MONALISA 2.0 – Activity 4
Efficient Management of Safety Information Systems in Ports

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1. Need for an integrated information system for safety management in a port

A commercial port is the set of physical components, usually including structures (breakwaters, locks, quays, facilities, etc.) that make it possible to use an area on a coast or riverbank as a place where vessels can load and unload goods and passengers can embark and disembark under favourable conditions.

Goods change their transport mode at the port, from land to sea or river.

The area of a port consists mainly of land areas, which may be adjoining or not, and a larger or smaller area of water which is used by vessels to enter and leave the port and also, depending on the layout of the port, to anchor.

An accident or emergency in a port may involve a land facility or a vessel, and sometimes both of them, depending on the scale of the accident. It may also entail a hazard for other facilities and/or vessels.

Response teams need to have as much information as possible to tackle the emergency with maximum safety and efficiency.

A wide range of information may be needed: about the vessel, the facility, the location and hazards of the goods, the procedures in place to be followed when tackling the emergency, prevailing weather conditions, operations underway at that time in the port, etc.

Very often the Emergency Director does not immediately have this information to hand because it is in different formats (paper or electronic), in different places, which means they have to contact the people who handle it, or is simply unavailable.

To get round these problems the information needed to tackle or prevent emergencies has to be readily available to the port centre or department tasked with handling and coordinating emergencies that take place in the port.

Hence, the software needed to achieve this goal has to be included in the port’s information systems.
2. Location of the integrated information system for safety management in a port

As noted in the previous section, the port safety information required to handle emergencies in the port has to be located in the centre or department tasked with handling and coordinating emergencies. This centre or department is usually one of the following two:

a) The Port’s Vessel Traffic Service

In many European ports this role is performed by the Port’s Vessel Traffic Service (VTS).

This service monitors the maritime traffic of vessels and ships in the port area with the help of radar, CCTV, radiotelephony, an Automatic Identification System (AIS) for vessels, weather stations, etc., in order to track and control their movements and ensure their utmost safety when sailing.

A port’s Vessel Traffic Service may be provided by the port authority itself or by the national maritime authority.

If the port’s VTS is provided by the port authority, it can also handle and coordinate emergencies taking place on board vessels and at the port’s land facilities.
b) The Port’s Emergency Control Centre

In other European ports, emergencies on vessels and/or on land facilities are specifically handled by the port’s Emergency Control/Coordination Centre (ECC) which usually reports to the port authority.

If the ECC does not provide the port’s Vessel Traffic Service, it will nevertheless be in constant contact with this service, especially in emergencies.

The ECC and the VTS may also handle security incidents or emergencies concerning vessels and port facilities.

By way of example, Spanish legislation requires all national ports handling dangerous goods to have an Emergency Control Centre which coordinates the response to emergencies. The ECC’s organisation, equipment and operational system have to be jointly agreed by the Port Authority and the National Maritime Administration.

Spanish legislation also requires every state-owned port to have an Emergency Plan and a Security Plan for the vessels, passengers and goods in port areas.
3. Minimum information required for port safety management

Based on the above, the ECC (or port VTS as applicable) needs to have the following information available at all times so it can use or provide it if there is an emergency at the port.

3.a) Information about the vessels

1. Data concerning the vessel’s call at the port

This means all the information required by:

- Directive 2010/65/EU of the European Parliament and of the Council of 20th October 2010 on reporting formalities for ships arriving in and/or departing from ports of the Member States; and by


All the information is received in each port by electronic data transmission through a single window that is in turn connected to the European Maritime Safety Agency (EMSA) SafeSeaNet system, national customs’ electronic systems and other national electronic systems such as border control, etc.

The most important information needed for emergency management can be summarised as follows:

**Information about the vessel:**

- Vessel identification (name, call sign, IMO identification number, MMSI number, flag, port of registry, etc.).
- Technical specifications of the vessel (vessel type, length, breadth, G.T., etc.)
- Vessel’s shipping company or shipping agency.
- Vessel’s shipping agent in the port.
- Family name and given name of the captain
- Family name and given name of the ship security officer and their contact details.
- Family name and given name of the company’s maritime security officer and their contact details.

