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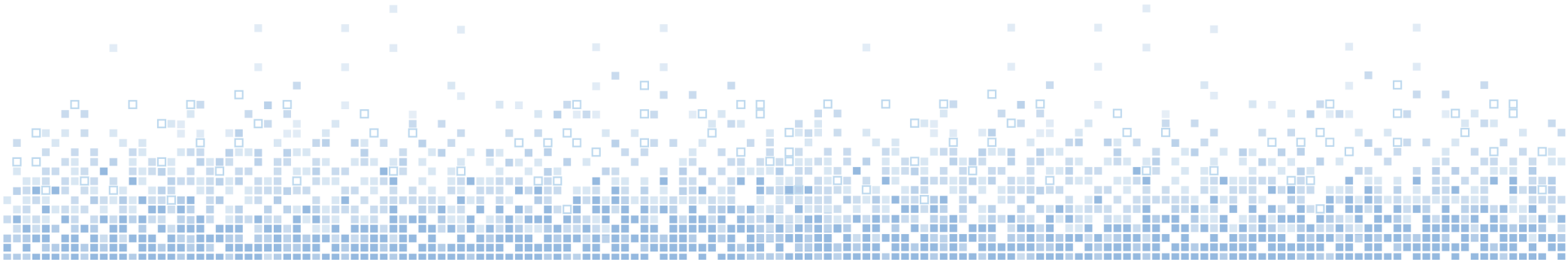
# The Implementation of e-Navigation

Nick Ward & Sally Basker, GLA R & RNAV

NAV 08, London, 28 Nov 2008



# Introduction

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- Report of IMO NAV 54 proposed a strategy for the implementation of e-Navigation
- The IMO Maritime Safety Committee will consider this next month
- If approved this will set in train an evolutionary process towards the future, digital vision for the maritime sector

# Introduction

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- This paper will explain the motivation for e-Navigation and the progress from the initial e-Navigation concept to the likely implementation plan
- How e-Navigation may be realised in practice and the benefits to the different stakeholders
- Necessary developments in key supporting technologies, in particular position-fixing and communications

# Definition of e-Navigation

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- The IMO definition of e-Navigation is “the harmonised collection, integration, exchange, presentation and analysis of maritime information onboard and ashore by electronic means to enhance berth to berth navigation and related services, for safety and security at sea and protection of the marine environment”

- The e-Navigation concept is based on robust and redundant positioning, navigation and timing systems, distributed information technology systems using fixed and mobile telecommunications and availability of electronic navigation charts world-wide.

# IMO Strategy for Implementation

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- NAV 54 agreed a Draft Framework for the Implementation Process
- architecture, gap analysis, cost benefit analysis and the creation of a detailed implementation plan
- structured and phased approach to capture evolving user needs

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# Implementation Strategy

- deployment of new technologies should be based on a systematic assessment of how the technology can best meet defined and evolving user needs
- architecture, information, communications technology and software, should be modular and scaleable

# Timescale

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- Initial architecture for review by 2009, complete by 2010
- gap analyses on technical, regulatory, operational and training aspects to be completed by 2010
- Cost-benefit and risk analyses to be completed by 2011
- Implementation of e-navigation plan could begin in 2012

# Motivation

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"a clear and compelling need to equip shipboard users and those ashore responsible for the safety of shipping with modern, proven tools that are optimized for good decision making in order to make maritime navigation and communications more reliable and user friendly. The overall goal is to improve safety of navigation and to reduce errors."

# Dangers of uncoordinated approach

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"if current technological advances continue without proper coordination there is a risk that the future development of marine navigation systems will be hampered through a lack of standardization on board and ashore, incompatibility between vessels and an increased and unnecessary level of complexity."

# Convincing cost benefit argument crucial to early acceptance

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- Safety
  - reduced groundings and collisions
  - improved accident investigation
  - more effective search and rescue
- Environmental benefits
  - reduction of accidents
  - more efficient counter-measures.
- Security enhanced
  - improved tracking and monitoring.
- Efficiency of operation
  - reduced waiting times
  - lower fuel consumption
  - tracking and utilisation of assets

# Risk Analysis

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- IALA – PAWSA, IWRAP for waterway planning
- MarNIS
  - risk-based approach to traffic monitoring and management
  - risk index based on vessel history, ownership, cargo and distance from coast, related to weather conditions
  - used to raise alerts and plan intervention

