This activity, led by the Italian Ministry of Infrastructure and Transport (MIT) focuses on how to increase maritime safety in a variety of different ways by implementing services, based on available technology. Focus is on providing services to large passenger vessels but without modifying existing rules and regulations.
Our ideas

We have focused our attention on:

- Safer
- Usual Operation
- People Tracking
- Evacuation
- Search & Rescue

Safer, but also ..... SUSTAINABLE

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

Analysis of the problem

Possible Solutions

Solutions Design

Solution Implement.

Solution Evaluation

Stakeholders involvement and Pilot Cases
NETWORKED VESSEL
(Indoor Positioning System)

Piero Susino
Technical Operations Director
Princess Cruises

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People Tracking System for Maritime applications
The purpose of this presentation is to describe the People Tracking System (PTS) on trial on board the Ruby Princess
Prototype & validation

• PTS was first extensively tested in labs: very positive results obtained.

• PTS installed and tested on board of Ruby Princess: requirements fulfilled
On board installation

Co2 PTS PLANT
On board installation

Co2 PROTECTED AREAS MAIN PAGE
A total of 150 tags have been assigned to all Technical Personnel, Deck Fire Party and Rescue Party, Security Team. All of these crew member could have the need to access a Co2 protected areas and therefore need to be monitored.
2.0

On board installation

Co2 PTS MULTIPLE DECKS VIEW
PTS Operator Station in E.C.R
C02 Satellite
C02 tag

(EACH TAG IS ASSOCIATED TO THE BLUE CARD NUMBER OF THE CREW MEMBER)
Co2 PTS Tags for Visitors
Remote Connection to the Emergency Response Center in Santa Clarita
Details of components:

- Satellite: fixed node located in known positions and connected in loops;
- TAG: mobile node associated to people to be monitored;
- Data Collecting Unit (DCU): electronic device demanded to communicate to Satellites and to transfer the acquired information to Servers;
- PTS Server: computer hosting People Tracking database;
- SMCS: operator graphical interface
Details of Installation

Project Details
• Cables and installation materials provided by Carnival UK
• Hardware provided by MARTEC
• Project Management and Ship for testing provided by Princess Cruises
• 4 men work team for onboard installation (320 sensors and 6Km of cables)
• 3 Months time needed to complete the installation with the ship in service
Details of Installation

**Monitored Areas:**
- Fwd and Aft Engine Rooms
- Fwd and Aft Purifier Rooms
- Incinerators
- Fwd and Aft Main Switchboard Rooms
- A/C Compressors and Stabilizers Room
- CO₂ Mustering Points (Primary and Secondary) and connecting corridors
- Engine Control Room
- PEM Room
- Emergency DG Rooms (Port & Stbd)
- Emergency Switchboard Room
- CO₂ Room
- Engine Casings (Fwd & Aft)
- Associated Escape Trunks
- 150 TAGs monitored for this trial
Thank you for your kind attention
Safe Evacuation System

WITH SES

Hypothesis: HEEL 30°

WITHOUT SES

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Safe Evacuation System

The prototype has been tested in June at the Jovellanos center.
ICT tool for Search and Rescue

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ICT tool for Search and Rescue
Sub Act 3.2 - ICT tool for Search and Rescue
Over 80% of all accidents occur because of inappropriate behavior and not due to lack of equipment or unsafe conditions.

Behaviour Based Safety

Behaviour Based Safety is a process that if duly followed, allows to prevent behavioural based incidents. It was born in USA in the Fifties, within the Behavioural Psychology.

It’s now applied for the first time in the maritime world.
Health Safety Quality Environment
Behaviour-based safety in Maritime

The method used consisted in:

• Customize for maritime applications other sector’s ashore mature technologies by adapting BBS methodology;
• Design and implement an ICT tool;
• Test and validate the ICT tool, also considering ergonomic viewpoint.
Pilot applications:

- Trasmediterranea – Acciona
- Balearia
- Costa Crociere – Injuries Analysis
- OLT (test of the tool)
## Health Safety Quality Environment Behaviour-based safety in Maritime

### OPERATIONS

<table>
<thead>
<tr>
<th>Store/spares/provision/garbage/personnel transfer</th>
<th>PLAYER</th>
<th>APPLICATION OF THE METODOLOGY</th>
<th>KIND OF OBSERVATION</th>
<th>EVIDENCE OF THE FEEDBACK*</th>
<th>SAFETY DATA OBSERVED</th>
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<tbody>
<tr>
<td>CRANE OPERATOR</td>
<td>CUSTOMISED</td>
<td>self-observation</td>
<td>POSTPONED</td>
<td>DOUBLE REINFORCEMENT**</td>
<td></td>
</tr>
<tr>
<td>TEAM</td>
<td>STANDARD</td>
<td>team observation</td>
<td>IMMEDIATE</td>
<td></td>
<td></td>
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</tbody>
</table>

| Restricted Enclosed space entry                  | CRANE OPERATOR | CUSTOMISED | self-observation | POSTPONED | DOUBLE REINFORCEMENT** |
| Restricted Enclosed space entry                  | TEAM           | STANDARD   | team observation  | IMMEDIATE |                          |

| Working on electrical equipment                  | TEAM           | STANDARD   | team observation  | IMMEDIATE | BBS STANDARD REINFORCEMENT |

| Painting (maintenance operation)                 | SINGLE OPERATOR | CUSTOMISED | self-observation | POSTPONED | DOUBLE REINFORCEMENT** |
| Painting (maintenance operation)                 | TEAM           | STANDARD   | team observation  | IMMEDIATE |                          |

* The final feedback coming out from an observation is the one and only effective “driving force” of the change of behavior, because it acts as an incentive to modify future actions.

** Doing 2 different kind of observations, we obtained redundancy of feedbacks and information that it means in B-BS words "having double reinforcement". This application doesn't exist in industrial domain and it has proven to be a, important result of the project.
Cost Benefit Analysis

- People Tracking
- Evacuation
- Usual Operation
- Search & Rescue

CBA
Cost Benefit Analysis
Benefits Monetized

Pilot application of Behaviour Based Safety
- Minor injuries

ICT Tool for Search and Rescue
- Number of deaths prevented
- Serious injuries reduction

Indoor positioning system
- Damages reduction
- Number of deaths prevented
- Serious injuries reduction

Safe Evacuation System
- Number of deaths prevented
- Serious injuries reduction
Cost Benefit Analysis
Discounted Cash Flow

Activity 3-1

Activity 3-2

Activity 3-3

Activity 3-4