SEA TRAFFIC MANAGEMENT VALIDATION PROJECT
Sept 13 Session 1

• Welcome back
• STM Italy including
  – Inauguration of the STM_ITA e-administration
• STM for Safety & Security
• Coffee & Demos
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INAUGURATION OF ITALIAN SHORE CENTER
(E- ADMINISTRATION)
13/09/2017

MARIO DOGLIANI, AUTHORIZED REPRESENTATIVE
ITALIAN MINISTRY OF INFRASTRUCTURE AND TRANSPORT
WHY STM_IT

STM is part of the Italian Transport Policy Priorities:
→ Ministerial Decree n. 212 of 15 June 2016

Expectations:
1. PPP – roles of Public and of Private in e-navigation implementation
2. Coherency in interoperability and data sharing (e.g. NMSW)
<table>
<thead>
<tr>
<th>BRICKS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship Operation Center</td>
<td>Software for Fleet Management and Route Planning. Keeps ship routes and voyage planning under control and generates alarms to alert operators of anomalies. Makes calculations on data related to energy consumption.</td>
</tr>
<tr>
<td>Fleet Operation Center</td>
<td>Ship owner shore centre: collects real-time data from all fleet ships.</td>
</tr>
<tr>
<td>Ship Energy Monitoring</td>
<td>Fleet Performance Governance is a monitoring system, initially developed to continuously manage and monitor onboard energy processes. Fleet Performance Governance gathers, organizes and analyses ship data and optimizes fleet performance. Flexible and feasible for several ship owners. The software helps ship owners and ship operators to monitor the emission of pollutants in compliance with SEEMP and MRV.</td>
</tr>
<tr>
<td>Flag Operation Center</td>
<td>Collects data from all flag fleet ships of each single ship owner.</td>
</tr>
<tr>
<td>Cooperative Ships</td>
<td>STM ship systems refers to ECDIS functionality, communication with ECDIS, STM module, communication with access point and online access point. STM equipment is not typically compatible with the Italian flag ships’ on board systems.</td>
</tr>
<tr>
<td>EMSN Simulator</td>
<td>Navigation Simulator to be used in Act 3 for EMSN</td>
</tr>
<tr>
<td>NMSW – UE Message</td>
<td>In compliance with Dir.2010/65/EU Italy implemented B2MSW standard Message (output of AnNa Project)</td>
</tr>
<tr>
<td>NMSW – IT</td>
<td>Reporting formality specific for Italy: in addition to the existing data (Declaration) included in B2MSW, other data will be added on Italian specific request</td>
</tr>
<tr>
<td>MRV – Regulation (EU)</td>
<td>CO2 Emission report formality</td>
</tr>
<tr>
<td>Container Verified Gross Mass</td>
<td>As required by SOLAS data related to VGM could be verified by the Competent Authorities</td>
</tr>
<tr>
<td>Crew e-certs</td>
<td>CeDA goal is to standardise reporting procedures and, for the shipping industry, to adopt the industry-driven standards for reporting formalities.</td>
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<tr>
<td>Electronic Log Books</td>
<td>System dedicated to Electronic management of Log Books</td>
</tr>
<tr>
<td>Ship Construction File</td>
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</tr>
<tr>
<td>Port-CDM PCS</td>
<td>Component develop for Activity 1</td>
</tr>
<tr>
<td>Port Maneuvering</td>
<td>Proof of concept: Technical-Nautical Services management (focus on tugs) and data sharing for Collaborative Decision Making (Activity 1)</td>
</tr>
<tr>
<td>Safe Port Operation</td>
<td>PCS developed by Port Authority of Livorno Safety and Security in Port</td>
</tr>
<tr>
<td>SID</td>
<td>State Property Information System</td>
</tr>
<tr>
<td>Indoor Positioning System</td>
<td>System developed in Monalisa 2.o Project</td>
</tr>
<tr>
<td>SECA – NECA Compliance</td>
<td>Sulphur Emission Control Areas (SECAs) – NOx Emission Control Areas (NECAs) MARPOL Protocol</td>
</tr>
<tr>
<td>Man over Board</td>
<td>System developed in Picasso Project</td>
</tr>
<tr>
<td>Other Simulators</td>
<td>E.g. for training purpose</td>
</tr>
<tr>
<td>Amodality, BoxTech</td>
<td>Follow the freight, a comprehensive worldwide technical catalogue of all existing and operated containers</td>
</tr>
</tbody>
</table>
As of 31/08/2017:
237 ships connected to Italian Shore Center (cruises, ferries & ropax, containers, tankers)
4 shore centers
Category 1 Fleet Operations

The category Fleet Operations effectively monitors vessel safety, navigation and efficiency. In addition, it provides access to remote support services to maximise the uptime of vessel operations, and decision support tools to help any decision-making between ships and shore more efficient.

The Fleet Operations Center comprises a set of tools for the tracking and monitoring of vessels and the monitoring, collection, exchange and analysis of data between ship and shore. The software helps shipowners and operators to monitor fuel emissions, according to SEEMP and MRV regulations.

