Cruise Ship Safety post Costa Concordia

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The Incident- Friday 13th

Safety is No Accident

- What types of items are required to be “Safe” on a ship?

- Strength of the structure
- Stability in Water,
- Internal subdivision
- Fire resistance of the ship fittings
- Ability to escape in an incident
- Ability to communicate in an emergency
- Electrical systems, power, lighting, etc.
- Training of the crew
- Etc.

Where do the requirements for safety for a ship come from?

United Nations

United Nations Convention on Law of the Sea

International Maritime Organisation

International Convention for the Safety of Life at Sea (SOLAS)

+ Supporting Codes

EU Legislation

Trade Association Policies

Flag States

National Legislation, e.g. Merchant Shipping Act

Owner's Requirements

Classification Society Rules

What aspects of safety were highlighted by the incident?

- **Recommendations after Costa Concordia in MSC.1/Circular. 1446**
  - Lifejackets – Additional numbers and placement
  - Emergency Instructions – Improvement in dissemination
  - Muster and Emergency
    - common elements
    - passenger participation
  - Muster policy
    - muster prior to departure
    - systems for crew emergency duties
  - Bridge Access limitations
  - Harmonization of bridge Procedures
  - Voyage Planning
  - Recording nationalities onboard
  - Lifeboat loading for training
  - Securing Heavy Objects
  - Inclinometer data for VDR

The Safety of Cruise Ships post Costa Concordia

- Although there were 15 aspects in MSC.1/ Circ 1446, the items did not highlight a significant weakness in the **physical** design of the ship.
- There were **no issues raised with Strength, Electrics, Stability, Subdivision**, etc.
- The **challenges were primarily assessed** as being down to the actions of the crew.
- Therefore for the physical ship, the post Costa Concordia situation is **not significantly different** to the pre Costa Concordia situation
- The **confidence** that the passengers and public placed in the industry, and the regulatory process before the incident, was largely justified.

However ……

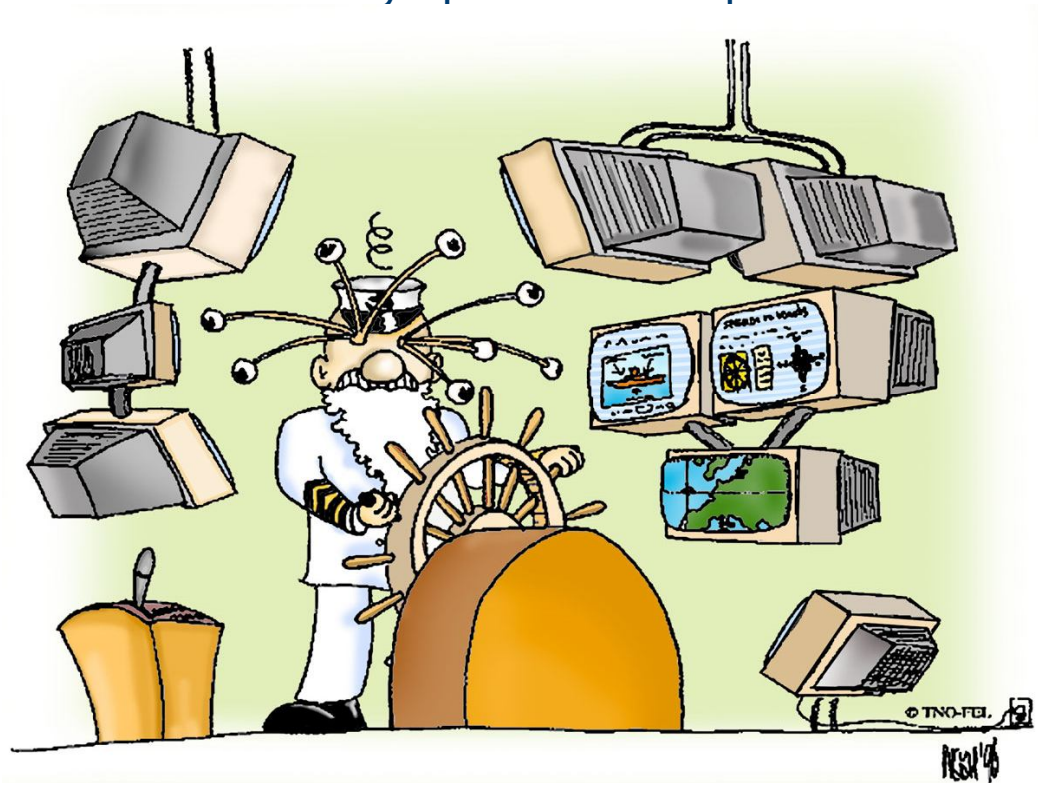
- The industry and especially the passenger ship industry and associated stakeholders cannot afford to simply be **reactive** to incidents.