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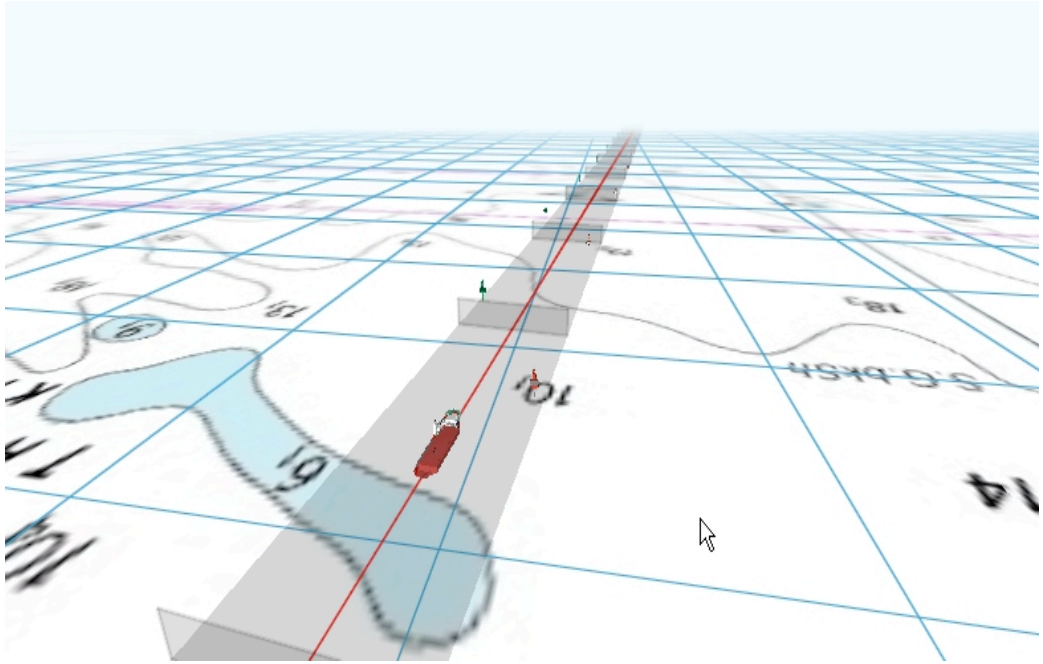
# Demonstration Applications

