# Large container ships
# Builder's and operational risks

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# Builder's risk on container ships – the issues

- Container ships growing in size
- Up to 18,000 TEU for recent deliveries…


- Structural issues have occasionally emerged
- Lets take a look at one case

# Builder's risk on container ships – the "MOL COMFORT"

- Built 2008, in service until 2013.
- Builder Mitsubishi Heavy Industries (MHI) in Japan – well known and respected.
- 86,692 GRT - 8,110 TEU – 316 m length.
- Broke in two on 17 June 2013. 26 crew saved.
- Stern section sank on 27 June, bow section 11 July.

# Builder's Risk on container ships – the "MOL COMFORT"



# “MOL COMFORT” – the findings

- 7 holds forward, 2 holds aft
- 6th vessel in series from MHI
- Sailing at 17knots, in 5.5 m waves, windforce 7
- Fracture occurred in bottom shell plating in no 6 hold (i.e. amidships) and the vessel soon separated into two sections
- Sister ships of “*MOL COMFORT”* were examined and several were found to be suffering from stress cracks in same area
- The vessels in the design series seem to have been ‘underdesigned’, with insufficient longitudinal strength to sustain torsion and shear stresses during adverse weather.

# “MOL COMFORT” – the findings

- The hull structures of all of the sister vessels were upgraded to increase the longitudinal and torsional strength
- NK Classification rules changed as a result
- As of now it seems to be an isolated incident
- Larger containers ships are prone to longtitudinal and torsional stresses amidships more than any other class of vessel
- With newer and larger ship designs, it is possible that design strength and suitabillity issues may re-emerge

# Operational Risks:

- Lets remind ourselves of basic purposes of the Carrier's obligation: **DUTY OF CARE**

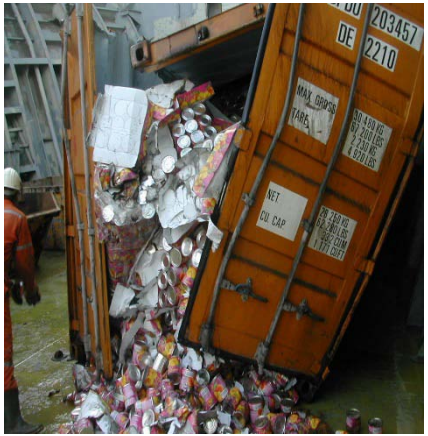
- Requires the carrier to exercise due diligence to make the ship seaworthy before and at the beginning of the voyage.

- - "…the carrier shall properly and carefully load, handle, stow, carry, keep, care for and discharge the goods carried".

(HVR Art III, r2)

# Before and during loading

- Inspect apparent condition of cargo:
  - Look for damages.
  - Check seals.
- Correct labeling segregation as per IMDG code and stowage as per plan.
- Reefer container:
  - Ensure machine is plugged in as soon as it is loaded.
  - Verify loading temperature.
  - Mark loading time on chart.
  - Ensure machine and chart is working.



# Condition of the container

Frequent damage:

- Holed roof due to misplacement of container spreader by stevedores.

# Reefer container - Cooling failure

# Inspect your vessel

- Twistlock on deck foundation

# Prior to sailing

Prepare the vessel for sea:

- Is "prudent over reaction" worth it?
- Prepare your vessel for the unexpected!

