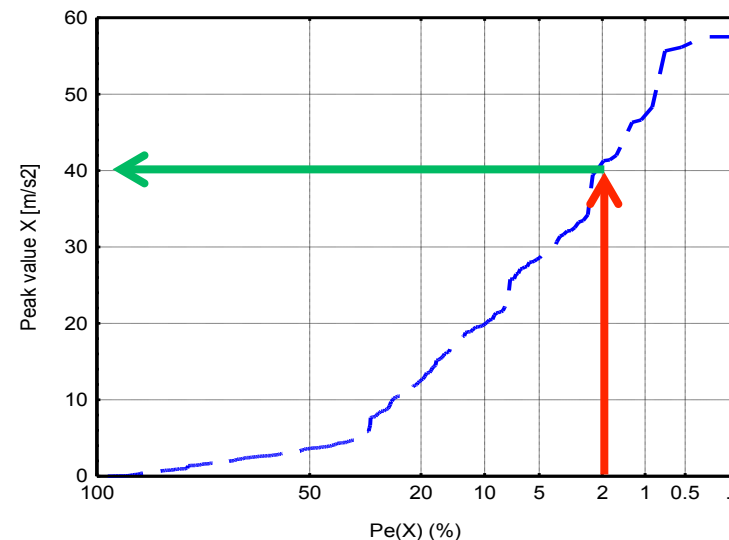
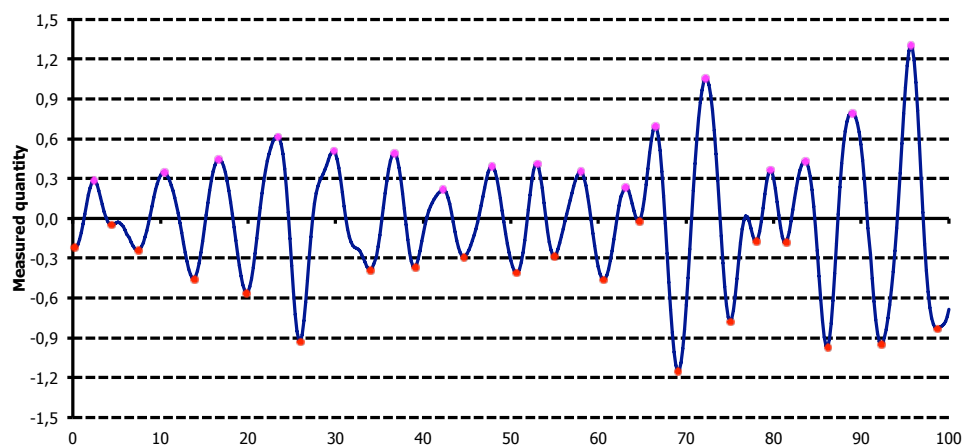
Innovation by synergy

- Science Dr. Ir. Lex Keuning, Delft University of Technology
- Design De Vries Lentsch, Damen Engineering
- Construction Damen Shipyards
- Operational experience KNRM