- Marine Electronic Highway
- Motorways of the Sea
- E-Navigation Test-Beds



# Shore-side Architecture

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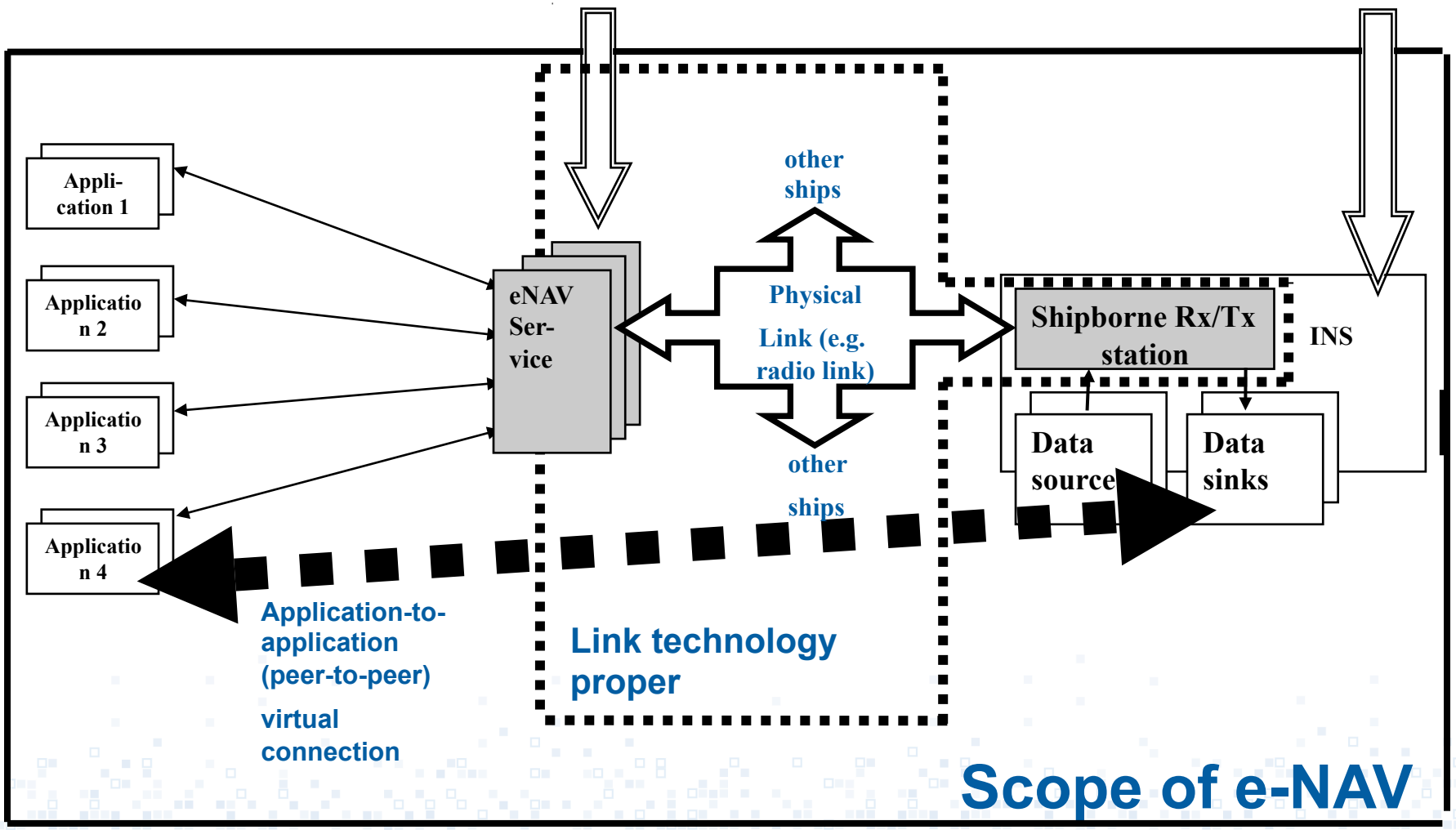
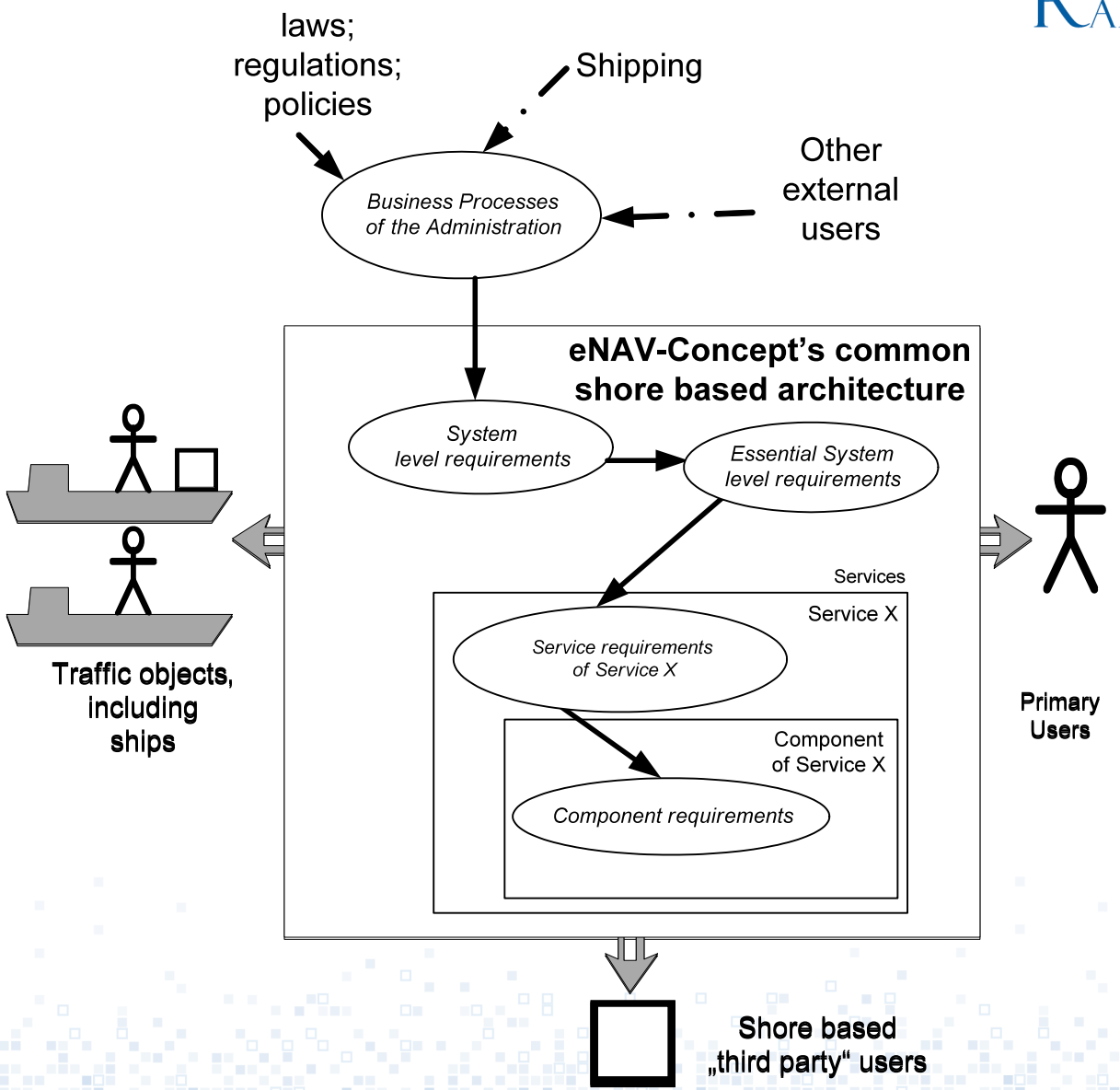
- IALA e-NAV Committee
- New Rec. 2009/10
- UML based
- application-to-application information flow