# Locked and secure?

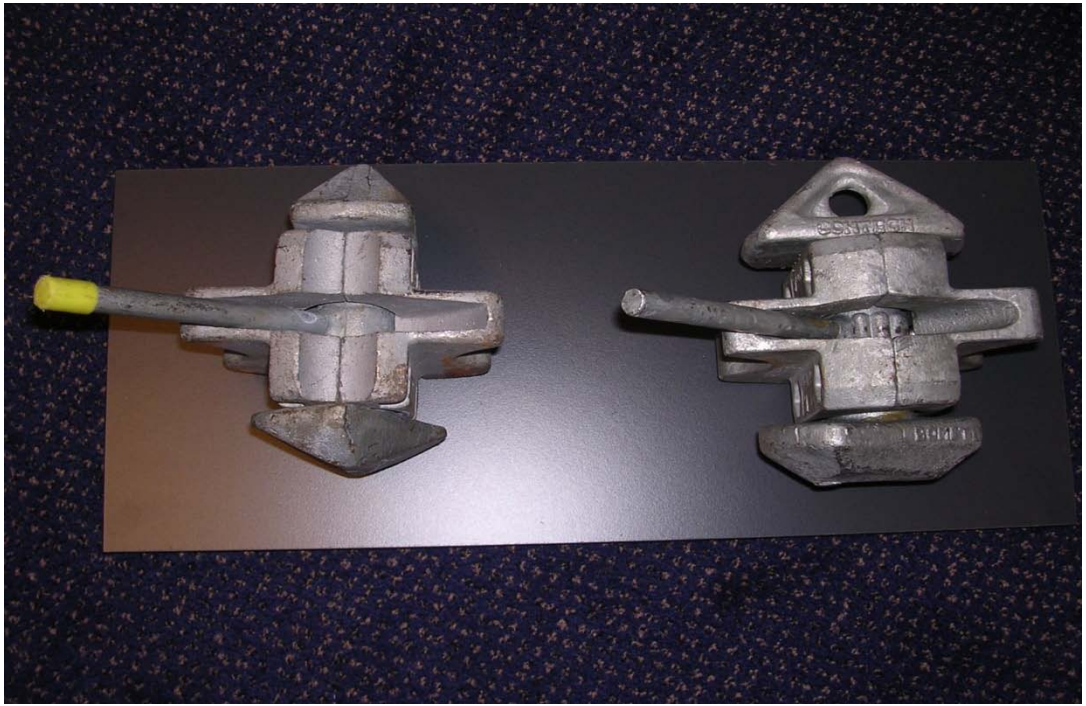

# Container Securing Manual

- A ship specific document, produced by the supplier of container lashing equipment.
- Class approved. Class and IMO requirements.
- For each individual bay of containers it provides:
  - Max vertical weight distribution
  - Max stack weight
  - Application of lashing components

- IMO has minimum GM criteria (0.15 m) for all vessels. The Container Securing Manual also gives a maximum GM.

# A variation of twistlocks

# No standard for left and right



# Prior to sailing

- Ensure appropriate lashing is done as per cargo securing manual.
- Ensure that it is tight.
- Ensure securing of cargo hatches, all weather tight compartments, and also loose gear.

# At sea

- Sea is known for its perils.
- However, most can be avoided!

# Heavy rolling result

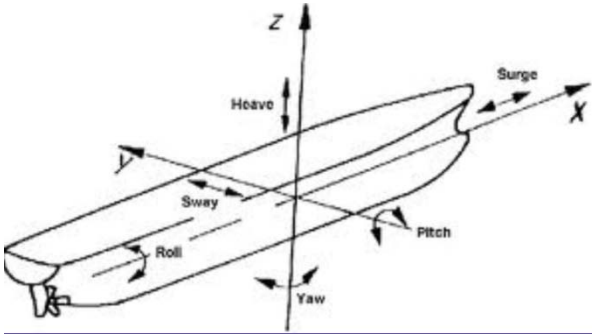
# On the rocks....

# Collisions with other vessels

# At Sea

The containers on deck are exposed to various dynamic forces at sea:

- Ship Motion,
- Green Water,
- Wind forces




# Containers lost overboard

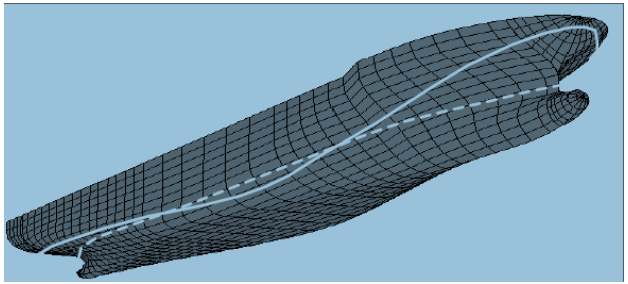
- More than an economic issue
- Environmental problem
- Danger to other craft

