

THE SINKING OF A SHIP

COSTA CONCORDIA REVISITED.

Captain Michael Lloyd, RD**, MNM, CMMar, FNI.



Kate Hopkins

COSTA CONCORDIA IN GENOA, 2010

« A commander should be able to hold his ship and everything on board of her in the hollow of his hand, as it were. But with the modern foolish trust in material, and with those floating hotels, this has become impossible. A man may do his best, but he cannot succeed in a task which from greed, or more likely from sheer stupidity, has been made too great for anybody's strength».

Joseph Conrad, "Some Reflections on the Loss of the *Titanic*" 1912

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Glossary

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Glossary of abbreviations and acronyms

ARES - Automated search and rescue

AIS – Automatic Tracking System

Carabinieri – Italian National Military Police

CE - Chief Engineer

D/G - Diesel Generator

DGP – Damage Control Plan

DOC - Document of Compliance

DPA - Designated Person Ashore

ECC- European Cruise Council

ECDIS- Electronic Computerised Display (Navigation)

ECR – Engine Control Room

EDG - Emergency Diesel Generator

EEBD - Emergency Escape Breathing Device

ETA - Estimated Time of Arrival

EU - European Union

FCC – Fleet Crisis Coordinator

GdF- Guardia de Finanzia. Branch of the Italian Police Force.

GRT - Gross Registered Tons

IB – Investigative Body

LSA – Life-Saving Appliance

IMO – International Maritime Organization

ISM Code – International Management Code for the Safe Operation of Ships and for Pollution Prevention

ITCG – Italian Coast Guard

MAMS- Marine Asset Management certification

Martec system – Software that manages the Stability controls for emergency Hull breach and fire

MLC – Maritime Labour Convention

MRCC – Maritime Rescue Coordination Centre

MRSC – Maritime Rescue Sub Centre

MSC – Maritime Safety Committee

NAPA- Ship stability software

NGO- Non- Governmental organisation

OSC – On Scene Commander

OOW- Officer of the Watch

PAX- Passengers
PSA- Passenger Ship Association
RINA - Italian Classification Society

RO-PAX – High-speed roll-on/roll-off ferry
RO-RO – Roll-on/roll-off ferry
SAR – Maritime Search and Rescue
SOLAS – International Convention for the Safety of Life at Sea
SMS – Safety Management System
STCW – International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
UCG – Coastal Guard Unit
UMS – Unattended machinery spaces

VDR - Voyage Data Recorder
VHF - Very High Frequency radio

W/T- Watertight
WTC – Watertight compartment
CCTV - Close Circuit Television

Introduction

This was intended to be a brief account of the sinking of the Costa Concordia. I had no pre conceived opinions except that of the stupidity of the Master and surprise that, according to the courts, no one else was held responsible. I did however, make protest in the first months of coverage about prejudging the Master based on various often lurid accounts of actions and our national concepts of moral behavior. Only a few of us in the marine industry did speak out and we were criticized for this at the time.

As I worked my way through the various documents and accounts, I began to realise that there was far more to this casualty than what I had been led to believe by the official and media reports.

The modern cruise ship, or to be more factually accurate 'hotel ship,' is a new phenomenon on the seas. The Companies that own and operate them even state that they are not in the shipping business, they are in the entertainment industry. Their ships continue to grow in size and the companies in corporate power, consequently their influence in the marine industry grows in proportion. The legislative regulations of various governing institutions have been overwhelmed by the rapid development of the size and passenger capacity of their ships as have the maritime bodies of the flag states that, theoretically, are supposed to govern their maritime responsibilities. Their financial power, coupled with the backing of their supportive non- Governmental Agencies (NGO's) in the IMO and their financial influence over their flag states is increasing their impact in all aspects of maritime endeavour.

The joining of the entertainment and marine industries is an uneasy relationship, as one is devoted to passenger comfort and pleasure as a priority and the other has the safety of the passengers and ship as their priority.

Even the management of the ship has required change with the traditional Master and executive officers losing areas of responsibility for the overall day to day running of the ship in favour of the hotel staff and thus the loss of executive control. This is not a criticism, as the size of ship, the hotel expertise and staff, now requires such considerations for the more efficient management. However, it does raise a dichotomy as to the leadership and chain of command in the event of emergencies. For the Captain and his senior officers there is also the danger that they are enveloped in the entertainment requirements interfering with their safety responsibilities and as we see, the navigation and handling of the ship with the marketing departments increased influence over the operations Department within these companies.

It also can affect the recruitment and promotion of the officers as, if the entertainment operations have the major voice in the control of the company, it is obvious that those amenable to the hotel side on board are preferable to those who see themselves purely as seamen.

The case of the Costa Concordia should serve as a warning to all of us on the need to clarify the chain of command on such vessels and to place the professional ability of those in senior positions above that of their social affability.

While this is intended to be a technical study, based on the various legislation and rules which govern our industry, it gradually also became something more. It became a story. Unfortunately for the dead, the injured and the traumatized, a true story. It is a story of ships, the sea and people. It is a story of what is wrong with the marine industry, especially the lack of proper governance by the very institutions that purport to oversee this vast international industry and the disinterest of marine organisations and government departments that know the truth but remain silent.

The Titanic sank almost 100 years to the day in similar circumstances. A Captain who failed to listen, going at speed through a known icefield and who believed that his ship could not sink. But on that occasion, the discipline, the ship board organisation, the professional skills and the standard of moral courage of the day and those involved, held the ship from panic, and allowed the majority of the women and children be saved in what lifeboats they had. Even then not all was perfect, many lifeboats departed without being filled, and some without seamen. The Captain died and, through the skills of the Company that stood by him, became a hero rather than the villain, which he so easily could have become, and attention was diverted away towards the tragic heroism of many on board towards another Captain and ship that was claimed to have ignored the distress calls, but of course, never proved. Over a thousand died when the Titanic sank.

If the wind and current had not taken the Costa Concordia into shallow waters and aground within meters of the land, far more would have died.

From the Titanic sinking came an international body then called The Safety of Life at Sea Convention, now evolved into the International maritime Organisation (IMO), still

responsible for safety at sea. In 2006, this organisation began, despite the protests of many professional mariners, to parrot the media output of the cruise ship Industry that 'The ship is a lifeboat' theme once again, similar to that at the time of the Titanic, of the unsinkable ship. The Costa Concordia grounding came 19 months after amendments to existing international passenger ship safety regulations came into force.

Adopted by the International Maritime Organization, (IMO), the amendments introduced in July 2010 were designed to improved survival rates, presenting a ship as "its own best lifeboat" however the real reason for the introduction of this phrase was not that the IMO necessarily believed it but if they could have it adopted, it avoided the necessary costly changes to the safety equipment, the construction and especially, the watertight integrity issue.

The amendments to passenger-ship regulations in the International Convention for the Safety of Life at Sea came about after a review of passenger-ship safety initiated in 2000 by the IMO. The changes mainly affect ships built from July 1 2010 onwards. Costa Concordia, built in 2006, would have complied fully with earlier amendments.

After the sinking of the Costa Concordia, the IMO has not used the absurd '*the ship is a lifeboat*' phrase again. However, the organisation has ignored the urgent requirement for investigation of the real reasons behind the disaster, especially the failure of the courts to follow and recognise that the ship was under the ISM code, possibly because of the organisation's association with the failures. This means that, once again, we are losing the opportunity to make the essential changes that are required to reduce the probability of such events from occurring again.

Ship Particulars.

Name: Costa Concordia
Flag: ITALY

IMO number: 9320544
Number of registration: Nr. 73 of the International Registers of the Port of Genoa
Ship Type: INTERNATIONAL PASSENGER
Identification: IBHD
Ownership and management: COSTA CROCIERE SPA
Class: RINA
Details of construction: YEAR 2006 - FINCANTIERI BOATYARDS SPA
Set keel: (to be added)
Length: 247.37 mt
Width: 35.5 mt
Height: 11.2 mt
Draft: 14.18 mt
Tonnage: 114,147 t.
Length in between pp.: 247.4 mt
Hull Material: Steel
Passenger capacity: 3780
Propulsion Type: Fixed pitch propeller
Main engines: 2
Electricity generation: Diesel Electric
Propellers: 2 fixed pitch
Thrusters: (aft 3 x 1720 KW - bow 3 x 1720 KW)
Maximum speed: 21.5 kts

PRELIMINARY

The Company

In June 2005, the Italian news media “Libero Quotidiano” reported about a near-sinking accident involving the cruise ship Costa Fortuna. In June 2005, the vessel was navigating along Italy’s western coast, passing by Capri island. During that voyage, the ship carried ~3500 people (passengers and crew) aboard.

According to the media source, the vessel performed a “salute” - cruising into the shallow waters. Until the Concordia disaster, this was an unofficial tradition on Costa ships – to perform sail-bys – just to entertain their passengers.

During that particular “salute”, the Fortuna ship ruptured its hull on the rocks off Capri and started to take on water. The crew used the water pumps at max to keep the ship from sinking. The vessel was able to move to the next call port Palermo Sicily, where the hole in the hull was repaired overnight. Neither the Captain or Company reported this accident to the Italian maritime authorities (including Italy’s Coast Guard). The only thing that Costa Crociere reported on that voyage was a rise in the main engine’s temperature.

This serious accident came to light during Costa Concordia's sinking investigation, when the Palermo Port authorities mentioned a report by one of the ship’s photographers who was on board when the collision happened. The investigators concluded that the incident was a

“critical” one, and only the favourable weather prevented a Concordia-like sinking disaster.

While the *Costa Fortuna* was making a close approach to the island of Sorrento, there was a “loud bang” after which the vessel rolled from left to right according to the ship’s photographer Roberto Cappello, 59. He later would photograph damage to the ship’s keel and a broken propeller blade, only to have the photographs and files confiscated by Costa. Costa apparently later claimed that the ship had stuck a whale.

Costa’s service record is hardly unblemished. In October of 2010, there was a collision between the *Costa Classica* and a cargo vessel at the mouth of the Yangtze River, leaving a 60 feet long gash in the side of the ship. Three passengers were hospitalized but there were no fatalities. The *Costa Classica* was also involved in a collision with the *MSC Poesia* in June of 2008. There were no injuries.

In February of 2010, three crew members were killed and three passengers injured when the *Costa Europa* struck a pier in high winds in the Egyptian port of Sharm el-Sheikh. In 2009, the *Costa Europa*’s “Jewels of the Indian Ocean” cruise was beset by a range of mechanical failures leading to the cancellation of several port calls and a near mutiny by passengers.

Although three crew members died when the *Costa Europa* struck the pier in Egypt, the casualty was never submitted to IMO’s Marine Casualties database.

The *Costa Concordia* was owned by Costa Crociere, a subsidiary of Carnival Corporation & PLC. When launched in 2005, it was Italy’s largest cruise ship, measuring 951 feet (290 metres) long with a passenger capacity of 3,780; by comparison, the *Titanic* was 882.5 feet (269 metres) long and could accommodate up to 2,435 passengers. The *Concordia* was known for its luxuries. It featured four swimming pools, a casino, and reportedly the largest spa on a ship. In July 2006 the vessel undertook its maiden voyage, a seven-day cruise of the Mediterranean Sea, with stops in Italy, France, and Spain. That became its standard route.

On January the 12th/ 13th, 2012, the *Costa Concordia*, was wrecked on Giglio island in the Mediterranean. At the time there were 4229 persons on board the vessel; 3206 passengers and 1023 crew.

This resulted in the deaths of 32 persons, crew and passengers, very low for such an incident, however this was only because there was no power to the engine or rudder and that the ship drifted back to the shallows off the Island where shore bases rescue services could be and were speedily initiated. As a result of the inquiries and trials, one man, Captain Francesco Schettino, was held to be criminally liable and sentenced to 16 years’ imprisonment, a decision that was upheld on appeal.]

Costa Crociere S.p.A. also does business using the name “*Costa Cruises*”. Costa Cruises is jointly owned by a dual-listed company comprising the two separate companies Carnival Corporation and Carnival plc. Carnival Corporation announced on 30 January 2012 that its board of directors will engage outside consultants in various disciplines, including emergency response, organisation, training and implementation, to conduct a comprehensive review of the accident and the company's procedures.

Costa Cruises at first offered to pay Captain Schettino's legal costs but decided later that they would not do so.

The purpose of this paper is not to attempt to exonerate Captain Schettino from his many errors of judgement made on that night, but to examine the other factors to two events, the first, the grounding, which is a safety issue, and second, the deaths of the passengers and crew, which was regarded by the Italian justice system as a criminal issue. Finally, to consider the inquiry and the resultant court cases.

The report, on which the charges were based, was published on the 24th of May 2013, by the Marine Casualties investigative body, under the auspices of the Italian Ministry of

marine casualties investigative body, under the auspices of the Italian Ministry of Infrastructure and Transport and was entitled a 'Report on the Safety Technical Investigation of the casualty.'

The Charges

Criminal complaints were made against;

Sir John Parker, chairman of Anglo American plc and vice chairman of DP World Limited;
Sir Jonathon Band, former First Sea Lord and Chief of Naval Staff;
Arnold Donald, president and CEO of the Executive Leadership Counsel;
Debra Kelly-Ennis, former president and CEO of Diageo Canada;
Micky Arison, Chief Executive of Carnival.

On 11 February 2012

A plea bargain by the company for all their executives was reached for the payment of one million Euros. This avoided any investigation of their actions and any charges being made against them. The Company pleaded guilty to '*the administrative offense resulting from the crime of destruction or deterioration of a protected habitat inside a protected site*'

On 20 July 2013,

five individuals also reached plea bargains with the prosecution whereby they were given suspended prison sentences of less than three years for their respective roles. These individuals were:

- 1) Roberto Ferrarini, the company's emergency manager on duty in Genova at the time of the disaster
- 2) Manrico Giampedroni, the *Concordia's* hotel director
- 3) Ciro Ambrosio, the *Concordia's* first officer and the officer of the watch at the time of the incident.
- 4) Silvia Coronica, the *Concordia's* third officer, junior officer of the watch.
- 5) Jacob Rusli Bin, the helmsman steering the *Concordia* at the time of the disaster.

2015, at the culmination of a trial lasting 19 months, Captain Schettino was found guilty of multiple counts of manslaughter, abandoning ship and causing a maritime disaster. He was sentenced to a total of 16 years and one month in prison (10 years for multiple manslaughter, five years for causing the shipwreck, one year for abandoning the *Concordia* before all the passengers and crew had been evacuated, and one month for providing false information to the authorities). Both the prosecution and the defence entered appeals against sentencing. Defence lawyers requested that the sentence be reduced to three years and five months, whilst the prosecution called for it to be lengthened to 26 years and three months. Ignoring both appeals, on 31 May 2016, Florence's appeals court upheld the original 16-year and one-month sentence imposed by the lower court.

On 12 May 2017, the President of the Court of Cassation (Italy's highest court) announced the final decision to uphold Schettino's lower court convictions and sentence. In giving reasons for the court's decision, the President re-affirmed the lower courts' findings:

- 1) Schettino was wholly responsible for the collision.
- 2) He should have given the order to abandon ship much sooner than he did.
- 3) He should not have left the *Concordia* before he had overseen its full evacuation.

1ST PHASE. THE GROUNDING



Isjc99

The Scola Rock

Timeline

19:18:hrs of 13 January 2012; Sailed from Civitavecchia.

21:00:10hrs: in position 42 ° 18'25 "N - 011 ° 10'48" E course of 302 ° at a speed of 15.8 knots.

21:03 the ship starts a series of turns to port ending at 21:11:35 in position 42 ° 19'18 "N 011 ° 06'57" E, where the course is 279 °, speed 16 knots; the ship is heading directly towards Giglio island.

21:19:02 the Senior OOW contacts the Captain by phone, as per the instructions given after the departure from Civitavecchia, informing him that the ship is 6 miles from the Giglio island and that will be abeam at 21:44.

21:34:36 the Master comes on the bridge and suggests that the helm should be in manual and that paper charts should be used for plotting, since this was the approved method, given the lack of required training for the use of ECDIS. Course is still 279 degrees.

21 36 02 the Senior OOW ordered the helmsman to steer 285 and 290 degrees after about 1 minute.

21 37 11 to 21 38 47 Master is engaged in a phone conversation with a person and ask him about the safe distance from the coast of Giglio there is a safe depth enough to pass, he replies that it is safe up to 0.3/0.4 miles away from the island.

21:36:35 Masters orders to set on radar a distance circle of 0.5 miles.

21 39 14, with a 290 heading, the Master takes the command of the watch.

21 39 30 with speed 15.3 Master orders the helmsman to steer 300. The ship is now almost at the alteration of course position. The new course required on the chart is 334.

21 40 00 orders to increase to 16 knots and then steer 310 °.

21:40:48 the Master orders, in English, " 325 " the helmsman answers, to confirm the order ". 315 .", the First Deck Officer intervenes to correct the interpretation of the helmsman but pronounces ".. 335 .." then the Master reiterates its order ".. 325 .." and then the Helmsman confirms ".. 325 ..".

The ship is at about 0.5 miles distance from the land.

21 42 07 ordered course 330 and the helmsman answered correctly.

21 42 40 Master sends the 2nd Officer on the left wing, the speed is about 16 knots.

21 43 08 ordered course 335.

21 43 33 ordered course 340.

21 43 44 the speed is 15.9, the Master orders, always in English despite Italian being the working language of the ship, "350 ", the helmsman whose first language is not English does not confirm properly (repeats 340) and the order is confirmed again, specifying the side "starboard" and warning that otherwise would end up on the rocks

21 43 46 the bow is oriented to 327°

21:44:05 in position 42 ° 21'05 "N 010 ° 56 'E, with the bow in the direction of "Le Scole " at 0.3 miles and a speed of 16 knots.

The turning radius is such that the ship is located 0.5 miles SW of the planned route, so much closer to the coast than planned.

21 44 11 Master orders Starboard 10

21 44 15 Starboard 20

21 44 20 hard to starboard

21 44 36 mid ship (centre) - the bow is less than 150 meters from Scole rock, while the ship is off the planned course by more than 809 meters

21 44 43 port ten (ten degrees to the left), but the helmsman reaches only 5 degrees to the left;

21 44 45 port twenty after this order the helmsman heads erroneously to starboard to correct himself and goes to port as requested by the Master, and then pulling again to the left as requested by the master, but spend about 8 seconds for the correction of the manoeuvre;

21 45 05 hard to port

21 45 07 the ship collides into the rocks. The speed decreases to 8.3 knots, the ship loses propulsion of the two engines, and adrift, proceeds in a direction of 350 °

21 45 33 master orders W/T doors closed.

21:46:05 the emergency generator that provides power starts only for 41 seconds.

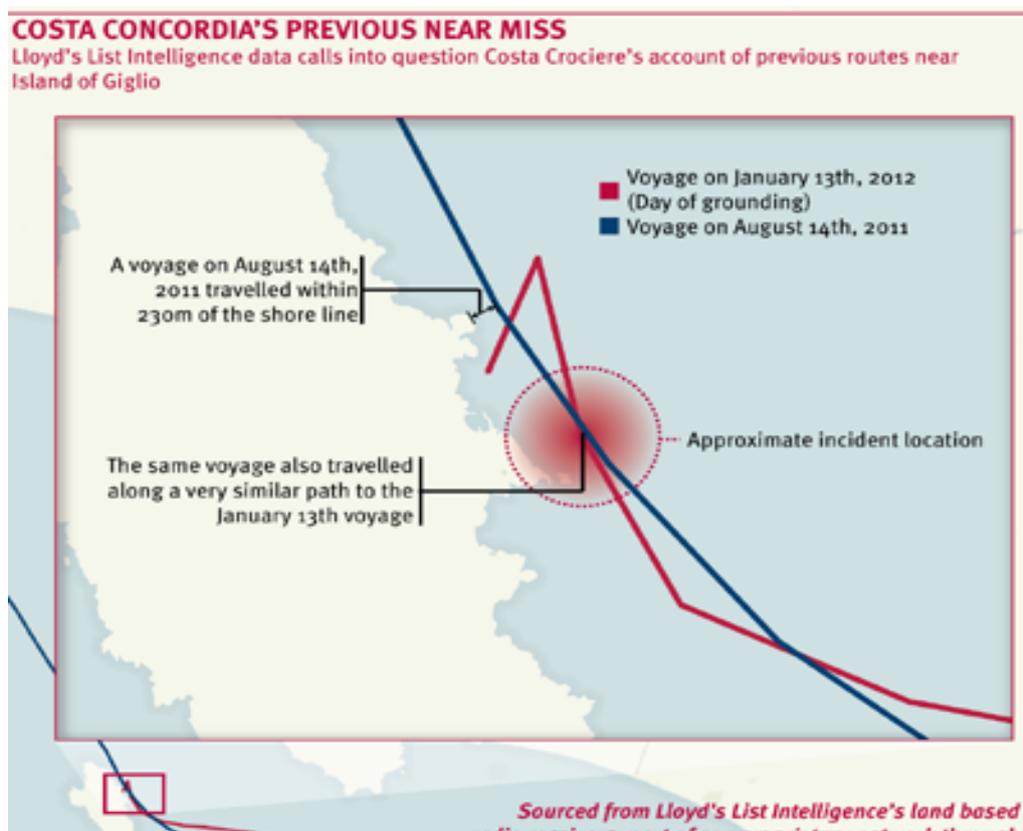
21:55 Bridge advised at least three compartments flooded. the computer software used for the calculation of stability (NAPA), despite the dedicated UPS, is not working.

The Initiation.

Captain Schettino was complicit by initiating the casualty. His career path began at Nautical College and then Ferries followed by tankers before joining the Carnival cruise group initially as Safety Officer, then two years later to Staff or Second Captain for two years followed by promotion to Master. In comparison to the past this would be considered rapid promotion but probably normal these days. His position as Safety Officer and later as Staff or Second Captain would not have involved him directly in the navigation operations of the ship.

He stated that he had passed close to this island in the past, confirmed by the AIS plots held by the Italian Coastguard. This was not an uncommon occurrence on ships in general but cruise ships in particular and such close approaches for amusement have been going on far longer than the existence of this shipping group.

Despite the Company's denials, On August the 14th 2011, with authority to do so, the ship under the same Captain made an almost identical pass by the island. The only difference being the angle of approach to the island as the diagram below shows.





In court at Grosseto, Simone Canessa, the ships navigating officer, said a former captain employed by the ship's owner, Mario Palombo, had successfully sailed 100 metres from the island's coast in a different ship in 2005.

'many instances have highlighted the common practice of large cruise liners, including the Costa Concordia herself, cruising unacceptably close to the coast. It is notable that legislation has to be enacted rather than relying on the cruise operators to respect normal prudence and caution.'

The EU Civil Protection Team Report. 26-29 January 2012

Pierluigi Foschi, chief executive of Costa Cruises, has condemned Captain Schettino's action that night. But he told an Italian Senate committee, during questioning, that carefully planned "touristic navigation" was "accepted by laws and it enriches the cruise package". It helps drives business, he said. "We do it because it is desired by passengers and we are competing on the world market."

In other words, the Captain was quite right, the Company knew of these close approaches and condoned them. This was not the only company to condone such 'tourist navigation' as the picture below confirms.



cruise ship Seven Seas Voyager of the American company RSSC. "bowing" to the Faraglioni rocks off the island of Capri.

The daily ***La Repubblica*** published transcripts of a conversation Captain Francesco Schettino had with an unknown person identified only as Fabrizio in which he implicates an unnamed manager of the vessel's owners Costa Cruises.

"Fabri ... anyone else in my place wouldn't have been so nice as to go there because they were breaking my balls, saying go there, go there," Schettino says in the conversation taped while he was being held following his arrest over the incident.

"...the rock was there but it didn't show up in the instruments I had and I went there ... to satisfy the manager, go there, go there," he says.

The Bridge Organisation.