# Scope of e-NAV concept


laws;
regulations;
policies
Shipping
Other
external
users
Business Processes
of the Administration
eNAV-Concept's common
shore based architecture
System
level requirements
Essential System
level requirements
Services
Service X
Service requirements
of Service X
Component
of Service X
Component requirements
Traffic objects,
including
ships
Primary
Users
Shore based
„third party" users

# Positioning, Navigation & Timing

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- IALA e-NAV WG
  - WWRNP
- GNSS
- Terrestrial
- Differential corrections
- Ranging signals
- Radar
- Non-radio
  - Inertial
  - visual

# eLoran

- Complementary to, but independent of GNSS
- Not susceptible to similar jamming or spoofing
- Only terrestrial, wide-area alternative
- Coverage of main shipping routes
- Interface with onboard systems

# Electronic Pelorus of the Future?

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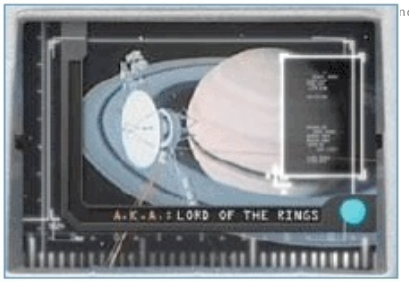





Data to ECDIS? Wireless or cable…

# Echo Referencing

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# Multi-beam sonar

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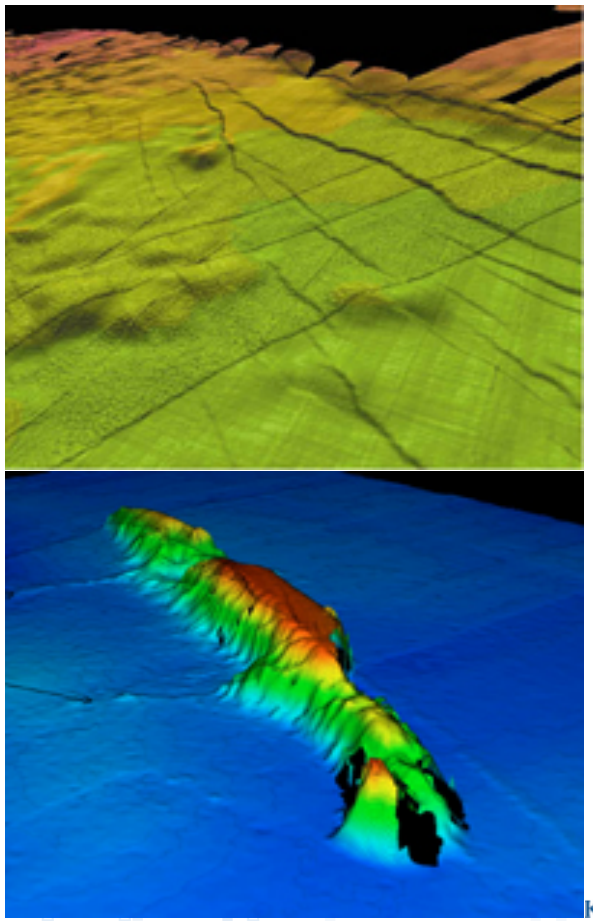
- Undersea mapping
- Detection of obstacles
- Grounding alarm
- Integration with surface navigation