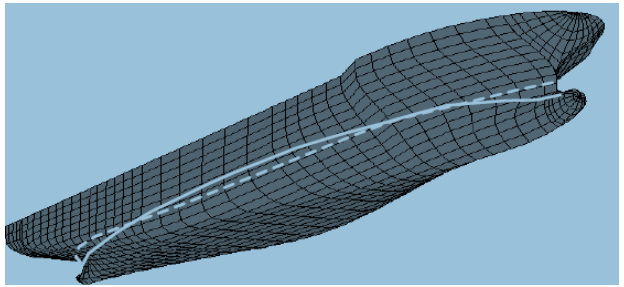


# Dangerous phenomena at sea

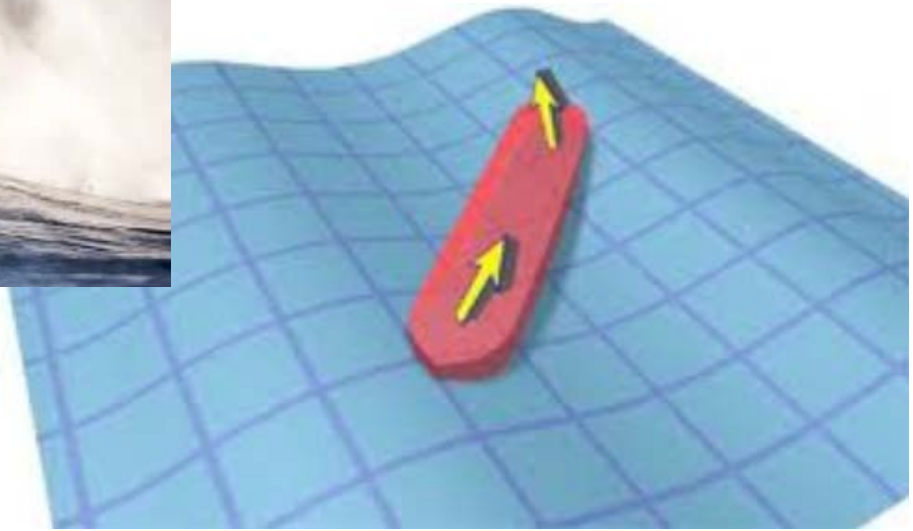
Following and quartering seas

- V/L encounters the waves with a longer period than in beam, head or bow waves.
- Surf-riding and broaching-to.
- Reduction of intact stability when riding a wave crest amidships.





# Surf-riding and broaching-to



# Dangerous phenomena at sea

Synchronised rolling motion:

- Large rolling motions may be enhanced when the natural rolling period of a ship coincides with the encounter wave period.

- More observed on tender ships where natural period of roll is longer.

# Dangerous phenomena at sea

Parametric roll motions:

- Usually observed with head or following seas.
- Parametric roll resonance develops when the frequency of stability change is nearly twice that of natural roll frequency, i.e. two wave lengths within one natural roll

# Dangerous phenomena at sea

- There is no single phenomena of wave motions that affects the vessel at one time.
- Thus more complex situations can be expected.

## What can we do?

# Dangerous phenomena at sea

- Prudent weather routing.
- Compare the actual roll period of the vessel with her natural roll period at frequent intervals.
- Monitor waves / swell
  - Their length (its dangerous if its between 0.6L to 2.4L);
  - Their period of encounter. (Synchronized rolling or parametric rolling);
  - Direction of waves / swell.

- Alter speed / course to break any resonance or synchronization.

# Damage by water, fire etc.

# Hold flooding

# Fire in containers

# Fire

- Normally cargo in containers should be safe from fires. Risks are:
- Self heating cargo (charcoal, fish meal, steel shavings etc)
- Dangerous cargo/ Chemical reactions i.e. Calcium Hypochlorite - not to be exposed to heat from sun, heated fuel tank, etc. 3 ships lost end of 90's
- Improper stowage
- Collisions
- Fire from ship

- **Note: It can be very difficult to fight a fire on a container vessel.**

# Barbecue charcoal self ignition

# Navigational claims

# Navigational claims

- Groundings
- Collisions
- Contact damages (high number)
  - Quays
  - Other fixed and floating objects
  - Damages to fender

# Navigational claims

- Causes...?

# Navigational claims

- Human Error …. ?
- Equipment Failure …. ?

- Poor planning?

  Or

- Failure to plan for unexpected?

- Titanic - failed to ask themselves ‘what if’ the ice has progressed further south so as to affect their intended course.