The modern word adopted by our profession for this is 'Bridge Team'. A strange concept in such a hierarchical shipboard organization. The Captain is not part of the team unless he directly assumes the navigation of the vessel. Only at that point does he becomes the leader of the team. As a generalisation, a confident Captain will discuss his intentions with whoever is directed to carry them out prior to their initiation, otherwise he imparts his wishes to the senior officer present who then directs the 'Bridge team', all of whom based on rank, are subordinate to another. Prior to the ship sailing, the navigating officer of the ship will prepare the courses to the next port and these will be approved by the Captain. Once under way, short deviations to the plan will be initiated by the Captain through the Officer of the Watch, unless the navigating officer is not a watch keeper, in which case he could be called for this task. It is for the OOW or the navigator, to advise the Captain of any impediment or

dangers to the ship caused by the deviation. The problem of 'teams' is they tend to separate the head from the body, the larger the number involved, the greater the distance of separation.

Thus the Captain of a cargo ship the same size or even larger than the Costa Concordia, with few bridge personnel, will have a greater 'hands on' approach than the Captain of a large cruise ship, who will, if he is not careful, become more remote from the prime task of navigation, leaving this to the bridge team, much as he leaves the engineering to the Chief Engineer and the catering to the Purser or Hotel manager. Now, instead of guiding the progress of the functions of his ship, he becomes a decision maker based on his direction to others and then dependant on their compliance and what he is told, rather than what he sees.

He is thus dependant on the abilities of his officers more than his own.

The Helmsman, or any helmsman for that matter, while being considered part of the bridge team is an important functionary responsible for the physical steering of the ship under the direction of the Captain or OOW, whoever has the con, and required to carry out the orders given to him. He is not management, nor is he any part of the decision making process on the bridge. It is essential that not only does he have the ability and experience to steer a ship but has an excellent understanding of the language of the ship. As an aside, all helmsmen make mistakes, especially when given in different languages to their own. That is why there is an age old system of helm orders on a ship's bridge as follows;

The order is given.

It is immediately repeated by the helmsman. This is to ensure that the wheel is going to be put the correct way

Once the order has been carried out, the helmsman states the order is carried out again repeating it.

That confirmation is then acknowledged by the officer who has given the order.

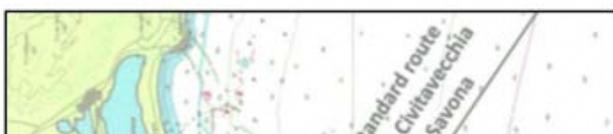
This standard system designed to avoid mistakes being carried out, was obviously not in force on the ship.

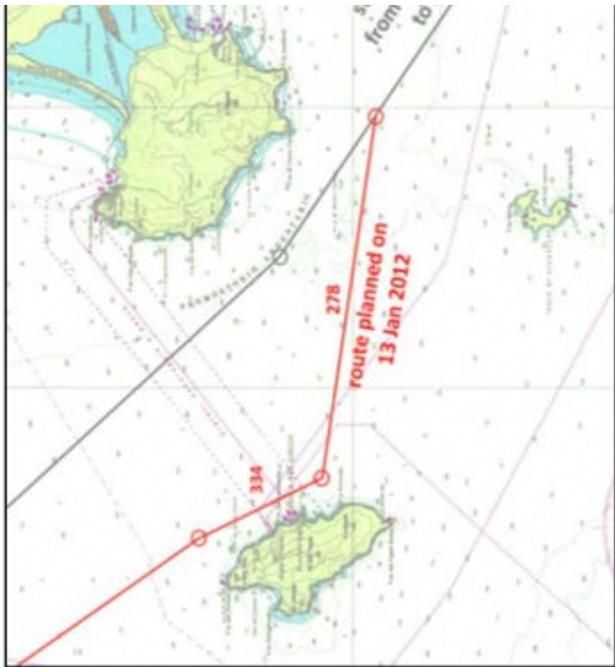
The Navigation

The Captain ordered Simone Canessa, the ship's navigator, to change the ship's route just before leaving the port of Civitavecchia. Canessa stated that he was not given any reason, although that would have been obvious, but that he heard it was to give the island a salute for those crew on board from the island.

Italy's Automated Search and Rescue System (ARES) states that notification of a deviation from the planned route needs to be made to the port authorities only if the new route deviates from the planned one by 15 nautical miles or more. As the *Concordia's* deviation was less than this, it did not need to be notified to, or approved by, the port authorities. The Company, as previously shown, denied that it knew about their ships deviating to sail close to land, but then admitted they knew and encouraged such actions.

On 13 January 2012, only the original route was drawn on a paper chart (with a scale of 1:100,000). The chart was used to plan the deviation, but it was not actually plotted on the chart. Instead, the planned deviation was uploaded to the ship's automated navigation system (the Integrated Navigation System (INS)), which, according to international law, could only be used as an aid to navigation when sailing close to land; not the primary means.





The deviation ordered by Captain Schettino.

The report on the Safety and Technical Investigation of the Casualty cites The first officer's testimony that despite being required to sail close to Giglio, the ship did not have accurate nautical charts for doing so. The Costa Concordia had a 1:100,000 scale map for open seas, not the 1:20,000 scale map for coastal sailing, on which the rocks that the ship hit are marked. If this was the case, then the same situation must have existed for the August 2011 close sail by.

21:19:02 the Senior OOW contacts by phone the Master, as per the instructions given after the departure from Civitavecchia, informing him that the ship is 6 miles from the Giglio island and that will be abeam at 21:44.



Excerpt of the navigation chart in use on the bridge. The scale on this chart is 1: 100,000 Instead of the correct chart 119 scale 1:20,000. The second officer, as the ships navigation officer, would be responsible to the Captain for the correct charts being available.

The Captain arrived on the bridge at 21.34.36. The First Officer, **Ciro Ambrosio**, as the Senior Officer of the watch, was in charge of the bridge team, and this position would continue even with the presence of the Captain on the bridge unless the Captain took over the Con. The First Officer

By this action, the Captain would assume the leadership of the bridge team. The First Officer was assisted by the Third Officer, Silvia Coronica, who was plotting the position of the ship.

On his arrival on the bridge, Schettino noticed the use of the Inertia Navigation System (INS) being used as the primary means of navigation and the ship in autopilot. He asked, "Don't we normally use paper charts and manual manoeuvring when we are this close to shore?"

In order to use the Electronic Computerised Display system (ECDIS) it is required by the STCW Convention Regulation A-II / 1 - as rewritten by the amendments of "Manila" entered into force January 1, 2012 - that the officers required to use such system have specific training; the courses for that purpose have been established in Italy, in the light of these amendments, by Decree of the Ministry of Infrastructure and Transport on December 5, 2011.

None of the navigators, not even the Captain, had the IMO required ECDIS training in accordance with the STCW requirement (by STCW Manila Amendment 2010)

From this, the Captain was correct in requiring the use of paper chart as the prime navigation procedure. This rendered the ECDIS along with any radar use, as navigational aids. The lack of training is purely the responsibility of the Company. The change to manual helm is normally the correct procedure when close to land. On this ship at that time, The ECDIS could only be regarded as a training module as if it had been used as the prime navigation method, this would have been illegal.

The Company bridge procedure "*P.14-MAN 01 SMS - Procedures for the bridge*" (Para 4.7.1) states that the charts and nautical publications to be used for navigation are those published by the Admiralty; vessels operating in Italian ports must also use the charts published by the Hydrographic authority and, in particular, the charts for the harbour and the first 2 charts of entry / exit used for arriving in the port must be kept. From this it is required that paper charts are used as the prime method of navigation plotting.

The First Officer then ordered the switch to paper charts for the main navigation and the helmsman to take the wheel. (Manual steering was also a requirement of the company when navigating in perceived hazardous waters.) This action should have been taken before the Captain had to remind the OOW.

At 2139.14. the Captain assumed the con of the ship. He had been on the bridge less than 5 minutes. Allowing for the time it would take for him to adjust his eyesight to night conditions this was insufficient time for him to absorb the information required to assume command of the bridge and the bridge team. The course at this time was 290 and the ship was almost at the next course alteration marked on the chart. It is also a recognised procedure that handovers are not carried out until any alteration of course is made or in good time to make a safe handover before such alteration. Also that the position of the ship be established to the satisfaction of both the officer handing over and the officer taking over. This was not done.

There appears to be a discrepancy at this point as to the function of the leader of the bridge team. If it is the Captain, then he should at least check the position of the ship. Alternatively, if he is reliant on the First officer for navigational duties, then, at least require a position check to be made.

The alteration of course should have begun before the Captain assumed the con or the Captain should have waited until this was completed.

First Officer *Ciro Ambrosio* was in charge on the bridge, when the planned turn was going to be executed away from *Giglio Island*. *Ambrosio* gave the following reason for this not being done;

"But he (Schettino) did not immediately speak the phrase 'I'm taking control,' which signals a change in command. However, given the way he positioned himself, I assumed he had taken command and I thought I was no longer in charge. Then, since the captain was distracted, and we were getting closer to Giglio, I (Ambrosio) gave orders to the helmsman. He (Schettino) was on the telephone with (retired Costa Capt. Mario) Palombo. Even though

... (concerning) was on the telephone with (re)checked Costa Supermarine, I remember even though I (Ambrosio) had finished my shift, I felt I had to retake command in order to give orders to the helmsman to start our approach to Giglio Island, which was getting closer."

At the time of handover, the ship was almost at the next plotted course alteration which was intended to bring the ship to a route taking it along the coast of the island. 30 seconds before arrival at this position the Captain orders a course of 300. Again this demonstrates that the Captain did not know the position of the ship as even if he had ordered the next course of 334 as marked on the chart, he would still be to port (closer to land) of the the course line. The ship is now 2.8 cables inside the intended course line.

This was confirmed in the inquiry by a comparison of the planned route on the chart no.IIM 6, recovered on board the Costa Concordia (rebuilt also by the Mate, with a good approximation, during the testimony of March 1, 2012), and the layouts AIS / VDR ship, it is clear that the Master has passed the point of turn planned to pass the Giglio island thus placing the ship into position much closer to the coast than that laid down on the chart.

Course Alteration

Course alteration combines all the principals of navigation. First the position must be established, then the alteration must be made in sufficient time and with a degree of wheel commensurate with the speed, draft, current and weather conditions, in order that the ship arrives on her new heading exactly on the course line. The closer the ship is to any potential hazard, the more accurate the alteration must be. In the case of the Costa Concordia, at the speed the ship was proceeding, the weather prevailing would not have effected any alteration. Being a cruise ship with little variation of draft, this again, once established, would not cause any variation of degree of turn. Therefore, in this case, consideration can be confined to speed of ship and degree of turn. Proximity to land enables the position to be fixed with complete accuracy, especially when using paper charts that the company required in the situation of close approach to land.

There are three types of change of course manoeuver;

The first is by arriving at or close to the alteration position and then to give the helm order or use the autopilot to bring the ship onto the next course. Once on that course, then establish the position and adjust the course to bring the ship back onto the required course line or if the open sea situation allows, then a new course can be made to bring the ship to the next alteration position. While this can be used on open seas away from land, it is not suitable for close coastal navigation.

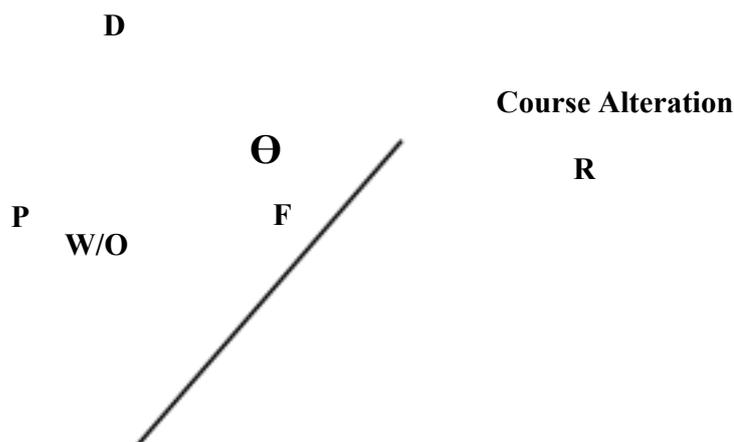
The second is by visual and gradual changes of course together with the use of other position aids such as parallel indexing to watch the progress through the alteration to achieve the next course on the line. To achieve this requires a good knowledge of the manoeuvrability of the ship and considerable experience, especially when in close coastal waters.

Wheel Over

The third and most accurate is one based on the ships manoeuvring data sheet and is referred to as a 'Wheel Over'.

The altering of course prior to arriving at the alteration position is a well-known and established procedure. Prior to the dawn of the larger ships existing today, this was generally done by the officer of the watch from his experience and knowledge of the ship, although even on passenger ships of the 50's, a marked wheel over position based on the degree of alteration required was used. With the size of ship today, this should be standard practice on large vessels, whether passenger or cargo, especially when near land. Experienced navigators usually make out a graph based on the manoeuvring data and graduated for speed and degree of change of course.

Factors of a Wheel Over.



Wheel over positions can be found from the ship's manoeuvring data. These are of special importance when making passage in rivers or channels. Most ships have ready for use pre calculated distances based on speed, degree of helm required, degree of turn and draft. F = Head Reach – Distance travelled by vessel after giving wheel over & before commencing turn, i.e. distance to overcome inertia.

P = Perpendicular distance from wheel over point to new course extension.

D + P = Parallel Index distance at W/O position.

D = Parallel Index distance from new course, as obtained from chart.

R = Radius of turn.

Θ = Change of course angle.

On the Costa Concordia, the Captain chose the second option of gradual changes of course. This was not carried out properly and placed the ship 2.8 cables within the required course line

Immediately after any alteration of course it is a basic professional requirement that a position be established to ensure that the ship is on the required track. In this case, this was not done, neither was there any evidence of parallel indexing or even visual or radar observation, even though the Captain had ordered the radar to be set for 5 cables distance off the land. No member of the bridge team seemed to be aware of the safe navigation of the vessel, possibly each expecting the others to do this. It should be pointed out that the duty of the 3rd officer, within the bridge team, was the plotting of the ships position.

Over the next three minutes the Captain orders three more course alterations all turning the ship to the next course finally settling on a course of 330 at 2142.07 and a speed increase to 16 knots. Even now the ship is still not steering the course laid down and no one has yet noticed that the ship is well inside the course line. The ship is now heading directly for the Scoble rocks.

During these course changes, it is apparent that there is general confusion as to the courses being ordered with both the helmsman and the First officer misinterpreting the orders given.

At 21:43, Schettino noticed the white foam of the waves breaking against the rocks in the distance and realised the immediate danger the *Concordia* was in. The fact that he was the only person on the bridge to see this would refute any argument that his eyesight or failure to wear glasses had any bearing on the case. He gave the order to turn "350 degrees to starboard", but the helmsman did not understand and said back, "340 degrees". Both Schettino and the first officer shouted back, "350 degrees!" It was at this point that the third officer had to leave her post to assist the helmsman.

It is strange that even at this point the helm orders were being given as courses to steer rather than direct helm orders. I would consider that the helmsman would have understood

better the direct degree of helm order rather than courses and that this method would have led to less language confusion. However, there is no set requirement as to how such alterations are ordered.

21 43 46. the the ship is heading 327°

21 44 11 the Captain orders Starboard 10

21 44 15 The Captain orders Starboard 20

21 44 20 The Captain orders hard to starboard

21 44 36 The Captain orders amidships. At the position, the bow is less than 150 meters from Scola rocks, while the ship is off the planned course line by more than 809 meters

21 44 43 port ten, but the helmsman reaches only 5 degrees to port before the next order at 21 44 45 of port twenty. By this the Captain, having cleared the rock with the bow, was intending to clear the stern which was now swinging towards the rock.

It was here that the helmsman went to starboard, then corrected himself and went to port as requested. The delay caused by the error was 8 seconds.

21 45 05 hard to port

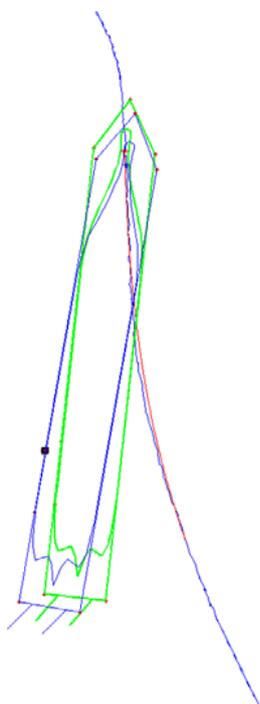
21 45 07 the ship collides into the rocks. The speed decreases to 8.3 knots, loses propulsion of the two engines, and adrift in the direction of 350 °

The 8 seconds delay.

At the trial, The Judge, based on his consultant's opinions, using qualitative arguments, stated that the helmsman's error had been inconsequential on the impact.

In November 2015, at the 2nd International Conference on information and communication Technologies for disaster management, a conference paper was presented by Paolo Gubian and Mario Piccinelli Dept. of Information Engineering University of Brescia Brescia, Italy, and Bruno Neri and Francesco Giurlanda both of the University of Pisa. Their studies are based on a reconstruction of black box and automation system data.

In the figure below, the blue outline represents the actual ship position at impact time while the green outline represents the simulated ship position, without the helmsman's error. The black ellipse represents the rock's position. As can be seen, in this case the left bulkhead of the ships is about 10m from the rock. One could safely state that, according to the simulator, the ship would have passed close to the rock without impacting or, considering the worst case for the simulation error and model approximations, the impact could have occurred about 18m behind.



“For a correct reconstruction of the facts, it was very important to evaluate the exact time at which the hull hit the rocks, as well as the exact contact point with the shallows, in the coordinate system of the ship's GPS. In fact, an accurate time-reconstruction is crucial, due to

the short time elapsed between the error and the impact. The Judge's consultants had previously performed an evaluation of the ship's position at the estimated impact time (21.45'.07"). This reconstruction, in our opinion, was not consistent with cartographic data: at 21.45'.07", the position of the breach on the ship's bulkhead was about 40m behind the shallows. To investigate this point in more depth, we performed an accurate analysis of position, heading and time data of the ship. From these data, it was possible to calculate the instantaneous (linear and angular) velocity and acceleration..... The Judge's consultants, using qualitative arguments, stated that the helmsman's error had been inconsequential on the impact. This conclusion in our opinion should be re-examined using a quantitative approach and taking into account the aforementioned facts."

Gubian, Paolo & Piccinelli, Mario & Neri, Bruno & Neri, Paolo & Giurlanda, Francesco. (2015). The Disaster of Costa Concordia Cruise Ship: An Accurate Reconstruction Based on Black Box and Automation System Data. 10.13140/RG.2.1.1912.5522.

Although an earlier version of this paper was made available to the courts, the judges did not take the results into consideration and considered them to be 'lacking in scientific validity' despite the "best paper award" assigned to the paper by a jury of international experts.

The chairman of an expert witness panel, Admiral Giuseppe Cavo Dragone, headmaster of the Italian Naval Academy at Livorno, said any delay caused by the helmsman's error 'appeared to be irrelevant' further stating, "The ship would have hit the rocks in any case."

Language Influences

On the approach to the grounding point, there are three steering incidents where the helmsman appears confused as to the course or helm orders and one case where the OOW is momentarily confused. To assist in the language issue, the 3rd Officer is taken from his position at the chart table and from his duties as the plotting officer to be stationed by the Helmsman.

SOLAS Chapter V – Regulation 14, and ISM Code paragraph 6.6.

Each crewmember must have suitable skill to understand the work language and, for some activities, to give orders and instructions, and consequently to answer using the language of work.

The language of work must assure an effective skill of communication suitable to:

1. 1) *to warrant adequate performance of the crew in the actions related to the safety;*
2. 2) *receive the information related to the application of the SMS procedures.*

The Company "Management Company System Manual" (MAN 01SMS – Annex- 15), has established, in the paragraph 5-5-3, that the language of work on board of its ships is the Italian language.

Proficiency of the English language was internationally mandated for those at sea nearly 10 years ago, although performance standards with a system of testing protocols to verify that mariners can speak, read and write English in accordance with the STCW and SOLAS regulations have never been formally established by the IMO. While some ship registries such as the United Kingdom and Marshall Islands have their own specific English language testing requirements for mariners, the international regulations do not. It should also be pointed out that although these countries have issued a testing requirement, that testing is in the hands of the shipping company or management employing them. Flag State Inspections and Port State Controls have the powers to check on language used, and it's understanding of the crew. This rarely occurs.

AN ISM audit was carried out by the Flag State (Italy) on March 6/7th 2012 during which the following non conformity was recorded;

- 1 The procedure for the evaluation related to the recruitment of the deck and engine

1. The procedure for the evaluation related to the recruitment of the deck and engine personnel does not provide for the assessment of the work language.
2. The procedure related to the recruitment of the personnel assigned to the complementary services does not provide for the assessment of the work language, when these personnel are engaged to be assigned in a task linked with the Muster List.

In support of this non conformity the following statements from officers and crew on board follow;

The helmsman, Jacob Rusli Bin, of Indonesian nationality, testified (reference paper n. 0267 of the Judicial Authority of Grosseto), that he did not at times understand the Master's orders, even though they were in English.

The 1st Engineer. Engine management, (interview on 20 March 2012 – Enc. 384), of Bulgarian nationality, testified he does not fully understand the orders given in the Italian language (the working language), during the emergencies situations.

Radio Officer (testimony on 16 March 2012 – Encl. 383) testified, that while lowering of the lifeboat, the Boatswain gave instructions both in Italian and in English to the crew coming from South America.

The Safety trainer (see interview on 23 May 2012 – Encl. 393) testified that both Italian and the English were the working language on board, and that the training activities were usually carried out in English.

The second Boatswain (interview on 30 March 2012 – Encl. 385) declared that they usually spoke Italian except when they did not understand each other, and they then spoke in English, whereas the Officers gave the orders in both languages.

The Safety Officer in his interview (page 7438 and in the folder of Grosseto Judicial Authority) showed he was not familiar about the SMS instructions related to the language of work on board.

As evident on the bridge recorder, the orders given on the bridge were in both Italian and English, with the Captain giving his helm orders to the helmsman in English.

From this it is proven that the language situation on board and most important within the operations staff, was chaotic, with the working language of Italian not being understood by the majority of the crew and many not understanding English. The crew were selected on an optimum cost basis with communication and safety taking a second place. This had considerable bearing on the grounding and the abandonment phase.

2ND PHASE. THE DAMAGE



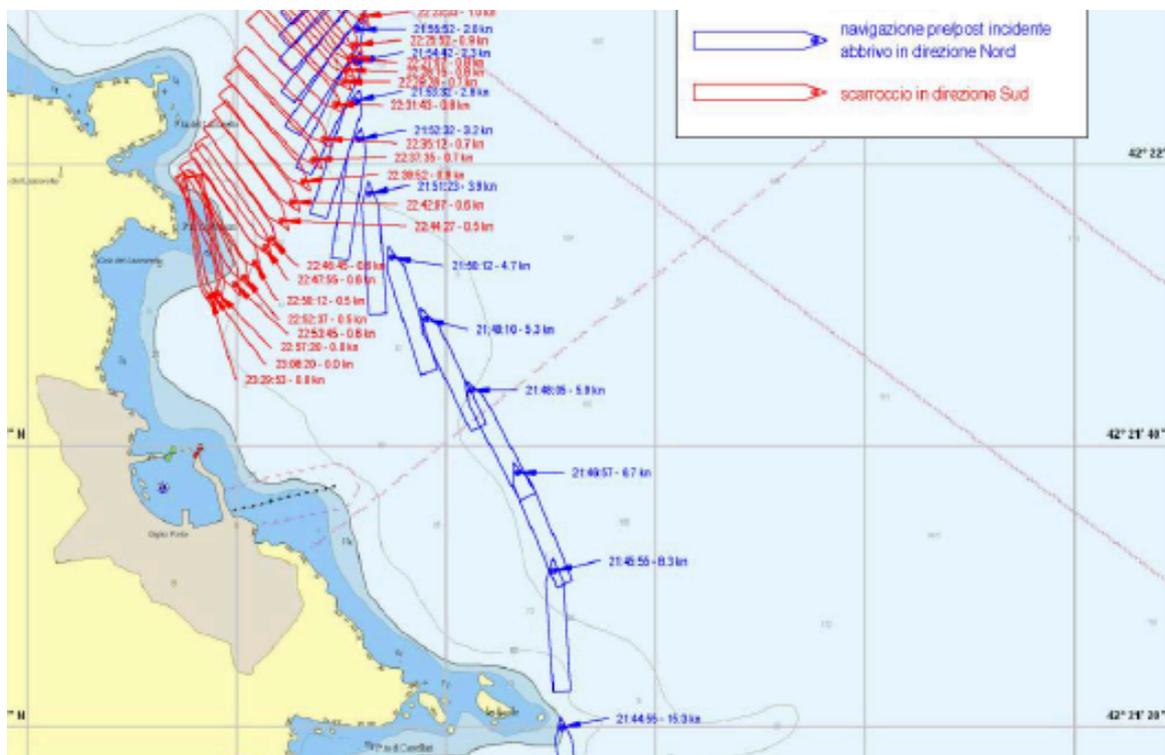


Time Line. Event

| | |
|------|--|
| 2145 | Grounding |
| 2150 | Blackout |
| 2155 | Initial Assessment of Flooding reported to bridge |
| 2212 | Leghorn maritime Rescue contacts ship. Advised of Blackout. |
| 2234 | Heel increases. Ship declares distress to maritime Rescue Centre |
| 2240 | Distress signal through INMARSAT |
| 2244 | Ship reported as touching bottom |
| 2248 | Abandon ship general alarm initiated |
| 2255 | First lifeboat launched |
| 2258 | Ship grounding report by Master |
| 2337 | 440 persons reported still remaining on board |
| 0034 | Ship final capsizes. Master leaves ship. Heel 70- 75 degrees |
| 0041 | 50 persons reported still on board |
| 0344 | 50 persons reported still on board |
| 0422 | 30 persons reported still on board |
| 0614 | evacuation reported completed. |

After the collision with the rocks, the ship gradually lost her own momentum and, without power to her engines and steering became subject to the wind and the current. Very fortunately, this took the ship back to ground for a second time close to the small harbour.





