NAPA SAFETY SUMMIT 2026

SAFETY · EFFICIENCY · AUTOMATION

# Welcome to NAPA Safety Summit 2026

Together towards automated, efficient and safer operations.

# Presenter

## Esa Henttinen

### EVP, Safety Solutions, NAPA

- Joined NAPA in 1999, Master's in Naval Architecture,
- Aalto University.
- Over 20 years working with digital solutions for ship
- safety and efficiency.
- Passionate about adopting data technologies and
- automation tools that support seafarers at sea and
- onshore operations.

# NAPA in 2026

**35**
years of experience

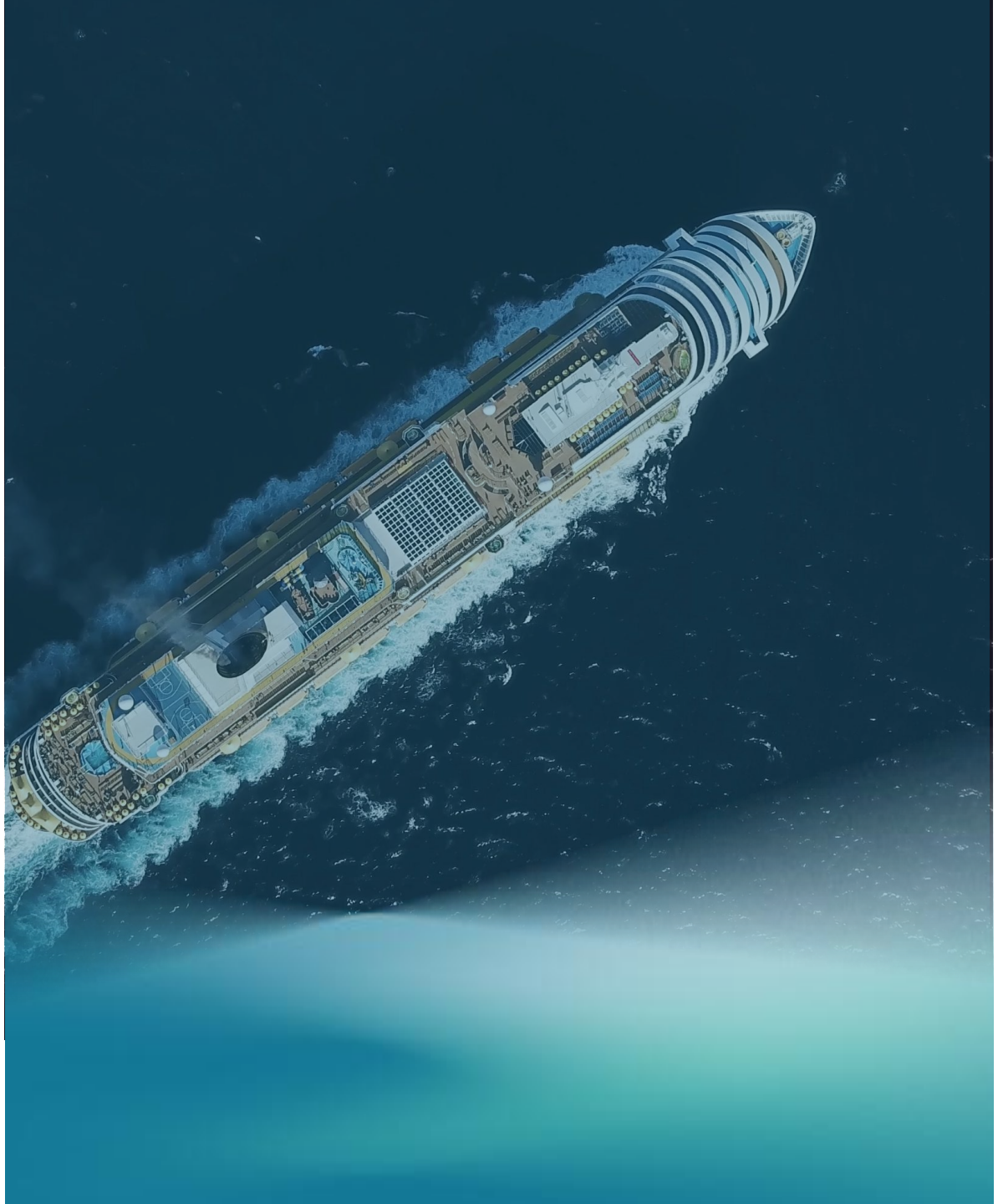
**40 M**
euros in turnover

**230 +**
employees

**10**
country presence, global footprint

**90%**
of newbuilds yearly built by NAPA customers

**17 000 +**
active users for NAPA applications



# Increasing Complexities – The New Reality


**20%**
of crew time lost to manual admin

# Three Pillars of our Strategy

**OUR MISSION**

Simplify data-driven decisions and automate workflows onboard and onshore, for safer and more efficient operations.

**ENSURING SHIP SAFETY**

**DIGITALIZE. INTEGRATE. AUTOMATE.**

**VALUE FROM DATA**

# Digitalizing safety, simplifying compliance

## THE REALITY TODAY

**54%**
of seafarers report increased workload

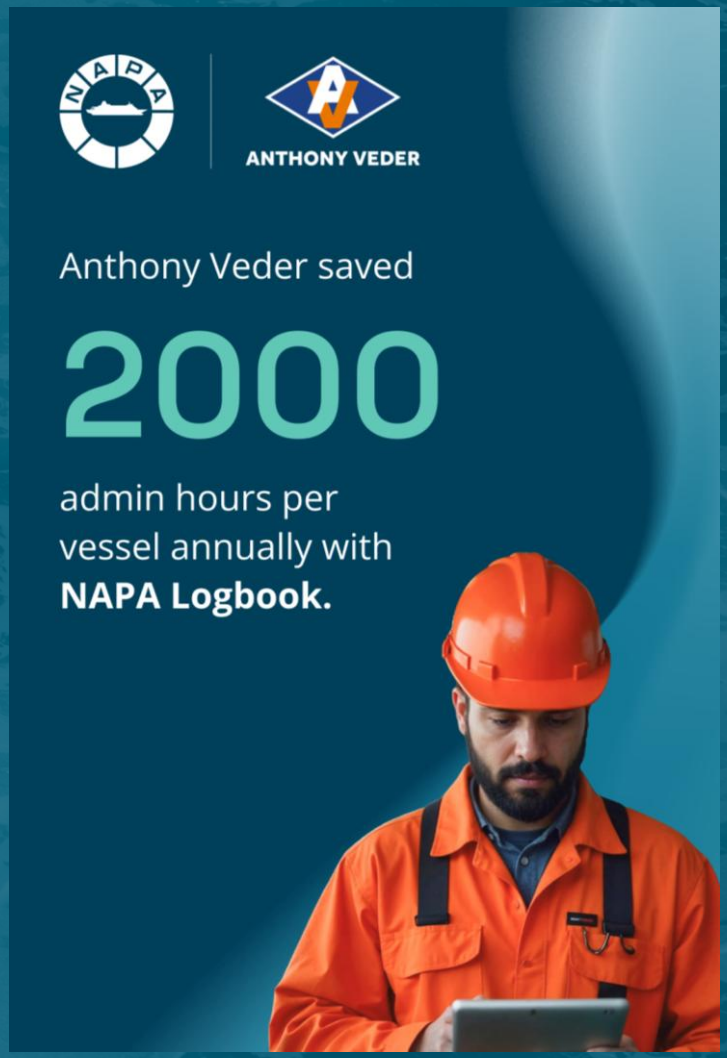
**55%**
accidents happened during planned work

- New technology, new fuels
- Multiplying regulations
- Growing operational complexity

## OUR SOLUTION

**DIGITALIZE. AUTOMATE. INTEGRATE.**

- **Onboard:** NAPA Stability, NAPA Emergency Computer, NAPA Logbook, NAPA Permit to Work, NAPA Checklists
- **Shoreside:** Data synced with NAPA Fleet Intelligence
- **Co-developed** with the industry



# Partners for the Long Haul.
# Ready for the AI Future.

Aligned to Your Goals. Scalable for Your Growth.