KONGSBERG

# Communications

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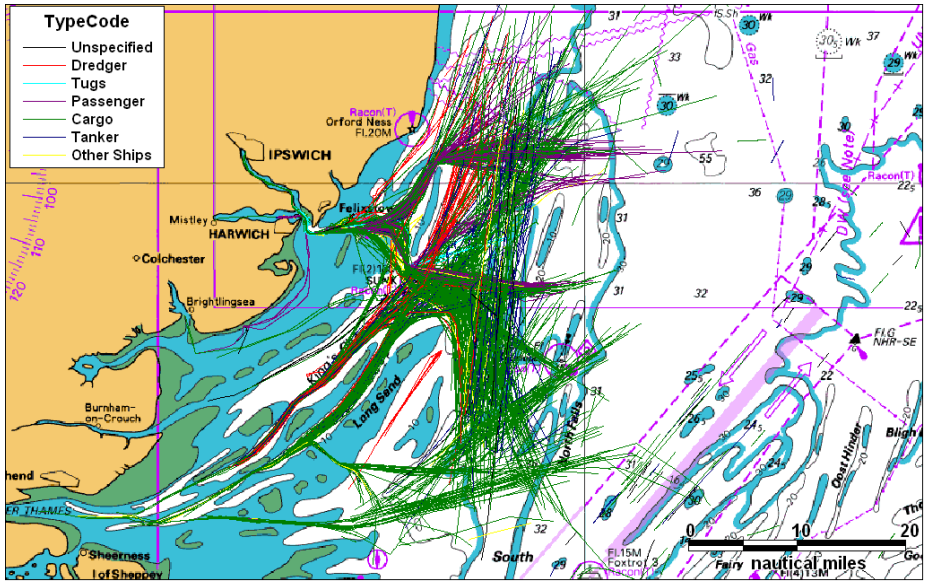
- IALA e-NAV WG
  - Communications plan for e-Nav
- Enhancement of existing systems
  - Global broadband
- Development of new systems
  - AIS via satellite
  - WiMax
- Working plan by end of 2009