Track of the ship after the grounding. The Blue track is the ships continuing course. to the North. As the momentum of the course and speed following the collision gradually ceases, the effects of current and wind gradually control the ship and she drifts South West as shown in red.

The Damage.

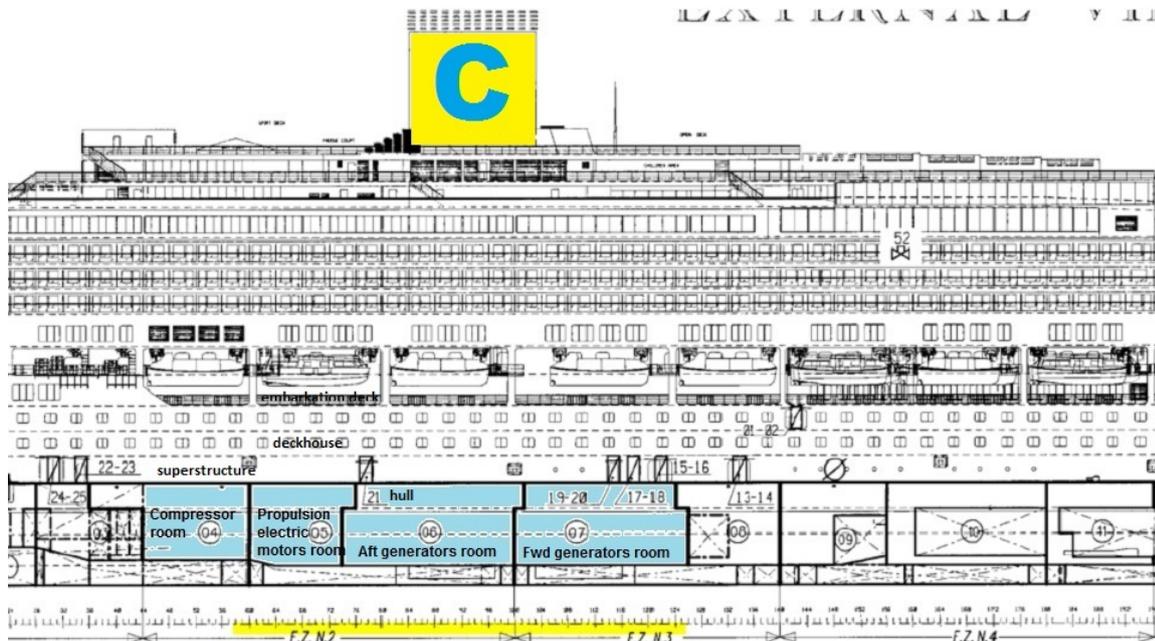
The damage was catastrophic, although unknown at the time. The ship had been built to SOLAS 90 regulations which specified that the number of flooded compartments the vessel would survive would be 2.

According to the reports, the Hull damage was a length of 53 metres (from frame 52 to 125) and variable width up to 7.3 metres.

| Compartment | Frames | Content |
|-------------|---------|---|
| No.3 | 28 44 | Store room |
| No.4 | 44 60 | Main thrusters, bearings and hydraulic units machinery space air conditioning compressors |
| No. 5 | 60 76 | Propulsion electric motors, fire and bilge pumps, propulsion and engine room ventilation, propulsion transformers |
| No.6 | 76 100 | Three main diesel generators (aft) |
| No.7 | 100 116 | Three main diesel generators (fwd) |
| No.8 | 116 140 | Ballast and bilge pumps |

Compartment No. 5 completely flooded in minutes, with rapid flooding occurring in Compartment 6 and progressive flooding of Compartments 4, 7 and 8. The flooding of these five compartments quickly increased the ship's draught so that deck 0 started to be submerged. This was the termination deck for the bulkheads so water also started to enter WTC No. 3 through a stairway connecting deck 0 to Deck C.

The flooded compartments contained a number of critical systems such as main diesel generators, ballast and bilge pumps, electrical propulsion motors. The flooding of these compartments resulted in black out of main electrical network, loss of propulsion and various high capacity sea-water service pumps. 6 compartments flooded within 40 minutes.



| DESCRIZIONE POMPE | | | |
|-------------------|--------|------------------|--------------------|
| DECK | FRAMES | NAME OF PUMP | CAPACITY/HEAD |
| PONTE | ORD. | NOME DELLA POMPA | PORTATA/PREVALENZA |

| REMOTE CONTROLLED SHELL | | |
|-------------------------|--------------|--------------------------|
| ITEM | PIECE NUMBER | SERVICE DESCRIPTION |
| Nr. | MARCAPEZZO | DESCRIZIONE DEL SERVIZIO |

Watertight doors.

M/S Costa Concordia had 16 watertight bulkheads at frames 28, 36, 60, 74, 100, 126, 140, 156, 180, 196, 220, 236, 252, 264, 284 and 308 however 9 bulkheads at frames 28, 36, 140, 156, 180, 196, 220, 236 and 252, had two doors making a total of 25 W/T doors.

MSC.1/Circ.1380 10 December 2010 Annex

Guidance for watertight doors on passenger ships which may be opened during navigation.

1.1 *Watertight subdivision is vital to ship stability and survivability to protect life, property and the marine environment in cases of hull damage after collision or grounding. The number of openings in watertight bulkheads on passenger ships is to be kept to a minimum in accordance with SOLAS regulation II-1/13.1 (previous SOLAS regulation II-1/15.1).*

1.2 *In order to maintain watertight subdivision, while allowing for the safe and effective operation of the ship, all watertight doors are to be kept closed during navigation, except in certain limited circumstances. SOLAS regulation II-1/22.3 (previous SOLAS regulation II-1/15.9.2), allows a watertight door to be temporarily opened to permit the passage of passengers or crew, or when work in the immediate vicinity of the door necessitates it being opened. In this case, the door must be immediately closed, when transit through the door is complete or the work is finished. Additionally, SOLAS regulation II-1/22.4 (previous SOLAS regulation II-1/15.9.3) permits certain watertight doors to remain open during navigation but only if considered absolutely necessary to the safe and effective operation of the ship's machinery or to permit passengers (*) normally unrestricted access throughout the passenger area (*).*

This determination is made by the Administration after careful consideration of the impact on ship operations and survivability.

7.4 *The necessity for a watertight door to remain open during navigation should be demonstrated by the Company. The Company should satisfy the Administration with relevant information, such as operational needs, number of passages through the watertight door per time unit, alternative passageways around the watertight door and results from the risk assessment. The Company should also submit a copy of the relevant sections of their safety management procedures relating to the operation of watertight doors during navigation, as well as related information such as restrictions or limitations on when watertight doors may remain open*

remain open.

Appendix 1: *Only after careful consideration of the impact on ship operations and survivability should an Administration permit a watertight door to remain open during navigation.*

It should be noted that the UK objected to this relaxation of the existing rules.

Simone Canessa, the ship's navigating officer, , says in her statement, *"The opening of W/T doors was standard practice during navigation to make it easier for those who were working to come and go"*. While this is not contrary to MSC 1/Circ, the responsibility is now transferred to the ships staff, which means the hotel side of the organisation, as to which doors can be opened and when.

It should be noted that immediately on impact with the rocks, the Captain ordering the closing of both the watertight doors in the bow and the engine room just after the collision and then again sometime later another order to *"Shut the door's. Shut all the watertight doors immediately."* This also indicates that the leaving of W/T doors open was common practice on board.

In the case of the Costa Concordia the flag state administration (Italy) allowed some watertight doors to be kept open at sea if deemed necessary. These exceptions are Watertight Doors 7, 8, 12, 13 and 24. The only doors indicated as open at the time of the accident were 12 and 13, which were located near the laundry on Deck B. These two doors were apparently closed by order of the Captain. However, we know from the evidence presented, that a door in the engine room was open.

Other doors in the damage zone were opened and closed by crew to assist with their escape. All watertight compartments are fitted with emergency escape trunks but these may not have been reachable.

On Tuesday 12 November 2013 Mr Hugo di Piazza, a technician in the engine room, told the trial;

"Before he could phone the bridge, he was hit on the shoulder by a 10-metre jet of seawater. He then managed to close a watertight door, only to see water seep underneath it, before he found a stairway, which was blocked, possibly due to the buckling caused by the collision", he recalled.

Di Piazza, who was on his first shift in the engine room, said he opened another door from which water was gushing, before finding a safe route to higher decks as the water swirled to knee level.

Another engine crewmember Mr Tonio Borghero, said the engine room was flooded within 20 minutes of the collision.

The nature of the incident was so fast that it necessitated the opening and closing of W/T doors in order to escape and secure the engine room.

While the hull was damaged over a length of 53 meters, the report does not say if the watertight integrity for this whole length was affected. Many ships have had quite severe damage to their hulls without losing the watertight integrity in those compartments adjacent to that area. While the opening and closing of W/T doors is not good practice, the reality is the ship had an inadequate subdivision and a lower achievable survival state. Greater subdivision, or better longitudinal bulkheads would address the issue of raking side damage as recommended by Lord Mersey I the Titanic inquiry a hundred years ago.

Regardless of this, because of the extensive hull damage, the eventual loss of the ship was inevitable, especially as, through the failure of the emergency generator, it was not possible to use the pumps, the watertight doors would have had no effect on the final loss of the ship although, if doors were open, as seems to have been the case in the engine room, then there obviously was contribution to the rapidity of the flooding resulting in a decrease in the time those had on board to abandon the vessel.

It should be noted that any ship intending to approach land and navigate at such a close distance should have all the watertight doors closed well before closing on the land and during the close passage no doors should have permission to be opened.

The Emergency Generator.

With the loss of power from the main generators due to flooding, the emergency generator as essential to keep the emergency functions of the ship such as the pumps, lifts, and essential bridge equipment.

Three Electricians testified that all lifts reached their scheduled deck after the blackout however one elevator was found by the speleologist divers with the doors opened, and bodies were found on the bottom of the shaft. This suggests that the doors were opened on this lift, when the emergency switchboard was connected in the forced mode at around 22.15.

“There were people stuck in the lifts screaming so we climbed up the large staircase.”

Monique Maurek, 41, and her husband Anton.

IMO does not have any special inspection requirement for elevators on ship. However, the SOLAS Convention chapter I, part B (Surveys and certificates) requires that it is established that all equipment is in satisfactory conditions and fit for the service for which it is intended, so that would also include elevators.

It is hard to imagine a more frightening death than this with the ship slowly turning over and the water getting closer until it overwhelmed them. The IMO has no legislation governing the capability of lifts to stop at a deck and open the doors and then ensuring the doors close again if power is lost.

3RD PHASE. THE ABANDONMENT





Rvongher

Lifeboats in Giglio Harbour the next day.

The evacuation lasted for more than six hours. Of the 3229 passengers and 1023 crew known to have been on board – 32 people drowned, hundreds were injured and many more traumatised.

The Criteria of abandonment

The Criteria was relaxed to accommodate the increased size of passenger ships and reduce any additional costs.

The International Maritime Organisation (IMO) under SOLAS Chapter III Regulation 21.1.4 requires that all survival craft shall be capable of being launched with their full complement of persons within a period of 30 minutes from the time the abandon ship signal is given. However, this regulation stipulates that the 30-minute timeframe only starts when all the passengers have been mustered with lifejackets donned.

SOLAS also requires the lifeboats to be capable of being launched up to a maximum degree of heel of 20 degrees.

Two reporters were travelling on board the ship. They boarded a lifeboat before 2300 when the ship was still at an angle of list of 15 degrees or less;

We soon realised that there was a big problem – the inclination of the ship meant our lifeboat couldn't be lowered directly into the sea. We were on one of the higher decks but the ship was tilting to the opposite side. The lifeboat was more or less resting against the side of the Concordia which meant that it couldn't be lowered into the water. Three young crew members tried in every way possible to free it, hacking away with axes at anything blocking our descent and kicking hard at the side of the ship. They were trying to work as fast as they could, while another member of the crew, who was still on deck, was shouting instructions. Blow after blow to free the lifeboat, but they couldn't free it. Each time they gained some space, the lifeboat dropped abruptly, making those of us inside feel as if we were plummeting into the sea. But it still wasn't enough

Castro, Luciano. Concordiagate - The cruise ship tragedy as told by two reporters on board (Futurebook Book 2) . CUEC Editrice.

The total passenger ship evacuation time will also include the time taken by the passengers and crew to actually assemble at the muster station from wherever they happened to be on the ship once the initial alarm has sounded.

The IMO "Guidelines for a Simplified Evacuation Analysis for New and Existing Passenger Ships" covered by [MSC Circ 1033](#) and its successor [MSC Circ 1238](#) recommend a maximum allowable total passenger ship evacuation time to be in the range of 60 to 80 minutes based on the following:

- 60 minutes should apply to ships having no more than three main vertical (fire) zones:
and
- 80 minutes applying to ships having more than three main vertical (fire) zones.

It must be noted that these are guidelines only and it is for the Flag State to decide on their implementation. In the case of the Costa Concordia the time taken was over 6 hours with the very close proximity to land and the considerable assistance of shore rescue facilities.

The IMO Criteria for abandonment is based on the following:

5.1 the crew will immediately be at the evacuation duty stations ready to assist the Passengers.

It is my experience that this never occurs, especially at night. As a benchmark, 10 minutes should be allowed for this. A small proportion of the crew will not even appear at their correct stations at all, many being stalled by the need for passenger attention or other immediate duties that only become apparent at the onset of the emergency. Others will be more concerned at ensuring their own safety than that of others. This is exactly what happened on the Concordia.

5.2 passengers follow the signage system and crew instructions (i.e., route selection is not predicted by the analysis).

With emergency lighting, as occurred on the Concordia, and not considered in the model, the signage and routing could be obscured. As the number of passengers grow, the following of the crew routing instructions will slow down.

.5.4 family group behaviour is not considered in the analysis.

This is particularly important. Families, if apart, will ignore crew instructions and look for their family members, especially if parents are on the upper decks at the time of the alarms and their children are in their cabins several decks below. Any instructions to deter from this will be ignored.

5.5 ship motion, heel, and trim are not considered.

This was a most critical factor in this case. Any rolling of the ship hampers movement, especially amongst those not experienced in movement during rolling. Any list or rolling will particularly hamper the infirm and disabled, especially those in wheelchairs. The question remains as to how these ships intend to move the wheelchair bound passengers down several decks without lifts. As the ship lists further, this immediately will hamper the speed at which the boats can be prepared and increase the case required during the boarding and lowering procedures. As the list increases, the more difficult movement around the vessel and the launching procedure will become. Eventually boats on one side, once passing the legislated launching list requirement of 20 degrees will become unusable.

Alcohol

The cruise industry of today relies on a high alcohol consumption for a considerable part of its profits unlike the past where the cabin cost was the main income. This means that the old controls that used to be imposed are now gone with the result that, especially at night, a

proportion of passengers will be intoxicated in varying degrees. This intoxication will considerably hamper the evacuation efforts and cause a safety concern for those passengers who are sober. This was not considered in the inquiry.

Lifejackets

A most important criterion has not been considered in the IMO model. The wearing of lifejackets in the ship will double the space required for passenger movement, again increasing the evacuation time.

The Mustering Points.

This Impacts heavily on the evacuation of the ship. As the decks continued to get higher, so did the lifeboats. Eventually, they became too high for safe evacuation and they were moved back down to a lower distance above sea level. Unfortunately, the deck space for mustering by these boats was not designed into many ships therefore the mustering of passengers is still completed in the public rooms on the upper decks. Then the lifejackets are put on and they are led down to the boat embarkation deck. This not satisfactory for many reasons. Passengers on the upper decks have to go to their cabins, often below the boat deck and then return to the upper decks for muster. At the same time passengers are coming from their cabins and going up to the upper decks to have to go back down again to the embarkation deck. Give the situation of night time and emergency lighting, it is very easy for passengers to get mixed up and indeed lost from their group. This in turn means that many passengers will not be in the correct boats leading to a panic enhancing situation trying to find space in other boats. This is exactly what happened in this case. If the mustering station is by the lifeboats, or there is a waiting area for boarding there has to be sufficient room for passengers to sit while waiting without being crushed together.

Stairways.

The main criteria for the design of stairways on these ships seems to be aesthetic rather than practical. The stairways should be so designed to avoid blockage which if occurring, would lead to delays and the inevitable start of panic conditions. It is therefore essential that they are wide enough to allow for the movement of dense two-way traffic with systems that allow for the emergency movement of wheelchairs.

Time Line.

| Time | Events | Angle of list | Source | Time after "contact" |
|------------------|---|---------------|--|------------------------|
| 21.45 | Contact with underwater rock | 0° | AIS | 0 |
| 21.50 21:52 | Black out The Chief Engineer and Electrical officer failed to start emergency generator | 0° 0° | Crew Crew | 0 h 05 min 0h 07min |
| 21.55 - 22.00 | Initial assessment of flooding and reports to personnel on the bridge | 0° | Chief Engineer 2 nd Engineer Chief Mate | 0 h 15 min |
| 22.12 | Leghorn Maritime Rescue Sub-centre Control contacts ship and is informed about black out | | | 0 h 27 min |
| 22.34 | Ship reports increasing heel and declares the "DISTRESS" Leghorn MRSC request information on number of persons on | | | 0 h 49 min |

| | | | | |
|-------|--|--------|---------------------|-------------------|
| | board | | | |
| 22.36 | Ship drifting | 5° | Crew | 0 h 51 min |
| 22.39 | Leghorn MRSC informed about Ship's stern heaviness | | Patrol boat "G 104" | 0 h 54 min |
| 22.40 | Ship distress launched through INMARSAT | | | 0 h 55 min |
| 22.44 | Ship touching the sea bottom | | Patrol boat "G 104" | 0 h 59 min |
| 22.48 | General (Abandon ship) Alarm | | | 1 h 03 min |
| 22.55 | First lifeboat launched | | Patrol boat "G 104" | 1 h 10 min |
| 22.58 | Ship grounding | 15° | Master | 1 h 13 min |
| 23.37 | 440 persons still to evacuate | 20° | Livorno Coast Guard | 1 h 52 min |
| 00.34 | Capsize - ship master leaves the ship | 70-75° | Master | 2 h 49 min |
| 00.41 | Helicopter ITCG intervention to recover 50 persons still aboard | 80° | Livorno Coast Guard | 2 h 56 min |
| 01.46 | Leghorn MRSC intimates the master to go on board the ship and to give an account of the actual situation | | Livorno Coast Guard | 4 h 01 min |
| 03.44 | 50 persons still to evacuate | | Livorno Coast Guard | 5 h 59 min |
| 04.22 | 30 persons still to evacuate | | Livorno Coast Guard | 6 h 37 min |
| 06.14 | Evacuation completed | | Livorno Coast Guard | 8 h 29 min |

Note. The numbers of persons waiting for evacuation are from the official figures quoted at the time rather than the actual figures calculated by the rescue services.

The Mental State of the Captain.

It is well known that disasters and catastrophic crises strongly affect human behaviour:

"People undergoing a crisis or dealing with the aftermath of a disaster are normally, well-functioning people who are struggling with the disruption and loss caused by the disaster. They do not see themselves as needing mental health services and are unlikely to request them." Because of this, it is important that those treating individuals undergoing a crisis learn to recognize the common reactions to a traumatic event. Reactions can include changes in behaviour, physical well-being, psychological health, thinking patterns, and social interactions. The following signs, symptoms, and reactions are common psychological responses to a crisis or traumatic event: disbelief, emotional numbing, nightmares and other sleep disturbances, anger, moodiness, and irritability and forgetfulness."

The Captain has just suffered a most severe traumatic shock. Certainly more than most people have ever endured.

'Immediately after a traumatic event, it is common for people to feel shocked, or numb, or unable to accept what has happened.

Shock - when in shock you feel:

- *stunned or dazed or numb*
- *cut off from your feelings, or from what is going on around you.*

Denial - when in denial, you can't accept that it has happened, so you behave as though it hasn't. Other people may think that you are being strong or that you don't care about what has happened.

Over several hours or days, the feelings of shock and denial gradually fade, and other thoughts and feelings take their place'

The Royal College of Psychiatry

In this case the trauma resulting from the accident was increased by the guilt.

'Patients with a higher level of shame and guilt at the start of treatment displayed a higher level of PTSD symptoms over the course of treatment compared to other patients'.

Trauma-related shame and guilt as time-varying predictors of posttraumatic stress disorder symptoms during imagery exposure and imagery rescripting—A randomized controlled trial
[Asle Hoffart](#) & [Tomas Formo Langkaas](#), Oslo University.

"The captain appears to have succumbed to "normalcy bias", where disbelief and overconfidence obscure realities too horrible to contemplate. "He wanted to believe things were not as bad as they looked, minimising problems and stalling decisions, while giving or receiving information. And then the command structure simply collapsed,"

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Professor David Alexander, of the Institute for Risk and Disaster Reduction and a specialist in disaster management has followed the case of the Costa Concordia.

These comments are supported by the bridge officers.

Captain Schettino called Roberto Ferrarini, the head of the crisis unit of Costa Cruises, the Genoa-based company that operated the ship.

"Roberto, I took the ship past Giglio. Palombo was telling me 'sail close, sail close'. I hit the rocks. I'm destroyed, I'm dead, don't say anything to me."

First mate Giovanni Laccarino, said that the Captain put his head in his hands and told the officers on the bridge: "I messed up".

During the trial, Mr Laccarino told the court that he was using his Playstation in a crewmate's cabin when the ship hit the rocks.

He rushed to the bridge, where instruments showed that the ship had lost propulsion, but was surprised at the captain's calm demeanour.

"He was completely lost," he said. "He was out of his routine mental state. He was under shock. He wasn't the person I knew."

Ms Canessa, the navigator, also said Captain Schettino showed chronic indecision as he contemplated the loss of his ship.

"I was saying to him very insistently that he needed to do something, to give the general

emergency signal, but he was telling us to wait," she told the court. "even as officers screamed at him to do so", said Canessa. "He told us to wait, he didn't give us answer," she said.

Capt. De Falco of the Coast Guard stated that;

"following the contact that took place between the person in charge of the Company, Mr Paolo Mattesi present in the operations room and Capt. Schettino, it was decided to send another person, subsequently identified as Officer Martino Pellegrini, since the captain did not appear to be lucid."

'Video of the chaos on the bridge that night later surfaced, and while it sheds little light on Schettino's technical decisions, it says worlds about his state of mind. "From the video, you can tell he was stunned," says John Konrad, a Nautical Analyst. "The captain really froze. It doesn't seem his brain was processing."

