



This brief analysis gives no answers, only indications!

**By investigating some tragic accidents,
we may become better prepared for the future.**

**Most of the findings prove that accidents occur
because humans are involved in design of the ships,
and planning and performance of the voyages.**

Sources:

- "Tall Ships down" (Capt. D.S. Parrott, Capt. of "Pride of Baltimore II")
- Norwegian Maritime Directorate

Board meeting Christian Radich 11 / 2007:

Director, please confirm that you always put safety first!

Answer: Negative!

Safety level
Time **Reduce costs** **Boost income**
Authenticity

I could not confirm without comments.

When we decide to order our ships to go out sailing,
we have to accept a certain risk level.

But we shall do our best at any time to avoid accidents.

This is what we all want!

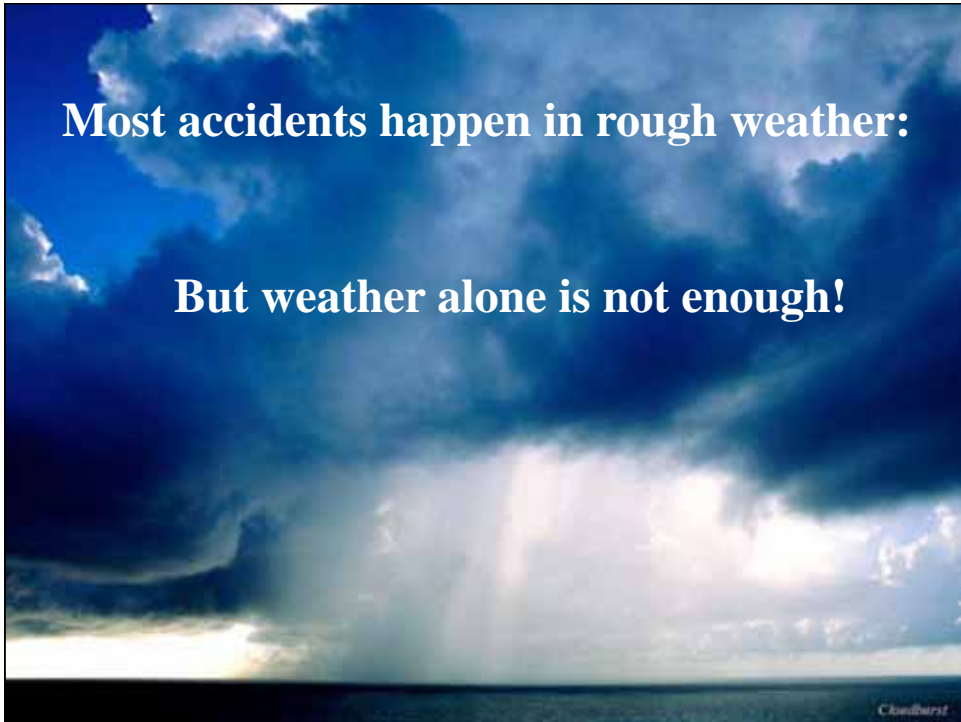


Regattas are impressive, but raise level of risk



You are Responsible
Be it as a Manager, Sail trainer or Captain !