**Information about the crew and passengers:**

- Crew: number of crew, given and family names, capacity on board, nationality, date of birth and identification number.

- Passengers: number of passengers, given and family names, nationality, date of birth and identification number.

**Information about the dangerous or polluting goods on board the vessel:**
✓ Type of dangerous or polluting goods (solid bulk, liquid bulk or in packages and their transport units).
✓ Position of the goods on board.
✓ Class and UN number of the goods.
✓ Net weight of the goods.
✓ Where applicable, registration of the transport unit and its contents.
✓ Material Safety Data Sheet for the different dangerous or polluting goods.

2. Information about the status of the vessels in the port
✓ Position of each vessel: berthed, at anchor, etc.
✓ The vessel’s operations at all times: loading, discharging, bunkering, waste collection, repairs, hot work, engine shutdown, idle, etc.

3.b) Information about terminals or port facilities

1. Permanent contact details
✓ Given and family name of the person responsible for the safety of the facility and their contact details.
✓ Given and family name of the person responsible for the security of the facility and their contact details.

2. Emergency Plans
✓ Availability of the Emergency Plan of the terminal or port facility.

3. Security Plans
✓ Availability of the Security Plan of the terminal or port facility.

4. Dangerous goods in the terminal or port facility

**Bulk liquid dangerous goods stored in tanks:**
✓ Class, UN number and proper shipping name of the goods stored in each tank.
✓ Volume and weight of the goods in each tank.
✓ Map of the tank or group of tanks in each terminal.

**Bulk solid dangerous goods in warehouses:**
✓ Class, UN number and proper shipping name of the goods in each warehouse.
✓ Volume and weight of the goods in each warehouse.
✓ Map of the warehouse or warehouses in each terminal.

**Packaged dangerous goods or in transport units:**
✓ Identification data of each package or registration of each transport unit (container, vehicle, etc.).
✓ Class, UN number and proper shipping name of the goods in each package or transport unit.
✓ Position of each package or transport unit in the terminal (warehouse, yard, etc.).
✓ Map of the locations of the warehouse and/or yard in each terminal.

3.c) Information about the port

1. Documents and procedures for emergencies
✓ The port’s Emergency Plan and its operating procedures.
✓ The port’s Security Plan and its operating procedures.
✓ IMO codes for dangerous goods (IMDG Code, IGC Code, IBC Code, IMSBC Code, etc.).
✓ Europe agreements for dangerous goods carriage (ADR, RID, ADN).

2. Dangerous or polluting goods
✓ Authorisations issued on entry into the port of the dangerous or polluting goods.
✓ Material Safety Data Sheet for the dangerous goods authorised in the port.
✓ Emergency Schedules (EmS) of the IMDG Code for fire or spill of dangerous goods.
✓ European Chemical Industry Council (Cefic) Emergency Response Intervention Cards (ERICards).
✓ Other information concerning interventions with dangerous goods: CANUTEC Emergency Response Guidebook, etc.
✓ Software for consequence analysis and planning zones in case of accident with dangerous goods: leaks, spills, fires and explosions.
✓ Software on motion prediction models for oil slicks in the water.

3. Other port operations that may lead to potential emergencies
✓ Supplies of fuel and gas to tanks in port facilities for their own use or production processes.
✓ Underwater work.
✓ Trains.
✓ Operation of locks.
✓ Operation of moveable bridges.
✓ Other.

4. Automatic alarms received
✓ About the operation of maritime signals.
✓ About the operation of firefighting water networks.
✓ About the operation of drinking water networks.
✓ About the operation of the port’s locks.
✓ About the operation of the port’s moveable bridges.
✓ About the operation of the port’s rail network.
✓ About the operation of tunnels and underpasses in the port.
✓ About the operation of power grids and transformer stations.
✓ About the operation of the port’s internal telecommunications networks.
About sensors installed to measure potential sea or air pollution.
About data detected by weather stations: wind speed, etc.
From anti-intrusion detectors or systems.
Other.