In an interview with the Naples daily newspaper Il Mattino, Gianluca Marino Cosentino, medical officer on board the Costa Concordia, also mentions the long delay before abandoning ship and accuses Schettino, "Everyone was looking for the captain. As a doctor, I thought he appeared upset and no longer rational. He did nothing to coordinate the rescue. Personally, I was very surprised to see Schettino out of uniform on the quayside after midnight. During the rescue operations on land I could be identified easily because because of my uniform."

The evidence overwhelmingly suggests that Captain Schettino was suffering from traumatic shock syndrome and was in a mental state of denial therefore obviously incapable of taking any decisive action. This was supported by video evidence of the chaos on the bridge. As this was recognised by two officers on the bridge, then this should also have been recognised by the Staff Captain who was also present. It was therefore his duty to assume command while the Captain was in this state. The question must be then why didn't he?

The Captain's mental state and the Staff Captain's failure to assume command was never mentioned or discussed at the initial inquiry or the trial or even the appeal. Yet this contributed to the delay in sounding the general alarm calling all to their muster stations and ultimately the delay in abandoning the vessel and to the deaths and injuries to the passengers. This delay was the central part of the charges of manslaughter against the Captain.

21 45 33 master orders W/T doors closed.

21:46:05 the emergency generator that provides power starts only for 41 seconds. :

21:52 The Chief Engineer and Electrical Officer tried and failed to start the ship's emergency diesel generator.

Passenger announcement

Shortly afterwards, passengers were told that the ship was suffering a "blackout", but that the situation was under control. Following the massive jolt and noise caused by the original collision, and the subsequent blackout the initial message to the passengers via the public announcement system was as follows;

"Ladies and gentlemen, your attention please, I speak on behalf of the Captain, we are currently in a blackout experience an electrical fault. At this point the situation is under control".

At some point, passengers and crew started spontaneously putting on lifejackets, and assembling in the lifeboat areas.

Again, a member of the crew, under the captain's command, informed the passengers that;
"We kindly ask you to return to your cabin or if you prefer you can stay in the lounges. Once we've finished addressing the problem that we have the electrical problem with the generator everything will be fine. This is why we have these emergency lights. Everything is under control. If you wish to remain here, that's fine but I kindly ask you to return to your

cabin and stay calm”.

This was despite the fact that the ship had a noticeable list and it would have been obvious to most on board that there was more than just an electrical problem.

21:55 Bridge advised at least three compartments flooded. the computer software used for the calculation of stability (NAPA), despite the dedicated UPS, is not working.

1st Deck Officer and the Deputy Chief Engineer during the inspection meet at Deck 0 and continue inspection of the watertight compartments. Arrived at the deck A to verify that there is a leakage of water from the water-tight door 24 and then deduce that the 4 compartment is flooded.

Therefore, the flooded compartments appear to be at least 4 (compartments 4,5,6 and 7)

Within 10 minutes of the collision the Chief Engineer had informed the personnel on the bridge about flooding in two WTC (No. 6 & 7). The 2nd Engineer's report on the flooding in WTC No. 5 was passed onto the bridge. The Chief Mate then informs the Staff Captain (ships second-in-command) about flooding in WTC No. 5, 6 & 7.

21:57:58 the Master has a first telephone contact with the Company and reports to the Fleet Crisis Coordinator that the ship hit a rock with the left side towards the stern, reports the dynamics of the casualty, but not the actual flooded compartments.

The Fleet Crisis Coordinator, received this information, incorrectly identifies the flooded local in that of the principal electrical engines (local PEM - compartment 5) and not in the compartment 6, where the Diesel Generators and the main electrical panel are situated and refers the information to the Technical Inspector of the ship which is located at the headquarters of the Company.

22:07, the ship, contacted by the Operations Room of the Civitavecchia Harbour Master, states that there is only a black-out, but that the situation is under control.

First Report

Somewhere on the ship, an Italian woman named, Concetta Robi, took out her cell phone and dialled her daughter in the central Italian town of Prato, near Florence. She described scenes of chaos, ceiling panels falling, waiters stumbling, passengers scrambling to put on life jackets. The daughter telephoned the police, the Carabinieri.

Rescue Services Response

The coast Guard Headquarter of Livorno, home to 2nd MRSC has responsibility over an area corresponding to the surface of the region of Tuscany. R.S.C. Department of Livorno is the element of organization that at 22:06 received the news of unspecified problems on board the Costa Concordia by Prato Carabinieri station. These were, in turn, informed by the mother of a ship passenger that reported the collapse of a portion of a room ceiling and also spoke about an order given to passengers for wearing life jackets. It is the M.R.S.C. that has kept in touch with the ship and coordinated SAR operations since the casualty occurred in the SRR of responsibility. They sent its own naval units and coordinated intervention of naval and air units belonging to other Italian Coast Guard and others government and private.

Following this, the coast Guard Headquarters, through the operations room of Livorno, established a first contact with the ship, which was followed by many others, on VHF channel 16, in which the coast Guard received misleading information from aboard the ship, apparently intended to minimize the risk on board as well as the true scale of the emergency.

Nevertheless, as soon as the major scale of the emergency became apparent, the SAR chain was immediately activated, under the coordination of the 2nd MRSC operations room, which responded to the emergency according to the duly provided regulations by ordering the de-routing of merchant ships in transit, also identified by AIS (Automatic Identification System), and the alert and dispatch of vessels of the coast Guard and other governmental departments, as well as rescue aircraft and rescue tugs, until reaching the final maximum deployment as listed below:

- 14 merchant vessels (diverted in the course of navigation or sent out of the nearby harbours);
- 4 tug boats;
- 26 patrol boats;
- 8 helicopters.

22:09 Judges at the trial played a recording of a call between Schettino and the engine room timed at 10.09pm, in which the captain asks, "*But where have we made contact?*", only to be told, "*Captain, here everything is lost.*"

22:10 The Fleet Crisis Coordinator contact the ship Technical Inspector again informing him that the ship is in black-out and there is water even in the stern generator room.

22:10 to 22:15 the list goes from the port to starboard.

22:10:36 the NAPA (Software stability) is running and is operated by the Radio Officers and 3rd Deck Officer. Its operation, however, is not constant.

22:11 the ship is practically motionless (0.3 knots), begins then to drift and to shift the bow to starboard, heading SW for the combined action of wind, NE, and rudder positioned all to starboard.

22:18 Engine Control Room reports to the bridge lost all automation and that no system (balancing pumps, bilge, masses, etc..) can be put into operation. The data is reported to the bridge.

22:18:19 Master refers by phone to the Fleet Crisis Coordinator of the Company that there are problems with the emergency diesel generator, also reports that there are at least two compartments flooded, those of diesel generators (compartments 6 and 7); aware of not having propulsion, he assumes that the ship can survive with only two compartments flooded.

2220 (35 minutes after the collision) the Captain is still asking how many compartments are flooding to which the confirmation "*3 compartments flooded*" is given. It is not clear when or if the bridge team became aware of flooding in WTC No. 4 & 8. Again this displays the Captain's mental state in not recognising the information that has been passed to him indicating that the ship is flooding beyond saving.

22:20:45 Master is updated about the flooding that affects the PEM, the main engines and stern generators one, two and three that is the compartments 5, 6 and 7.

22.21 The DPA reached a manager of the Company by telephone, considering him the CMD (and the latter declares to be such), to inform this person about the situation. But according to the above mentioned procedure, the CMD was a different person, who was not immediately informed.

22:22:22 The ship contacts the operations room of Civitavecchia Coast Guard asking the assistance of two tugs due to a breach, it is reported that the situation is under control thanks to the compartmentalization of the ship.

22:25:15 (VDR) the The Captain, contacted by MRSC Livorno, states that the ship has a hull breach, on the left side, that is causing a gradual heel, that on board there are dead or injured people and he only requires the assistance of a tug. At this point M.R.S.C. Livorno is ready to take on the control of emergency operations: from Porto Santo Stefano leaves the SAR unit "CP 803" leaves Port Santo Stefano, and crews of all available SAR patrol boats are alerted. Is decided to call on all ships in zone that can provide assistance and identifies, through the A.I.S, ships ALESSANDRO F. "and" GIUSEPPE SA ".

22:26:38 the Master contacts the company updating it on the actual situation.

22:28:36 The 1st Engineer reports to the ECR that there are cooling problems to the Emergency DG

22. 29. 27 Chief Engineer orders staff present in DG Emergency room to re-start it. This attempt fails.

22:30:08 some passengers enter lifeboats

22:30:07 the Chief Engineer, suggests to the Master to abandon ship.

22. 31. 33 engine staff, in clear danger, leave the ECR with the permission of the Safety Officer and move to Deck 4.

22:33:26 the "general emergency" alarm is raised.

The General Emergency Alarm

The general emergency alarm is meant to announce to the crew that the organisation of muster stations was now to commence. It is basically a preparatory order given in good time to prepare all ready for abandoning the vessel in an orderly, disciplined and calm manner. At the same time all relevant emergency equipment was to be prepared ready for use. This would include the lifeboats being lowered to the embarkation decks, engines tested, crew standing by to organise the mustering and embarkation, the elderly or infirm passengers taken care of and cabins searched for passengers who may not have heard the alarms or not understood the meaning.

22:35:53 the Master decides to "abandon ship".

22 36 05, passengers ordered to go to their muster station.

There has only been an interval of 2 minutes 27 seconds between the general alarm for the crew and the order for passengers to go to their muster station. This does not give those with the duty of dealing with the passengers, sufficient time to prepare for the muster or even time for them to get to their duty stations. The situation was aggravated by the fact that no preliminary muster drill had been held for the 696 passengers who boarded the vessel in Civitavecchia prior to sailing. While this was not illegal and the SOLAS requirement was that this should be done within 24 hours of sailing, this meant that these passengers, especially those experiencing their first time on a ship, were still not familiar with the layout of the ship, not only as to where various muster points were or how to get to them, but also with the correct wearing of lifejackets or even where the lifeboats and life-rafts were.

Passengers who embarked at Barcelona recounted an inadequate drill consisting of a video and lacking any practical instruction by the crew in the lounge where it was performed.

When any study of design of both ship and equipment is made, the prime consideration is the safety of those on board and, in the final analysis, to have the ability to abandon the ship successfully. For this we should adopt a worse case model. Obviously a hurricane situation, while theoretically possible, cannot be imposed on companies as the standards required would be prohibitive but a median can be assumed.

Lifeboats.

On passenger carrying vessels, lifeboats can still only be provided for 75% of the persons on board. This places the cruise ships in the same position of the Titanic. Putting this in perspective on the Costa Concordia the night of the sinking, there were 4229 persons on board the vessel; 3206 pax and 1023 crew.

| Port | Starboard |
|---------------------------|---------------------------|
| 12 x 150 person lifeboats | 12 x 150 person lifeboats |
| 1 x 60 person lifeboats | 1 x 60 person lifeboats |
| 33 x 35 person life rafts | 34 x 35 person life rafts |
| 1 x 25 person lift raft | 1 x 25 person lift raft |

The 13 boats on the starboard side odd numbered 1 to 27 with no number 13.

The 13 boats on the port side numbered 2 to 26.

Presuming that the passengers on board have priority for lifeboats this gave a theoretical capacity for 1860 passengers on each side giving a total capacity of 3720.

According to the LSA code 2010, the lifeboats, which are allowed to carry up to 150 persons must be boarded in 10 minutes. Which is 15 per minute or if you like, a passenger every 4 seconds. This is impossible, especially with enclosed lifeboats which are boarded through

narrow openings.

As the whole marine industry knows, what the class societies certify the boats to carry and the real numbers can be quite different figures.

The space and weight allocation defined in the 2003 IMO Life Saving Appliance (LSA) Code, under which this vessel falls, of 430 mm buttock width and 75 kg average weight were established many years ago, before people started to grow taller and expand their girth. For many years now, most survival training schools have realized that it has not been possible to load any of the lifeboats to full capacity, even when the students were just wearing work coveralls and no lifejackets.

*'In 2005, a typical maritime offshore oil training class of 41 people was measured in Dartmouth, Nova Scotia (39 male, 3 female). Their ages ranged from 18 – 56 years. Over 70% of the group measured in **work clothes only** exceeded the 430 mm space allocation at the hips, and the shoulders were even wider. The average weight was 87 kg, 12 kg over the IMO specification.'*

Ref; A human factors study on the compatibility between human anthropometry, ship abandonment suits and the fit in a representative sample of lifeboats – A preliminary report on 41 subjects.

Proceeding of the 4th International Congress on Maritime Technological Innovations and Research, Barcelona, Spain, 95-102.

Brooks, C., Kozey, J., Dewey, S. and Howard, K. (2005).

If this were applied then the total lifeboat capacity would be reduced by approximately 15% and would now be 3162, a shortfall of 44 passengers.

Life-rafts

Life-rafts have been a large step forward in saving life at sea however to rely on life-rafts as lifeboat replacement is wrong and unsafe. Such an interpretation is not placed on conventional merchant ships where the lifeboat capacity is required for all on board.

The capacity criterion of life-rafts is the same as that for lifeboats.

The legislation states;

'the number of persons having an average mass of 75 kilogrammes, all wearing either immersion suits and lifejackets or, in the case of davit-launched life rafts, that can be seated with sufficient comfort and headroom without interfering with the operation of any of the life-raft's equipment.'

As previously stated, the average weight was proven to be 87 Kg without any extra weight. If the weight of immersion suits, wet clothing and lifejackets, I suggest that a conservative figure can be assumed to be at least 90Kg which means that the capacity is now reduced by one fifth of that stated. Thus a 25 person life-raft is now only capable of holding 20 persons and a 35 person life-raft only capable of holding 28 persons.

Passenger Capacity

On the Costa Concordia, there were 67 x 35 person life-rafts with a total capacity once the one fifth is deducted, of 1878, and 2 x 25 person life-rafts which with the one fifth deduction give a capacity of 40.

23 of the 26 lifeboats were launched as 3 of the lifeboat davits did not function. the launching crew experienced problems with the erecting of the telescopic davit arms. The telescopic davits had quite recently been modified in Finland, by the installation of an extra "power packet" of compressed CO₂ "to push the davits out", and this system were reported

to have failed for some lifeboats.

Lifeboats must be capable of being launched when the ship has a list of 20 degrees in either direction.

Of the life rafts, only 3 of the ships 69 rafts were launched.

These launching figures means that the total capacity of the functioning lifeboats was 3270. Add to this the three life-rafts with a capacity of 105. This gives a grand total of 3375 seats for a total of 3206 passengers and 1023 crew giving a grand total of 4229. This leaves a shortfall of 715. If the Dartmouth figures of increased size were to be applied, then only 2869 seats are available which leaves a shortfall of 1360.

Following these figures, it is interesting to note the remarkably close figure to the shortfall of 1270 persons who were rescued by shore rescue services intervention.

22 30. Reported that some passengers had already started to enter the lifeboats.

22 36 05, passengers ordered to go to their muster station.

The IMO Life Saving Appliances (LSA) Code 4.4.3.1 states: *“Every passenger ship lifeboat shall be so arranged that it can be boarded by its full complement of persons in not more than 10 minutes from the time the instruction to board is given.”*

This translates to 15 persons per minute or if you like, a passenger every 4 seconds. Again, as those in the industry know, this is impossible, especially with enclosed lifeboats which are boarded through narrow openings.

22:36:34 Leghorn Coast Guard station advised that the list is growing and declares "DISTRESS".

2239 The first patrol boat reached Costa Concordia

22:40, with the ship already resting on the bottom, 'distress' was issued through INMARSAT 'C.'

22:47.22 The Captain orders drop the anchor. This order was superfluous to the situation as the ship was already resting on the rocks. Photos taken later by divers show clearly that they were lying flat, with their flukes pointed upward; they never dug into the seabed, rendering them useless.

2254 The Captain orders the abandon-ship order that was given first in English over the public address system

The Abandonment Begins

The operation, in fact, had already begun: Arriving on scene at 2239, local police reported three lifeboats already in the water. SOLAS regulations state that if necessary, the abandonment phase can start before all passengers have assembled. Many passengers were ready to board the lifeboats much earlier in the evacuation process but were prevented from doing so by the crew who were awaiting the captain's abandon ship order.

Not all the lifeboats and life-rafts were ready by 22.54 hrs. Three port lifeboats were not lowered to the embarkation deck for passengers to use and no life rafts were launched with any crew inside. Three lifeboat davits didn't work.

Warm Clothing

Under SOLAS, all on board, passengers and crew are required to have warm clothing and to wear this at muster, in order that they recognise the need to wear this for abandonment and for the ship's crew to check that they have this.

In Carnival cruise group, there is no policy for advising passengers to bring warm clothing with them nor are they checked at muster for warm clothing.

Crew Training

All crew members assigned to manage the lifeboats must have been trained and received a Certificate of proficiency in Survival Craft and rescue Boat (MAMS)

As required by legislation (SOLAS regulation 10 Chapter III and articles 205 and 209 of presidential decree 135/01), two crew members were assigned to each lifeboat as launch

presidential decree 455/91), two crew members were assigned to each lifeboat as Launch Chief and Launch Deputy.

Of the 52 persons assigned 35 had the required legal certification. 12 crew had MAMS certification issued 5 years earlier with no current validation and 5 had no MAMS certification.

SOLAS Regulation 10 chapter III states that each lifeboat must be crewed with crew capable of operating the motor and making minor repairs. This was not met for boats 25 and 26.

SOLAS Regulation 10 Chapter III requires a single person to manage each of the life-rafts.

Raft 34 did not have anyone assigned.

Of the 48 crew members assigned to manage the life-rafts, only 13 had valid MAMS certification, 4 had certification over 5 years old without validation and 31 had no training certification at all.

This meant that for the life-rafts, only 12 rafts were managed by trained crew, 3 rafts with crew with expired certificates, 18 by crew with no training certification and one raft with no crew at all. That could explain the failure to launch only 3 of the life-rafts on board.

The Master, after a drill for abandoning ship held on the 15 October 2011, warned the Company that the performance of his crew was decreasing and showed critical findings. The Safety trainer, during the interview carried out by the Leghorn Maritime Authority, confirmed to have found, when joining, the unaligned training of the crew and the lack of any evidence related to the training carried out on board, according with the ISM procedure, by the same crew. He immediately informed the Master, and the Master reported to him that the Company addressed the ship management for improving the training program on board.

During a Company audit in the last week of July 2011, the Company noted the unsatisfactory performance of the crew in the drill

Several passengers from the USA testified about the inadequate preparedness with the safety procedures showed by crewmembers assigned to manage the abandon ship. Similar evidences can be found in the interviews to the press given by several passengers.

22:57:41 hours The Captain informs the MRSC Livorno he has ordered abandon ship.

22:58 in its final position. Point of sinking in position 42° 21'50 .76 "N 010° 55'17 .40" E (Isola del Giglio - Cala del Lazzaretto).

23:00 The Crisis Committee was formed by Company.

23:10 the patrol boat "G. 104 "tells MRSC Livorno the lifeboats begin to move and head for the harbour of Giglio island , the life rafts, however, are towed by the SAR UCG Porto Santo Stefano and placed alongside the ferry" Aegilium ".

Other vessels converge in the area.

23: 16: 36 The Master orders everyone on the bridge to go to the bridge lifeboats and take their radios.

23:19:This time was the last recorded voice of the Captain from the bridge except for the Second Master that stays to coordinate the evacuation. His last communication was recorded at 23 32 55.

23:32:56 the Bridge is abandoned by the Second Master(Staff Captain)

23:35 MRCC Rome contacts the FCC who announced that the abandonment is almost complete. This was wrong information.

2337 The list on the ship now reaches 20 degrees. With the departure of the Staff Captain, the bridge is now abandoned.

4TH PHASE. CHAOS



23:38 hours MRSC Livorno contact the ship's Master by phone who reports there is still about 200/300 people passengers and crew still on board. 300/400 was the estimate from Patrol boat "G. 104 ". In fact, this estimate was considerably below those remaining.

23:45 A helicopter arrived from the mainland at 11:45. It carried a doctor, a paramedic, and two rescue swimmers from the Vigili del Fuoco, Italy's fire-and-rescue service. The swimmers boarded a police launch, Before them, the Concordia, now listing at a 45-degree angle, was lit by spotlights from a dozen small boats bobbing at its side. The launch headed for the port bow, where people had been jumping into the water. As it approached, a Filipino crewman on a high deck suddenly leapt from the ship, falling nearly 30 feet into the sea. He was taken ashore. It was the first of six trips the two divers would make in the next two hours. On the second trip they pulled in a 60-year-old Frenchwoman floating in her life

jacket near the bow. Next they pulled in a second Frenchwoman in an advanced state of hypothermia. "She was shaking uncontrollably," Scipioni recalls. "She was conscious, but her face was violet and her hands were violet and her fingers were white. Her circulatory system was shutting down. She kept saying, 'My husband, Jean-Pierre! My husband!' We took her ashore and went back."

On their fourth trip they lifted an unconscious man into the police launch; this was probably the woman's husband, Jean-Pierre Micheaud, the night's first confirmed death. He had died of hypothermia.

Two factors affect those in the water, Hypothermia and the lifejackets themselves.

Hypothermia.

| WATER TEMP | WATER TEMP | EXHAUSTION/ UNCONSCIOUSNESS | EXPECTED TIME OF SURVIVAL |
|------------------|----------------|--------------------------------|------------------------------|
| | 32.5°F | Less than 15 mins | 15 to 45 mins |
| 0.28°C to 4.4°C | 32.5°F to 40°F | 15 to 30 mins | 30 to 90 mins |
| 4.4°C to 10.0°C | 40°F to 50°F | 30 to 60 mins | 1 to 3 hours |
| 10.0°C to 15.6°C | 50°F to 60°F | 1 to 2 hours | 1 to 6 hours |
| 15.6°C to 21.1°C | 60°F to 70°F | 2 to 7 hours | 2 to 40 hours |
| 21.1°C to 26.6°C | 70°F to 80°F | 3 to 12 hours | 3 hours to indefinite |
| >26.6°C | Over 80°F | indefinite | |

The water temperature in Giglio island is around 15c in January. As can be seen from the chart above, this allows 1 to 2 hours before unconsciousness sets in. However, this is also affected by the age of the person in the water. The older they are the less time can be allowed.

It is difficult at night to judge the distance from land the ship may be and for an older person, after the first minutes, as tiredness sets in, the slower the ability to progress in water becomes.

Life Jackets

The SOLAS specification for lifejackets are inadequate for all shipping regardless of type. The standard lifejacket can injure the wearer by rising up and possibly breaking the neck. The SOLAS lifejacket has changed little from the Titanic incident when bodies were found with broken necks. Crotch straps, which would prevent this from happening, are not required. Some passenger ferries with Mass evacuation systems now carry lifejackets with crotch straps.

There is no hood to prevent heat loss through the head or face mask to keep the or-nasal cavities clear to prevent drowning by water inhalation.

The term life jacket is a misnomer as they are not jackets and do not give any warmth protection to the body.

The bulkiness of these jackets double the space required during evacuation and mustering.

'Currently, these passengers are each issued a large bulky SOLAS approved inherently buoyant lifejacket. Anyone making their way from a cabin to the upper deck for abandonment when the ship is listing or flooding has an impossible task to do this when wearing one of these or trying to drag it behind them along the companion ways, stairwells and stairs'

MARKIE, K.L. A STUDY OF LIVESAVING SYSTEMS FOR SMALL PASSENGER VESSELS. USCG STUDY MARCN 29, 1991.

'Anyone who has spent any time in open water with any wave splash and wind understands the huge improvement in performance with the addition of a face shield and crotch strap. All who attended the expert meeting were in favour of strongly promoting face shields and crotch strap.'

The conference on drowning in Amsterdam in June 2002.

Jumping from the ship

The SOLAS training manual 3.2. states that the following procedure be followed when jumping from a ship wearing the standard lifejacket.

Check the water for debris

Hold your nose and cover your mouth with your left hand

Check to see the life jacket is tied and all the straps secured

Cross over your left hand with your right hand and hold on to the lifejacket collar

Hold your elbows down to the side

Keep the legs together as you jump. Cross over the ankles will help with this.

Although this is a SOLAS requirement, passengers were not instructed in this at their muster stations or by notices in cabins and on the decks.

Finally, and most important, from the SOLAS training manual;

'The recommended maximum height for jumping in the water with a lifejacket on is 4.5 meters.'