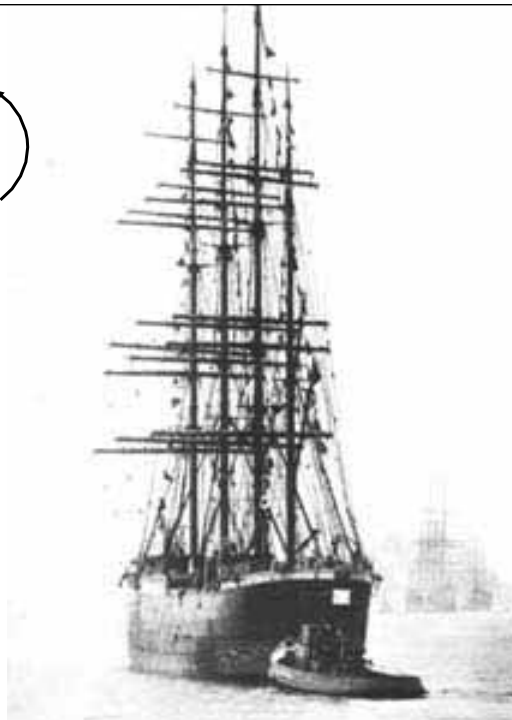
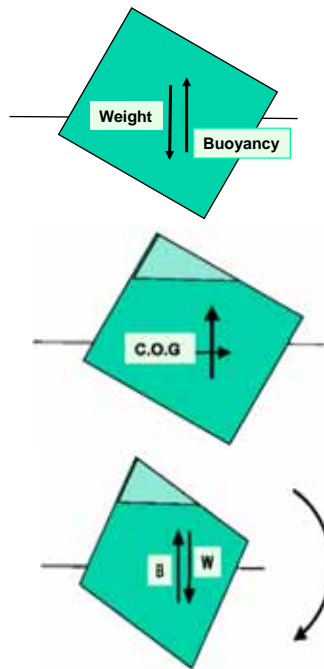
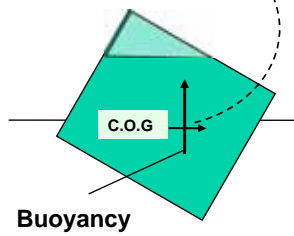




- 4-masted barque
- Cargo ship with sail training cadets
- Built for Germans, later 7 other flags, most German and Finnish.
- Good construction

Accident W of Azores:

- Filled with Grain in bulk
- Hit by the hurricane "Carrie"
 - Severe heel, cargo shifted, Centre of gravity moved



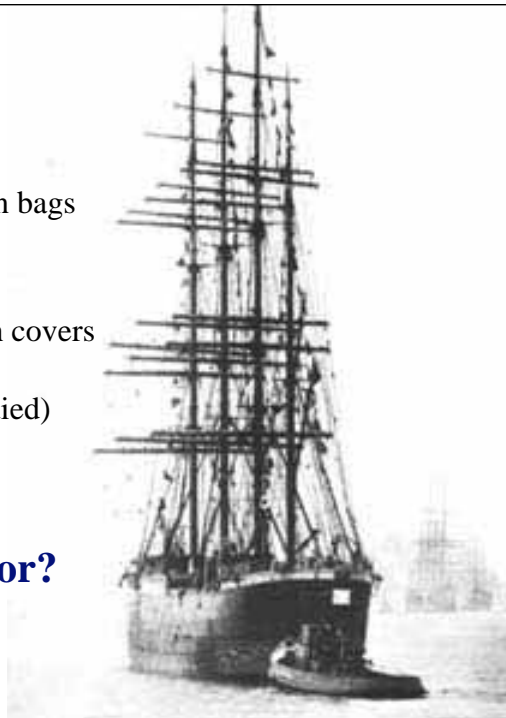
The art of securing hatch covers vs. Safety