Design: from concepts to blue printing

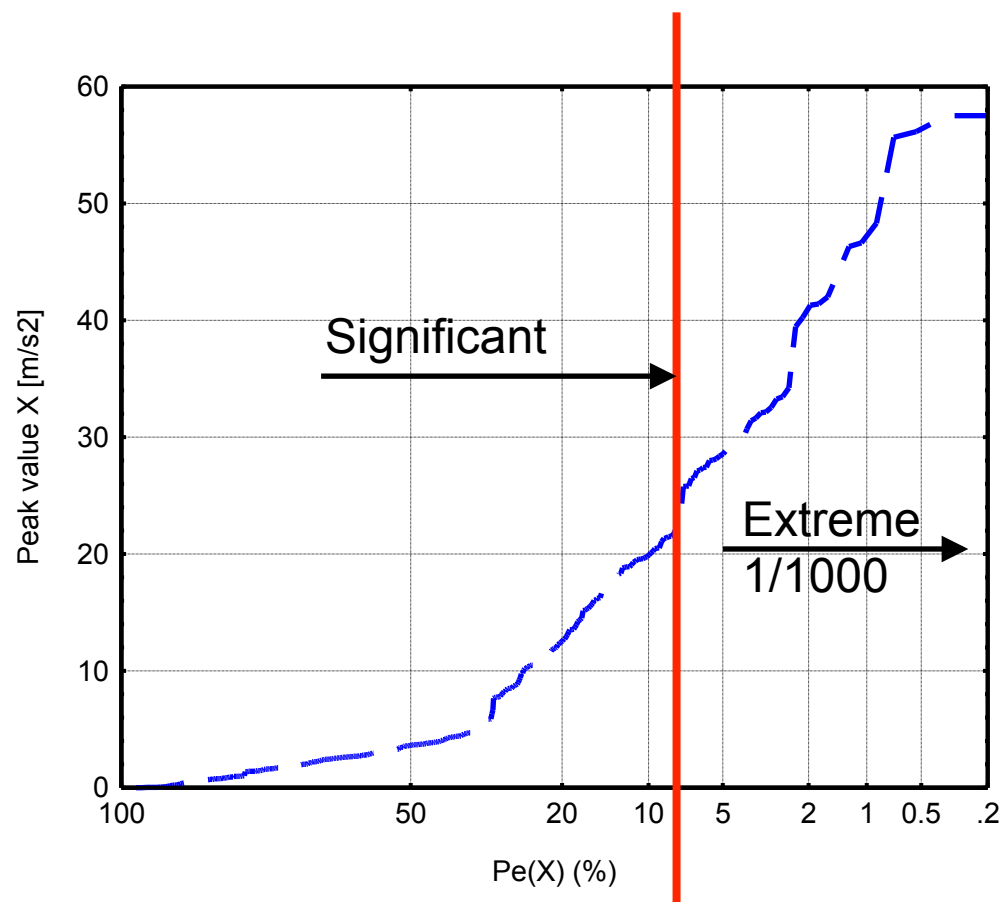


Previous Research: Operability Criteria

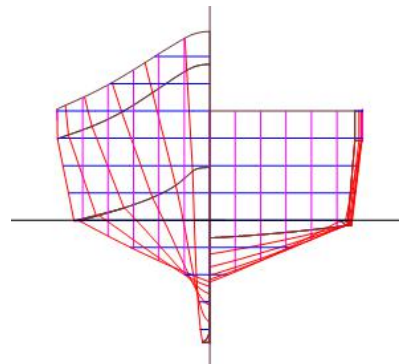


- Strong nonlinear behavior in accelerations
- 85% of speed reductions voluntary
- Peaks are avoided irrespective of significant level at the time

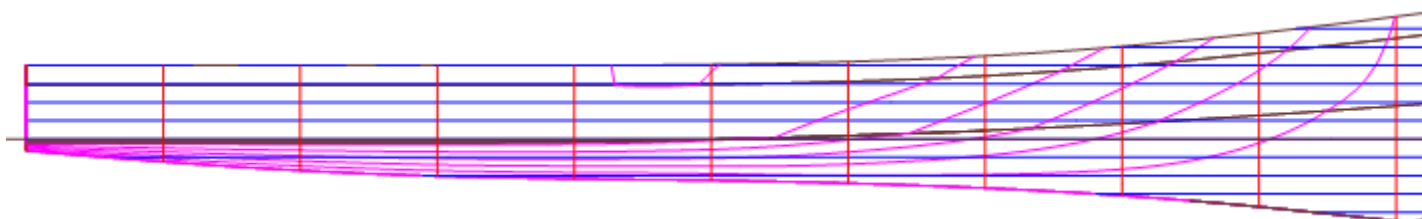
How to improve seakeeping?