Although most of the open deck space on the Costa Concordia were above this height, passengers were not instructed about this nor were notices posted on those decks above this height or in cabins warning of the dangers.

As of Friday, January 13th, 2012, RINA suspended the ship's class status citing other circumstances as the reason.

14.01.2012

00:00 The ship increases the list to starboard such as to create significant difficulties in embarking on life-saving craft, especially on the port side. There are now three groups of people left on board situated on the bow, in the centre and at the stern.

Divers teams are also activated by Livorno MRSC.

00:15 Despite the lack of leadership, confused and untrained crew members, the failure of 3 lifeboats to operate correctly, the failure of the emergency generator causing the loss of all power except for battery emergency lighting, almost total failure of the life-rafts, and hundreds of passengers on the edge of panic, in this first stage of the evacuation between approximately two-thirds of those on board the ship, somewhere between 2,500 and 3,300 are now off the ship, assisted considerably by the close proximity of the harbour which allowed lifeboats to return to the ship for more survivors and the many shore boats assisting with the abandonment.

On the ship, at this stage, any attempt at organised abandonment was gone.

The ship was now capsizing on her starboard side and the resulting inclination made it extremely difficult to embark the passengers on survival craft on the port side.

Owing to this and the fact that there were now survivors in the sea and with parts of the ship slowly submerging in the water there was a need to begin search and rescue(SAR) operations in the submerged part of the hull, the 2nd MRSC gave the following orders:

All naval means ready to operate in SAR operations, including the rescue forces dropping their rafts in the sea as well as boats and fast rescue boats were to rescue those in the water.

All divers were to be employed in the extraction of any passengers still trapped in their cabins or accommodation of the ship.

Further, after realizing, upon contact via phone with the Captain, that the ship had been abandoned by almost all the officers and crew, the Livorno operations station ordered the dispatch of aircraft rescue means over the ship to rescue the passengers.

Shore Rescue services take over the Abandonment

In consideration of the fact that almost all the officers and crew had abandoned the ship, the MRSC effectively and uniquely took over the abandonment of the ship arranging the passengers on board to be led to a ship's ladder lowered in the stern area to allow a more rapid and larger recovery of the survivors by the rescue craft.

Although the majority of officers had left the ship, Mario Pellegrini, the deputy mayor of Giglio, actually went onto the sinking ship and assisted with the rescue effort, as he could not find any senior officers on board *"There were a lot of people who wanted to help but there was no-one guiding them; there was nobody directing anything....At the beginning there wasn't much panic, just a lot of confusion. People didn't know what to do but there was no real fear. Then I went on the right-hand side of the ship and it started tilting towards the sea. Big parts of the ship were going underwater - then panic erupted, people really were scared."*

With the arrival on location of rescue patrol boat CP 305, sent from Civitavecchia, due to the greater size of this patrol boat an unusual but very effective rescue technique was devised, using another patrol boat to push the larger boat under the ladder. Once on CP305, they were then transferred to the smaller thrusting boat which when full departed to be replaced by another boat. This allowed for the 700 remaining passengers and crew to be rescued. This took a little less than 3 hours.

Witnesses Statements

As to the state of affairs on board the ship at this stage, we are reliant on witness statements, all of whom are suffering a high degree of stress. For this reason, care has to be taken as to their recall of events.

'it is hard to generalize about the effects of stress on eyewitness memory. The findings are somewhat mixed, and the explanation for stress effects on memory is far from clear, making generalization difficult.

More research is necessary to resolve this uncertainty. However, it is clear that, overall, high levels of stress harm eyewitness memory in more ways than they help it.'

Aharonian, Ani A. and Bornstein, Brian H., "Stress and Eyewitness Memory" (2008). Faculty Publications, Department of Psychology. University of Nebraska-Lincoln.

However as can be seen, the general accounts support each other as to the state of affairs on board the ship.

Giuseppe Grammatico told reporters that some passengers, including himself, seized the initiative to be evacuated, because orders weren't forthcoming from the ship's officials.

"Just think, our lifeboat was lowered into the water because we insisted that it be done without an order from the captain," Grammatico said.

A couple who were celebrating their fourth wedding anniversary, were eating in Milano

A couple, who were celebrating their fourth wedding anniversary, were eating in Milano when the ordeal began. Mr Rodford, 46, a tiler and plasterer from Rochester in Kent, said: *"It was our first cruise. I booked it as a surprise. We were at dinner when the ship seemed to hit something and started swaying from side to side. Suddenly the lights went out as if the generator had packed in, and from then on it was bedlam.*

"After a long wait – around 10.15pm – we were led out to the deck by some waiters and taken to lifeboat number 12, but it wouldn't lower down to the water because the lean on the ship was so bad.

"We had to climb out of that one and climb back up onto the deck and slide down its width towards the side of the ship that was leaning closest to the water. From there we managed to jump onto the bottom of an upturned lifeboat and then onto another lifeboat that was still upright. There were about 30 of us that got into it." It was 12.30am when they reached land.

By now two swimmers had boarded a police launch, Before them, the Concordia, now listing at a 45-degree angle, was lit by spotlights from a dozen small boats bobbing at its side. The launch headed for the port bow, where people had been jumping into the water. As it approached, a Filipino crewman on a high deck suddenly leapt from the ship, falling nearly 30 feet into the sea. He was taken ashore and then the launch returned to the ship. It was the first of six trips the two divers would make in the next two hours. On the second trip they pulled in a 60-year-old Frenchwoman floating in her life jacket near the bow. Next they pulled in a second Frenchwoman in an advanced state of hypothermia. "She was shaking uncontrollably," one swimmer recalled. "She was conscious, but her face was violet and her hands were violet and her fingers were white. Her circulatory system was shutting down. She kept saying, 'My husband, Jean-Pierre! My husband!' We took her ashore and went back."

3rd Engineer Andrea Carollo was asleep in his cabin on deck 3 when the collision occurred. By the time he opened his door, water was already rushing down the corridor, and when he went to his post in the engine room the engines were beginning to flood.

"Within 15 minutes, the engine room told the bridge that there was nothing to be done," he said. "The situation was beyond repair."

He then reported to his muster point, a lifeboat for 35 crew members. *"Unlike the captain, we were there until the end. We did all we could to avoid catastrophe,"* he said.

Alberto Fiorito, 28, another engineer, said: *"We didn't wait for the captain to give the order to abandon ship. We saw how serious the situation was, and we did it ourselves."*

Miss Cacopardo, from Messina, said: *"Francesco stayed very calm, as if he was trying to understand what was going on, but I thought we were going to die. That it was the end for both of us. They made us wait a long time go towards the lifeboats. When we finally boarded one it would only go down bit by bit and kept banging against the side of the ship because the cables seemed tangled. Even once it was in the water the engines wouldn't start.*

"The crew were all Asian and it was very hard to communicate with them. They were trying to help us and working hard to get us off, but there was so much confusion.

Mr Page made his way to a muster station on Deck 3 – close to the funnel on the side which was starting to tip skywards – only to find that all the lifeboats were packed.

The people gathered on deck were told to make their way to the back of the ship to see if there were any lifeboats available. But not only were these full, they were impossible to launch because one side of the Concordia was by now high in the air. Mr Page climbed a deck and made his way towards the back of the ship, passing at least five other muster stations.

He reached the highest point of the liner and was clinging on to the rails to stop himself falling, as it continued to list and the incline got steeper and steeper.

"I was holding on the railings for dear life," he said.

An announcement instructed people to move to the other side, which was closer to the water and from where lifeboats were still being launched. Mr Page was one of the first to let go and slide across the boat, through Milano restaurant, before crashing into railings. He then managed to squeeze through them, dropping himself four feet into a lifeboat.

"Behind us people were getting pushed and crushed against the railings, there were people

Behind us people were getting pushed and crushed against the railings, there were people with broken fingers," he said. The lifeboat was released and shortly after Mr Page finally reached the safety of the shore.

In the theatre were Monique Maurek, 41, and her husband Anton. *"There was a loud tearing sound and we felt a crunch,"* said Mrs Maurek, an undertaker from Rotterdam, Holland.

"At first we thought it was part of the magic show. But then the boat started tilting to one side and woman on a wheelchair came sliding past us at speed and that's when the panic started. The magician ran off. He just disappeared.

"We didn't have lifejackets and people were shouting that we should go up to Deck 4 to get some. There were people stuck in the lifts screaming so we climbed up the large staircase. When we got outside – on the side of the ship furthest away from the water – we managed to get some of the last life jackets. There was a panic and my husband pushed me into a lifeboat to make sure I got on. Other people fell on top of me and I was screaming. People were falling out of the lifeboat in front of us down into the water."

The lifeboat was stuck and it took four crew members 20 minutes to force it down into the sea before the Maureks escaped.

American **Patrick Capito** swam to shore after several attempts to board lifeboats *"We went to the first lifeboat. It hit the side railing and we got out of there. The second lifeboat, the same thing. When we got into a raft, the water was up to our necks. So we got into the water and swam to shore. I didn't really feel the water until I got out. Then it was freezing."*

Mike van Dijk, a 54-year-old from Pretoria, South Africa *"We had to scream at the controllers to release the boats from the side. We were standing in the corridors and they weren't allowing us to get onto the boats. It was a scramble, an absolute scramble. Everybody tried to get a lifeboat and people started to panic. A lot of people were falling down the stairs and some were hurt because things fell on them. Everybody was trying to get on the boats at the same time. When people had to get on the lifeboats they were pushing each other. It was a bit chaotic. We were trying to keep passengers calm, but it was just impossible. Nobody knew what was going on. We were on the same level as the water so some people started to swim because they weren't able to get on the lifeboats."*

Steffano, a 21-year-old from Buenos Aires, who was on the ship with his mother, two brothers and girlfriend *"I saw desperate people. All around me screaming and terror but also uncertainty about what to do. In my opinion, we were not adequately helped by the crew to abandon ship."*

"There wasn't anybody that was in control" Jim Salzburg He was traveling on the Costa Concordia with his wife, Jo, and daughter, Mary-Jo. *"We heard this big jolt and it was the most unusual noise you could ever imagine,"* said Jo of the ship's grounding. Jim added: *"You began to realize that the Costa crew wasn't going to save you; if you were going to get off this ship, you were going to save yourself,"*

"Fortunately I was above the water line, but I could see the waters climbing higher and higher towards us. Some of the crew didn't seem to even know how to release the lifeboats or even start the lifeboat engines once they were down on the water. The crewman in charge of our lifeboat was absolutely ashen-faced, he just didn't know what to do."

Mr Tofanelli, a 38-year-old Italian studying English in London who was with his family on holiday, said it took two hours for the lifeboats to dock at the island of Giglio, where they found shelter inside the local church.

Grandmother Sandra Rogers, 62, said: *'There was no "women and children first" policy. There were big men, crew members, pushing their way past us to get into the lifeboats. It was disgusting.'*

Benji Smith, from Boston, said he fashioned his own rope ladder to save him and his wife *"I felt like the disaster itself was manageable, but I felt like the crew was going to kill us. They shouted instructions, but the instructions contradicted each other."*

Francesco Verusio relives the moment when the youngest victim of the disaster, five-year-old Dayana Arlotti, and her father, William, drowned.

Mr Verusio wrote that they died *"because they were unable to find any space in a lifeboat on deck four, on the left-hand side, and they were then directed to the right-hand side by crew members on the same deck but as they were crossing the inside corridor ... they fell into a hole that had been created when the ship rolled onto its right side.*

"They dropped into an area that was already flooded and they died from drowning," he added.

Once she boarded a lifeboat, Ms. Grasso said, the helmsman appeared ill equipped to bring the scores of travellers on his vessel to safety: *"he kept banging into the ship, unable to steer the lifeboat to the shore, until a passenger shoved him aside and took the lead".*

"No crew member was trained for an evacuation," she said.

Of particular interest is the testimony before a congressional hearing in Washington

Dear Mr. Chairman and members of the subcommittee:

Thank you for inviting me to testify today. My name is Brian Aho. My wife, Joan Fleser, my daughter, Alana, and I set sail from the Port of Rome (Civitavecchia) on January 13, 2012, aboard the Concordia cruise liner operated by Costa Crociere and its parent company, Carnival Corporation.

Though we have been on many cruise vacations with several cruise lines, this was our first European cruise and our first time sailing with Costa. We chose this particular ship and itinerary for our 20th anniversary cruise because of the opportunity to visit many ports in several countries.

As experienced cruise passengers, we have fallen into a particular embarkation pattern. Once aboard we locate our stateroom, unpack our luggage (if available) and take a walking tour of the ship. We investigate the theatre, the pools, the dining-room to which we have been assigned and the safety features. We made note that our stateroom was on Deck #2 forward, our dining room was on Deck #3 aft, and lifeboat access was on Deck #4.

After our investigation, we went back to our stateroom to prepare for a late-seating (9 p.m.) dinner. Once seated--while our appetizers were being served--the ship began to shudder. The rhythmic vibration quickly became worse and, after a tremendous groan and crash, the ship began to list severely. People were falling, glasses and plates were sliding off the tables and smashing, and people were screaming. The panic got worse when the lights failed.

My family formed a three-link chain and we worked our way through the fallen debris toward an outboard gangway leading up to Deck #4 and the lifeboats. The central (Main) entrance to the dining room was blocked with panicking passengers and crew. The only crew member offering guidance was a woman in a showgirl-style gown near the gangway who was showing the passengers the way to the lifeboats.

Once on Deck #4, people were panicking and fighting over lifejackets. Once I found and delivered one to my wife, another woman damaged it while tearing it out of her arms. The announcements indicated that it was an electrical problem with the generators and everything was under control. Evidence indicates that some passengers were instructed by crew to return to their cabins. As these announcements were made, the ship was listing more and sinking deeper. Immediately after a similar announcement, we heard the abandon ship signal (six short signals and one long signal). Few people knew what it meant as there was no verbal abandon ship announcement.

When a crewmember finally appeared, the panicking passengers pushed their way toward

When a crewmember finally appeared, the panicking passengers pushed their way toward the boat. My wife had to grab my daughter and pull her into the boat as a cowardly man tried to push her out of the way. Once the boat was filled, the crewman had trouble readying and releasing the boat. After much hammering noise, the boat swung away from the Concordia. We were showered with white paint chips as if this boat had not been released since the gear had been painted over. After being lowered, the crew had difficulty disconnecting the boat from the davits. Once disconnected, it was clear that the crew did not know how to pilot the lifeboat effectively. It kept colliding with other boats and, eventually, the pier.

There were NO Costa representatives--neither officers nor crew--on the pier to provide guidance to the passengers. The only help we received was from the residents of the island. As experienced cruise vacation passengers, we have recognized significant problems that, in our opinion, made a terrible situation even worse:

There were no safety drills or instructions distributed to passengers before sailing out into the open Mediterranean Sea. The public address announcements provided false information. The manning and deployment of the lifeboats was delayed though the ship was in imminent danger. The crew was unable to instruct passengers during an emergency. The crew was unable to launch and operate the lifeboats effectively. According to reports, the captain and senior staff abandoned the ship with passengers still aboard the capsizing vessel. There was no one aboard to coordinate the evacuation.

This accident was not caused solely by the actions of a single individual. It has been alleged that Costa and its parent corporation, Carnival, allowed Captain Schettino to divert from the assigned course on previous voyages. Clearly, this course deviation was not due to climatic or safety concerns. It is our opinion that--with today's technology--central management of the cruise line must have been able to locate the position of--and track the progress of--a massive liner like the Concordia. Either they were aware of its deviation from the pre-determined course and sanctioned it, or they were ill-equipped to manage the operation of this and perhaps other vessels.

The courts will determine who or what organization is to blame for the tragic loss of life in January of 2012 off the coast of Tuscany.

It also emerged that holidaymaker Maria D'Introno was told to get out of a lifeboat because it was too full and the tilt of the ship made it impossible to launch safely. She was later seen terrified by the edge of the ship, jumping into the water without a lifejacket despite not being able to swim.

The question must be asked as to who were the officers in charge of the lifeboats and where were they?

MRSC talks with Captain

MRSC Livorno contacts on the mobile phone, the Master of the Costa Concordia, which refers about the landing of all persons on board. To the requests of clarifications relating to what is happening on the port side, the Master declares he is to be found along with a sailor on board a lifeboat on the opposite side; he also reports that it is engaged in the recovery of some survivors. When asked to know who has remained on board to coordinate abandon ship operations, he replies that the entire crew has landed. MRSC Livorno then ordered the Captain to reboard his vessel, although they had no authority to do so.

It should be noted that when a ship capsizes, and the circumstances dictate the Master to order 'Abandon Ship', all on board, including the Captain are relieved of their duties and try to save themselves. In many wartime instances this occurred.

How the Captain abandoned the ship is entirely superfluous to the case. While agreeing with the principle that the Captain should be the last, and recognising that under Italian law this

is a criminal offence, the question must be asked that on ships carrying so many people over a vast area of many decks, how can the Captain possibly know if there is anyone left on board?

00:41 The FCC calls MRCC Rome in order to ask for assistance as it considers the actual situation very critical of the ship being completely listed 90 ° to starboard, about 50 people are no longer able to leave the ship, and considers the intervention of helicopters also announces that - except for one person - he has no news about injuries and that the Master is not on the ship.

The Shore Rescue Services

Almost all the Officers and Crew have now abandoned the vessel and the remaining passengers. The rescue is in the hand of those ashore.

00:42 Hours MRSC Leghorn contact the ship's master who says that there seems to be a hundred passengers on the ship; MRSC Livorno strongly urges the ship's Master to go on board with the other officers to coordinate the disembarking passengers still on board .

00:53 rescue of people still on the ship by helicopter commences

01:00 with the ship now lying almost flat on its side, between 700 and 1,000 people remained on board. Clumps of people were scattered throughout the ship, many clinging to railings. About 40 were hanging on a rope amidships. Almost everyone else had congregated in a panicky crowd of 500 or more toward the stern, on the port side of Deck 4, facing the sea. Many of these had taken refuge in a cramped passageway; others remained on the deck outside. Dozens of boats had gathered, about 60 feet below—the Coast Guard later counted 44 different craft in use by dawn—but there was no easy route to them.

Many passengers and crew were jumping in the water to swim to the nearby rocks and eventually over 100 people were gathered there awaiting rescue.

01:04: Helicopter lowers Air Force officer aboard to assist with evacuation

01:35 hours the OSC updates MRSC Livorno about the situation and report information gathered by a passenger who reported that on board there are still about 400 people assisted by crew members that coordinate the disembarking on the port side.

02:00 the patrol SAR "CP 892", as requested by MRSC Livorno, takes on board the first team of seven fire-fighters with thermal cutting equipment (to release any people trapped inside the ship). This team will be joined by two other similarly equipped.

03:44 It is estimated that there are still on board at least 40/50 people.

04:20 hours the OSC updates the situation, in progress is the disembarkation of people, through the aft side ladder of people still on board, collected by the M / V SAR "CP 305", On board, on patrol are three fire-fighters and two Coast Guard specialists rescuer.

04:30 MRSC Livorno orders, a Safety officer with a Fire Brigade team to board to assist the rescuers in the search for the missing people.

05:15 another team of Fire Department personnel boarded the ship to see if there are still people trapped on board and recovered two traumatized passengers.

06:17 hours the first rescuers suspend search operations on the ship. Subsequently the research on board will continue seamlessly. The Fire Department continue exploration of the ship, both in the emerged and immersed part of the ship, in searching for missing people. MRSC Livorno, however, will continue until 25 January the search at sea, on increasingly large areas, based on the calculation of the drift due to the current.

Last survivors

Fire brigade personnel have rescued two passengers Koreans alive inside their cabin and an injured crew member. Manrico Giampedroni, the hotel director, who remained to assist with the evacuation of the passengers was found alive in the wreck after spending 36 hours waiting for rescue. he said he was helping dozens of passengers evacuate the listing ship when he slipped and fell about 20ft through a doorway, landing in a flooded restaurant area and breaking his left leg in two places. He was the last person found alive on the ship

The search for the Dead

In the following days continued the search and rescue operations with the use of divers team of the Coast Guard, Police, Navy and Fire Department. The search of any further survivor at sea continued with the patrol boats of the Coast Guard and of the other government departments that have contributed in the rescue operations as well as by helicopters.

15.01.2012 The surface searches for the identification of possible survivors ended on and continued for those inside the ship and the surrounding seabed .

Resignation of the President of RINA

January 17th Shortly after [Costa Crociere](#) chairman and CEO Pier Luigi Foschi blamed the grounding of the Costa Concordia on an "inexplicable" error by the captain, Gianni Scerni, the president of [RINA](#), the Italian classification society that issued the certificate of seaworthiness and the [Safety Management System](#) (SMS) certification for the Costa Concordia. He resigned as president of RINA.

He also was critical of Costa management and questioned the claim that Costa was unaware of the practice of its ships presenting a "salute" or "bow" in the form of a close passage by island of Giglio.

Recovery of the Dead

Divers of the Coast Guard recovered two dead bodies in the corridor leading to the boats of the bridge 4. Fire brigade personnel have rescued two passengers Koreans alive inside the bridge 8 and a crew member wounded. This was Manrico Giampedroni, the Cruise Director who had been injured while assisting passengers escape. He was the last survivor to be found on board the ship

January 16th, the Fire Department recovered the body of a passenger in the corridor of the second deck of the bridge.

January 17th, Coast Guard divers found five bodies, a member of the crew and four passengers, in the aft elevator of the bridge 4.

On January 21st, the body of a passenger is recovered by divers of the Coast Guard in the corridor leading to life rafts to the bridge 4.

On January 22nd, the body of a passenger inside the cabin No 7421 of deck 7, is retrieved by the Fire Department

On January 23th. the bodies of two passengers are recovered by divers of the Coast Guard by the deck 4 near the stairs connecting the deck 3.

On January 24th. the body of a passenger at the end of deck 3 starboard side is recovered, by the Fire Department

On January 28th G d E recovered the body of a member of a crewmember outside the cabin

On January 28 . G.U.F recovered the body of a member of a crewmember outside the cabin No 8389 of deck 8.

On February 22nd, Fire Department recovered 4 bodies, all passengers, inside the elevators in the atrium of deck 4.

On February 23th. four bodies are recovered by firemen near the elevator at deck 4.

On March 22nd, during an exploration with the ROV through the opening of a new passage in the hull, the bodies of five victims are sighted. The five bodies, four passengers and one crew member were retrieved on March 26 by the Italian Navy.

2014.

November 3rd. The last missing person from the wreck of the cruise ship Costa Concordia was finally accounted for on Monday when workers dismantling the hulk found the remains of Russel Rebello, a waiter on the ship.

Rescue Data

The complete passenger data, which was later supplied by Costa Cruises, indicate that there were a total of 4229 people on board the ship at the time of the accident, including 3206 passengers and 1023 crew. Out of the passengers, there were 2954 adults, 200 children (under 12 years old), and 52 babies (under 3 years old).

A total of 4197 people were rescued. Among these, about 1270 were rescued by the rescue units intervened directly under the coordination of MRSC of Livorno.

- 80 people on board the Costa Concordia life rafts were tugged ashore

- 16 people were rescued by helicopter

- 4 people were rescued from the sea

It is thought that the remaining survivors abandoned the ship on survival crafts (boats and life rafts) and reached the coast autonomously.

5TH PHASE. THE GIGLIO MAGISTRATES INQUIRY/THE INTERNATIONAL MANAGEMENT CODE FOR THE SAFE OPERATION OF SHIPS AND FOR POLLUTION PREVENTION (THE ISM CODE)

Prosecutor General Deidda made explicit reference to “problems and incredible acts of irresponsibility regarding safety and organisation” and notes: “The employer is guarantor and has responsibility. Decisions taken by the shipping company should be under close scrutiny”.

This would seem to indicate an explicit invitation to the magistrate in charge of the case, public prosecutor Francesco Verusio, to formally involve company managers by adding their names to the register of individuals under investigation. So far, magistrates had refrained from doing so despite Captain Schettino’s statement that he had told Roberto Ferrarino, the head of the crisis unit, about the seriousness of the situation and, above all, that he had been encouraged by the company to perform sail-pasts as a publicity stunt.

Mr Ferrarino, spoke to Captain Schettino at least three times on the evening of the tragedy and reassured him that he would send helicopters as requested. The Costa executive will have to explain why evacuation of the liner was delayed even though it had been confirmed that the vessel was out of control.