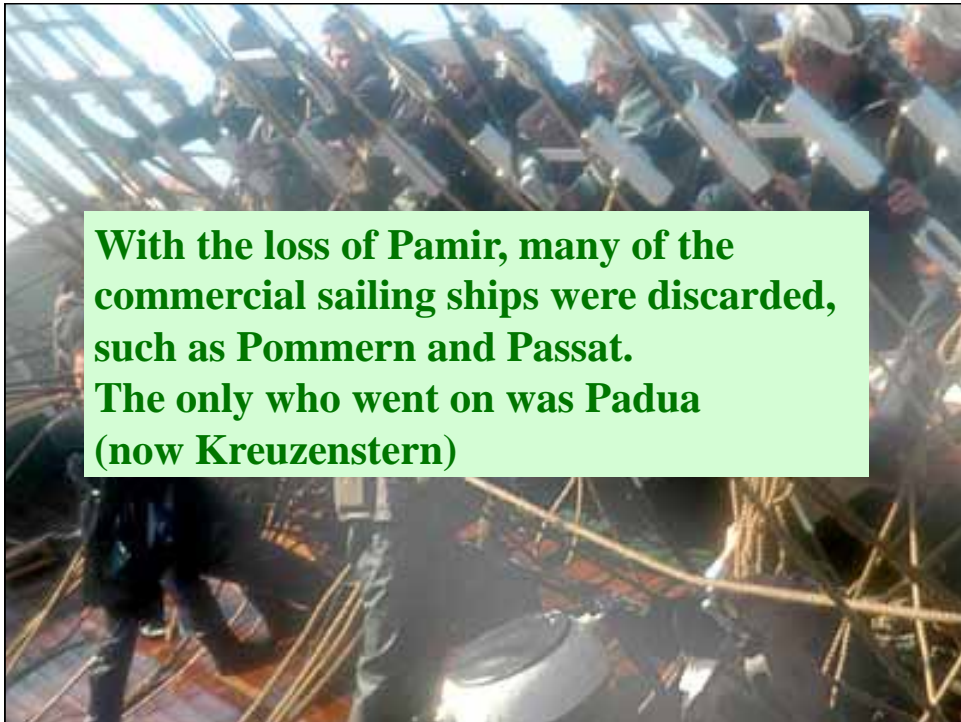
1948	1952
Wooden hatch covers caulked	Wooden hatch covers not caulked
Three tarpaulins over the hatch, folded, hand stitched corners, sewn to each cleat	Two tarpaulins used, not stitched in corners, nor to cleats.
Third tarpaulin coated with mix of tallow, oil and tar.	No tarpaulin used
After battens were placed, each wedge was nailed	Battens used, but not nailed
2-in planks placed fore and aft over the hatch.	Three 2-in planks
Three heavy beams placed and secured across the hatch	Three flat steel straps replaced the beams.
Buntline wires secured the wooden beams.	Buntline wires omitted

Causal factors:

- 1: The change from grain in bags to grain in bulk
- 2: Could more secure hatch covers save more lives?
(80 of the 86 on board died)

**Is management
one common factor?**





With the loss of Pamir, many of the commercial sailing ships were discarded, such as Pommern and Passat. The only who went on was Padua (now Kreuzenstern)

Albatross 1921-1961

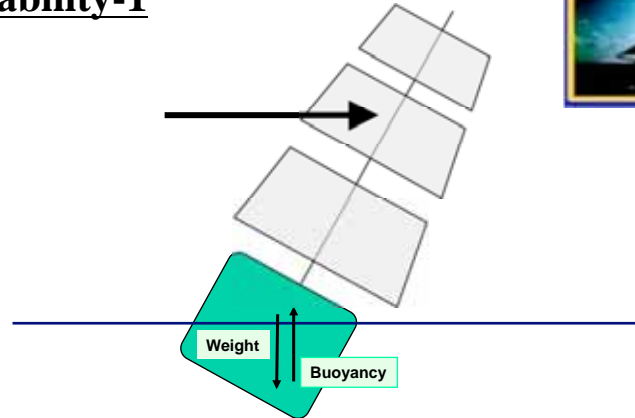


- Sail training ship, later movie star, then sail training again
- Gaff schooner, converted to topsail schooner, and to brig/brigantine
- Originally regarded safe and well designed

Meeting a squall N.of Cuba:

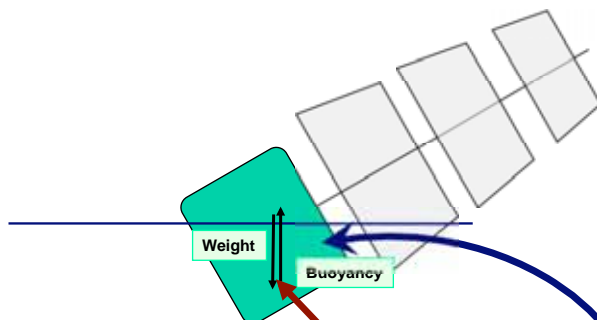
1. With much sail aloft, in not extreme wind cond's, she suddenly heeled 45°
2. Water filled her in few minutes, 6 did not survive

Stability-1



When a stable ship heels, the buoyancy centre moves!