# Navigational claims

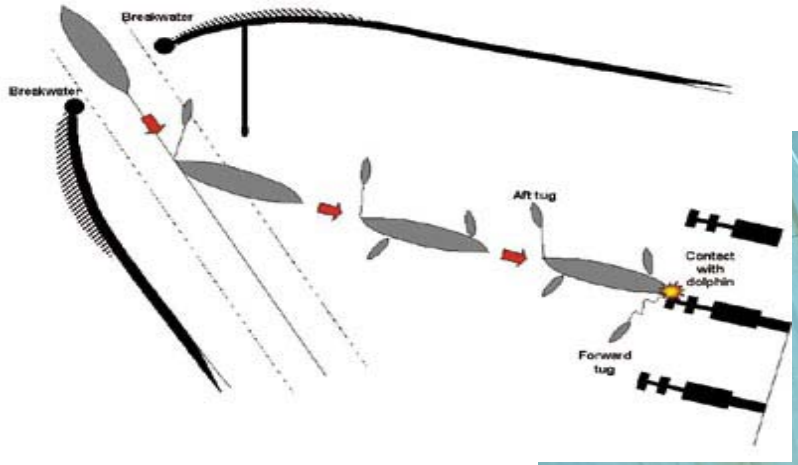
- Over reliance and complacency are single most contributory factors for navigational incidents.

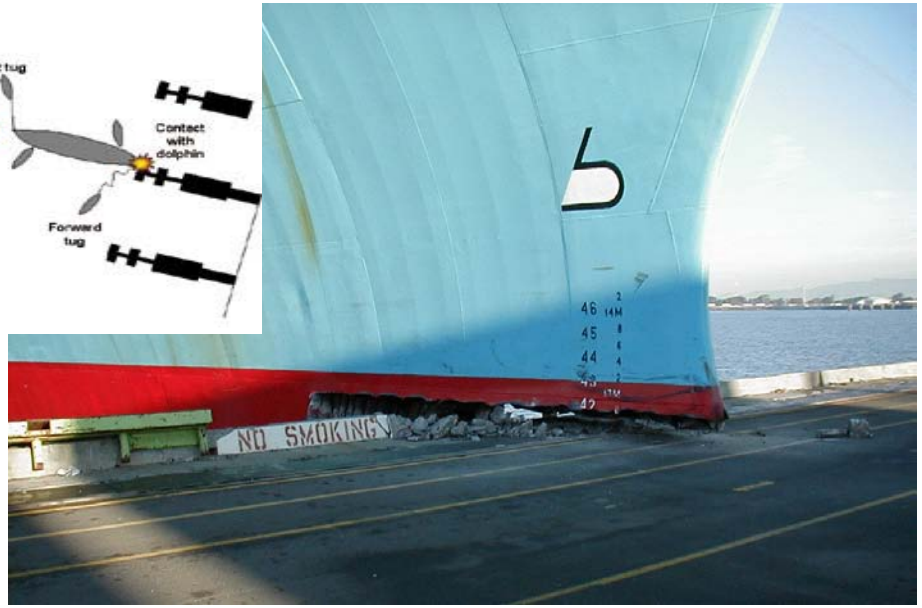
- In constrained waters and within port limits, it is not uncommon for the pilot to join the bridge team.

But….

- Is there a real team?