Mr Deidda went further and explicitly refers to Costa’s top executives when he listed the offences committed. The Prosecutor General said: *“Magistrates seek cause and effect links for events. Up till now, attention has focused on the negligence of the captain, who was tragically inadequate. But who selects the captain? Decisions made upstream by his employer, the shipping company, need to be scrutinised. There is also the fundamental issue of safety organisation – lifeboats that could not be lowered, crew with no idea of what to do, poor emergency management training and incompetent orders like the absurd instruction to return to the cabins. The confusion shows incredible negligence in applying safety regulations. This is an area that should be organised in advance with exercises and simulations. Actual emergency management comes later”*. Over the past few days, the procurator general has pointed out that rescue operations showed that *“crew members assigned to the task were unprepared and bereft of any specialist knowledge. Passengers left to their own devices received conflicting messages from the captain and other officers”*.

Captain Schettino’s defence also distanced itself from the company. The statement lodged by lawyer Bruno Leporatti with the magistrate before the evidentiary hearing to examine the ship’s black box is tantamount to an accusation of complicity directed at Mr Ferrarino but it is also a request to verify the functioning of the ship’s instruments. Captain Schettino has said that various instruments remained non-functional despite efforts to activate them manually.

Mr Leporatti stressed that *“the statements made by Schettino about his conversations that evening with the head of the crisis unit have opened further lines of investigation that could reasonably point to a broadening of the subjects involved in the inquiry”*.

Transcript

On the 17th of January the first legal inquiry opened on the Island of Grosseto. The following

is a transcript of that hearing.

No. 12/285 N.R. and No. 12/117 Magistrate in Charge of Preliminary Inquiries
REPUBLIC OF ITALY
COURT OF GROSSETO
OFFICE OF THE MAGISTRATE IN CHARGE OF PRELIMINARY INQUIRIES

The magistrate in charge of preliminary inquiries, Dr. Valeria MONTESARCHIO, having seen the request of the Public Prosecutor, received on 16/01/2012 at 1:55 PM, for validation of the detention of:

CAPTAIN SCHETTINO, Francesco, born in Naples on 14 November 1960, with counsel for the defence of choice Bruno LEPORATTI, attorney of law of the Bar of Grosseto, for the following violation:

*a) 113, in conjunction with *Ciro Ambrosio*, 449(2) in reference to Art. 428, 589(3) of the Penal Code, for having, in co-operation with one another, Schettino as captain of the ship *Costa Concordia*, Ambrosio as first deck officer (responsible for the watch) – owing to culpable behaviour consisting of imprudence, negligence and incompetence and in violation of the regulations of the sector (and in particular of Art. 6 of Law No. 1085 of 27 December 1977, for having maintained a speed over 15 knots, even though in the proximity of obstacles, in a way such as not to be able to act in an appropriate and efficient manner so as to avoid collisions and to halt the craft within a distance appropriate to the circumstances and to the conditions of the moment), caused the shipwreck of the said *Costa Concordia*, at the same time thus causing the death of *Tomas Alberto Costilla Mendoza*, *Jean Pierre Micheaud* and *Francis Servel*, who, fallen overboard, perished due to drowning or due to hypothermia.*

*b) 81(1) and 591 of the Penal Code, for having abandoned about three hundred persons (passengers on the cruise ship *Costa Concordia*), unable to fend for themselves (in particular, since still aboard the said motor ship, in the process of shipwreck and in the night-time, who he was supposed to take care of inasmuch as captain of the said motor ship.*

*c) 1097 of the Code of Navigation, for not having been the last to leave the motor ship *Costa Concordia* of which he was captain, during the abandonment of the same (in danger, being in the process of shipwreck) ascertained on the day.*

Having heard at the validation hearing of 17/01/2012 the Public Prosecutor, the detainee and his counsel for the defence, pronounced the following

ORDER

As concerns the presuppositions for the decree of detention pursuant to Art. 384 of the Code of Criminal Procedure, the magistrate observes the following:

*Substantial circumstantial evidence exists with regard to the offences hypothesized by the Public Prosecutor's Office charged to Francesco Schettino, as emerges from the records with particular reference to the first report of the Coastguard of Porto Santo Stefano of 14/1/2012, based on the summary testimonial information given by the members of the ship's crew, the chronology of events of the Harbour Office of the Port of Livorno, the AIS recording on record, and the PG Annotation of the Harbour Office of the Port of Livorno. The culpable behaviour Capt. Francesco Schettino is charged with results from all the records of investigation compiled in the immediacy of the tragic event, who, with a highly imprudent manoeuvre brought the cruise ship *Costa Concordia* too close to the coastline of the island *Isola del Giglio*, changing from the ordinary route to the so-called route for "tourist navigation" (see the unambiguous declarations made by *Roberto Bosio*, *Alberto Fiorito*, *Silvia Coronika*, *Jacob Rusli Bin* and *Stefano Iannelli*), caused the impact with*

a large coastal reef that sprung a leak in the bottom of the craft. The route deviation and the approach to 0.28 nautical miles from the coast of the island was admitted even by the captain in the course of the guarantee interrogation, affirming becoming aware only visually that there was a jutting reef with which the ship's bottom impacted.

The grave imprudence and incompetence that marked the conduct of the suspect at the time when he initiated the rash manoeuvre just mentioned is evident and indisputable. The impact with the reef caused the springing of a leak, with the water flooding the engine rooms and causing the electrical system of the engines to fail, leading to the blackout within the ship, which first veered on the port side, then began to ship water and list on the opposite side.

In that predicament the captain, due to incompetence and negligence, underestimated the extent of the damage and failed to notify the coastal authorities of the accident in timely fashion, reporting that an electrical problem was involved (blackout), without mentioning immediately the impact that had caused the springing of the leak and the flow of water into five compartments of the ship's engine room and thus delaying the implementation of emergency procedures and rescue operations (see the day book of the operations room of the district maritime office of Porto Santo Stefano, the chronology of events of the Harbour Office of the Port of Livorno, the report of the operational division of the Revenue Guard Corps of Porto Santo Stefano, and the summary testimonial information given by Silvia Coronika and by Stefano Iannelli).

It is a certified fact, notwithstanding the declarations to the contrary made at the time of interrogation, that the captain could not help being aware immediately of the seriousness of the damage produced both due to the ever increasingly more evident tilt of the ship and because advised by the crew of the huge amount of water shipped (see the summary testimonial information given by Giuseppe Piulon and Silvia Coronika and other members of the technical staff on board).

In the aforesaid situation the captain lost control of the ship, which had its engines off and shifted position only by means of inertia and the rudders. The SOS was only sent 30-40 minutes after the impact (as reported by Schettino himself); in the meantime no external alarm signal was given to the coastal authorities to make the real seriousness of the situation aboard understood. At this point, as one also learns from the declarations of Capt. Schettino (which are corroborated by what was referred by the second-in-command as per table, Roberto Bosio), he ordered to drop the anchors and the ship, progressively increasing the tilt starboard, ran aground in the proximity of the coast of the island. The subsequent developments of the tragic wreck of the Costa Concordia are on record and known through the official bulletins mentioned (again see the Informative Report of the Naval Operational Division of the Revenue Guard Corps of Porto Santo Stefano, the chronology of events of the Harbour Office of the Port of Livorno, the service report and day book of the operations room of the District Maritime Office of Porto Santo Stefano, and films shot by the rescue patrol boats).

At 10:58 PM the captain ordered the ship to be abandoned and informed the coastal authorities (see the informative report of the commander of the Naval Operational Division of Porto Santo Stefano) but, during the said operations, left the ship when there were still at least a hundred persons aboard ship (see the PG annotation of the harbour master of Livorno, Attachment 23), according to summary testimonial information given by Dimitros Christidis and Stefano Iannelli, as well as summary testimonial information given by numerous members of the ship's crew, who state that during the disembarkation operations they no longer saw the captain aboard ship, PG Annotation of CF Gregorio De Falco of 15/1/2012, Attachment 170).

The circumstance is admitted even by Capt. Schettino, who nevertheless, in his version of the facts at the validation hearing, stated that the abandonment was not wilful and that in light of the condition of the deck that he had reached, it was necessitated. However, it has been

ascertained that other officers still aboard co-ordinated and directed the rescue operations while the captain had reached a reef aboard a lifeboat and refused to come back on board the ship, considering it an impossible feat (again see declarations made in the course of the validation hearing).

That having been premised as to the effective existence of serious circumstantial evidence of culpability with regard to the offences the suspect is charged with, the party passing judgement does not believe the second presupposition of law exists for the decree of detainment with regard to Francesco Schettino, namely the concrete danger of flight, for the following reasons.

From the testimony gathered in the immediacy of the facts through the summary information given by the persons who accompanied the captain it appears evident that, once having abandoned the ship, albeit in untimely fashion, he remained in place on the reef of Isola del Giglio where he had landed aboard a launch, and watched the ship sink at the mercy of the tragic event that was occurring (see the service report of Capt. Roberto Galli, Head of Area Security of the Municipality of Isola del Giglio, declarations made by Dimitros Christidis and by Stefano Iannelli and eyewitnesses, unambiguous on the point).

Upon the arrival of the rescue patrol boat, the captain climbed aboard the same and was taken to the offices of the Carabinieri company of Orbetello, where the detention was ordered. There is no trace in the records and in the chronicles of the event (in the immediacy Capt. Schettino made statements to journalists in an interview aired on the national news) of any attempt to flee during or subsequent to the catastrophic event forming the object of investigation. Such attempt cannot be read into the albeit untimely abandonment of the Costa Concordia because it turns out that in any case the captain was accompanied in the debarkation by members of the crew, he remained on the reef to watch the disaster caused, was reached by members of the Fire Brigade and was in touch by phone with Commander De Falco, who ordered him to go back aboard the ship. In any case, Schettino did not engage in any behaviour aimed at leaving the coastal locality where the rescue of the shipwrecked was managed or in any case aimed at hindering his identification with the role filled. As was recalled by the defence in the course of the validation hearing, at the time of disembarkation the captain was without documents and nonetheless no attempt to hide or flee is evidenced. Even in light of constant jurisprudence on legitimacy (see penal sentences No. 15315 of 7/4/2010, No. 5244 of 10/1/2006 and No. 4089 of 18/12/2003) it is not thought that the presupposition of the concrete danger of flight has marked the behaviour of the suspect either in the course of the event of the shipwreck or subsequently, and that also in consideration of all the circumstances of time and of places in which the event occurred.

On this point it must be remembered that the presupposition of the danger of flight is the only requirement that can justify the precautionary measure of the detention of the person suspected of committing a crime, the same measure not being able by law to be adopted to cope with the other precautionary requirements pursuant to Art. 274 of the Code of Criminal Procedure and signally of that pursuant to letter a) of the normative provision cited. As for what pertains to the possibility, feared in the request for validation, that Capt. Schettino, because of his position and on the occasion of his activity of ship's captain, might have established human relations in outside localities that he could have utilized to flee and to escape from the investigations, it is evident that this circumstance is wholly hypothetical and in any case devoid of support even in terms of circumstantial evidence.

FOR THESE REASONS

Having read articles 384 and 390 of the Code of Criminal Procedure The Magistrate in Charge of Preliminary Inquiries DOES NOT VALIDATE the decree of detention ordered with regard to Francesco Schettino on 14/1/2012.

As for the further request of the Public Prosecutor's Office of Grosseto to subject Francesco

Schettino to the measure of custody in prison, the Magistrate observes:

Regarding the existence of serious circumstantial evidence of culpability pursuant to Art. 273 of the Code of Criminal Procedure, what is premised in the matter of this order must be viewed in light of the totality of the verified facts concerning the dynamic of the shipwreck forming the object of investigation, and as concerns the seriously culpable behaviour engaged in by the captain in the course of the entire event in question. The gravity of the culpable behaviour of the captain is indeed verifiable from the beginning, with the ordering and carrying out of the ill-considered manoeuvre of drawing too close to the island; in the phase of the impact, with the underestimating of the damage produced to the vital part of the Costa Concordia; and in the phase immediately subsequent to the impact produced, with the delay of the alarm signals and in any case of the tardy reporting to the coastal authorities of the actual situation in which the ship found itself. The emergency manoeuvre that the captain performed to bring the ship alongside the coast of the island (which manoeuvre was described by him in detail during the interrogation) is worthless for exempting him from responsibilities or in any case for attenuating the said responsibilities, since it is only natural that what was involved, at that point, was a due act to limit as much as possible the tragic consequences that the serious error committed and admitted unfortunately caused. But there is also serious circumstantial evidence of culpability for the other offences Francesco Schettino is charged with.

On this point it is in fact necessary to repeat that the records show and that the suspect also has declared during the guarantee interrogation that Schettino left the ship when the operations of abandonment of the same by the passengers were still underway, assisted by members of the crew. The fact that other members of the crew and officers still aboard the ship were doing everything they could to make possible the disembarkation of the passengers objectively gainsays what the captain declared about the objective impossibility of directing and managing the emergency and rescue procedures. Even if what was asserted about the objective need for the disembarkation were true (as stressed by the public prosecutor), no attempt was made by the captain to return at least in the proximity of the ship in the phases immediately subsequent to the abandonment of the Costa Concordia that had taken place.

Concerning the existence of the precautionary needs pursuant to Art. 274 of the Code of Criminal Procedure, it is necessary to point out that: For the reasons explained above concerning the non-validation of the detention, the Magistrate deems inexistent a concrete danger of flight of the suspect, since according to law and constant jurisprudence the aforesaid presupposition cannot take shape as a mere investigative hypothesis unsupported by any element referable to his behaviour. It is repeated that Schettino, after having left the ship, did not commit any act from which it can be inferred that he had an intention to escape. The declarations he made at the Carabinieri Barracks of Orbetello about his intention to turn over a new leaf and to no longer want to go on ships clearly are due to dejection over the disaster caused and have no importance in the sense of an intention to take flight. Therefore, the precautionary measure pursuant to letter b) of Art. 274 of the Code of Criminal Procedure is ruled out.

Coming to the danger of tampering with evidence, it must be pointed out that what was initially highlighted by the Public Prosecutor with regard to the presumed intention of the captain somehow to remove the ship's Voyage Data Recorder (VDR), it is belied on record by Document 170, PG annotation of Capt. De Falco, which specifies the possible misunderstanding of a piece of information given on that point. Capt. De Falco states that "following the contact that took place between the person in charge of the Company, Mr Paolo Mattesi present in the operations room and Capt. Schettino, it was decided to send another person, subsequently identified as Officer Martino Pellegrini, since the captain did not appear to be lucid."

As for the possibility that the captain might make use of his hierarchic position to influence the testimonial declarations of the officials and crew members concerning the facts that

occurred, as the investigations stand, in which many of the subordinates of the captain have been heard who have made declarations that do not contradict one another, the aforesaid danger appears inexistent. The partially collaborative attitude assumed by the captain at the time of the validation hearing must also be pointed out, where, as already said, he admitted the error committed with the ill-considered manoeuvre of drawing near the island. One does not see, based on the results of the investigations, what convenient version the captain might concoct for the purpose of absolving himself of responsibility.

The objective gravity of the event is unquestionable – a world-scale disaster – as well as the seriously culpable behaviour charged to the captain of the Costa Concordia. These facts, of a nature in any case objective, are in addition to an overall negative evaluation of the personality of the individual. In the magistrate's opinion, this is not specifically in terms of the precautionary needs propounded by the Public Prosecutor, but rather in terms of the danger of recidivism involving offences with a culpable background perpetrated to the detriment of third parties assigned to the care and responsibility of the individual being investigated, owing to the role involved and the activity performed.

Indeed, even as recalled above, Schettino admitted his imprudence under questioning and tried to mitigate the enormity of his error with the subsequent manoeuvre, effected to prevent the moving away of the ship from the coast of Isola del Giglio. Recalling that manoeuvre in detail, Schettino affirms being a "good captain." That appears to indicate an incredible thoughtlessness in assessing the actual scope of the behaviour engaged in to the detriment of over 4,000 persons entrusted to his responsibility. It is indeed evident that with the said manoeuvre the captain caused the shipwreck of the passengers and the death of verified victims. On this point, concerning the error committed, Schettino admits the circumstance but then goes on to describe the phase of the emergency manoeuvre which, at that point, as stated, at least formed part of his duties. But to this thoughtlessness also must be added the total incapacity to manage the subsequent phases of the emergency created, thus delaying the rescue operations from land.

Finally, the negative evaluation of the individual's personality includes the fact of having abandoned the ship ahead of all the passengers on board and of having remained over an hour on the reef where he had disembarked in a situation of complete inactivity. In the final analysis the serious incompetence, imprudence and negligence that mark the behaviour of the captain make real and present the danger of repetition of offences of the same sort as those for which we proceed, i.e. of seriously culpable offences committed to the detriment of third parties entrusted, owing to the activity engaged in, to the responsibility of the suspect. This conviction of the magistrate cannot be invalidated by the uniqueness in terms of dimensions of the event caused. And in fact what was declared by Schettino himself during his stay at the Carabinieri Barracks of Orbetello about his intention to turn over a new leaf and no longer board ships, concretely opens the scenario of the existence of the possibility of repetition of the type of offences the suspect is charged with. Schettino engages in the professional activity of captain of ships and he is not forbidden in the immediate future to continue in his activity. In any case specific danger of repetition of culpable offences takes shape concretely for any kind of activity that entails the entrustment of third parties to the care and to the responsibility of the suspect.

The magistrate therefore believes that precautionary requirement pursuant to letter c) of Art. 274 of the Code of Criminal Procedure applies with reference to the offences Francesco Schettino is charged with.

Coming to the criteria for the choice of precautionary measure pursuant to Art. 275 of the Code of Criminal Procedure, it must be pointed out that the nature of custody in prison is configured by the law as an extreme remedy to be applied only when every other measure provided for is to be considered unsuitable for meeting the precautionary needs that present themselves in the case in point. It is thought that, including in consideration of the circumstances stated in the defensive instance, the aforesaid and recalled precautionary

circumstances stated in the defensive instance, the ajoresaid and recalled precautionary needs can adequately be satisfied with a measure less harsh than that requested by the Public Prosecutor and signally with the measure of house arrest.

If one actually considers the social inclusion of the suspect, the fact that he has a stable family with which he cohabits, the absence of the danger of flight, the circumstance recalled by the defence under the profile of the professional training received and confirmed by the behaviour engaged in with the workers at the time of the detention, he is in any case accustomed in ordinary life to the observance of hierarchies and rules, which is why it is unreasonable to think that he may elude the controls provided for. The measure of house arrest, with prohibition to communicate with persons other than those with whom he cohabits, therefore appears fully suitable for satisfying the precautionary needs in connection with recidivism involving engaging in seriously culpable criminal behaviour by the suspect.

FOR THESE REASONS

Having read articles 273, 274 and 284 of the Code of Criminal Procedure., She applies to Francesco Schettino, under investigation for the offences pursuant to articles 113, 449(2), in reference to Art. 428, 589(3), 81(1) and 591 of the Penal Code, the measure of house arrest to be executed at his residence located in Meta di Sorrento (NA) at Via Vito San Cristoforo 10, with absolute prohibition against going away or communicating by any means with persons other than his cohabitants.

She orders the immediate release from prison of Francesco Schettino unless detained for another reason.

She authorizes Francesco Schettino to reach unescorted, with his own means, taking the shortest route and in the shortest time possible, the place of the house arrest.

She orders that upon arrival at the place of house arrest the suspect shall promptly notify the police forces competent for the controls, to be identified as the Carabinieri, Station of Piano di Sorrento (NA).

She tasks the Office of the Court's Clerk with the matter of discharging obligations and communications.

*Grosseto, 17 January 2012
THE MAGISTRATE IN CHARGE OF PRELIMINARY INQUIRIES
Dr Valeria Montesarchio
COURT OF GROSSETO
Office of the Magistrate for Preliminary Inquiries
Filed with the Office of the Court's Clerk
TODAY 17 Jan. 2012 7:35 PM
The Court's Clerk
(Dr Sandra ZANELLI)*

This initial inquiry set the grounds for the eventual trial proceedings This preliminary investigation was compiled from evidence immediately after the event, including the first report of the coast guard of Porto Santo Stefano of 14 January 2012, the summary testimonial information given by the members of the ship's crew, the chronology of events of the Harbour Office of the Port of Livorno, the automatic Identification system recording, and the evidence of the Harbour Office of the Port of Livorno.

Amongst this 'evidence' a considerable amount of the magistrate's findings is a result of hearsay rather than direct evidence, even to judgements of the Schettino's character which are supposed to find in an official legal hearing

are strange to find in an official legal hearing.

On the 2 February 2012 the prosecutor's office in Paris, France, opened a preliminary inquiry to question survivors to establish any criminal liability and "assess psychological damage".

On 22 February 2012, four officers who were on board and three managers of Costa Cruises were placed formally "under investigation"

The Magistrate's Inquiry

On 3 March 2012, in Grosseto, judges began a closed hearing open to all survivors and other "injured parties", and their lawyers.

On 9th of March an investigative tribunal, consisting of two Admirals and two professors was convened in Grosseto to assist the criminal investigation decide on any prosecutions and the parties to be prosecuted.

Tuscany's Prosecutor General said that the investigation will seek to find causes for various aspects of the event, and beyond Captain Schettino to other persons and companies. However, the Italian court failed to provide the statutory independent safety investigation, as required by both the IMO and the EU directive 2009/18/EC as Italy had not implemented this into Italian Law at the time of the incident.

The Italian practice that criminal investigation overrules the statutory safety investigation is not accepted by the European Union. No criminal court actions against the captain or any crew member should have been taken by any court without the statutory investigation providing full knowledge of what happened and why it happened.

Mr Deidda goes further and explicitly refers to Costa's top executives when he lists the offences committed. The prosecutor general says: "Magistrates seek cause and effect links for events. Up till now, attention has focused on the negligence of the captain, who was tragically inadequate. But who selects the captain? Decisions made upstream by his employer, the shipping company, need to be scrutinised. There is also the fundamental issue of safety organisation – lifeboats that could not be lowered, crew with no idea of what to do, poor emergency management training and incompetent orders like the absurd instruction to return to the cabins. The confusion shows incredible negligence in applying safety regulations. This is an area that should be organised in advance with exercises and simulations. Actual emergency management comes later". Over the past few days, the procurator general has pointed out that rescue operations showed that "crew members assigned to the task were unprepared and bereft of any specialist knowledge. Passengers left to their own devices received conflicting messages from the captain and other officers".

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code)

This was introduced as a result of the sinking of the 'Herald of Free Enterprise' on March 6th, 1987, with the loss of 193 lives. Strangely, the Master in this case was thrown from the bridge wing into the water. The public inquiry led by Justice Sheen revealed that while crew negligence was a major factor, the inquiry revealed that the shore management, Townsend Car Ferries Ltd., was just as much to blame.

The report summed up the management's attitude towards safety in the following statement:

'From top to bottom the body corporate was infected with the disease of sloppiness' (Sheen, 1987).

It is intended to provide an international standard for the safe management and operation of ships at sea.

As a member of both the IMO and the EU, Italy is obligated to incorporate the ISM Code into

its domestic legislation and, therefore, its judicial system. However, it has failed to do so. because of this failure, lawyers were unable to present, and thus the courts unable to consider, the technical ISM and nautical issues that led to the disaster. As this code has been implemented by the IMO in Legislation and all ships have to follow it, how can any trial court make legal decisions on the liability and accountability between the company and the crew with regards to maritime safety? Why do companies choose to register their ships with flags that either delay or do not implement EU or IMO?

Even the safety inquiry ignored the very IMO guidelines for the implementation of the ISM system regarding responsibility, as these would have supported the Prosecutor General's intentions.

The Code is very clear on the fact that the captain of a ship cannot be delegated the sole responsibility for the total operation of the ship as it is the company that has this ultimate responsibility. Possibly, apart from the two military officers on the tribunal having little knowledge of such matters, it could have been that this could have caused an outcome not acceptable to the powers behind the courts and the safety inquiry.

"If the entity who is responsible for the operation of the ship is other than the owner, the owner must report the full name and details of such entity to the Administration.