Stability-2

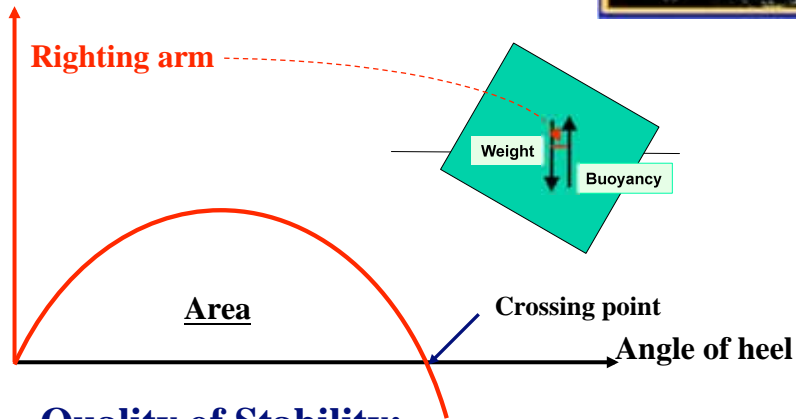


When heeling more:

1: "Righting arm"
(distance between forces)
is reduced or negative

2: Water may flood
through openings

Stability-3: Dynamic Stability



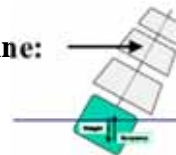
Quality of Stability:

1. Large Area under the curve
2. Crossing point at a high angle

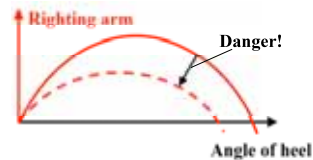
Rebuilding and refits:



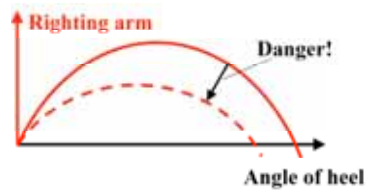
Converted from schooner to a lofty brigantine:
Wind forces made her heel more and faster



Change of rig, placement of two boats
6ft above deck and new deckhouses
raised the gravity centre:
Reducing the Dynamic stability



Change of engine to a lighter model:
Reduced weight well below deck,
Thus raising centre of gravity even more



	1949	1956
Centre of Gravity (above keel)	7,99	8,78
Heel angle to edge of deck	16,84	15,85
Downflood angle	58,4	57,2
Range of positive stability (degrees)	110	57,0

Causal factors:



- 1: The sail area was not reduced**
- 2: The hatches were not closed, neither were watertight doors**
 (Investigations have concluded that the very calm weather before a sudden and extraordinary squall made this almost forgivable)
- 3, 4, 5, 6, 7..: Reduced stability after rebuildings and refits, inadequate stability tests**

Sufficient Quality of management ?

Marques

1917-1984



- General cargo schooner
- 1972-74 Rebuilt to brigantine, "went to the movies"
- 1976-77 converted to 3-masted barque
- 1981 Rig extended 8ft to take royals, studsails added
- 1960-84: Gradual transition to Sail Training

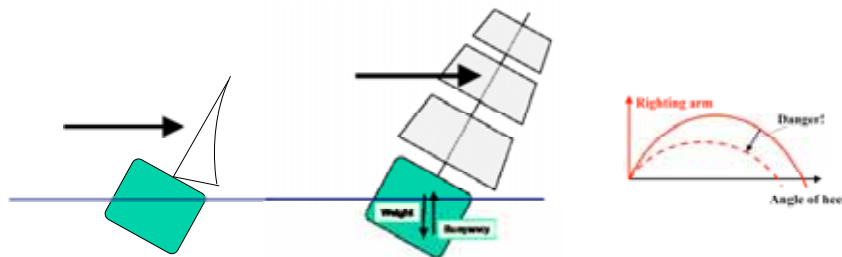
Meeting a squall during T.S. Race N.of Bermuda:

1. Strong wind and a freakish wave made her heel 90°
2. Water filled her in abt. one minute, 19 out of 28 lost their lives

Rebuilding and refits:



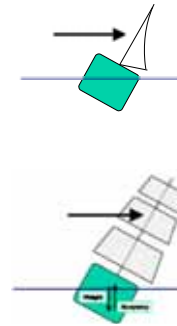
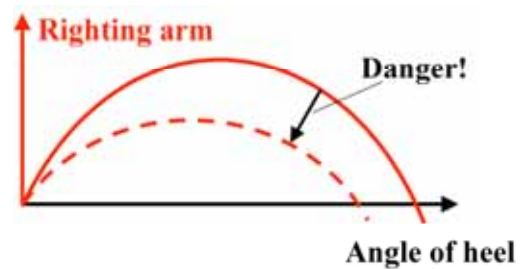
**Converted from schooner to a lofty barque:
Wind forces made her heel more and faster**



Estimated new stability data:



Angle of downflooding: 60 degrees
Range of positive stability: 57 degrees



On board routines



**Main hatch 9x13 ft was most often not covered,
in order to secure ventilation below deck**

**Gun ports acted as freeing ports.
All but two were sealed because of earlier damage.**

EPIRB (Radio beacon) stored below deck

Relations to Authorities



Recommendations to check or improve stability were not converted to requirements.

Frequent diplomatic discussions with authorities, Certificates stretched to (and beyond?) its limits

Were Authorities stretched for the purpose of securing Marques continued operation ?

Causal factors:



- 1: Gradually reduced stability from rebuildings and refits**
- 2: Conflict between the aim to secure future operation and security ?**
- 3: Freeing ports blocked, main hatch tarpaulins were not fully battened and wedged**

Is management still one common factor?

Pride of Baltimore

1977-1986



- 2-masted topsail schooner
- Replica of Baltimore clipper
- Huge sail area
- Sailed for City of Baltimore, and for private companies in US and S. America.
- 1986: Goodwill tour to Europe

Meeting a squall N. of the Caribbean Islands:

1. Capsized and sank
2. 4 out of 12 died

Causal factors:



- 1: Sailing in blue waters**
- 2: Conflict between the aim to secure a historic replica and security ?**
- 3: Water flooding into the ship, lack of watertight subdivisions**
- 4: 2 EPIRBs (Radio beacons) stored below deck**
- 5: Poor stability**

Maria Asumpta

1858-1995



- Brig
- Cargo ship
- Pleasure yacht
- Sail training ship (?)

Navigating too close to the Coast of Cornwall, England:

1. Started Main Engine, engine stopped
2. Hit the rocks, 3 out of 14 died

Bourbon Dolphin

(Anchor handler / supply)
2006-2007



Capsized during AH operations in the North Sea:

1. Was ordered for a heavy operation
2. Ship drifted, requested assistance
3. Towing pin released, reduced stability, capsized, 8 of 15 died

Routines and documentation



The yard delivered unrealistic anchorhandling calculations
The odd stability characteristics were not documented
Owners had no ISM routines for this particular ship
Crew lacked experience with the ship
Accept for an operation beyond the ship's normal capability
Inner towing pin retreated.

Owners were fined (600' €)

What can we learn?



Don't stretch the authorities!

**Dynamic stability is in general important to any ship,
and very important to sailing ships.**

When rebuilding and refitting:

Make sure that Stability is maintained or improved!

**Keep freeing ports open, secure hatches and
close watertight doors before it is too late.**

**Well documented and implemented routines
reduce the risk level considerably!!**



120 persons died in these 6 accidents

**We are all responsible
for our decisions!**