5. Weather conditions in the port

- Data received from weather stations and oceanographic buoys in the port or very close to it.
  - Wind speed, wind direction, temperature, degree of humidity, atmospheric pressure, rainwater collected, etc.
  - Current speed, wave height, water temperature, etc.
- Official weather forecasts received.

6. Electronic communications with other external emergency control centres and services

- Data received via technological platforms for emergency management and communications with civil defence emergency control centres and services.
4. Integration of the minimum information required for port safety management

Integration of all the minimum information required for port safety management is designed and conducted in its own way by each port or national ports system and there is no uniform model for ports in the European Union.

4.a) Example of information integration

For example, the Port Authority of Valencia has created proprietary software for the twin purposes of integrating the necessary information about the port and also managing any emergencies that take place in it.

This is done mainly through two computer programs called “ESTRABON” and “SOCAIRE”.

**ESTRABON**

GIS format computer software that presents real-time information that the Emergency Control Centre may require concerning the port status: vessels in port, dangerous goods on board and in terminals, and other active events that may change safety conditions.

It draws on the PAV’s databases to provide full information about means of contact, vessel characteristics, dangerous goods, emergency response intervention cards, first aid, etc.

Other ESTRABON features:
- Safety distances from the accident point.
- Measurement of distances and surfaces.
- Security log - black box.
- Emergency simulator: evolution of toxic clouds.
- Other.

**SOCAIRE**
SOCAIRE’s aim is to attack accidents or incidents before they happen. It manages safety from a holistic perspective by hybridising the concepts of industrial, environmental and occupational safety and port security.

Events are input in SOCAIRE. An event is something that is happening in the port that could cause a future emergency.

For example, events are: bunkering of ships, hot work on board ships, immobilisation of vessel’s engines, underwater works, works in utility tunnels, roadblocks, anticipation of adverse weather events, vessels or facilities at a higher security level, lowered crane booms without a vessel alongside, stowaways on board ships, maintenance works on firefighting systems, etc.

Described events:
  - Control and monitoring of dangerous goods.
  - Control of fire alarm systems.
  - Collaboration with national SAR services.
  - Oil & HNS spillage response.
  - Knowledge of operational facilities status.
  - Working with medical emergency services.
  - Collaboration with national security forces.
  - Collaboration with security officers (ships and facilities).
  - Rescue of people in the water.
  - Stowaways.
  - Piloting, towage and mooring services.
  - Ship and facility bunkering.
- Special situations on ships.
- MARPOL collection.
- Aids to navigation.
- Ship operations: hot works, repairs, immobilization of propulsion and steering systems, others.
- Weather conditions.
- Control of port roads.
- Control of recreational and sport events in port waters.

4.b) Heterogeneity of the software used in European ports for safety & security and emergency management

As noted above, European ports have various kinds of software developed in-house or acquired from a software company to integrate information on safety and security and handle emergencies that take place in the port.

These programmes’ communication modules connect to the emergency services of the port itself or with those of the city, region or country.

It is thought that none of them is as yet ready or designed for communications with other technology platforms such as Port CDM (Port Collaborative Decision Making) to be developed as part of the Sea Traffic Management in MONALISA Project 2.0.

Hence the connection of port authorities’ information systems to Port CDM technology platform would have the following teething troubles.
Different software used by European ports to manage safety & security.

Ports’ information systems unprepared to transmit and receive safety & security information to or from Port CDM.

What kind of information should be transmitted to Port CDM?
5. Port Collaborative Decision Making (Port CDM)

5.a) Monalisa 2.0 Project’s Activity 2

The aim of Monalisa 2.0 Project’s Activity 2 (Sea Traffic Management: Definition Phase Study) is to define and propose a comprehensiveSea Traffic Management (STM) concept that increases operational efficiency and safety as well as generating environmental benefits in the maritime industry.