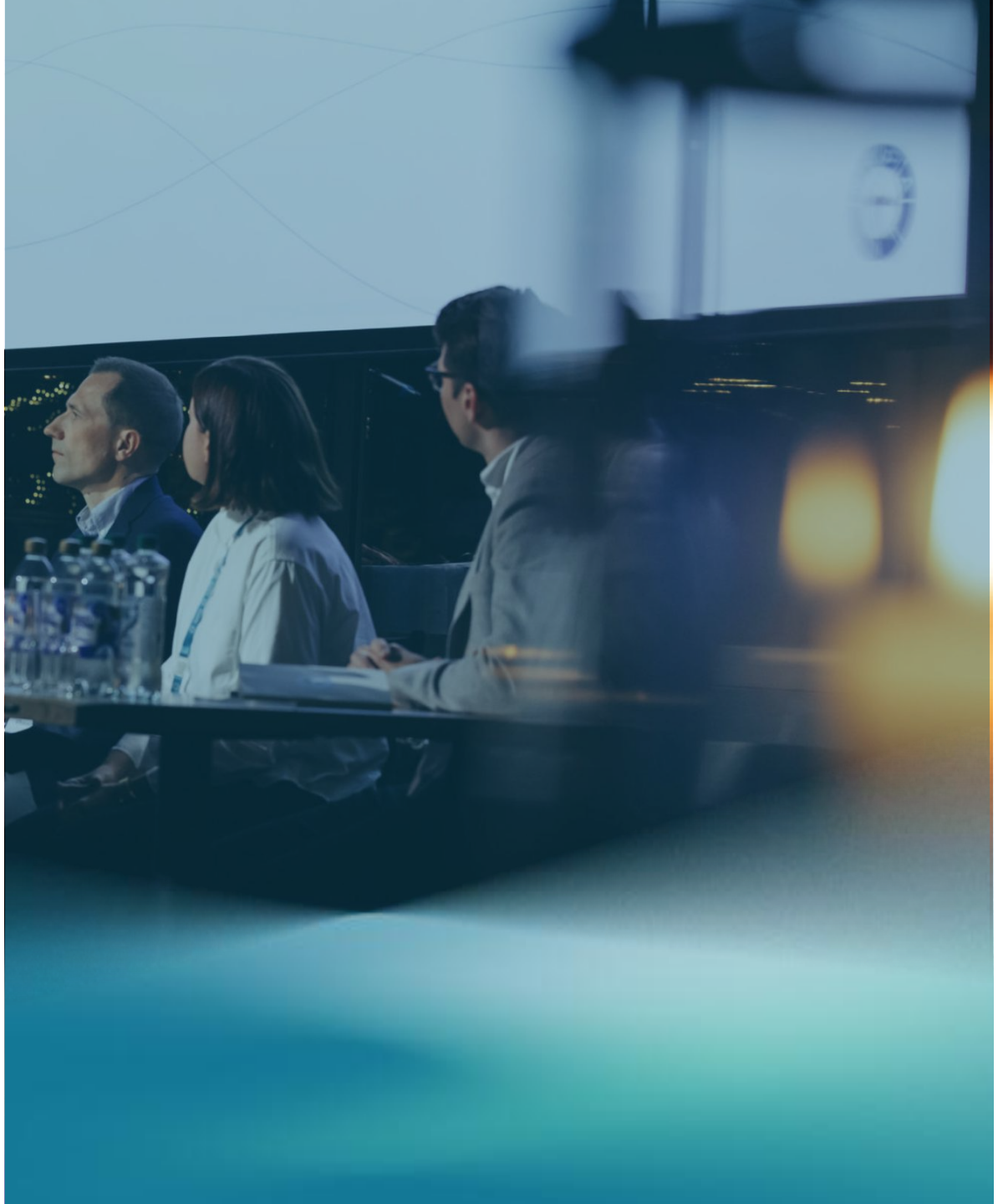
# NAPA Safety Summit 2026 – Why this forum?

**NAPA Safety Summit is more than just an event.**

- Collaborative forum, a safe platform for our long-term partners and users
- Exchange ideas, learnings and experiences with different industry stakeholders – and find solutions together.

**Welcome to the Safety Summit 2026!**

“Together towards automated, efficient and safer operations.”



# Speaker

## Henning Luhmann

**Naval Architect,**
**Henning Luhmann – NavalArchitecture**

- Prof. Luhmann is a Naval Architect and Owner of Henning Luhmann – NavalArchitecture. After graduating from the University of Hannover, he spent 40 years at Meyer Werft in roles focused on damage and intact stability, hydrodynamics, and ship design, ultimately leading Product Development at Meyer Werft and Meyer Turku.
- Since the mid-1980s, he has influenced modern cruise ship development. Now an advisor and trainer, he has been a visiting Professor at the University of Strathclyde since 2019 and is a recognized expert in passenger ship safety and stability.

# Development of Cruise Ship Design
# - A safety related view -

Dipl.-Ing. Henning Luhmann

HENNING LUHMANN
NAVALARCHITECTURE

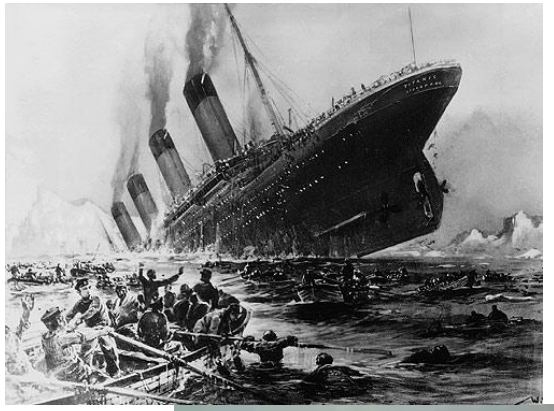
## 40 years of experience

- Various positions as naval architect at MEYER WERFT until 2023
  - Ship theory and design in sales
  - Head of Naval Architecture
  - Head of shipbuilding design
  - Head of Product Development (MEYER WERFT and MEYER TURKU)
- Experienced naval architect and NAPA user
  - Cruise ship design
  - Intact and damage stability (ferries, cruise ships, gas tankers)
  - Weight estimations and management
  - Hydrodynamics
- Former member of the German delegation at IMO
- Former Chair of the Cruise Ship Safety Forum
- Visiting Professor at NAOME, University of Strathclyde, Glasgow

# What can we learn from History

Accidents have been

– the main driver to establish suitable set of rules and regulations
– accelerate the design improvements and safety of cruise ships

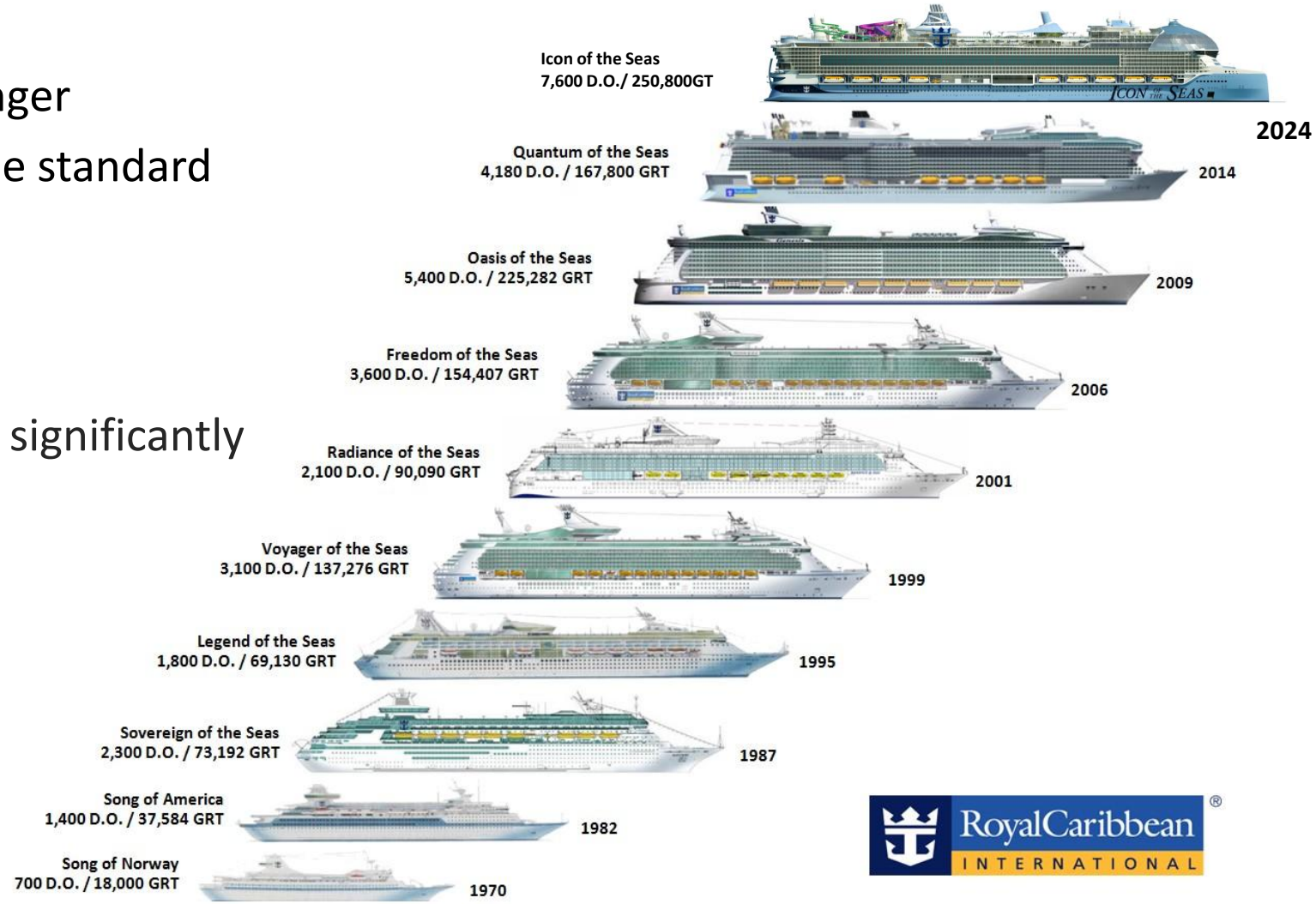



# Background

**Increasing size of ships**

- Each of the ship was a game changer
- The megaship of today may be the standard tomorrow
- Economy of scale important