# Comparison: Commercial Rx vs COM DEV Rx

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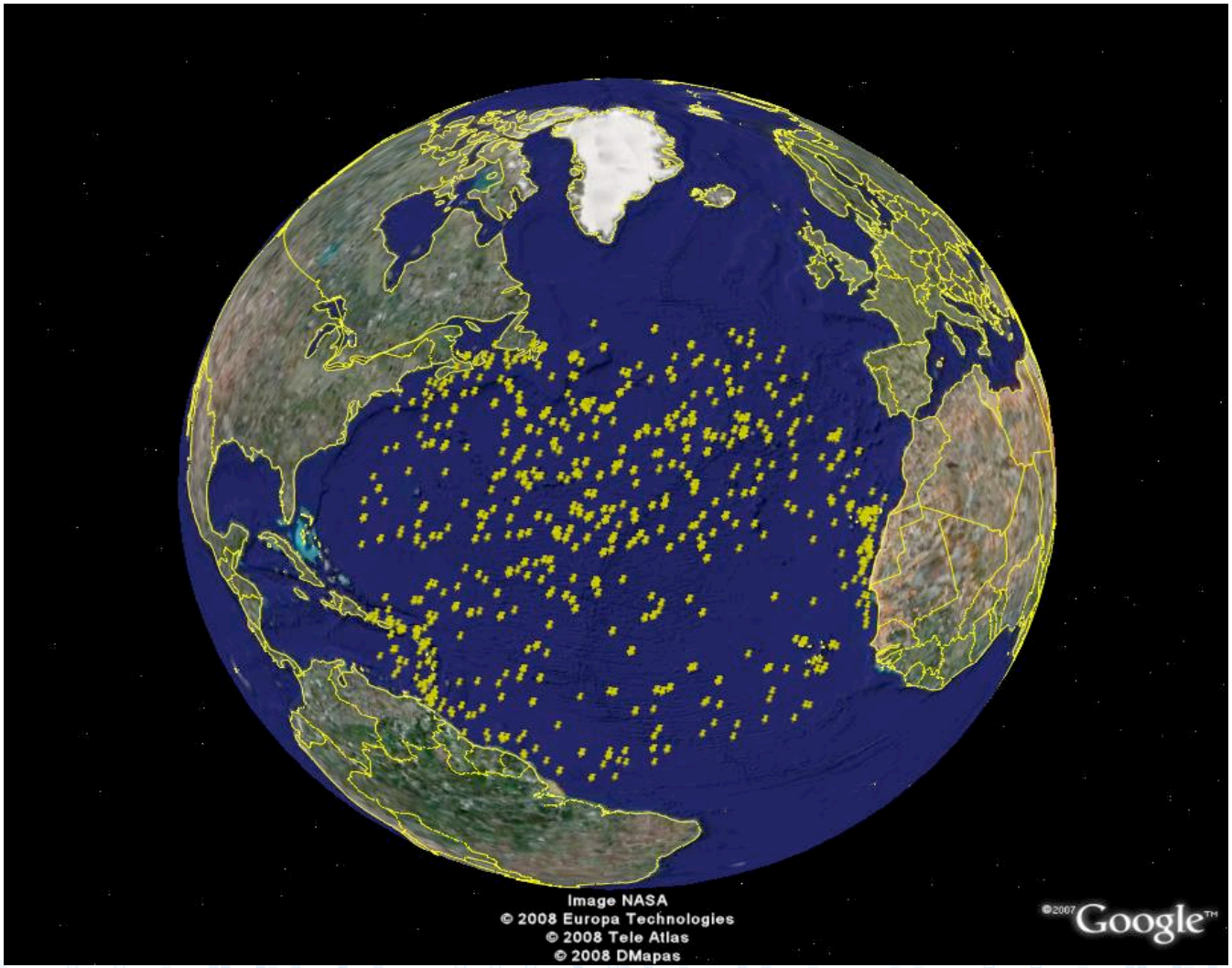