The ISM Code, chapter 3.1

If the Captain is not named, then the Carnival cruise group is responsible for the operation of the ship. How then can they be allowed a plea bargain allowing them to absolve themselves from this responsibility and place it on the Captain who is not named?

"In the final analysis, while the master is clearly responsible for the safety of the ship and her crew, the final responsibility for the administration and safe operation of each ship rest with the Company"

The International Chamber of Shipping "Guidelines on the application of the ISM Code", Introduction

"Every Company shall develop, implement and maintain a Safety Management System (SMS) which includes the following functional requirements:

"1.3: define levels of authority and lines of communication between, and amongst, shore and shipboard personnel."

The ISM Code, chapter 1.4, Functional requirements.

From the above it is clear that the ISM code confers on the Master the ultimate responsibility on board the ship, while the Company have the overall and final responsibility for the administration and safe operation of the ship.

In support of the application of the ISM Code, the EU rules on safety operations on ships apply to all passenger ships operating in EU waters and make mandatory the implementation of the IMO International Safety Management (ISM) Code for all passenger ships in regular service to or from EU ports (Regulation 336/2006). One objective is to ensure that the crew is trained for all safety and emergency procedures including the evacuation of passengers, and that it carries out periodic drills. The EU applied the ISM Code in 1996, even before it entered into force.

The inspection and certification of equipment including life-saving appliances is also governed by EU law for all ships flying the flag of an EU member State (Directive 96/98).

It is important that it is clarified what this report was and that it was issued to prove guilty parties to be prosecuted rather than to find out the truth of what went wrong. It thus

parties to be prosecuted rather than to find out the truth or what went wrong. It thus started out with a list of names and then gathered evidence against them. A preliminary report was presented to the Criminal court on the 13th of September and followed now the usual pattern of being leaked to the world media.

The report therefore is a mix of technical inquiry clouded by the criminal side which looks for blame and individuals for prosecution. In the requirement for a criminal finding, the report concentrates on this and therefore the investigation of the Captain too often influences the report. It seems as if the report is following a prearranged script with a defined conclusion of blame on one person, the Captain. To do this required considerable and essential parts of the inquiry to be omitted.

This investigation therefore missed so many facts of seamanship and safety that would have changed such charges if prepared and presented to a marine court but that chance was now over. The report was officially handed over on the 15th of October.

The decision of the criminal inquiry.

*The preliminary investigations about the **COSTA CONCORDIA** shipwreck (that) occurred on the 13th (?) of January 2012 in front of Giglio Island have been concluded and a request for committing the responsible persons for trial has been lodged.*

The Public Prosecutor's Office in the court of Grosseto informs all the people offended about the demand sent to the Judge of preliminary investigations to place on file:

*- the crime of cooperation in **unintentional shipwreck** against:*

Salvatore URSINO, born in Messina on the 16th of July 1985.

*- the **crime of cooperation in unintentional manslaughter** and unintentional personal injuries against:*

Salvatore URSINO, born in Messina on the 16th of July 1985;

Roberto BOSIO, born in Sanremo (Imperia) on the 26th of October 1966;

Manfred URSPRUNGER, born in Enns (Austria) on the 12th of May 1958;

Paolo Giacomo PARODI, born in Genoa on the 26th of February 1953.

*- the **infraction of lack of cooperation with the maritime Authorities** against:*

Andrea BONGIOVANNI, born in Sanremo (Imperia) on the 25th of January 1981;

Simone CANESSA, born in Rome on the 24th of November 1985;

Manfred URSPRUNGER, born in Enns (Austria) on the 12th of May 1958.

*- the **infraction of cooperation in destruction or deterioration of a protected habitat** inside a natural site against:*

Francesco SCHETTINO, born in Naples on the 14th of November 1960;

Ciro AMBROSIO, born in Torre del Greco (Naples) on the 29th of October 1983;

Salvatore URSINO, born in Messina on the 16th of July 1985;

Silvia CORONICA, born in Trieste on the 5th of January 1983;

Jacob RUSLI BIN, born in Jakarta (Indonesia) on the 11th of December 1963.

- the administrative offense resulting from the crime of destruction or deterioration of a protected habitat inside a natural site against:

COSTA CROCIERE Spa, Headquarters in Genoa, Piazza Piccapietra n. 48.

The offended people have the faculty, within ten days from this notice, to examine the reasoned application of placing on file as well as all the deeds concerning the investigations and for the above-mentioned crimes, to lodge objection, explaining the reasons why the investigations should continue.

It is reported that the Indonesian Union representing Jacob Rusli Bin was not going to accept that he should be held responsible.

No comment was made by the Italian maritime Unions other than to express their condolences, possibly because of their close relationship with the company, Costa Crociere Spa.

October 15th. The Criminal Court reconvened

October 19th. The hearings ended. No decision regarding who was to be prosecuted and what for was not announced.

Who really caused the capsizing of the ship on January 14th remained unclear because the capsizing and the killing of people on board was not discussed. The judge would decide if there were enough evidence to warrant a trial by the end of the year.

The ship owners Costa Crociere, surprisingly was not even called to give evidence. However, they avoided potential criminal charges by making a Plea Bargain, accepting partial responsibility and agreed to pay a fine of 1 million Euro, and that a similar arrangement was done for five of its employees including three of the officers in the bridge team and the helmsman. The only person not affected by the Plea Bargain was Captain Schettino and any attempt by his council to arrange the same was refused.

November 30th The Italian Maritime Investigation Authority presented its initial findings at the International Maritime Organization's 91st Maritime Safety Committee. It is six months exactly since Italy reported to the MSC in May. However, the authority said the situation had changed.

At the first presentation, the spokeswoman for the investigation said it could only provide an overview of initial stages of activity as the investigating prosecutors had seized key documents and data necessary for the technical investigation.

The administrative, criminal and technical investigations continue but the spokeswoman said there was a new important element to report.

On October 15, the first criminal hearing took place and this meant that the data retrieved from the voyage data recorder and other relevant documents seized by prosecutors was disclosed for the first time.

The data was still under scrutiny, but the authority has made some preliminary recommendations based on three main areas: navigation, safety management and stability.

The inquiry concerning the navigational phase focuses on what happened before the impact and in particular the behaviour of the master and his decision to take the vessel so close to the shoreline.

The investigation simulated the last navigation phase using Carnival's cruise simulator training centre C-Smart in Almere, considered the manoeuvring before impact and the ship's behaviour after the event. It reconstructed the action using witness statements, the survey report and video data.

The authority showed the simulation at the IMO to demonstrate how close **Costa Concordia** sailed to the shoreline. The only change made was to simulate the action in daytime so that the coastline could be more visible.

The spokeswoman said: "The reconstruction allows analysis of evidence from the critical point for navigation and the preliminary factors which contributed to the accident. First of all, the shifting from a perpendicular to a parallel course extremely close to the coast.

"A second critical point is that the reference point for starting turning was not the most external landmark, instead the ship proceeded to sail southward towards the inner coastline. Another critical point is the high speed at night so close to the shoreline."

The spokeswoman also highlighted the inappropriate use of cartography, as the ship was using chart no 6 instead of chart 122.

The master's inattention due to people present who were outrageous to the bridge watch

The master's inattention due to people present who were extraneous to the bridge watch and to making a phone call not related to operations also contributed to the accident, the Italian body said.

The simulation also showed that the master's orders to the helmsman aimed to ensure that the compass course was followed rather than the rudder angle.

Finally, the investigation highlighted the attitude of the bridge team. "Although the staff were more than suitable in terms of number, they were not paying the due attention to steering and the ship position," the spokeswoman said.

On the subject of safety management, the spokeswoman said the alarm on Costa Concordia was not immediately activated after the impact and this delayed the management of the emergency phases and abandon-ship procedure.

"An analysis of the crew certification, muster list, training and certification highlights some inconsistencies in the assignment of duties to some members of crew," she said.

"The lack of direct orders from the bridge to the crew on safety issues hindered an efficient management of the general emergency abandon ship phase. The existence of different backgrounds and training of crew without complete co-ordination hindered operational management."

Although Italy noted that these issues were well regulated by SOLAS, the spokeswoman added that regulation regarding safe manning and muster lists could be reconsidered.

On the subject of muster lists, she explained that investigations carried out by the Italian coastguard on more than 50 cruise ships flying different flags found that muster lists are often confused with the minimum safe manning document.

On the issue of stability, the spokeswoman said a combination of factors caused immediate and irreversible flooding of the ship beyond any manageable level.

She said the flooding of the compartments was caused by the gash in the hull.

"It is now possible to provide exact measurements. The gash was 53 m from frame 52-125 with a variable width up to 7.3 m. Watertight compartments five and six flooded in a very short time after collision and represent already a limit condition for giving the abandon-ship order allowing for a safe evacuation," she said.

A stability simulation was also conducted by Safety at Sea Company in Glasgow, using all the information available, especially VDR.

"It was found that a critical factor caused by the flooding was the immediate loss of propulsion and general services located in watertight compartments five and six. One of the consequences was that the high-capacity seawater service pumps were unavailable as they could only be supplied by the main switchboard."

The investigation also noted that the lack of a wireless telecom system could be considered a factor in delaying the exchanges between key persons during the emergency.

Although the spokeswoman said the flooding of watertight compartments where most of the vital equipment was stored made the casualty unique, it also demonstrated the validity of some amendments to SOLAS setting further requirements for new buildings or existing ships, such as requirements for segregating vital equipment.

She said: *"Improvements can be seen in conjunction with the Safe Return to Port requirements, such as: providing double skin to protect the watertight compartments containing equipment vital for the propulsion of the ship; more partitioning and sub-partitioning of the watertight compartments to limit the effect of flooding; discontinuity between the compartments containing the ship's essential systems; more detailed criteria for distribution of bilge pumps along the length of the ship and possible arrangement of at least one high capacity pump to drain large quantities of water from an isolated compartment."*

Italy has recommended central systems for the emergency diesel generator in cases of

emergency such as redundancy of steering to counteract flooding and heeling.

It also said it should be possible to supply the bow thrusters to maintain the bow at sea even with loss of propulsion and main steering failure.

A programme of tests simulating the emergency conditions took place on November 16 and 17. The results are under evaluation and will help to verify and better understand the emergency diesel generator and related switchboard.

20th December, Prosecutors concluded the *criminal* investigation into the shipwreck of the Costa Concordia cruise liner and were preparing to seek a trial for its captain and eight other people.

Captain Francesco Schettino was accused of (A) manslaughter, (B) causing a shipwreck and (C) abandoning the ship, when the vessel first *contacted* rocks and then capsized after he brought it too close to the island of Giglio.

On February 23, 2013 the names of 10 persons and a company charged with crimes and infractions of the Costa Concordia incident January 13, 2012 were made public as follows;

*The preliminary investigations about the **COSTA CONCORDIA** shipwreck (that) occurred on the 13th (?) of January 2012 in front of Giglio Island have been concluded and a request for committing the responsible persons for trial has been lodged.*

The Public Prosecutor's Office in the court of Grosseto informs all the people offended about the demand sent to the Judge of preliminary investigations to place on file:

*- the crime of cooperation in **unintentional shipwreck** against:*

Salvatore URSINO, born in Messina on the 16th of July 1985.

*- the **crime of cooperation in unintentional manslaughter** and unintentional personal injuries against:*

Salvatore URSINO, born in Messina on the 16th of July 1985;

Roberto BOSIO, born in Sanremo (Imperia) on the 26th of October 1966;

Manfred URSPRUNGER, born in Enns (Austria) on the 12th of May 1958;

Paolo Giacomo PARODI, born in Genoa on the 26th of February 1953.

*- the **infraction of lack of cooperation with the maritime Authorities** against:*

Andrea BONGIOVANNI, born in Sanremo (Imperia) on the 25th of January 1981;

Simone CANESSA, born in Rome on the 24th of November 1985;

Manfred URSPRUNGER, born in Enns (Austria) on the 12th of may 1958.

*- the **infraction of cooperation in destruction or deterioration of a protected habitat** inside a natural site against:*

Francesco SCHETTINO, born in Naples on the 14th of November 1960;

Ciro AMBROSIO, born in Torre del Greco (Naples) on the 29th of October 1983;

Salvatore URSINO, born in Messina on the 16th of July 1985;

Silvia CORONICA, born in Trieste on the 5th of January 1983;

Jacob RUSLI BIN, born in Jakarta (Indonesia) on the 11th of December 1963.

- the administrative offense resulting from the crime of destruction or deterioration of a protected habitat inside a natural site against:

COSTA CROCIERE Spa, Headquarters in Genoa, Piazza Piccapietra n. 48.

25th February 2013, On 25 February 2013 the Chief Prosecutor said after a sophisticated scientific and other technological investigation was carried out:

"the determining cause of the events of the shipwreck, deaths and injuries, is, unfortunately,

dramatically due to the human factor."

He also said Costa Crociere SpA, the Italian cruise company and *ship owner*, has asked for a plea bargain agreement which, if it was accepted, could see Costa pay a €1 million (\$1.35 million) fine.

The trial was supposed to take place 15-24 April, 2013 at Grosseto, apparently behind closed doors, so the public and media could not attend. On April 17 the presiding judge postponed the hearings until May 14.

25 February 2013 – Italian prosecutors seek indictment of *Costa Concordia* captain Francesco Schettino and five other Costa employees (four crew, one shore side)

PHASE 6 THE COSTA CROCIERE PLEA BARGAIN

10th April 2013. Costa Crociere reached a Plea Bargain with the prosecution. In this, Costa Crociere accepted a Euro One Million fine in order to settle potential criminal charges against it. This prevents the company from ever being prosecuted in a criminal court for its role in the disaster. This effectively leaves the Master as the sole agent responsible for the disaster. It also completely ignores the The International Safety Management (ISM) Code that is an international standard for the safe operation of ships and for pollution prevention required for ships to be operated by the IMO.

Comments on the Plea Bargains.

The IMO, under whose auspices the ISM Code was instituted and effectively are responsible for its governance, said nothing.

Taking particular exception to the court's decision to permit plea bargaining arrangements in such a serious maritime incident, IFSMA secretary general Commodore Jim Scorer said that the criminalisation and victimisation of the master ***"is beyond belief and needs exposing and condemning at the highest level"***.

'Learning from mistakes identified during the process of an accident investigation is an important, if not vital, part of the international Maritime Community's safety culture.'

H.P.Berg. Human Factors and Safety Culture in Maritime Safety (2013)

This was acknowledged by the Bundesstelle Fur Seeunfalluntersuchung (BSU, The German Federal Bureau of Maritime Casualty investigation, when it publicly criticised the Plea bargaining and the decision not to investigate Costa Crociere's role in the disaster.

Ref; 2014 Bundesstelle Fur Seeunfalluntersuchung annual report.

May 22, 2013, it was announced that the trial will begin on July 9 and that only Captain Schettino will be tried for causing the shipwreck by navigating too close to shore producing a contact with a rock on January 13, 2012.

The other persons accused of assisting the Captain will only be judged later.

24 May 2013 – Italy releases full accident report on *Costa Concordia* casualty

The considerable delay in publishing this report was the subject of extensive criticism.

On April 26 2013 the International Chamber of Shipping (ICS) and the International Transport Workers' Federation (ITF) made a joint submission to the IMO commenting on the apparent failure of some flag states to submit maritime casualty reports to the organization, obviously directed at the Italian Accident report.

"The lack of investigation and accident reports hinders the development of appropriate measures by IMO to address the cause of serious incidents in which seafarers may have lost their lives"

ITF acting general secretary, Stephen Cotton.

"It also frustrates efforts by ship operators to learn from the reports and to amend or develop new procedures, or implement other measures to prevent or mitigate similar future incidents"

ICS secretary general, **Peter Hinchliffe**.

ICS and ITF have therefore suggested that further consideration might be given by IMO to the extent to which flag states should retain the latitude which they currently enjoy when determining whether the results of any investigation should be submitted to IMO.

the Italian Marine Casualty Investigation Central Board, MCICB, submitted months 16 months after the accident, giving the reason for the delay that the criminal court and the prosecutors had confiscated the VDR for 9 months.

It could be that the ICS/ITF have misunderstood the situation. Flag States are only required to report where there is a regulatory importance. When they do report, it is the flag state that gives permission to the IMO to release.

7TH PHASE. THE SAFETY REPORT

Below follows the complete unaltered translation of the Safety report conclusion. It is disappointing that the translation has been done so poorly.

The EU Directive 2009/18/EC establishes the fundamental principles governing the investigation of maritime accidents in order to determine their cause.

This Directive, which entered into force on 17 June 2011, introduces among others the obligation for Member States to have in place an independent accident investigation body and the investigation itself is done on the basis of a common methodology and the accident report should be made public within 12 months from the date of the casualty. However, Italy did not have such a unit, which left the responsibility, in the case of Costa Concordia, with the Flag State administration.

Owing to the length of the report only the conclusions have been included.

CONCLUSIONS

Foreword

It is worth to summarize that the human element is the root cause in the Costa Concordia casualty, both for the first phase of it, which means the unconventional action which caused the contact with the rocks, and for the general emergency management.

It should be also noted that the Costa Concordia is, first of all, a tragedy, and that the 32 dead people and the 157 injured, depended only by the above mentioned human element, which shows poor competence by key crewmembers.

According with the evidences found at the end of the present investigation, it is necessary to put in evidence that Costa Concordia resulted in full compliance with all the SOLAS applicable regulations, matching therefore all the related requirements once she left the Civitavecchia Port on the evening of the 13 January 2013.

5.1 Navigation before the impact phase

This is the phase of the incident is to be considered crucial to the investigation, as it is the cause of action originated the serious Concordia casualty, and in that sense is due firstly to highlight the conduct of the Master geared wilfully to pass the ship in restricted waters and then in a small space, by a route parallel to and perpendicular to an excessively close to the shore, intervening in a very light way on the course (then with bows which gave the helmsman faculty of self-management) to generate a sweet turn, but at the same time very wide.

It is worth to highlight also the following problems in terms of organization: - in the meantime, although the ship was proceeding quickly toward the shore , taking command well in advance, still in time to correct the dangerous route, represents for the Master an aggravating in his nautical behaviour; - the difficulties of the Master in reading the radar screen (according to 1st Deck Officer, was without glasses for near vision); - the use of cartography totally inadequate - an inappropriate application of systems navigation (Ecdis and Radar in appropriate scale of approaching); - however, the distraction of the Master by the conduct due both to the people in the hotel business department that were already on the bridge when he arrived, and to the call engaged by one of them with a colleague on the ground; - the orders of the Master to the helmsman given by assigning the bow to follow, rather than ordering the rudder angle.

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Regarding the specific directives collected within the ISM procedures, emerge precise criticality that can be found in watch-keeping on the bridge, both with regard to the distraction of service personnel due to the presence of strangers, but also about the verification of the ship position, which in this case has never been (at least from audio recordings) ascertained. And in this context it is clear the arbitrary attitude of the Master in reviewing the original waters. The computer simulation somewhat confirmed delays in the ship's manoeuvring in that particular circumstance. In this respect, the following critical points can be preliminarily indicated as contributing factors to the accident:

- shifting from a perpendicular to a parallel course extremely close to the coast by intervening softly for accomplishing a smooth and broad turn;

- instead of choosing, as reference point for turning, the most extreme landmark (Scole reef, close to Giglio town lights) the ship proceeded toward the inner coastline (Punta del Faro, southern and almost uninhabited area, with scarce illumination);

- keeping a high speed (16 kts) in night conditions is too close to the shore line (breakers/reef);

- using an inappropriate cartography, i.e. use of Italian Hydrographical Institute. chart nr. 6 (1/100.000 size scale), instead of at least nr. 122 (1/50.000 size scale) and failing to use nautical publications;

- handover between the Master and the Chief Mate did not concretely occur;

- bridge (full closed by glass windows) did not allow verifying physically outside, a clear outlook in night-time (which instead could have made easier the Master

eyes adaptation towards the dark scenario), catching moreover noise by sea slamming to the rocks/beach;

- Master's inattention/distraction due to the presence of persons extraneous to Bridge watch and a phone call not related to the navigation operations;

- Master's orders to the helmsman aimed at providing the compass course to be followed instead of the rudder angle.

- Bridge Team, although more than suitable in terms of number of crewmembers, not paying the required attention (e.g. ship steering, acquisition of the ship position, lookout);

- Master's arbitrary attitude in reviewing the initial navigation plan (making it quite hazardous in including a passage 0,5 mile off the coast by using an inappropriate nautical chart), disregarding to properly consider the distance from the coast and not relying on the support of the Bridge Team;

- overall passive attitude of the Bridge Staff. Nobody seemed to have urged the Master to accelerate the turn or to give warning on the looming danger.

The present case demonstrates the inadequacy, in terms of organization and then about "who does what" of the Bridge Team. This incident can be useful as a warning for a revision of the guidelines now taken by the various Conventions (SOLAS, STCW, ISM Code), and included with the ISM procedures on board. This in particular to explore the areas where intervening in order to ensure that the management structure of the bridge respond to each situation and condition (ordinary, critical, emergency) that may occur at sea, providing also instruments for adaptation to different types of vessels / sailing / quantity and quality of the crew (among the others a correct adoption of the traditional navigation tools and related criteria, the adaptation of the outlook and radio-navigation).

One particular area can be, of course, the division of duties of everyone which is in service, together with the consultation for sharing of data and risk analysis (in Concordia nobody has verified exactly how the ship was proceeding regard to the danger, with the exact position in relation to the seabed and the coast and with the kinematics it was taking while sailing). These tasks, if coded, can be (regardless who was the watch-keeper) a model of support to avoid risks in the event conditions:

- close navigation;

- narrow passages;

- possible dangers.

Finally, it could be also coded in a better way a complete ban of the presence on the bridge during the voyage and manoeuvres of personnel which is not part of the commanding/conducting staff (Deck Officers and sailors / lookouts), and the resulting penalties [see on the reference the related chapter titled recommendations (operational matters)].

On the whole, the accident may lead to an overall discussion on the adequacy, in terms of organization and roles of Bridge Teams.

5.2 Breach and management of dynamic stability during flooding

A critical factor concurrent to the flooding, caused also by the violent and sudden flooding and very decisive, was the immediate loss of propulsion and services in general, short circuits occurring in the chain of the two WC more violently affected, i.e. the same PEM room (No. 5) and the WC 6 (aft DD.GG.), where vertically - but under the Bridge 0 - insist respectively the electric production panel and the distribution one (in PEM are present, below the production panel, even the transformers). The black-out was recorded only 50 seconds after the contact. Although the protections present before the power distribution have intervened to prevent the transmission of short-circuits on the electrical panel from emergency DG, loss of propulsion due to the collapse of the six main DD.GG. and the consequent loss of production and distribution of electricity hit, crucially, production facilities and overall governance of the ship.

Once lost the production of electrical power, the consequent criticality was, in fact, the inability to have available the pumps of exhaustion large masses (approximately 1,000 m³ per hour flow rate, requiring a large power consumption which is insurable only by the network production / primary distribution), as only adequate aids to control (3 pumps should have operated at the same time), depleting them, the free liquid surfaces immediately produced in WC 4, 7 and 8.

The emergency pump (250 mc flow / h) has not been activated, also for the discontinuous operation of emergency utilities evidently (especially in the crucial phase of failure, i.e. from 3 mins to 20 mins). It, however, could not provide any significant contribution to the reduction of free liquid surfaces.

A further electrical line supplying the emergency, and then affected by the same problems of continuity in operating, is the balancing pump. Regardless, and taking into account the severity of the list, the use of that pump, possible only in tanks at the extreme bow, could not surely have an impact on the improvement of conditions of stability.

Taking into account the exceptionality and the rapidity of the event, the SOLAS rules referable to Concordia do not establish that the ship is equipped with an automated system of water detection in the free compartments and, consequently of a computerized failure control system by direct information necessary to calculate the residual dynamic stability.

With regard it should be noted, in fact, the mere function of support performed by the computerized stability system (i.e. NAPA) , which responds to Rule 8 of Chapter II / 1 of SOLAS to provide, before and after failure, the parameters of static stability and the condition of final flooding determined with the help of the operator who manually enter the necessary data. The NAPA is powered by one of the battery groups (UPS) on board, and after some initial technical difficulties, appears to have been used regularly by the Officers in charge.