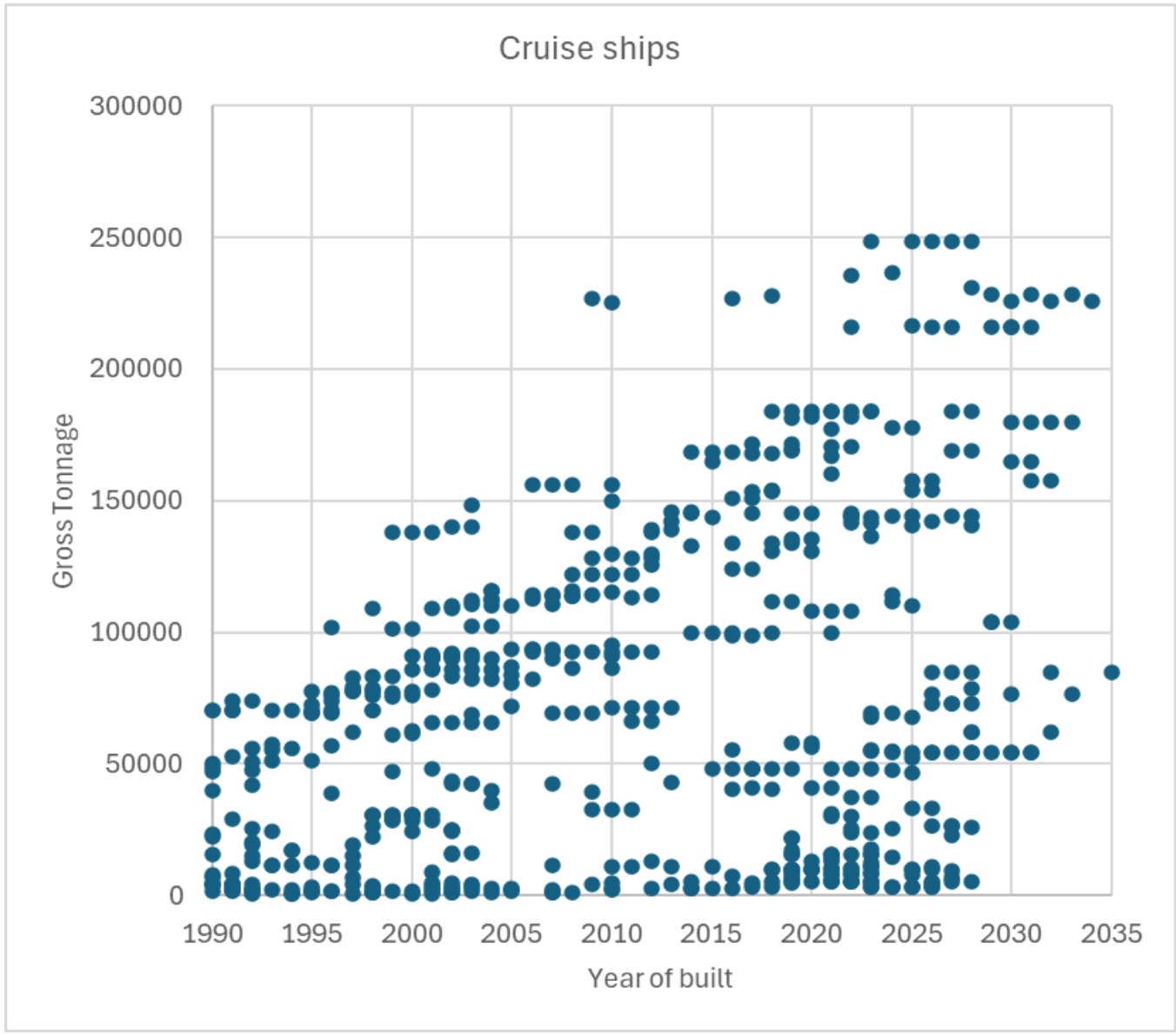
- Rules and regulations defined for significantly smaller ships



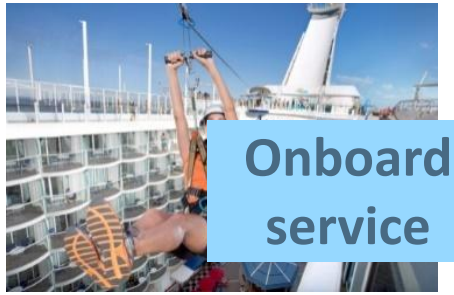
# Background

**Increasing size of ships**

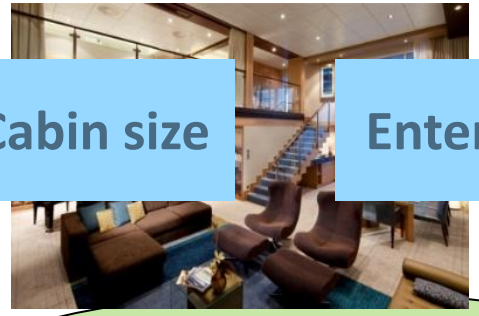
- Average size 1990's
  → 80,000 GT
- Average size 2015 – today
  → >170,000 GT
- Since 2015 strong increase of ships <50,000GT



# Factors influencing design



Onboard service

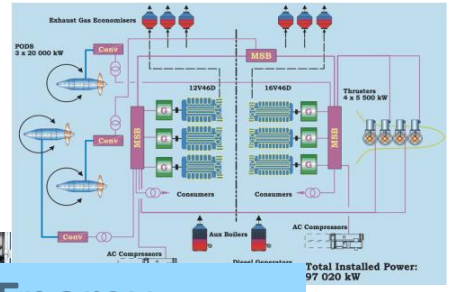


Cabin size

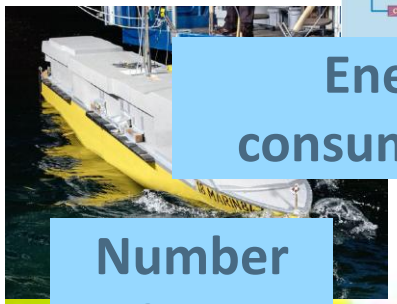
Entertainment

Destinations

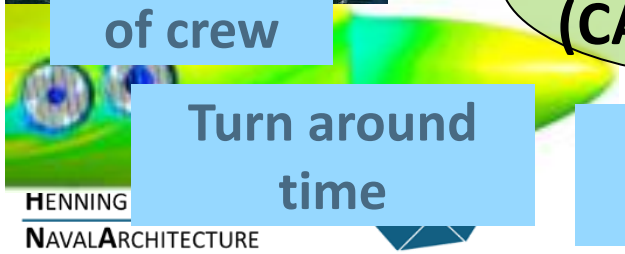
Guest satisfaction



Energy consumptions



Number of crew



Turn around time

Logistics

Successful design

Efficiency (CAPEX, OPEX)