# Navigational claims



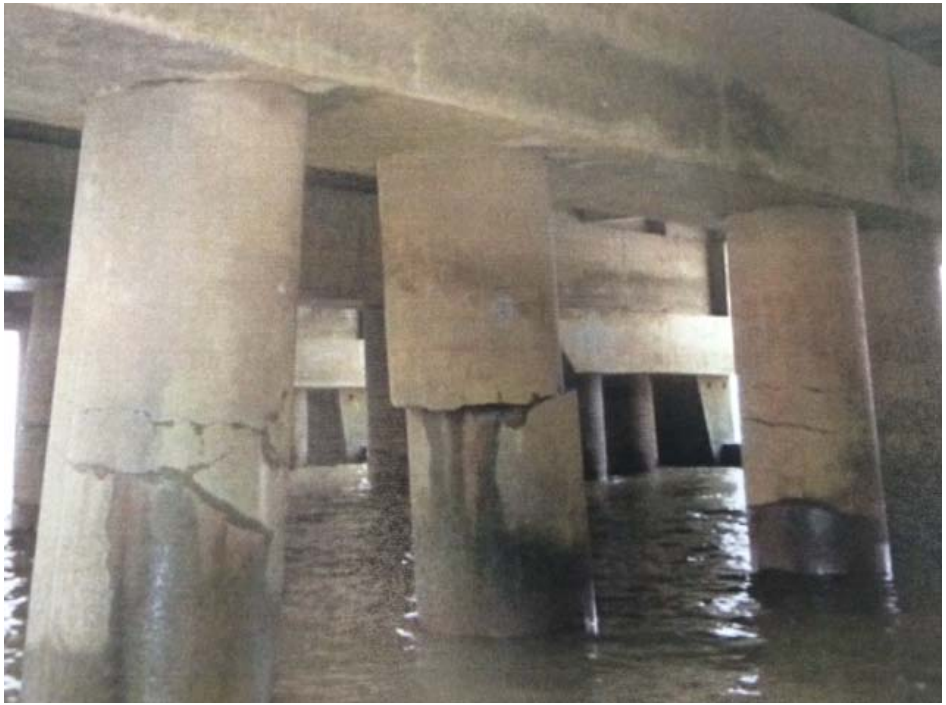



# Navigational claims

Wharf / fender damages:

- It is important for the bridge team to monitor the progress of the vessel when approaching berth.
- Speed of contact is one among very crucial factors as the momentum of vessel could cause major / expensive damages to berth / fenders.
- Supervision / interaction with pilot essential.