Design: The AXE Bow Concept (2006)



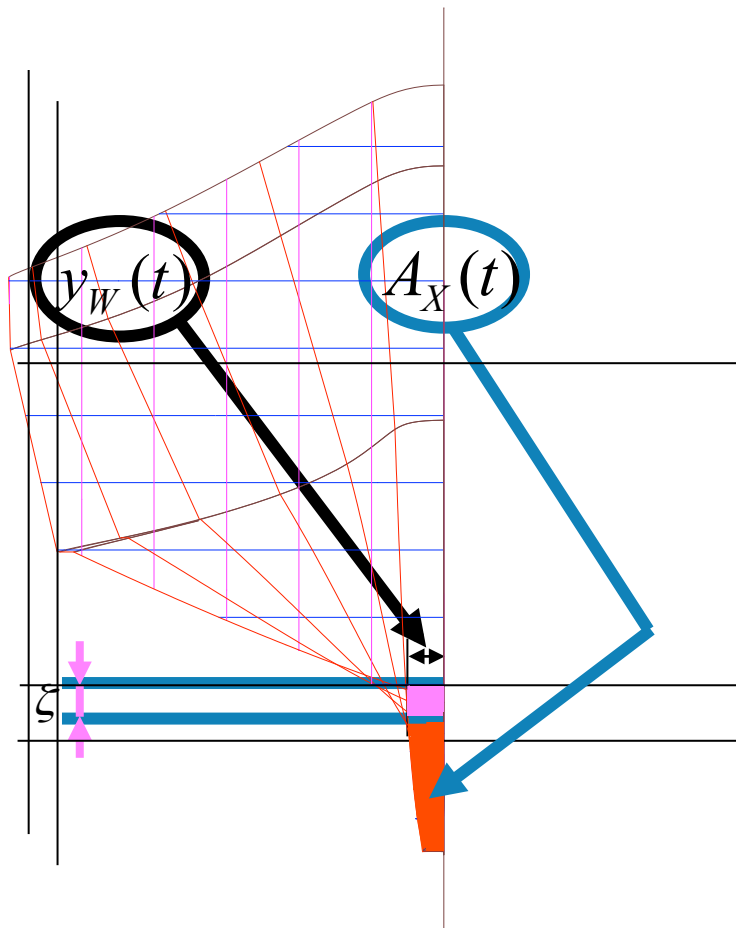
- ✓ No Flair
- ✓ Vertical Sides
- ✓ Increased Sheer
- ✓ Downwards slope and contour



Design: Principle of the AXE Bow concept

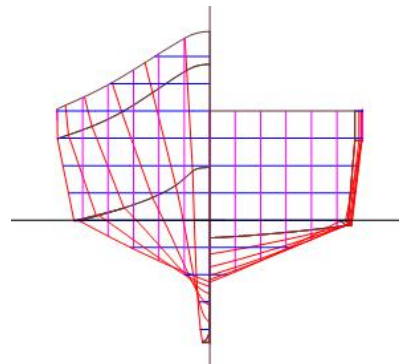
$A_x(t)$,
 $y_w(t)$,
 m_a
 dm_a/dt
 reduced

The AXE BOW!

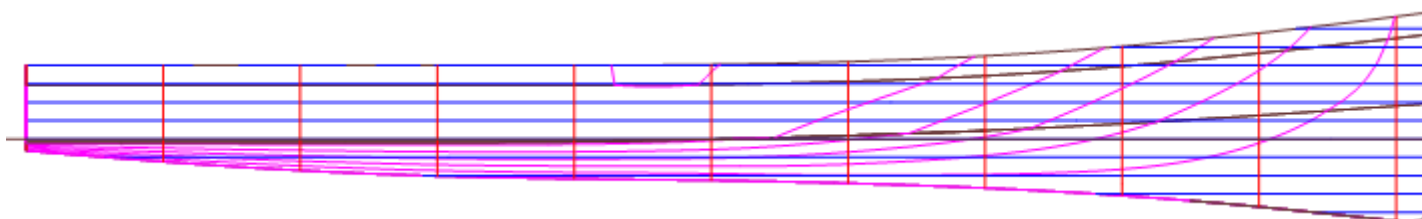


“Reducing the Froude-Kriloff force and the hydrodynamic lift forces particularly in the forward part of the ship”