Safety and environment

Emissions

Security

Stability

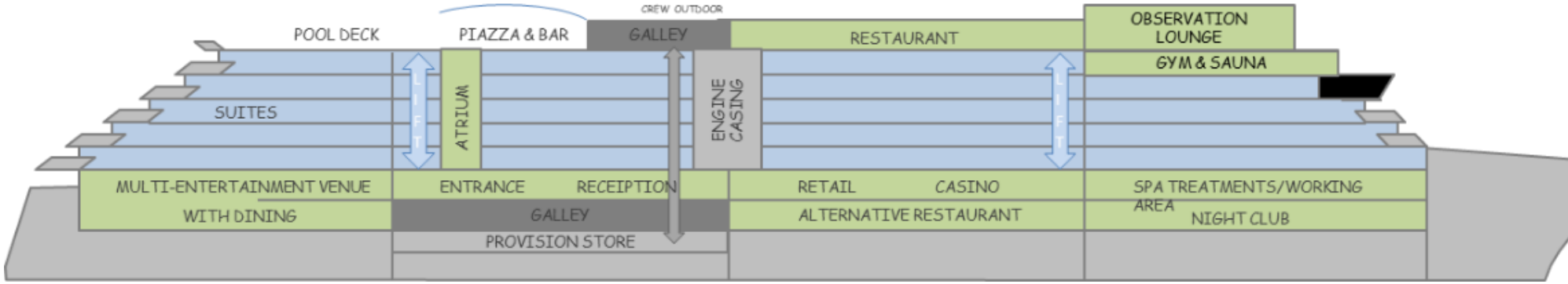
Fire Safety

Manoeuvrability

# Revenue spaces

Important to understand the revenue spaces

- Cabin areas
- Public spaces
- Open decks




- What is important during operation

# Safety

## Increasing size of ships

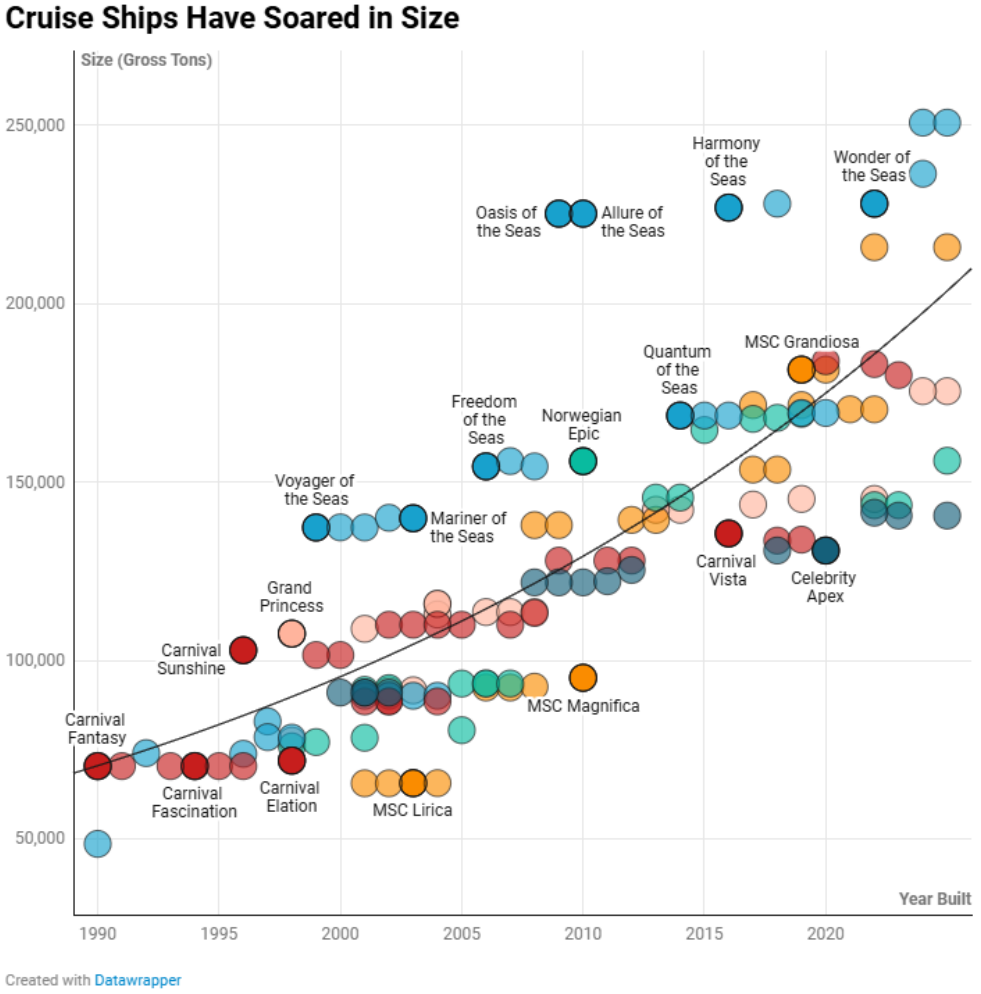
- Since the 1970's ship size of cruise ships increased
- Average size 1990's → 80,000 GT
- Average size 2015 – today → >170,000 GT

## Safety concern in 2000

- How to evacuate
- SAR capabilities not sufficient
- Crowd management
- Improved survivability after flooding

→ IMO large passenger ship initiative

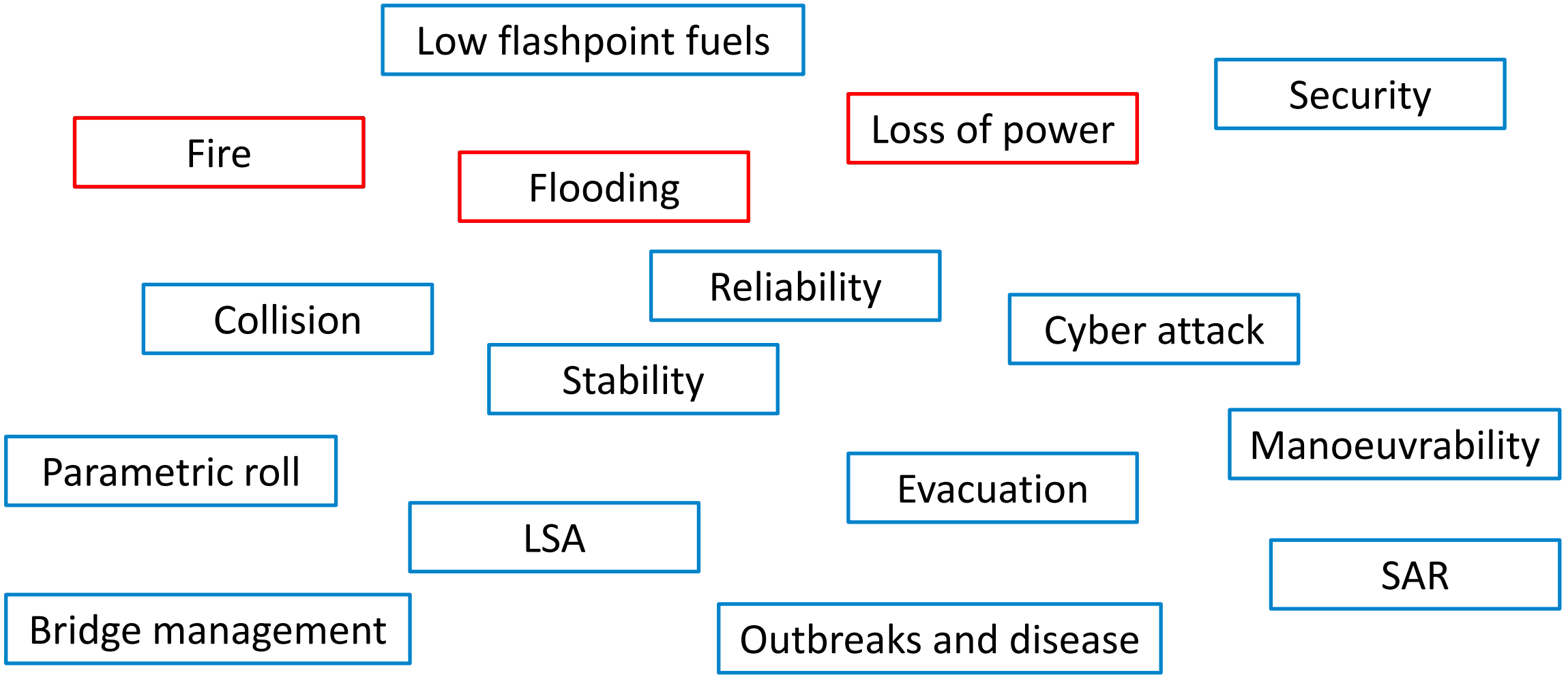
→ 1st CSSF meetings




Source: cruzely.com

# Main risks

Safety to be ensured by ship design, equipment and operational procedures



# Redundancy

## Carnival Splendour Accident 2010

Engine failure after fire → loss of energy, propulsion

170 nautical miles off San Diego

4,500 persons on bord

No food, no toilets, no ventilation

Rescue operation took several days

### Carnival Splendor fire leaves cruise passengers stranded

Cruise ship being towed slowly into Mexican port of Ensenada after fire in engine room cut power supply

The Carnival Splendor at sea. A fire which broke out in the engine room left passengers and crew on the cruise ship stranded. Photograph: HO/AFP/Getty Images