# Damage to concrete piles

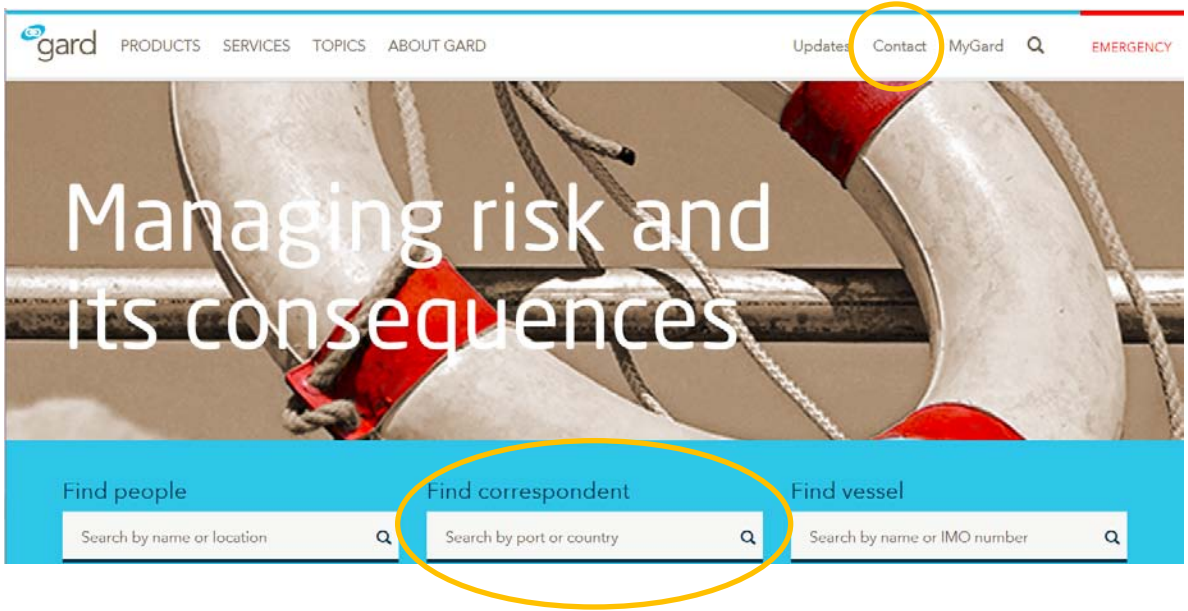


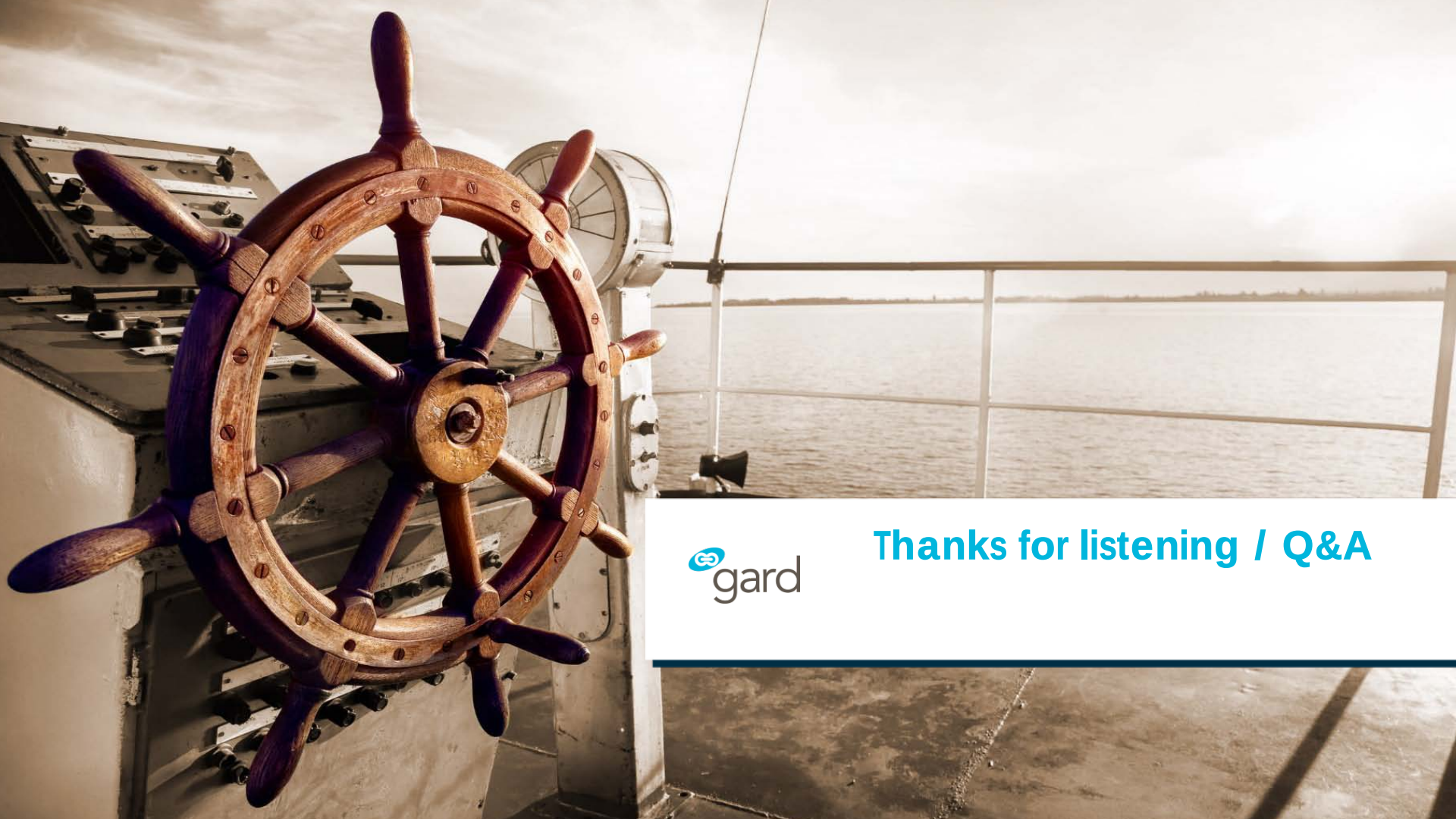
# What can Shipowners do?

- Besides the usual preventive measures, it is important to collect all possible evidences post incident so as to reconstruct the scenario.
- Evidence to include:
  - Log Books;
  - Other records (Bell Book, E/R Logs, rough notes, course recorder, etc.);
  - Photographs;
  - Witness statements;
  - VDR;
  - ECDIS;
  - AIS.

# Contacting Gard

- All ships should have Gard Correspondent's list on board:
- If you have access to internet:
  - Go to http://www.gard.no/web/correspondents





# Thanks for listening / Q&A