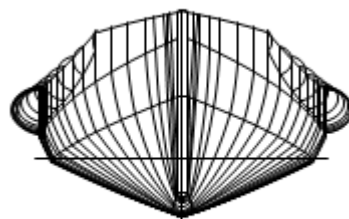
Design: The AXE Bow Concept (2006)



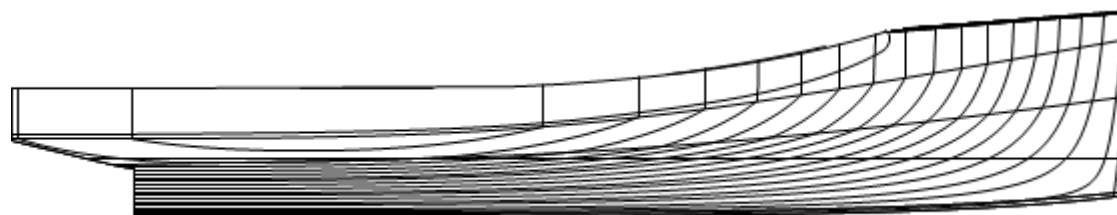
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Evolution of AXE Bow to Nh1816 design



- ✓ Length 21.0 m
- ✓ Beam 6.4 m
- ✓ Displacement 34 tons
- ✓ Speed 33 knots



Model trails at Marin Institute NL

Stern quartering seas $V_s = 25$ knots $H_s = 2.5$ m

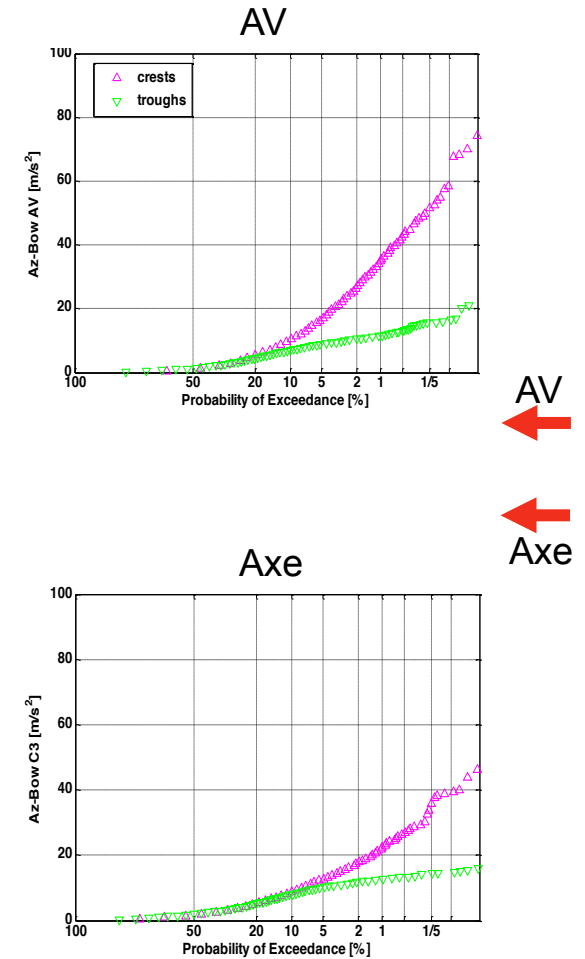
Arie Visser



Concept 2



Open water, side by side, tests AV & Concept



The result ...

Construction

- Aluminium Hull
- GRP Wheelhouse
- Noise ≤ 72 dB

Humphree trim system

Finding the right trim



Modified AXE Bow

Vert. acc $\leq 4,5$ g

Specific SAR / KNRM adjustments

Retractable Fins

For course stability fins deployed
or for manoeuvrability fins retracted

The next challenge ...

- How to operate a ship like this?
- How to “fit this ship like a glove”?
- How to support a volunteer to operate as a professional?