- This industry **strives to constantly move forward** by using technological advances to improve safety.

- Advances are currently being made in many areas
  - Human Factors
  - Probabilistic Damage Stability → Survivability
  - Escape Analysis
  - Full ship structural models – optimization
  - Systems Modeling
  - To name a few….

Human Factors

- Often overlooked, the influence of the human element upon the vessel is crucial and the use of Human Factors methodologies can improve the ship operations.
- It could be the modification of positions of the navigational controls on the bridge or separation of the safety centre from the bridge, the use of human factors can improve efficiencies and effectiveness of the crew and how they operate the ship.



Probabilistic Damage Stability

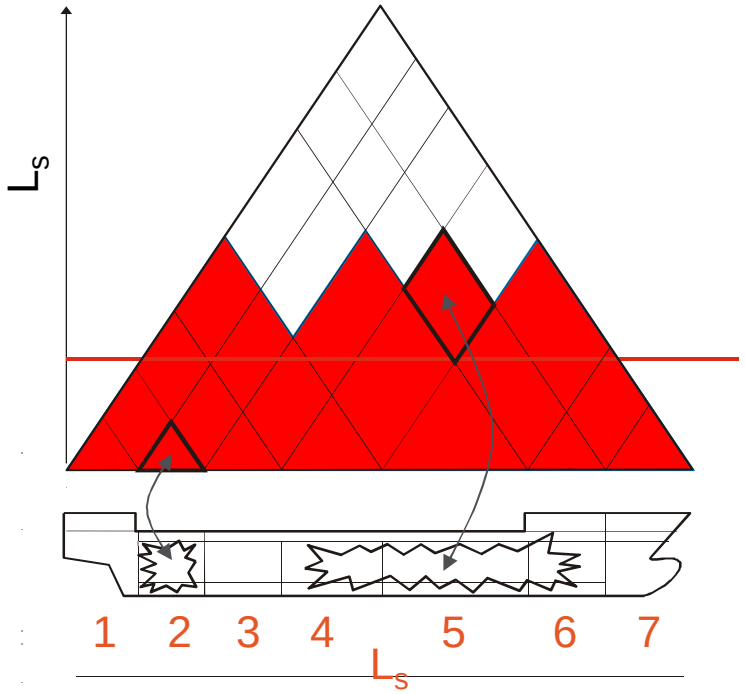
- With the advances in computing power, the ability to model the hull and simulate many different scenarios is greatly improved.
- This allows the designer to optimise the design.