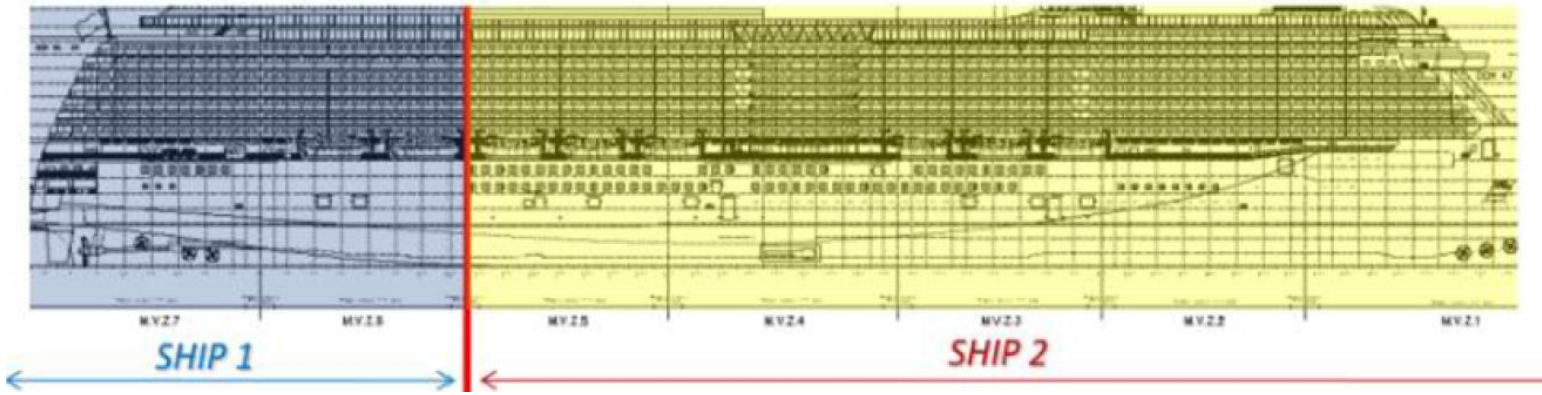
Source: The Guardian

**→ Evidence that large passenger ships require better redundancy**

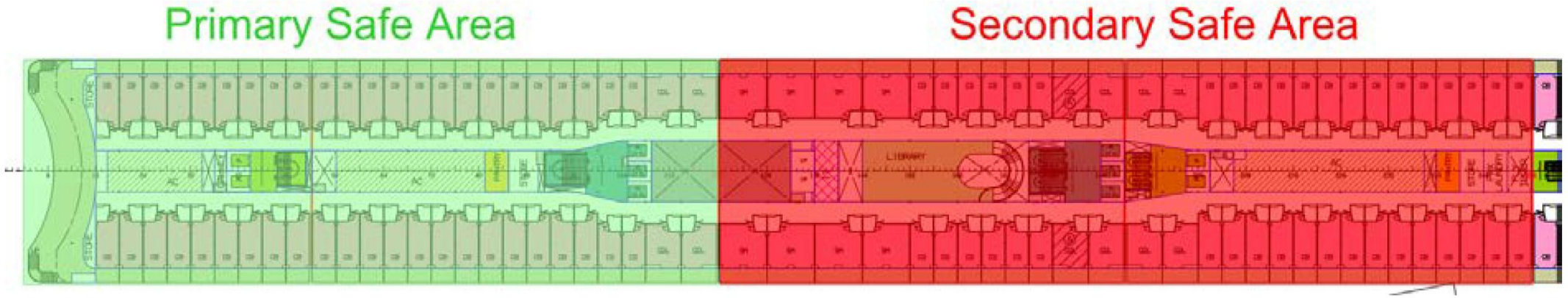
# Typical “Safe return to Port” solution

Ship is divided into two zones A+B

- Each main engine room is used in one failure scenario
- Power evenly distributed
- Safe areas are divided accordingly




*A. Maccari / Safe Return to Port 2010–2025, the Revolution in Passenger Ship Design*




Source: Meyer Werft

# Example of essential system

Separate engine rooms are not enough

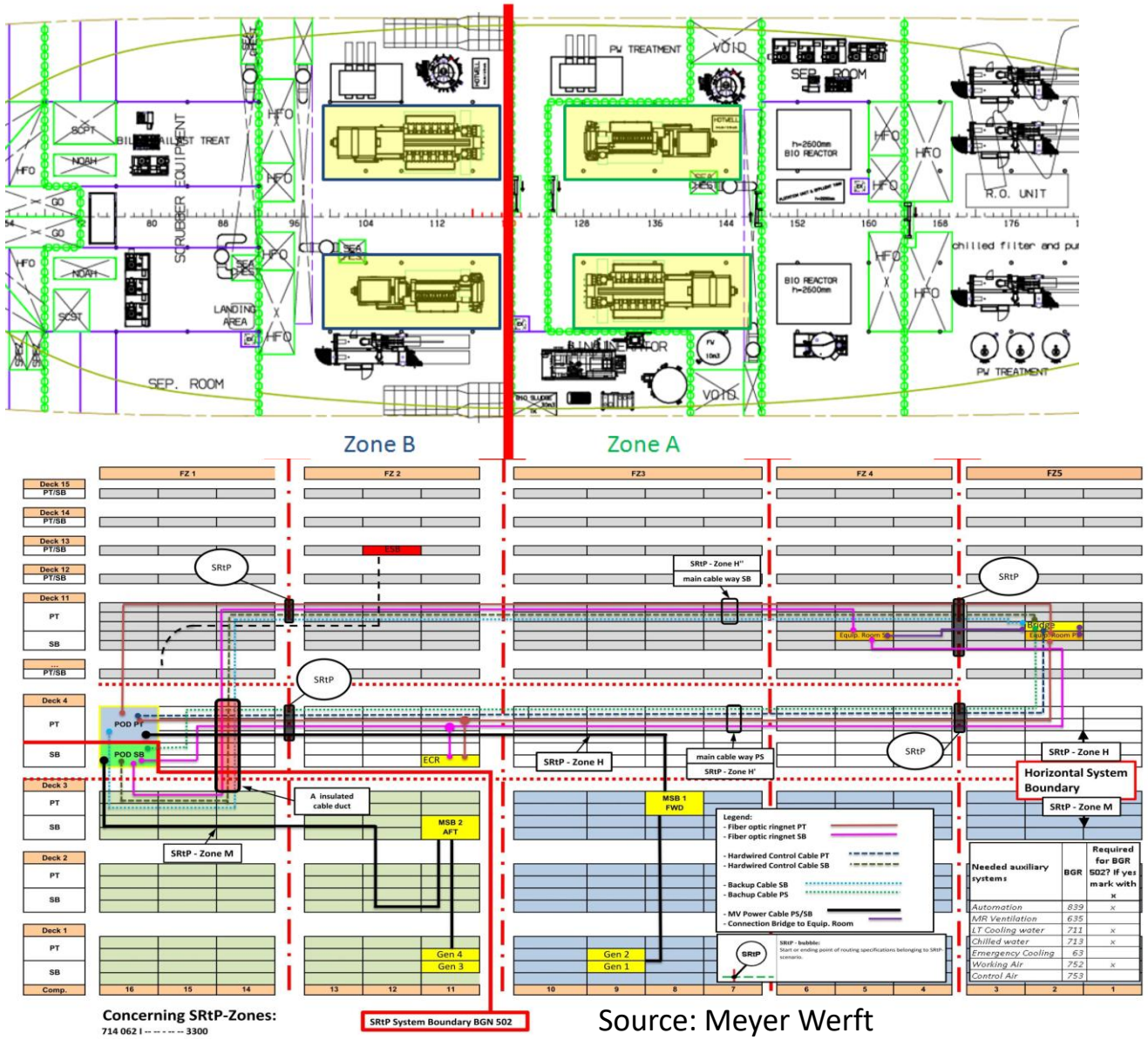
Routing of essential system require a holistic view

e.g. cabling distributed port and starboard and on different deck levels

**Operation**

Systems have become very complicated

Modifications to systems require careful check of SRtP requirements




Source: Meyer Werft

# Fire Safety

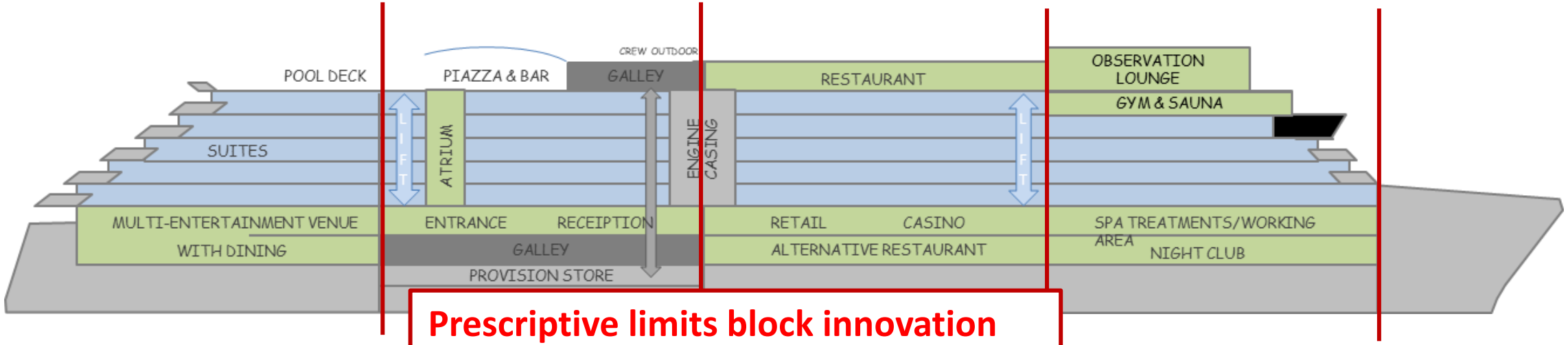
- Strict regulations for MVZ, materials, fire detection and extinguishing systems are in force.