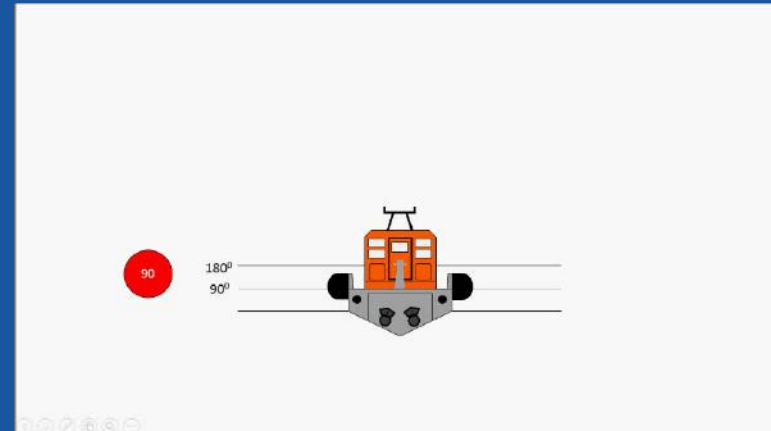
KNRM IPMS

The KNRM “Integrated Platform Management System”

Designed and built by KNRM and L&T Servowatch UK

KNRM Integrated Platform Management System

- Introduction of sophisticated process technology on SAR vessel
- Enables complex capsizing scenario (continuous propulsion availability)



KNRM Integrated Platform Management System



- Connects the crew with the vessel by a Human-Machine-Interface
 - ✓ Remote operability – State reading / controlling
 - ✓ Intuitive interface, easy to understand
 - ✓ Different ways of interacting

KNRM Integrated Platform Management System



- Modular, redundant, highly-available, built with proven technology
 - ✓ Quintuple network aka “Lord of the Rings”
 - ✓ Redundant information and source strategie
 - ✓ Critical equipment can be remotely or manual be controlled

KNRM Integrated Platform Management System



- Provides a platform to integrate vessel information, sensor data, communication and external information

Principles of KNRM IPMS

- Introduction of sophisticated process technology on a SAR vessel
- Enables complex capsized scenario (continuous propulsion availability)
- Connects the crew with the vessel by a Human-Machine-Interface
 - Remote operability – State reading / controlling
 - Intuitive interface, easy to understand
 - Various ways of interacting
- Modular, redundant, highly-available, built with proven technology
- Provides a platform to integrate vessel information, sensor data, communication and external information

uhm NO!

- The role of information during a mission?
- Support interpreting professional information?
- How and which information can help to get a better understanding of the Situational Awareness?
- What are the requirements for infrastructure and tools?

