Making Everything Work Together
Building the Maritime Internet of Things
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Who is this guy?

- Co-Founder & CEO @ MARSEC-XL
- MARSSA initiator & co-creator
- Open Source proponent
- Mariner - Commercially licensed, High speed vessels (Chalmers University of Technology)
- Diver (PADI)
- Career-long work with software dependency
  - Maritime, Automotive, Aeronautics, Defense, Telecom.
- Previously: Managing Director @ Carnegie Mellon Software Engineering Institute Europe
- Founder & CEO of Q-Labs.
What is the Internet of Things (IoT)?

- The IoT refers to **uniquely identifiable objects** and their virtual representation in an **internet-like structure**.

- More objects are becoming embedded with **sensors** and gaining the ability to **communicate**. The resulting information networks promise to create **new business models**, improve **processes** and reduce **costs and risks**.
What does the IoT do?

• In the IoT, **sensors** and **actuators** embedded in physical objects are **linked** through wired and wireless **networks**, often using the same **Internet Protocol (IP)** that connects the Internet.

• When objects can both **sense** the environment and **communicate**, they become **tools** for understanding complexity and **responding** to it swiftly.
  – They can work **without** human intervention.
What does the IoT do?

- The widespread adoption of IoT will take time but it’s speeded up by wireless technologies, Open Source Software, standardization, data collection (Big data!), cloud computing.

- A first step toward the IoT is converting networks on proprietary protocols to IP-based networks.

- When objects can sense and communicate, it changes how and where decisions are made and who makes them.
What does the IoT do?

• When an object can represent itself digitally, it can be controlled and/or monitored from anywhere. This connectivity means more data, gathered from more places, with more ways to increase efficiency and improve safety, security and situational awareness.

• The network plays a critical role as the connectivity platform for control and operational systems, sensors, devices.
  – It must provide a secure infrastructure with open standards and seamless integrated architecture.
The Internet of Things in Maritime

- Two groups of IoT applications are emerging:
  
  1. **Information & Analysis:**
     - Tracking behavior
     - Enhanced situational awareness
     - Sensor-driven decision analytics
  
  2. **Automation & Control:**
     - Process optimization
     - Optimized resource consumption
     - Complex autonomous systems
Enabling the Internet of Things at Sea

- **IP protocol & Open Standards**
  - Data Sharing and Exchange

- **Open Source:**
  - MARSSA – Open Reference System Architecture
  - OBP – Open Bridge Platform – an instance of MARSSA
  - Maritime Cloud – a communication framework

- **Communications** – Global connectivity – Internet, (VDES?)

- **Community** driven approach:
  - E-navigation
  - STM – Sea Traffic Management
  - E-Maritime
What do we need to succeed?

Critical Success Factors for global e-Navigation adoption*:

• High **quality** systems at **reduced cost**
• **Interoperability** in a **multi-vendor** environment (no vendor lock-in practices).
• **Future-proof** & Platform **Independent** (Maritime Cloud & MARSSA Open Reference Architecture)
• **Intuitive** usability with reduced training needs: less complex but more sophisticated solutions.
• **New** & Sustainable **Business Models** (Open Innovation)
• **Harmonized** infrastructure, Processes & Quality of Data
• Regulation & Standardization at the “right” abstraction level

Community driven approach

• Lessons learned from ICT & Open Source (OSS) Community:
  – Grass root vs top-down approach

• E-Navigation – perceived as a “disruptive” concept: evolution or revolution?:
  – New business models
  – Push for transformational innovation
  – End-User driven
  – Incubator for new (disruptive!) technologies.
An organization needs to be fairly **mature** in its views & practices wrt **Open Source** before it will be comfortable **giving back to the community**.

Source: Phil Odence, Black Duck Software
Technology Roadmap Maritime IoT

- **2015**: RFID, Geo-positioning facilitating inventorying, optimization & loss prevention
  - Prototyping: E-Navigation & STM Test Beds

- **2020**: Surveillance, Security, RT exchange, locating people & objects
  - Document & Data Management (Single Window)

- **2030**: Tele-operation & Tele-presence: Ability to monitor & control distant objects
  - Software agents & advanced sensor fusion
  - Swarm management
  - The Maritime Web

**Demand for increased safety & efficiency**

**Cost reduction leading to broad adoption & 2nd wave of applications**

**Adoption: driven by legislation & cost savings**
Key Take-Aways

• Success is not measured in market share but in Adoption!
• Wide e-Nav adoption dependent on Affordability, Reliability & Seamless Interoperability of Systems - Can be achieved with OSS Components & based on Open Reference System Architecture as a “blueprint”.
• Community & Collaboration: across various ongoing & upcoming Maritime IoT projects.
• Early e-Nav Systems Prototyping & Test Beds.
Thank You

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