Safety, environment and efficiency are defined as the Key Performance Objectives in STM and are supported by five strategic enabling concepts defining STM:

**Strategic Voyage Management** concerns what can be done before the journey has started in order to optimise it. An example of a solution that would optimise management is the implementation of a Voyage ID, similar to the flight number in air traffic.

**Dynamic Voyage Management** concerns optimising maritime information exchanges in order to improve the voyage of the individual ship. Vessels can travel at an optimised speed and select the best route to the destination.

**Port Collaborative Decision Making** is inspired by air traffic but taking into account the uniqueness of the maritime industry. Closer collaboration between the operators in the port and the ships provides conditions for improved traffic coordination. The ports will know when the vessels arrive and as the port is ready for them, the ships will receive a precise ETA. Tests will be conducted in Gothenburg and in Valencia.

**Flow Management** concerns optimising the flow of traffic, particularly in restricted waters, channels and near ports. Monitoring the traffic and having information about the vessels’ routes will allow warnings to be sent that may prevent grounding and collisions.

**System Wide Information Management** applied in the maritime domain is a concept for information exchange and will serve as a trusted infrastructure for organisations that participate in information exchanges.

5.b) Port Collaborative Decision Making (Port CDM)

The Port Collaborative Decision Making concept (Port CDM) enables port operations and vessel turnaround processes to be performed just-in-time. By interfacing existing port information systems, Port CDM supports involved actors in the port call to share information about their intention constituting situational awareness for increased predictability. Such situational awareness enables long-term planning, resource optimisation and handling of late changes. By port call synchronisation, arriving vessels can avoid unnecessary anchoring and steam slower, thus saving money and the environment.
Port CDM constitutes the interface between sea operations and port operations within the STM concept.

Objectives of Port CDM - The efficient and collaborative port.

At the time of writing this, deliverable tests for information transmission between the ports of Gothenburg and Valencia were being carried out.

It is not planned to include information about emergencies or incidents affecting the port that may be of interest to Port CDM users in this testing phase.
5.c) Integration of port authority information systems in Port CDM

Section 4 above identified the problems that might be entailed by integrating port authorities’ safety and security information to be sent to or received from Port CDM.

Once the technological problems have been sorted out, we think that the following information about the safety and security of the port as a whole, and which is to be provided by port authorities to the Port CDM system, would be useful or necessary:

Port safety information:
- Closing the port to navigation due to weather conditions or any other cause.
- Nautical accidents of vessels in port waters involving immobilisation of the ship while it is being repaired afloat in port or having to take it to a shipyard.
- Adverse weather conditions in the port: wind speeds, ban on mooring, etc.
- Port terminal emergencies involving stoppage of operations.
- Marine pollution in port waters:
  - Ships not allowed to depart until the water and/or hull is cleaned up.
  - Ship not allowed to depart as it is the cause of the pollution.
- Other information.

Port security information:
- ISPS 2 or 3 levels in the port.
- ISPS 2 or 3 levels in a port terminal.
- Other information.

Other information:
- Port worker strikes that affect the entire port.
- Strikes in technical nautical services (piloting, towage and mooring).
- Other strikes leading to stoppages in port terminals (land transport, etc.).
- Other information.
6. Conclusions

- Operational and safety conditions in a port are a key factor in Sea Traffic Management (STM), since accurate information about incidents or accidents occurring in it or weather conditions affecting it should be known immediately by ship operators so they can take decisions which make their management more efficient.

- Although each port has its own safety management system, it is not feasible to integrate them into a joint technology platform. Moreover, it is likely that port authorities may be reluctant to provide certain information about port safety, arguing that such information might be a weak spot for overall port security.

- Port Collaborative Decision Making (Port CDM) should be driven and developed with the greatest possible consensus of national port administrations so that it becomes a mandatory tool to be used by each European port authority.

- This document has sought to indicate what information about the safety and security of the port provided by the port authorities should be integrated into the final technology platform which is developed for the purposes identified by Port CDM, regardless of whether it is finally decided to add more information in this respect.
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