IMO Res. A.265
(SOLAS equivalent)
Passenger ships
Probabilistic

SOLAS – Ch. II-1
Passenger ships
Deterministic

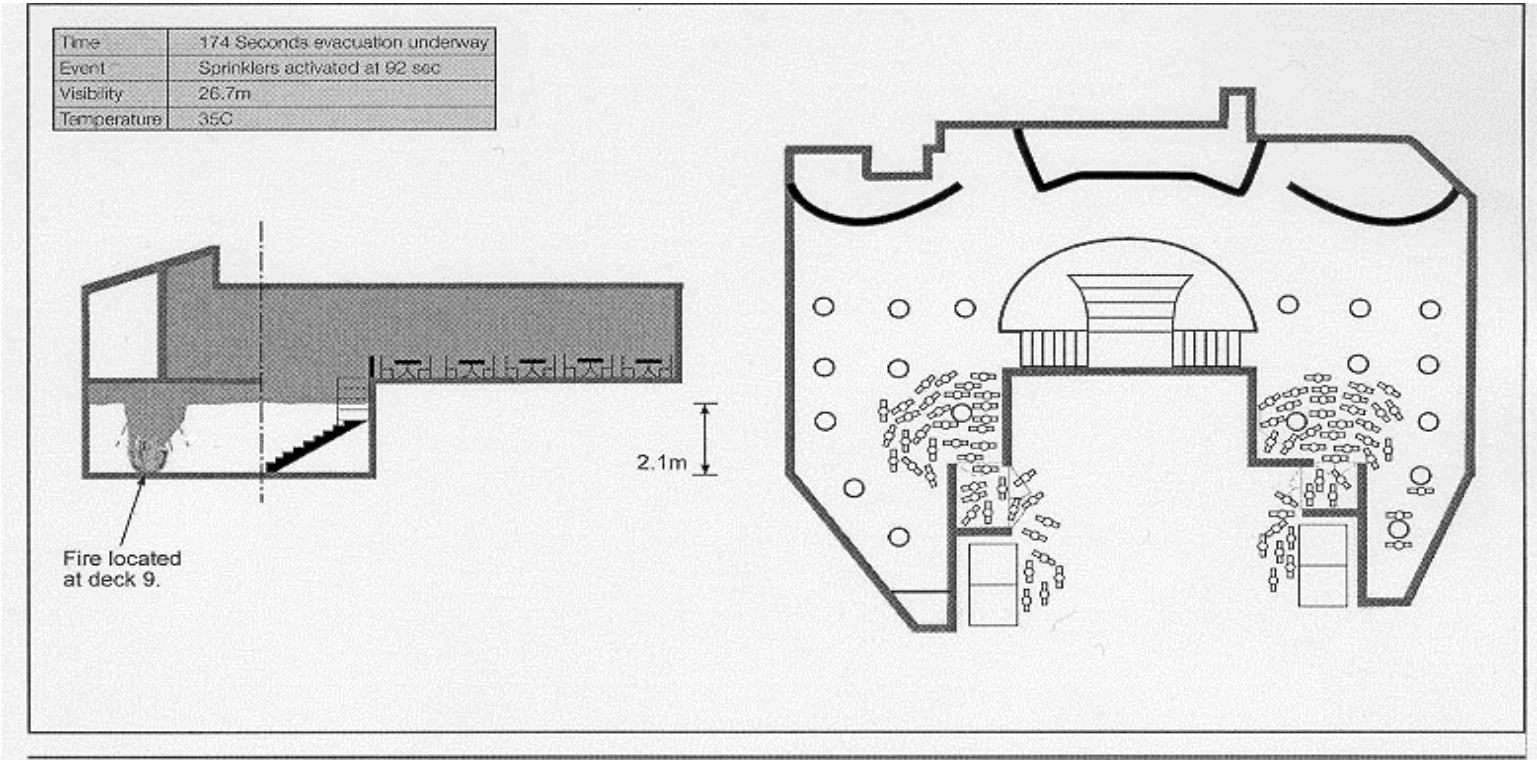
SOLAS – Ch. II-1 B-1
Cargo ships
Probabilistic

Revised SOLAS2009 - Chapter II-1
Harmonised Regulations for Passenger & Cargo ships
Probabilistic