Main Vertical Zones

- The ship is divided in vertical zones
- Maximum length 40m (may be extended to 48m)
- Maximum area 1600m2
- No steps in bulkhead
- In line with WT bulkheads

Each MVZ has:

- Stair cases to embarkation deck
- Separated HVAC, electrical substations, fire extinguishing systems
- MVZ are separated by A60 boundaries




**Prescriptive limits block innovation and fast adaption to customer needs**

# Alternative design

SOLAS regulations are very strict and prescriptive

Deviations are possible via

- Interpretations by Class and Flag state
- Exemptions by Flag State
- Alternative design based on risk and/or safety level
  - Fire protection → Regulation II-2/17
    - Over sized fire zones
    - Mono space lifts
  - LSA → Regulation III/38
    - Lifeboats >150 persons
    - Novel lifeboats

© RawPixel.Ltd

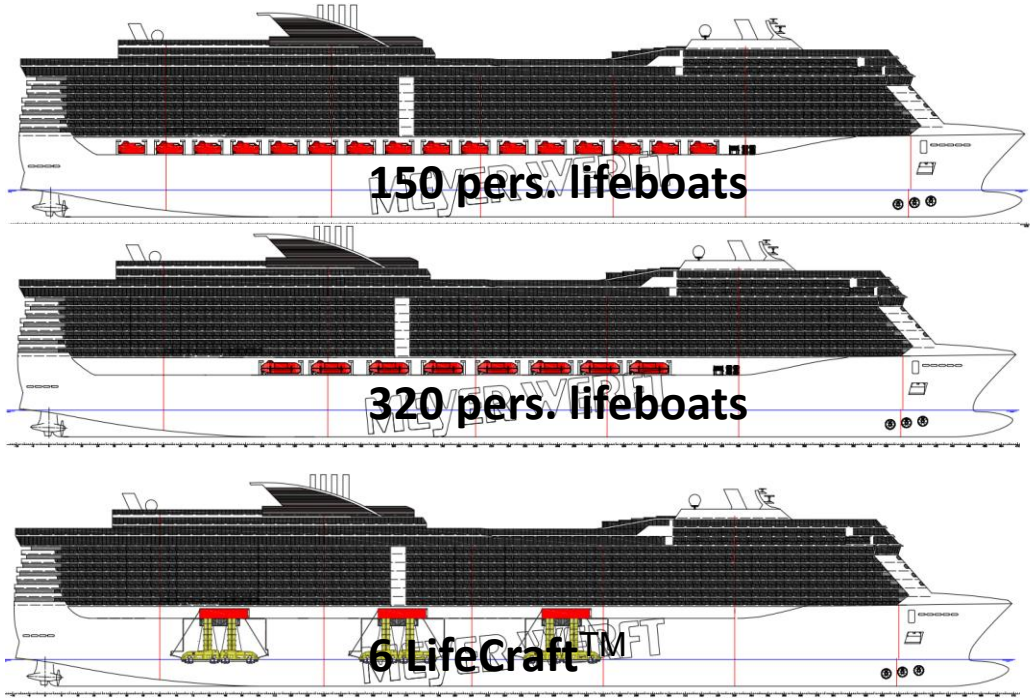
| IMPACT | | | | | |
|---|---|---|---|---|---|
| Catastrophic (5) | 5 | 10 | 15 | 20 | 25 |
| Significant (4) | 4 | 8 | 12 | 16 | 20 |
| Moderate (3) | 3 | 6 | 9 | 12 | 15 |
| Low (2) | 2 | 4 | 6 | 8 | 10 |

**Refit/Operation**

Understand which areas have used alternative design methods and their conclusions

# Life Saving Appliances

- Impact on GA:
  - SOLAS lifeboats are not a suitable solution for large passenger ships
  - Overhanging lifeboats vulnerable against wave loads


# Damage stability

What's about flooding?

- Risks due to collision and grounding
- Very rare events, but with possible catastrophic consequences
- Not acceptable by society for passenger ships

→ Requirements for ship design (SOLAS, MARPOL) and ship operation (COLREG, ISM)

© The Week

© Le Journal

# Damage Stability

GM requirements have significantly increased over the years

e.g. 50,000 GT cruise ship

1988 → GM min approx. 1.4m

2000 → GM min approx. 1.8m

2010 → GM min approx. 2.1m

2024 → GM min approx. 2.4m

Increased stability requirements

- Min GZ, range
- Flooding stages
- Required Index R
- Strict WTD regime

Each ship stays over its lifetime with damage stability rules valid at keel laying

e.g. >230,000 GT cruise ship

2010 → GM min approx. 4.5m

Low freeboard, wide hull challenges with range criteria

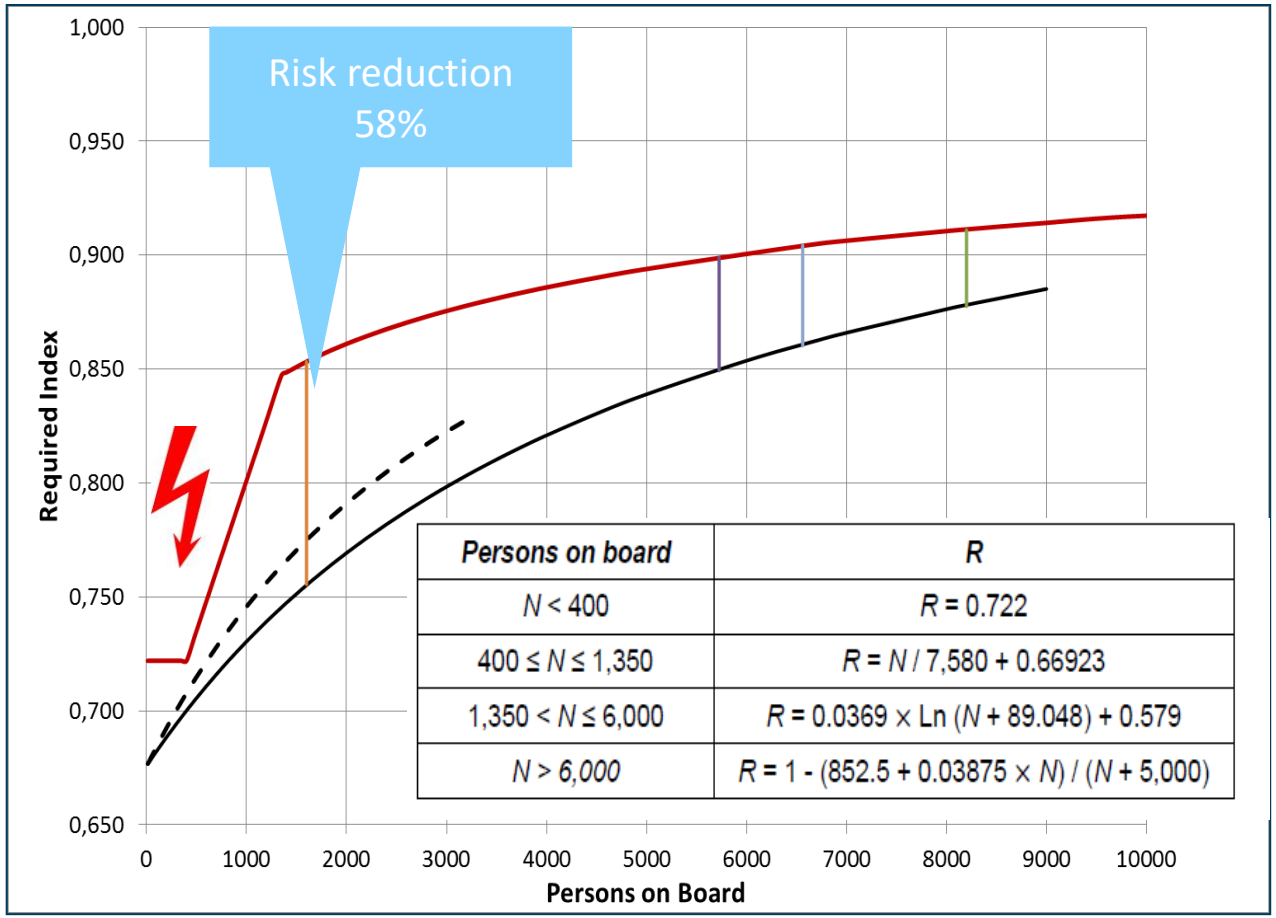
# Damage stability

## Required subdivision index R

- SOLAS2020 requirements seems to be reasonable high
- Small ships (POB<1000) have reduced safety level due to political compromise at IMO
- Even 1-compartment ships are still possible (POB<400)