Identical 50 seconds of data from COM DEV approach

# Integrated Information Systems

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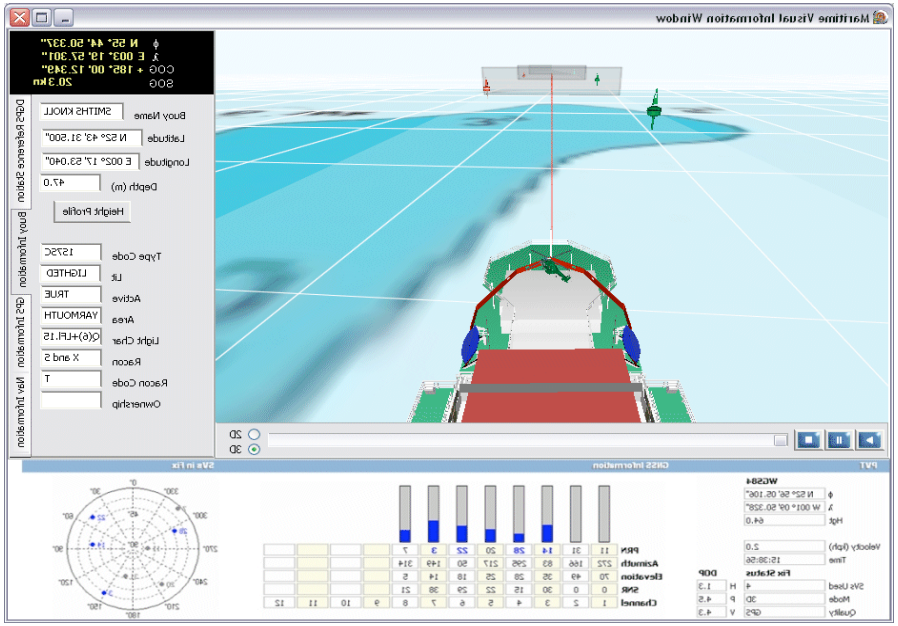
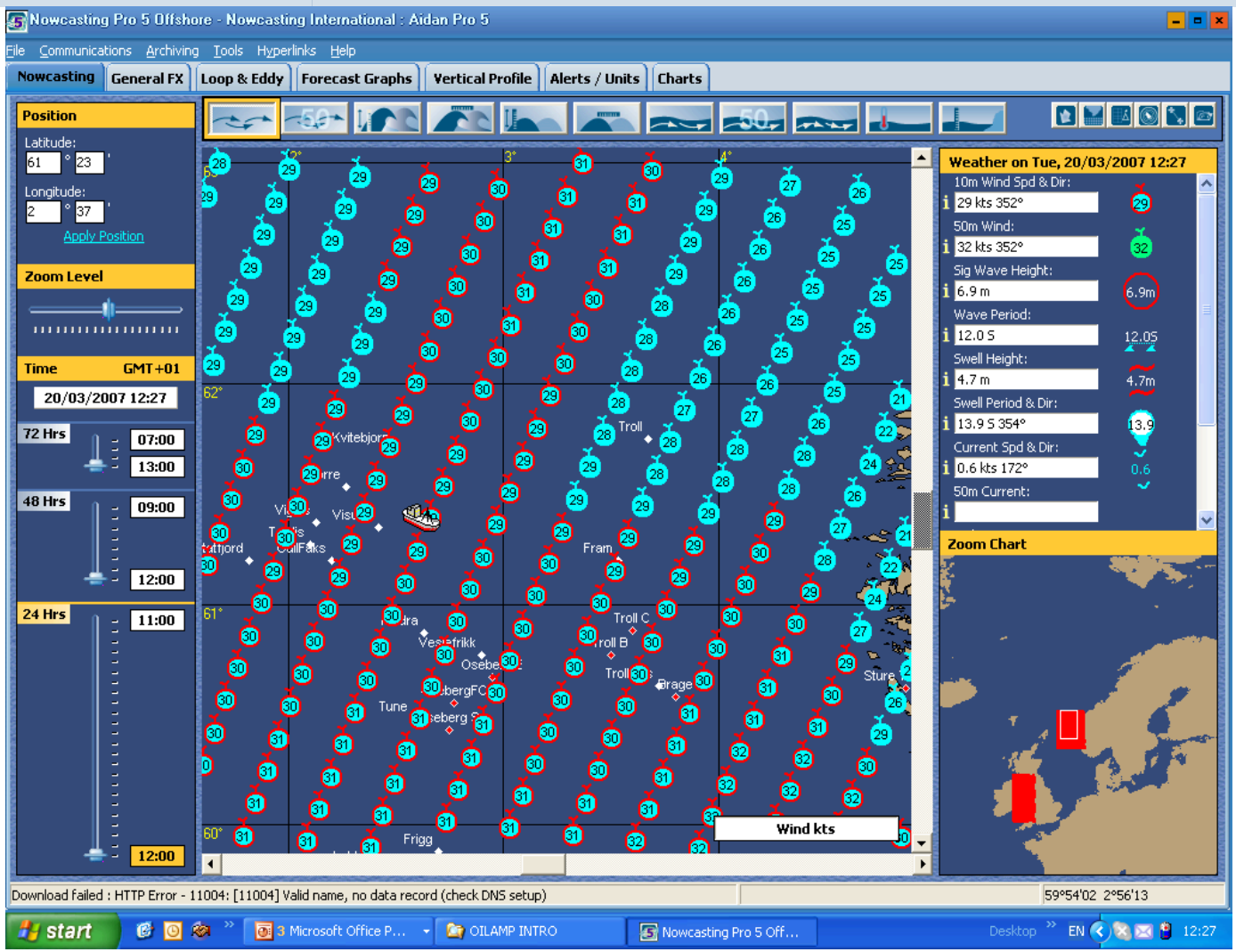
- Inputs
  - GNSS/DGNSS/AIS/radar/AtoNs
- Displays
  - ECDIS/AIS/radar/AtoNs
- Decisions
  - navigation, collision avoidance



# NPro 5 Forecast Data Types
# Wind @ 10m (surface)




- 10m Wind speed and direction

# Conclusions

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- Progress in IMO
- IALA work on key elements
  - Architecture
  - PNT
  - Comms
- 2012 realistic for plan

# Questions?

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