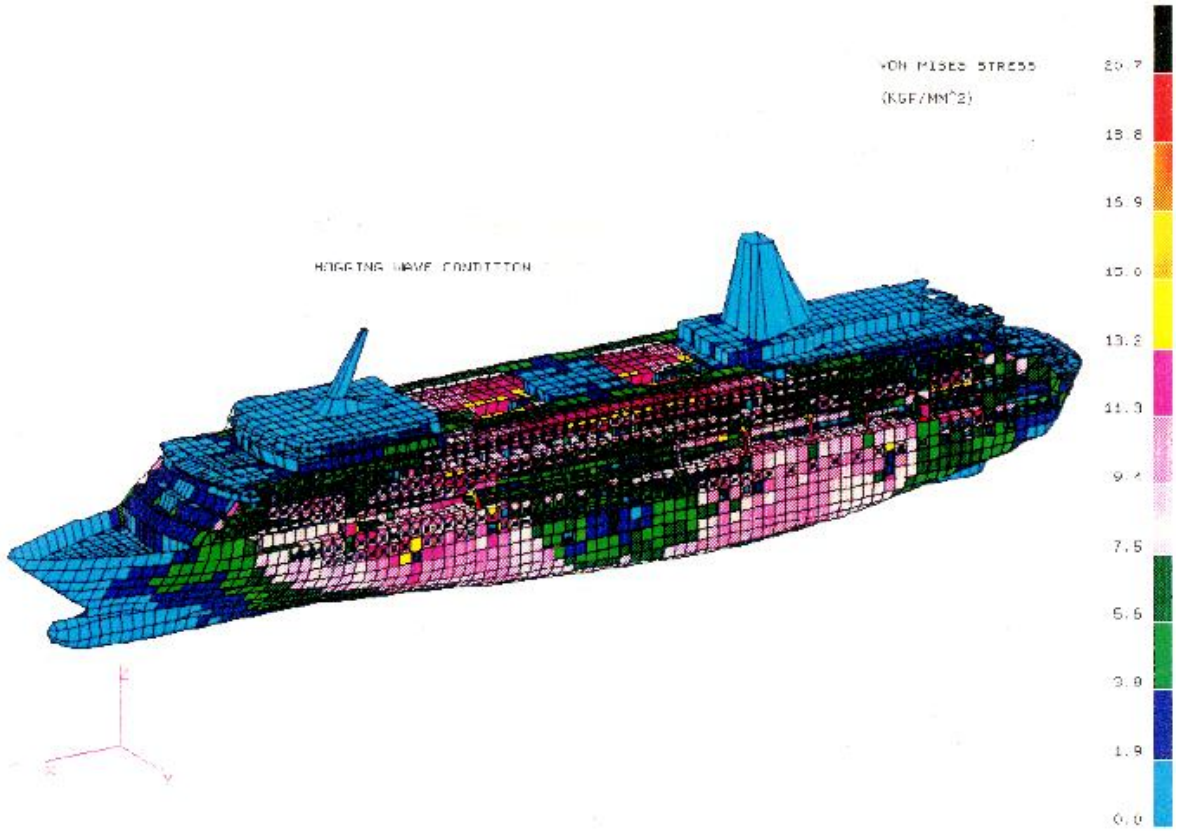
Escape Analysis

- Also due to the improved computing power, the designer can now model and predict how humans will behave as they move around the ship.
- This allows designer to simulate many different arrangements and to select the optimum layout on board from both a safety and circulation aspects



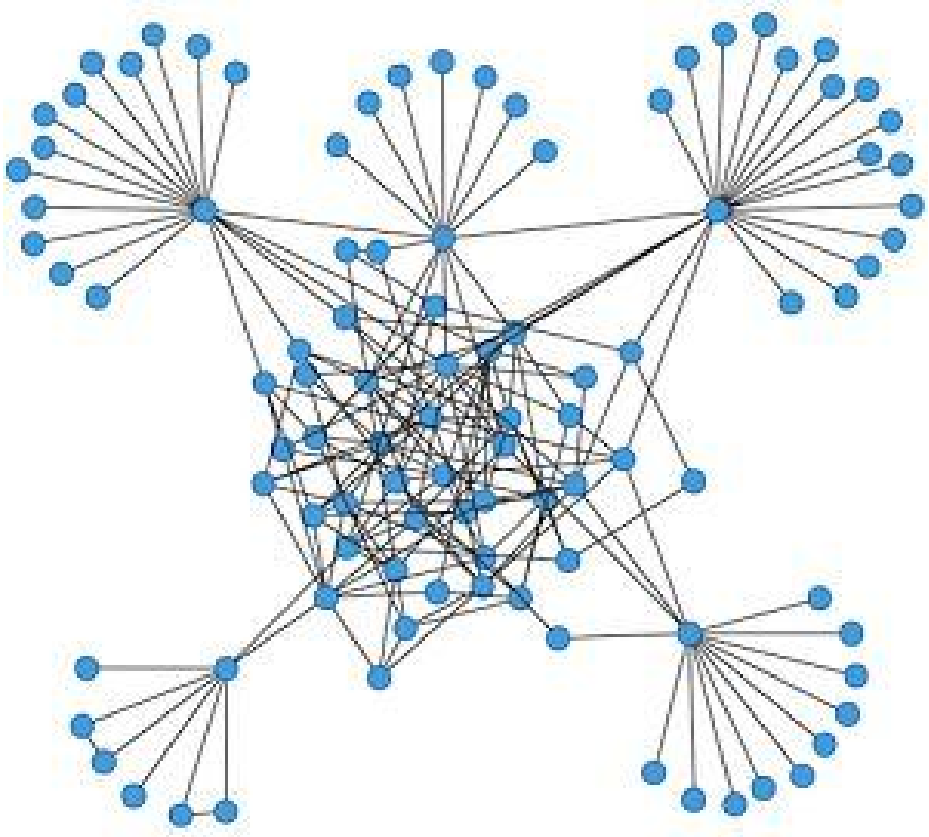
Finite Element Modelling

- The use of finite element modelling allows the stresses in the structure to be better understood. The optimisation of the structure can allow a structure which is optimised for carrying the various loads upon the ship.



Systems Modelling

- By using advanced modelling of the systems onboard, the number and position of key items of equipment can be optimised
- This ensures the optimal effectiveness in many different scenarios providing resilience and robust continuity of operations.