→ It is up to the design team (owner, operator and shipyard to design ships with acceptable safety after flooding

→ No current activities regarding stability at IMO

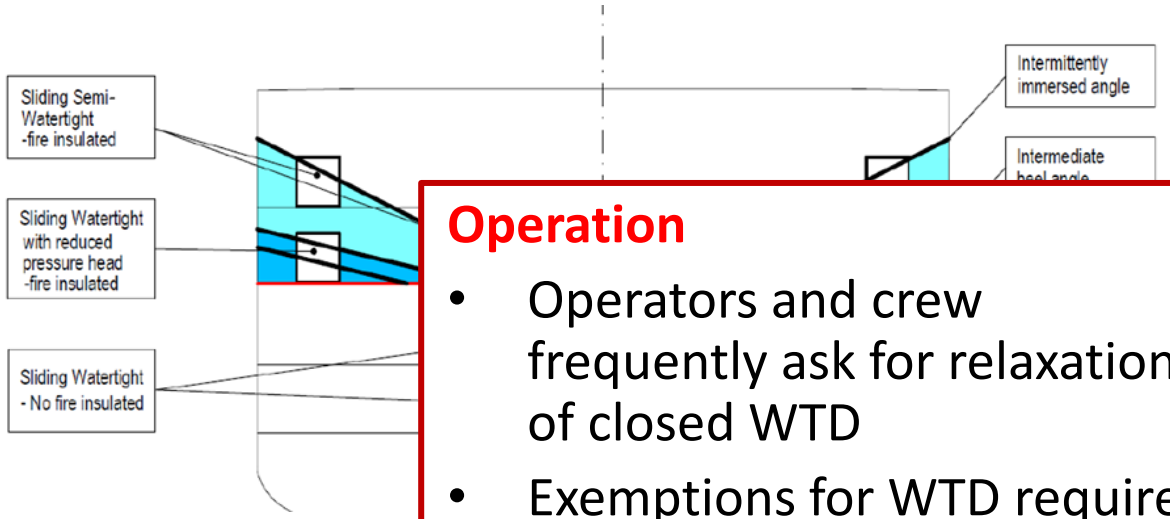



| Persons on board | R |
|---|---|
| $N < 400$ | $R = 0.722$ |
| $400 \le N \le 1{,}350$ | $R = N / 7{,}580 + 0.66923$ |
| $1{,}350 < N \le 6{,}000$ | $R = 0.0369 \times \mathrm{Ln}(N + 89.048) + 0.579$ |
| $N > 6{,}000$ | $R = 1 - (852.5 + 0.03875 \times N) / (N + 5{,}000)$ |

# Damage stability

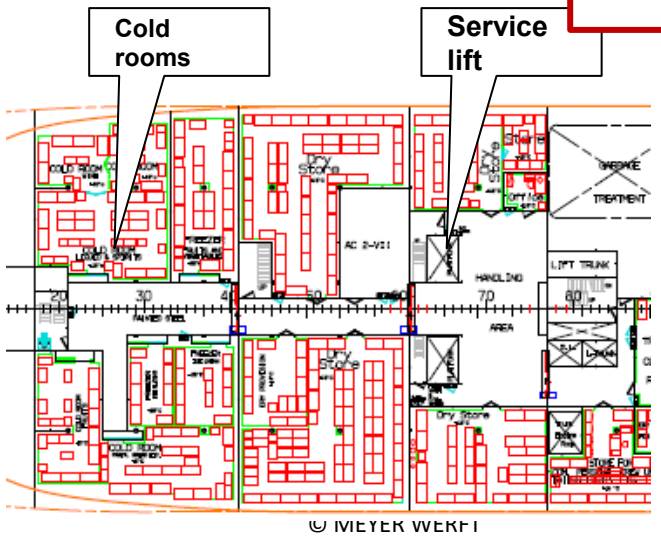
**Watertight Integrity:**

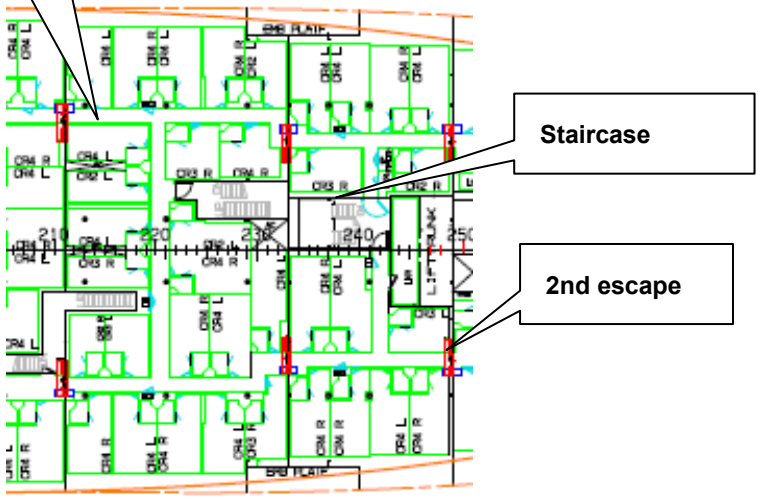
- Different types of watertight doors possible
  - Normal WT sliding door
  - WTD with reduced pressure
  - “Semi-watertight” doors
- WTD should remain closed at sea and only used for passing through
  - SOLAS2020 very strict
  - Pre SOLAS2020 ships may have exemptions
- WTD are needed for escape routes, maintenance and operation
- Arrangement of spaces to comply with operational needs even if WTD are closed




**Operation**

- Operators and crew frequently ask for relaxation of closed WTD
- Exemptions for WTD require full risk assessment and floatability assessment



# Where are we today?

- Power outage is still a frequent incident
- Recent power failures of cruise ships did not lead to dramatic consequences
- Power could be restored within a couple of hours

**MSC World Europa loses power off coast of Italy**

By Kelly Ranson 26 August 2025


At the time, the Italian Coast Guard told *Shipping Italy*: "The situation on board is calm and under control. The weather and sea conditions are favourable and the essential services for passengers continue to be provided by the onboard generators."

**P&O Cruises ship skips ports due to 'technical issue'**

6 January 2026

**Celebrity Cruises ship drifts off coast of Italy during power outage**

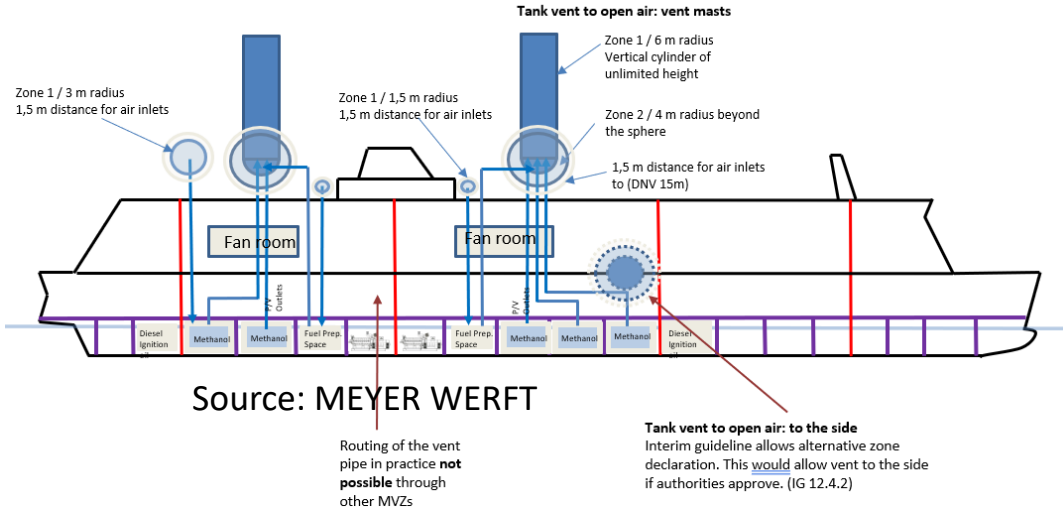
Passengers aboard the Celebrity Cruises' Constellation experienced a few hours of neither air conditioning nor electricity during a brief power outage.