Main functionalities:
- Data Collector
- Trim Optimization
- Propulsion Efficiency
- Decision Support System
Category 2 Ship Traffic Info

The category Ship Traffic Info provides tools for a coordinated, global approach to maritime traffic monitoring.

Ship Traffic Info enables port-to-coast-to-country monitoring, control and support. It provides fully connected maritime traffic control.

Main functionalities:
- Monitoring routes
- Optimum Speed/Trim/Ballast
- Propulsion efficiency monitoring
- Energy Monitoring/Management
- Energy management of on-board installations
- Fuel Cycle Control
Category 3 Academy

The category Academy connects maritime stakeholders and provides them with integrated solutions and high-quality content, helping them to bridge the gap between STCW and the required competency level.

It facilitates all aspects of simulation and training by bringing technology, expertise and content together.
Category 4 Ship Solutions

Ship Solutions component combines tools that enhance vessel safety and efficiency. The tools reduce workload and prevent human errors occurring during planning and optimisation, monitoring and operations, reporting and administration, and minimise system downtime through its Remote Support service and Maintenance module. The easy-to-use mobile applications provide the Captain and the crew with easy access to non-mission critical data and information, in a fast and efficient way.

This component provides a single point of connectivity to Fleet Operations Solutions, Maritime Services Providers (MSP), Maritime Data Products and Shore-based stakeholders. The data is stored on board and sent to shore in a secure way.
EXPECTATION #1 PUBLIC–PRIVATE PARTNERSHIP (PPP)

- Port-CDM PCS (STM Act. 1)
- Fleet Operation Center (STM)
- Cooperative Ships (STM equipment)
- Ship Energy Monitoring
- MRV – REGULATION (EU) 2015/57
- NMSW – IT Message
- NMSW – EU Message
- Revision NMSW – EU Message
- SID
- Ship e-certs (CeDA - AnNA)
- EMSN Simulator (STM – Act. 3)
- Crew e-certs (ML)
- Other simulators
- Flag Fleet Operation Center (STM)
- Port maneuvering
- SECA – NECA Compliance
- Man over board (Picasso)
- Safe port operation (ML2)

THESIS

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Ship e-Certificates

Current
• Onboard and ashore application adopted by PRIVATE companies to collects relevant data from both efficiency and environmental perspectives

Future
• Prior to ship arrival the “fully electronic certificate*“ is checked by the PUBLIC (local competent authority) e.g. to allow ship refuelling

* Based on IMO’s Guidelines for e-certificates & Italian NMSW (PMIS) compliant
e-Log Books – Oil Record Book

Current
• **PRIVATE** *(Shipowner)* on board compliance platform shore accessed for monitoring purposes

Future
• **PUBLIC** *(National Competent Authority)* shore based e-compliance* check

* Based on B2MSW message (WCO & IMO compatible) & Italian NMSW (PMIS) compliant
Ship Energy Monitoring

Current
Onboard and ashore application adopted by PRIVATE companies to collects relevant data from both efficiency and environmental perspectives

Future
PUBLIC (e.g. Italian Competent Authority) remotely check/get MRV* data

* EU/MRV Regulation 2015/757
“The future starts today, not tomorrow!”

-Pope John Paul II
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MARITIME DIGITAL SERVICE INFRASTRUCTURE
CILLI SOBIECH, RISE VIKTORIA

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What is it – SeaSWIM?

Secure information exchange

SeaSWIM (system-wide-information-management) ensures secure information exchange among authorized parties.

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Registered Service Providers

Registered Services

Navigational warnings

Enhanced monitoring

Port call optimization

Registered Users
Achievements

STM Validation Project and beyond

SeaSWIM

Guidelines
  - compliant

Security
  - interoperable
  - resilient
  - trustworthy

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Maritime cyber risk management

1. IMO MSC-FAL.1/Circ.3: Guidelines on maritime cyber risk management (high-level)

2. BIMCO, CLIA, ICS, INTERCARGO and INTERTANKO: Guidelines on Cyber Security on board Ships


4. NIST: Cybersecurity Framework

5. further... such as EU law relating to information security
Sharing of Voyageplan

“Apple”

Shared Mental Model?
Goals in this project - Safety

• Enhanced monitoring
• Ship to Ship Route Exchange
• Nordic Pilot Route Services
• SAR
• Nav. Warnings
• New Service!
Enhanced monitoring

Shared mental Model
Ship to Ship Route Exchange

Shared mental Model

Imagery: Adveto AB

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Nordic Pilot Route Service

Ship’s planned route

Pilot’s planned route

Shared mental Model?
MRCC’s Mental Model

Shared mental Model?

With STM we will get “SAME Mental Model”
New Services using STM

• RTZ as input (Again Sharing of VP)
• ONLY relevant information regarding portcall (Fairway restrictions etc.) returned to ship automatically
• No need to Search for relevant information
• NAME?
STM & THE HUMAN FACTOR IN MARITIME SAFETY

DR CLAIRE PEKCAN, PROFESSOR OF MARITIME APPLIED PSYCHOLOGY, WARSASH MARITIME ACADEMY

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The Human Factor in Maritime Safety

The Issue: Navigators need to develop and maintain situational awareness.