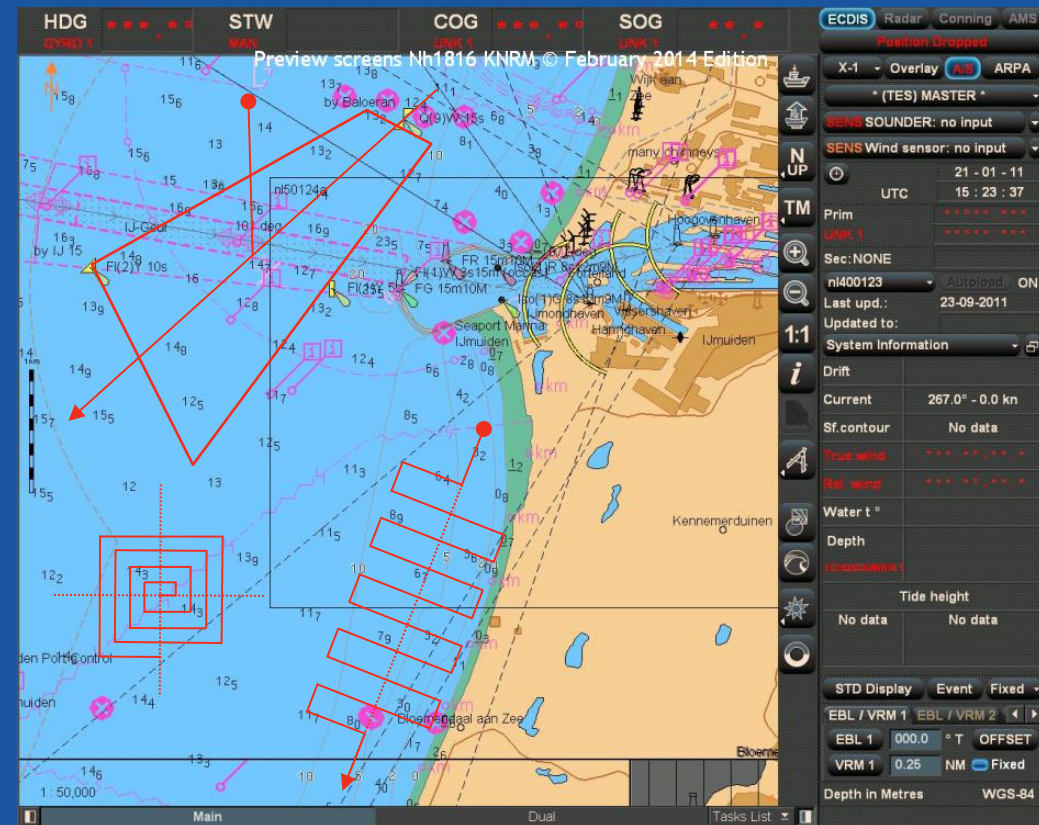
KNRM Information and Situational Awareness



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KNRM Information and Situational Awareness

- SAR Information
 - ✓ Information in layers
 - SAR patterns
 - SAR areas
 - Hazards and dangers
 - ✓ Effective Command & Control for SAR operations
 - ✓ In the near future exchange of vector based Shore Radar and AIS Coastguard data



KNRM Information and Situational Awareness

- Mission Information
- ✓ Meteo information
- ✓ Wave condition
- ✓ Tidal information
- ✓ Sitreps
- ✓ Elementary Messenger service
- ✓ Crew information
- ✓ Vessel information



The screenshot displays the iSar software interface with the following sections:

- Alarms:** Total 0, New 0.
- Description:** Preview screens Nh1816 KNRM © February 2014 Edition.
- Time/Date:** 12:54:00 UTC, 21/01/2014 LOC.
- Left Panel:** VHF 1 CH xx, VHF 2 CH xx, AFT CAM, PTZ CAM, CCTV, OUTSIDE LIGHTS, INSIDE LIGHTS, and CONFIG buttons.
- KUSTWACHT-INFORMATIE:** INCIDENT (27-apr) 12:10: Alarm KWC: Zandvoort Annie Poulisse. INZET: ZVT, BERICHT: Pno 1, Vaartuig maakt water. Location: 51.92.031 N - 6.12.301 O (est.).
- OPGEKOMEN BEMANNING:** Table with columns for CREW 1th-12.
- VERDERE INZET-INFORMATIE tlv KUSTWACHT:** Schipper: Leonardt Langbroek, Status: Bemanning is opgeroepen, Meteo: Zicht is goed, etc.
- METEO-/HYDRO-gegevens:** Wind: 7 kts = 9 Bft - NO, Dekkingspercentage bewolking = 85%, Waterstand (NAP): 84 cm, Eb om: 23:20 uur, Verwachte waterstand: -74 cm, Water-temperatuur: 11°, Lucht-temperatuur: 11°.
- Bottom Panel:** Log of messages including "25-nov 15:02: NH 1816 -> KWC: Boot gezien, ligt eig schuin" and "25-nov 14:57: KWC -> NH 1816: Volgens onze schermen zijn jullie al de haven uit. Is er ook al visueel contact met het vaartuig?".
- Right Panel:** VESSEL STATUS, COM, HELM, RADAR, ECDIS, IPMS, ISAR, More, and MODE buttons.

Questions and others?