Passengers told the publication *Cruise Hive* that *Britannia* suffered a power outage in Curaçao, when lights went out before backup systems restored electricity about 30 minutes later.

# Current safety status

**Actual status seems ok**

- Very high standard for survivability after flooding
- Fire risk seems under control
- Redundancy and SRtP minimize need for abandonment
- LSA still require improvement




Source: MEYER WERFT

but **new technologies** may cause **new risks**

- new fuels like LNG
  - Protection of tank spaces and fuel handling
  - Bunkering procedures
  - Secondary risks like changed load ramps
- What will happen with Methanol, Ammonia, LH2, large batteries

**River cruise ship evacuated after suspected battery explosion**

Posted on August 8, 2022 by News Hound

Dutch officials are investigating an explosion aboard a river cruise ship docked in Amsterdam as a likely malfunction of the vessel's battery power system. The newly launched Viking Gymir, which was introduced by Viking for river cruises on the Rhine in 2022, features a new hybrid propulsion system that was developed in place of solely diesel propulsion on Viking's other Longships.

# Design tendencies

Expedition and polar cruises

**Safety challenge**

- Small ships in remote areas
- Harsh weather conditions
- Systems, equipment and structure ready for polar waters
- Higher risk for grounding
- Excursions with guests

# Design tendencies

New technologies will come on board

- Fuel cells, large battery installations
- AI supported navigation
- Guest interaction with AI bots
- Circular materials
- Net zero design



**Safety challenge**

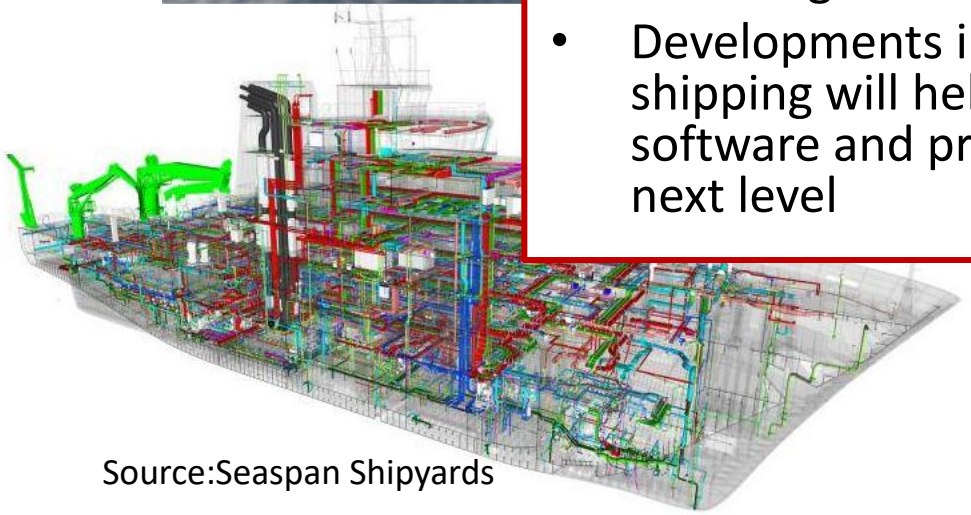
- Find qualified crew for new technologies
- Reliability and trust in AI systems
- Cyber security

# Artificial Intelligence

Using digital twins AI is already onboard

- Surveillance of systems
- Maintenance before a system fails
- Decision support for energy management
- Improved voyage planning and routing
- Prediction of parametric roll





Source:Seaspan Shipyards

**Safety opportunity**

- AI may help to manage the complex and integrated systems
- Developments in autonomous shipping will help to bring sensors, software and predictions to the next level

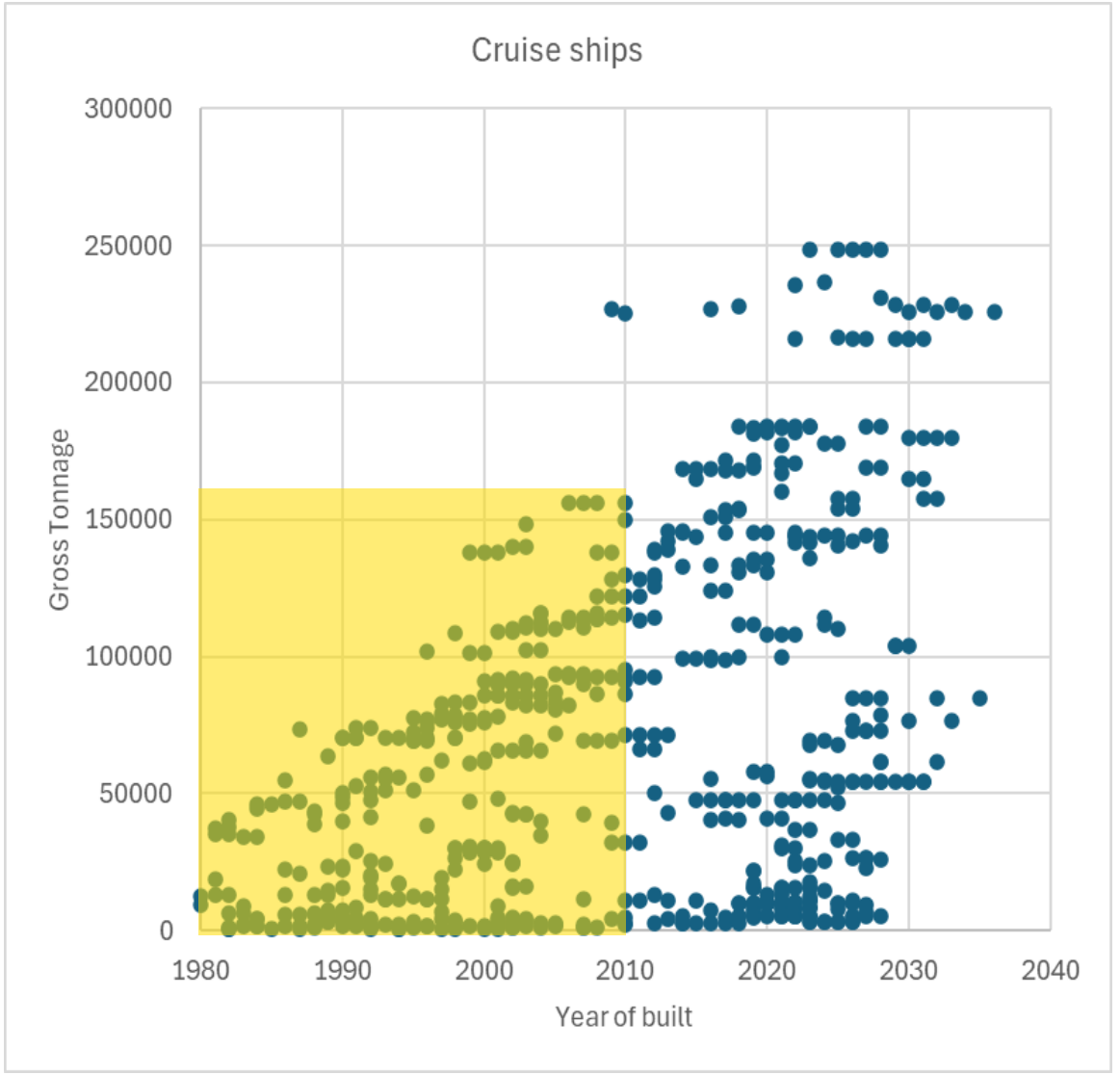
# Outlook

Lifespan of passenger ships is 30-40 years

IMO grandfathering clause allow to keep the assets

**Challenges:**

- Pre-SOLAS2009 ship in service for +20 years
- Low stability requirements remain valid
- Weight growth require continuous attention
- Fire and system integrity might be undermined by refits and modifications, or poor maintenance
- Assumptions and limitations from alternative designs might get lost
- Current designs will be in service beyond 2050



# Conclusion

- Ship design is always a challenge to find the best solution without compromising profitability, safety and ecological footprint
- Safety is an essential part of cruise ship design
- Just complying with rules and regulations not sufficient for large passenger ships
- Designers should keep in mind that the crew on board can handle the complex systems
- Crew onboard need to be prepared to adapt to new technical solutions
- Ship owners should not only look at revenue and CAPEX/OPEX but understand that safety measures are an invest in future business.
- Any major incident may harm the whole industry and should be prevented by all means

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