The Problem (1): Situation not fixed but varies over time; e.g. no. of threats in the environment (Endsley, 1995)
The Problem (2): Humans have limited Short-term or Working Memory Capacity

• Can deal with no more than 7 (+/- 2) pieces of information
• Limited capacity to remember who is where, who said what, and what they were going to do next
• Limited processing power to comprehend the intentions of others and predict the future
Current Situation

• High workload, ambiguous situations, unpredictable behaviours
STM: The Solution

• Reduced Workload
STM: The Solution

• Comprehension
STM: The Solution

• Predictability
## Goals: Validation

<table>
<thead>
<tr>
<th>Element</th>
<th>Primary metric</th>
<th>Secondary metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness</td>
<td>Errors</td>
<td>% task completion</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Subjective mental effort</td>
<td>Time on task</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>Software usability</td>
<td>Confidence and trust</td>
</tr>
</tbody>
</table>
Next steps in project

<table>
<thead>
<tr>
<th>Controlled Experiment (~ 1 hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local testing @ WMA and Chalmers</strong></td>
</tr>
<tr>
<td>2 live bridges</td>
</tr>
<tr>
<td>2 target ships</td>
</tr>
<tr>
<td>4 runs per day</td>
</tr>
<tr>
<td>20 seafarers per week</td>
</tr>
<tr>
<td>No STM normal</td>
</tr>
<tr>
<td>HO X OT TSS</td>
</tr>
<tr>
<td>With STM normal</td>
</tr>
<tr>
<td>HO X OT TSS</td>
</tr>
<tr>
<td>No STM fog</td>
</tr>
<tr>
<td>HO X OT TSS</td>
</tr>
<tr>
<td>With STM fog</td>
</tr>
<tr>
<td>HO X OT TSS</td>
</tr>
</tbody>
</table>

**Measures**
- Eye tracker – allocation of attention
- Situational awareness diary
- Performance: COLREGS compliance
STM Vision

- Digital technologies that are truly assistive to the seafarer
- Enhanced realistic training through the EMSN
In which way can STM improve navigational safety?

Covadonga Suárez
Ship-handling and navigation Area, Centro Jovellanos, SASEMAR, Spain.

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1. Route interchange
2. Area management
3. Flow management
4. SAR Services
5. Winter navigation
6. Enhanced monitoring
1. ROUTE INTERCHANGE

It permits to know in advance other ships intentions and future courses, adapting our route to the circumstances.

It permits cross-check, that its, an estimation of most dangerous point, minimum distance among two ships.

It results specially useful on areas where traffic comes from any direction, as the TSS limits.
On STM, areas are transmitted through ECDIS and directly showed on ships screen.
Ship traffic can be managed in order to avoid congestion points.
4. SAR SERVICES

SEARCH PATTERN
Improved by adapting to STM some systems already in use in Eastern Baltic

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Shore Centre will be able to detect if a planned schedule is not kept or if ship deviates from planned route.
## IMPROVEMENT INDICATORS

<table>
<thead>
<tr>
<th>KPA</th>
<th>KPO</th>
<th>KPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFETY</td>
<td>Increase voyage safety</td>
<td>No. of Accidents and Incidents per year in VTS areas</td>
</tr>
<tr>
<td>INTEROPERABILITY</td>
<td>Improve Information Sharing</td>
<td>Number of routes exchanged ship to shore center</td>
</tr>
<tr>
<td>USABILITY</td>
<td>Increase operational services addressed by STM that permit taking decisions</td>
<td>No. Of messages replied by ship approving suggested route</td>
</tr>
<tr>
<td>ENVIRONMENTAL SUSTAINABILITY</td>
<td>Decrease Navigation within Sensitive Areas</td>
<td>Number of Sensitive Areas Violation</td>
</tr>
<tr>
<td>EFFICIENCY</td>
<td>Reduce Congestion in all Voyage Phases</td>
<td>Turnaround Time per Voyage</td>
</tr>
<tr>
<td>INTEROPERABILITY</td>
<td>Increase Technical and Operational Integration</td>
<td>Number of operative processes managed by information exchange systems</td>
</tr>
<tr>
<td>INTEROPERABILITY</td>
<td>Improve Infrastructure Interoperability for better Information Sharing</td>
<td>Number of systems/technologies integrated with STM technologies</td>
</tr>
<tr>
<td>SECURITY</td>
<td>Increase Voyage Security</td>
<td>No. of Security Incidents related to Maritime Voyages per Year</td>
</tr>
<tr>
<td>Safety preventive actions</td>
<td>Early deviation detection</td>
<td>Number of deviations detected with anomaly detection tool.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of deviations that could lead to incident.</td>
</tr>
</tbody>
</table>
Preparation for Session 2

Shipping companies
Port actors
Authorities
Service Providers

4 rooms: Rossini, Verdi, Bellini, Vivaldi
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Demos

• Italian STM solutions
• PortCDM applications
• Transas STM ship & shore centre solutions
• Carmenta SAR solution for Rescue Centres
• Analysis tools