The move from prescriptive rules

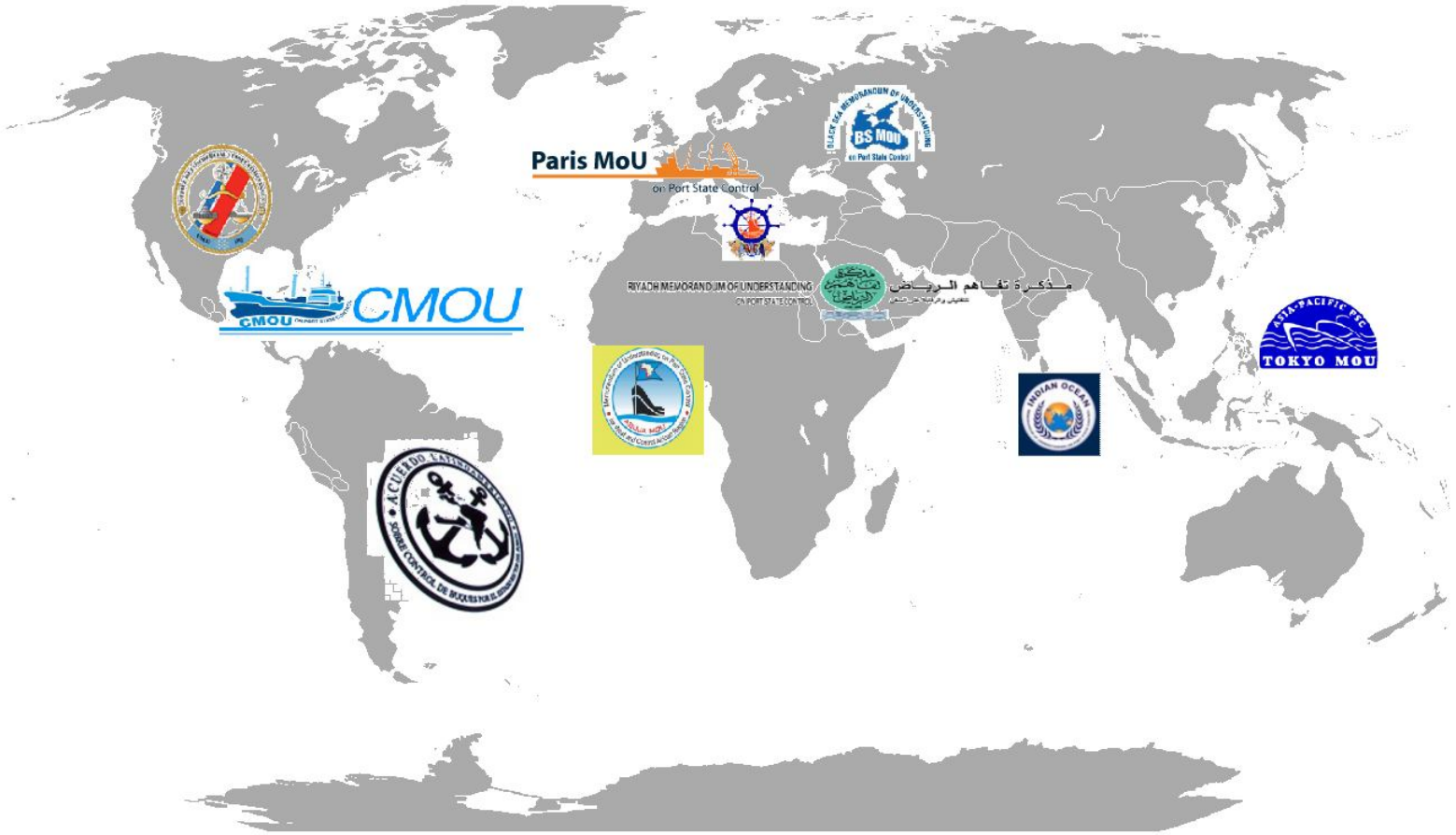
- **With all prescriptive rules there are limits** and assumptions to the application of the rules. Unless these limits and assumptions are **fully understood**, the rules may be inappropriate.

- Designers have more powerful tools with which to design the ship compared to the past. These **allow significantly more analysis to be performed in the design stage.**

- By using goal based approaches to designs the **designer has more flexibility** to design the ship to meet the operator's criteria, rather than the ship which the prescriptive rules allow him to design.

- Thus considering all the risks and addressing them individually, the future designs can be **more flexible** in their solutions.

That said, The World is always Watching……



Questions/Comments

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