The stability of the vessel resulting in the 10 steps analysed in the flooding sequence have been determined using NAPA, as the software used for the flooding simulation does not perform stability calculations; the stability results are available in Annex 1b App 3.

The stability of the vessel is found satisfactory in terms of GM at equilibrium heeling angle, range and area under righting lever curve (representing the residual righting energy of the vessel) from step 1 (representing the vessel situation at 9.45 p.m. of 13 January 2013) to step 9 (representing the vessel situation at 10.31 p.m.), whereas at step 10 (representing the vessel situation at 10.54 p.m) the righting lever curve is almost neglectable meaning that the vessel has lost her capability of opposing to healing causes.

Furthermore, starting from step 8 (representing the vessel situation at 10.26 p.m) irreversible progressive flooding of the intact spaces afterward the breach occurs causing the progressive loss of stability and the loss of the ship herself.

For the related diagram, see the pictures reported in the Annex 1b attached to the main Appendix No. 3 (however the related technical graphs are reported at page no. 117 and

Based on the sequence of events, even in the absence at the time of a complete picture of the evidence - and given the exceptional nature of the event [it refers to an extreme case of a contact for high speed while sailing at short distance from the coast and for the incident route (could be qualified as boarding) followed till a few minutes before impact] – it can be assumed that an integrated system of defence (passive and active) can handle a similar case in the future, reducing:

the consequences and ship's flooding reaction even in terms of resistance against sinking, should be based on criteria of safety / construction / arrangements of different systems, other than those existing today.

Excluding in the long-term the replication of an event so dramatic and severe as that which occurred to the Costa Concordia, should be considered in the future a similar incident (consequential damages) the eventual contact between two ships at high speed, with acute / obtuse angle of impact that would affect, therefore, more than two adjacent watertight compartments.

The above matters are examined later in the corresponding recommendations chapter, both in terms of vital equipment and redundancy.

5.3 Functionality of the Emergency Diesel Generator.

The operation of the EDG showed significant criticalities, which require prudent considerations in the round.

It is a critical issue that both the violent impact, the consequently collapse and the massive amount of water that flooded the vital parts of the ship, causing uncontrollable consequences and damage, even invisible, properly imponderable .

We point out that the power emergency grid went into automatic operation, despite the fast path followed by the water within the complex system of production / distribution of electricity, particularly in the WTC 6 (stern DDGG room and Electrical Panel of the main distribution). It is however known, as showed by this IB, that the related equipment were then invested by a collapse, and the grid worked only in a forcing way.

Being understood, the conclusion of the deep technical investigation drafted in the following sentences, some critical elements can be found in the aspects below mentioned:

- limited availability of emergency lines in case of failure for flooding and direct consequences on management of residual dynamic stability;*
- absolute absence of redundancy in the production of emergency power ;*
- lack of lines available in emergency, in particular those also that could be used for an alternative government of the ship.*

In view of the afore mentioned results, carried out with the aid of board Costa Favolosa sister ship activities , the conclusions are here below submitted:

The statement in Enclosure no. 1 to the main Enclosure nr. (...) provides evidence of EEP efficiency conditions at the departure of the m/v Costa Concordia from Civitavecchia on 13th January, 2012 (it is to emphasize the positive results – with the breaker 901 closure – during the monthly test with no load, carried out in the port of Toulon on 8th January, 2012).

As it can be noted from the events chronology reported in the narrative of this report, the contact occurred at 21.45.07 and the black-out was recorded at 21.45.57. At 21.46.03 the EEP automatically started, as shown by the steering gear pumps power signal.

The large and sudden flooding of the compartments led to a critical situation for the breaker 901 that at 21.46.44 tripped causing a power loss to the ES. As the breaker 901 was supporting a situation of contemporaneous short circuits (those of the lines powering the

compartments involved in the progressive flooding) its tripping may have caused the total black-out. Due to the above the concurrency of the short circuits occurring to the lines powered by the ES would seem the most probable cause of the breaker 901 malfunctioning.

We cannot rule out that the "ship-to-shore" commutator submersion may have contributed to the breaker 901 malfunctioning, still bearing in mind that it is not possible to actually ascertain the flooding real sequence, also due to the fact that the main switchboard rooms were bounded by class A (steel) bulkheads, doors and deck plating, i.e. fire-resistant and although the latter were not waterproof to head pressure they were anyway an obstacle to the flooding progress.

On the other hand, should we consider the sudden flooding of the main switchboard room feasible, the latter circumstance could not be considered as a contributory cause to the EEP malfunctioning (breaker 901). As a matter of fact, the EDG still kept on working automatically supplying power to the ship's electric plant up to 21.46.44.

The test no. 6 showed that it is possible to manually close the breaker 901, manually disconnecting the auxiliary tension to the closing/opening coil without employing a screwdriver, provided that the minimum tension coil is powered. Should the minimum tension coil not be powered or resulting faulty the switch cannot be operated, even manually operating the mechanical closure push buttons. That means that we cannot rule out that a fault or a power loss may have involved the minimum tension coil of the breaker 901, therefore justifying the First Electrician forced intervention.

Later on the EEP resumed working, as declared by the First Electrician, and as resulting from the VDR records relevant to the lifts doors.

Summarizing, the EEP discontinuous working depended on the breaker 901 intermittent functioning, the latter caused by the exceptional event in progress and by the unexpected consequences occurring due to the heavy water progressive flooding. In fact the evidences resulting from the witnesses and the records relevant to the m/v Costa Concordia casualty - as verified during the checks carried out on board the sister ship m/v Costa Favolosa - demonstrated the EEP adequate intervention when the black-out occurred and its full compliance with the applicable rules.

Redundancy of electric power is one the main target drafted in the following chapter titled recommendations (emergency power generation), as suggested by the present lessons learnt.

5.4 On board organization – emergency management

The General Emergency Alarm was not activated immediately after the impact. This fact has led to a delay in the organization of the subsequent phases of emergency (flooding-abandon ship process). With regard to the organization on board, the analysis of crew certification, of the Muster List (ML) and of the procedures of familiarization and training on board highlighted some inconsistencies in the assignment of duties to some members of the crew. The procedures implemented for the familiarization and training of the crew, required for their inclusion in the ML, were not fully responsive to the need. Some communication problems between the crew members and between them and the passengers somehow hindered the management of the general emergency-abandon ship phase and contributed to initiatives being taken by individuals. It is deemed that such flaws are attributable also to the different backgrounds and training of crews. It appears, therefore, that the recruitment of crew members, carried out by external agencies worldwide, plays a fundamental role in the management of emergencies.

It is also necessary to emphasize the different scope of the Minimum Safe Manning (MSM) document and the Muster List (ML). SOLAS regulation V/14.1 requires that the ship shall be sufficiently and efficiently manned, from the point of view of the protection of the safety of life at sea. This regulation makes reference, but not in a mandatory way, to the Principles of Safe Manning adopted by the Organization by Resolution A. 1047 (27). The Administration should, therefore, issue a MSM document appropriate with the above mentioned provisions. SOLAS regulations III/8 and 37 provide details for the preparation and posting of the ML. In particular, regulation III/37 requires that the crew should be organized in a ML showing their

particularly, regulation 17, requires that the crew should be organized in a way ensuring that assigned tasks in the management of various emergencies.

In the light of the above, it should be underlined that, in our experience, too often the scope of the ML is confused with that of the MSM (and this was also found out on passenger ships flying a Flag other than the Italian one).

In fact, the crew indicated in the MSM document shall be properly trained, be in possession of the certificates and training provided in accordance with the STCW Convention and then holding the "minimum standard" required. However, persons on board who are assigned to safety duties, as per the M.L., sometimes lack the necessary skill or simply are unfamiliar with the ship lay-out and procedures. It is believed that this aspect merits a focused attention and discussion.

The general emergency and the abandon ship signals were activated with delay in respect to the moment when the awareness that at least three contiguous WTC of the ship were flooded; this meant that the seriousness was evident, and this information reached the bridge at 22.01 but the first lifeboats were lowered in the sea only at 22.55.

The Master, whose last voice in the bridge was recorded at 23 19 30, first of all abandoned very soon the bridge (leaving of there the Staff Master, who remained till the 23 32 30) and left the ship before her evacuation was completed; at 01.11(contacted by the SAR telephone number 1530). The Master declared to be on shore, while several passengers and crewmembers were still on board; and however, most of the Officers were already on shore, together their Master.

It is evident that the Master of the Concordia:

- not promptly declaring the general emergency, despite the premises occurred; thus seriously delaying the gathering of the passengers and crew in the Muster Stations;*
- not activating the Muster List;*
- abandoning the ship while passengers and crew were still on board,*

could have caused as a consequence of the above findings the 32 decedents in the casualty, as already showed in detail by the statement reported in the previous chapter 4, according with the finding which reconstructs the dynamic of the causality and the only practicable alternative way to avoid those victims, which was, instead, ignored by the Master.

Within the ship reports (Annexes 59 - 60) regarding the two last general drills carried out on board during December 2011, although simulating an abandon ship after a serious fire on board, it was pointed out - despite the Master was the same – a correct approach of the both emergencies. In particular within the 14th December one, the Master, just after the awareness that passengers were in danger, launched immediately the general emergency alarm and just after 25 minutes, when the Hotel Director confirmed to the Master that all passengers had been evacuated from the living spaces, he raised the abandon ship order.

Therefore the above mentioned delaying played the main root cause on the reference, because mostly of those persons (at least 18 on the whole as passengers and crewmembers) delayed, desperately attempted to cross the ship from starboard to left, slipping to the starboard side when the ship listed because the heeling gradually increased from 30 degrees to 80 degrees.

This is confirmed by the analysis carried out according to the position where those victims were been found. Meanwhile, the others desperate people were thrown into the sea.

It is clear, according with the analysis already drafted, that several Officers belong to the deck staff contributed to cause the casualty. Moreover, some of the deck staff officers and the hotel director, since they failed their duty during the management of the emergency, could have contributed to cause the dead persons. The DPA, indirectly, could have contributed to cause of the dead persons as well (at least in terms of moral obligation, taking into account that he realized the serious danger too late).

5.5 Summary Of The Human Factors Analysis And Related Final Conclusions

On the whole, human factors characterized this casualty, as already stated in detail both in the previous analysis and in the present conclusions.

Now, however, it is worthwhile to put in evidence in what terms this main element can be stated, matching it with each of the single actions, or with the respective crewmembers who committed the action.

First of all, analyzing the background of the crewmembers (Officers mainly) involved in all the different phases of the event (even before the contact), this IB excludes that the casualty and the consequent handling of the emergency is due, in terms of human performance, to the lack of competency.

It is likewise evident - also because we have no elements to say the opposite - that the casualty and the related failure in terms of emergency handling was characterized by the lack of alertness. In reference to this, this IB excludes, in accordance with the previous analysis, that there were problems related to fatigue and related rest and the health of the crewmembers (they had certificates of fitness). Instead with reference to stress, while most factors which could have influenced this element, it has to be excluded as well. This IB cannot say the same for the individual factors such as: personally, health problems occurred during the seagoing service on Concordia, personal relationships, motivation, sense of danger. This IB has not elements to establish, for each crewmember involved, if he/she felt "optimum performance" (linking it to the stress level) on the day 13th January 2012 and exactly during the occurrence of the casualty.

Therefore, distractions, errors and violations can be established as the elements which characterized the human factors as root causes in the Costa Concordia casualty.

Both distractions and errors (in all terms of slips, lapses and mistakes) had been made during the Master's performance before the contact, according to the previous detailed analysis. Distractions and errors (in all terms as slips, lapses and mistakes, as well) had been made during the Bridge Team performance (all the Bridge Team involved) before the contact, according to the previous detailed analysis.

Notwithstanding the above preamble, regarding the competency, not having attended a training course on Bridge Resources Management course - BRM, (not mandatory at this stage) could have represented a weakness in terms of competency (human factor as bad human performance) in this casualty. In fact none of those deck Officers on duty before the contact (Master and all the Bridge Team) had attend a BRM course. Regarding the actions carried out by the Master during the navigation before the contact, some errors and violations occurred (as this IB supposes), respectively due to:

- about errors, as "false hypothesis" [according with his convincement to operate in a familiar surroundings, despite the external environment changed (ship was not in manoeuvring but she sailed like in an usually navigation like in high sea, darkness)], "pressure" (promise to a crewmember for sailing too close), "decision" (insisting to change the original voyage plan), "mistake" (he applied a bad rule to manoeuvre), "lapse" (he omitted the handover);

About violations, as "short cuts" [two ISM procedures were, in fact, not applied, the first in order the scheduled handover and the consequent watch-keeping, the second regards the watch-keeping in case of close sailing with others ships (keep a distance not less than 1 mile – see Annex 25). In this reference, despite it is applicable for other ships approaching, the related criteria should be extended as well, by the Master, to the Giglio approaching, considering the external environment and the speed], "optimizing" (he tried to match the pleasure towards a crewmember with the only purpose of the sailing, which was to proceed in safety manner for approaching the next scheduled port).

It is worth to point out that the above error (the lapse) and violations (the two short cuts) regard also the First Mate (in duty before the contact). While all the Bridge Team carried out both lapse and mistake/failure of attention, respectively not making the look out and the adequate support/assistance to the Master during the most dangerous phase of approaching

adequate support/warning to the Master during the most dangerous phase of approaching (not anticipating the manoeuvres to correct the wrong course).

About the emergency, the performance of the Master was affected by errors. These can be stated in terms of lapses (omissions of procedures such as, mainly, the Decision Support System; moreover, he left the bridge as first and after left the ship very soon), failure of attention (he seemed such as absent by the context of the emergency and disoriented both his Staff and DPA), mistake (lack of knowledge about the vital equipments located in each compartment below the bulkhead).

Once again about the emergency, it is worth to point out the following: - both delay and mistake regarding the Hotel Director (he did not cover his duty scheduled by the procedures, omitting firstly his fundamental role on board); - delay and mistake by some Deck Officers belonging to the emergency Staff after the contact (they did not cover their exactly role, despite they were active in supporting the emergency handling; however, their actions/reactions were influenced by the absence of the Master who, carrying out the above errors, did not coordinate and govern - at all as resulted by the VDR conversations - the emergency).

5.6 SAR Operations

Summarizing, SAR Authority which intervened to coordinate the rescue operations was, of course, not informed in a suitable way respect to the real scenario occurred on board, both by the Master/Bridge staff and the Company. Fortunately, the incident happened near the shoreline (the area, however, is still not covered by the VTS system), and that's way the delay caused by the Ship, first of all, didn't compromise the rescue operation. Just 15 minutes after the event, thanks to some passengers, Leghorn MRSC was warned about some failure on board, and after few minutes (22 14), the vessel track was found by Leghorn AIS. The Patrol Boat in the area was tasked, at 22 16, to reach the Concordia position, approaching her at 22 39. The main lesson learnt is, therefore, the delay and the missing information by the ship.

SAR operations can be considered overall successful, taking into account that in few hours all the persons on board had been evacuated. It is need to take into account that, after 5 hours by the abandon ship, remained only 40/50 persons on board. 1.270 persons (a third of the total) were, at the end, saved by the shore SAR resources, while the others were saved by the ship, who were been supported by the same SAR resources by the time when the first lifeboat touched the sea. Despite the casualty is a tragedy, the number of victims was constricted, and all of them dead mainly for the delaying of the on board emergency procedures.

The abovementioned success was achieved also with the contribution of two significant elements:

- special patrol boats deployed by the Coast Guard (22 meters length and able to load more than 100 passengers) provided with a special fender, known as "balmoral", which allowed to approach the hull and the lifeboats without creating any damage to both ships and people to rescue;

- special rescuers, who were divers with a proficiency as speleologist, able to climb and break the structures, to rescue, even in dark condition, persons standing in the ravines.

6. SAFETY RECOMMENDATIONS

FOREWORD

The following recommendations have been made, despite the human element being the root cause in the Costa Concordia casualty.

Here is why, after this investigation, we would like to delivery in the hands of the International Maritime Community our suggestions regarding as the naval gigantism, represented by the Very Large Cruise Ships, to face this actually and rising wonder.

We believe that we can only investigate to:

- mitigate the human contribution factor with education, training and technology;*
- improve day by day the building, through the modern technology;*
- stress all the maritime field cluster to make the maximum contribute for the related study and consequent technical research.*

The following recommendations must be considered the starting point of the actions taken consequently to this extraordinary tragedy, since we believe that many other issues could be risen, reflecting on the deep and taking time to react more, among others, with the three suggestions fore mentioned.

6.1 Actions taken

6.1.1 What Flag Administration already made:

It should be recalled that in the interim period from the beginning of the investigation and the publication of this report, some of the issues identified by this Investigation Body, and already implemented on Italian Flying Flag ships, was brought by the Flag Administration to the IMO (refer to documents MSC 90/Inf. 19, MSC 91/7/7) and taken on board by such an Organization (refer to MSC.1/Circ 1446/rev 1, Long-term action plan on passenger ship safety and amendments to SOLAS convention as set out in MSC 91/22 Annex 14).

The proposals originally made are summarized in the following:

1. Information on passengers: the information required by SOLAS regulation III/27 and European Directive 98/41/EC should be integrated with the indication of the nationality of each passenger. This would help communications, in case of accident, between SAR Centres and Administrations whose citizens are on board;

2. Voyage plan: the voyage plan requested by SOLAS regulation V/34 should be made available by the master to the Company prior to the ship's departure and be kept available until the next DOC audit;

3. Instructions to passengers: the following measures should be implemented:

a) at their embarkation, passengers are to be provided with a brochure containing all the essential emergency information; these brochures are to be available in the Flag language and in the languages spoken by the passengers on board;

b) in addition to what is prescribed by SOLAS regulation III/19.2.2, safety information is to be available through the ship's TV system, both in cabins and in conspicuous points in the public areas, at the embarkation and throughout the voyage;

4. muster of passengers: the muster of passengers as per SOLAS regulation III/19.2.2, is carried out at the ship's departure from the home port; where embarkation takes place in different ports, separate and dedicated musters are to be performed for passengers embarking in those ports.

6.1.2 How the MLC Convention (in the final rush to enter in force) could contribute, in terms of recruitment, placement and manning towards the human factor:

Assessment necessary to recognize the private Manning Agency which manage in the maritime field to recruit and find employment for seafarers and other personnel who supply the ships sail under the Italian flag should be taken;

- periodic controls on the activities of such Agencies should be established;*
- a more detailed criteria for employing Recruitment and Job Agencies. Organize procedures, through the SMS Manual, to carry out systematic audits of the above mentioned Agencies should be established;*
- the regulation pertaining to the MLC 2006 ILO Convention even to the Countries which are*

not Member States of the related Organizations/Agencies should be extended;

- improving the guidelines to control the activity carried out by the Manning Agencies for the recruitment and find employment could be delivered within the MLC working group.

6.1.3 What the Company already did (before and after the March 2012 audit by the Flag State)

1. Company Audit follow-up as a consequence of the casualty:

Following the Costa Concordia event and after the evaluation of initial information and elements of investigation acquired, the Flag Administration considered necessary to perform an audit related to the safety management system of the Company "Costa Crociere SpA".

In this regard, the Flag Administration provided a DOC additional verification that was performed on 6 and 7 March 2012 by four ITCG Officers and a Recognized Organization auditor (Rina Services SpA). 7 "Non Conformities" and 5 "Observations" were found. Notwithstanding the need to conduct an additional audit, within 6 months, the Company DOC certificate was endorsed.

The non-conformities control and corrective actions were monitored by the Flag State Administration and definitively closed on 5 June 2012.

On 3 October 2012 the above mentioned DOC additional audit was carried out by ITCG personnel in conjunction with Recognized Organization auditors (Rina Services SpA) without any finding.

2. Regarding the organizational changes implemented by the Company following the Costa Concordia case, the most relevant with the subject are:

a. Amending P12.04 IO 01 SMS Procedure "Management of the Emergency Instruction for Passengers (Annex 61):

Forwarding the Circular Letter GEN. SER. N°97/2012 – implementation of actions in favour of cruise ships identified in response to the accident of "Cost Concordia", which amended the above procedure establishing a new policy on passenger emergency instructions, by the 1st of February 2012 (this should be adopted one week before that the same policy was adopted by the rest of the whole Cruise Industry). According with this new policy, the above procedure (Annex 62) points out that guest's safety drill is performed now before the departure of the ship from the embarkation port, and those guests identified as not participants are re-invited to another event organized on-purpose.

b. Amending P12.04 IO 02 SMS Procedure "Decision Support System for Master" (Annex 63):

Reviewing, by the 2nd of June 2012, the related fundamental rule, implementing each action to be taken in case of emergency. The related workflow is amended for:

- Contact/Leaking, enforcing the assessment of the WTC and the linked, consequent, actions, also related to the Damage control Plan;

- Aground, implementing the procedure for the VDR discharge;

Fire in Engine Room, enforcing the assessment and the confinement of the related vertical zone, and implementing the procedure for the VDR discharge;

Fire outside Engine Room, implementing the procedure for the VDR discharge;

Emergencies related with Pollution, stressing the action of the Master already established, to emphasize that he is obliged to follow the related plan for fighting the pollution.

It results, moreover that the Company made:

Creating a new Maritime Development & Compliance Dept, which reports directly to the CEO and manages all the HESS [Health - Environmental - Safety - Security] matters related with the COSTA-IBERO-AIDA brands (Annex 64).

Implementing an advanced system to manage and monitor fleet route the "High Tech Safety Monitoring System" (HT-SMS), involving both on board and ground staff. The system enables the Company to monitor position and course of the entire fleet in real time (Annex 65), to verify:

- The safety level of route plans, comparing the route planned by the Master (Passage Voyage Plan or VPP) with the standard route;*
- Actual position of each vessel compared with the route planned by the Master (VPP) and the standard route;*
- quickly and automatically identify unexpected changes of direction.*

Creating a dedicated "F.O.C." Fleet Operations Centre in Genoa HQ to monitor and manage any alarm generated by the system (the related procedure is attached);

'Is about to be officially replaced the P15.6 IO 01 "Crisis Management Preparedness Plan Operational & Reporting Procedure" by a brand new E.S.U. [Emergency Support Unit] Manual, prepared by a working team led by another new role created: the Crisis Management Director, reporting directly to the President. The Crisis Management Director's organization is about to be fully deployed whenever crisis levels are such as to pose risks for passengers, crew and corporate structures in general and involves new and dedicated Genoa HQ infrastructures.

d. Implementing the training towards the Deck Officers, through a mandatory policy adopted by Carnival Corporation on 1st September 2012 (see Annex 50), which establishes, as drafted in the previous chapter 4, the following action taken about such the following summarized mandatory courses, which amended in concrete the procedure P5.03 SMS (Annex 66):

- Bridge Resources Management (BRM - two levels);*
- ECDIS-NACOS (two levels);*
- Ship Handling;*
- Stability.*

Furthermore:

Master and Staff Master have to attend all the above courses;

Senior Officer on Watch the two levels of both BRM and ECDIS;

Junior Officer on watch BRM and ECDIS 1st Level;

Course for Instructor is recommended for the Master;

The Carnival Corporation new Safety Standard addresses the proficiency in details as well.

6.2 RECOMMENDATIONS

PREAMBLE

The immediate flooding of five watertight compartments, where most of the vital equipment of the ship was located, makes the Costa Concordia casualty quite a unique event. The extent

of damage is well beyond the survivability standard applicable to the ship according to her keel laying date.

However, the investigation has allowed the identification of some recommendations the adoption of which could constitute an improvement of the current requirements.

The aim of some recommendations is already taken into account by the SOLAS Convention for new buildings or existing ships, through various amendments to the Convention including:

- 1. requirements for segregation and redundancy of vital equipment for propulsion, steering and navigation, i.e. SOLAS regulations II-1/8-1, II-2/21 and II-2/22 on the safe return to port, applicable to ships built on or after 1 July 2010;*
- 2. onboard stability computer (or shore-based support), applicable to passenger ships subject to the safe return to port requirements and built on or after 1 January 2014, i.e regulation II-1/8-1.3 as contained in resolution MSC.325(90);*
- 3. flooding detection system, for ships built on or after 1 July 2010 as per SOLAS regulation II-1/22-1; and*
- 4. use of Electronic Chart Display System (ECDIS), SOLAS regulation V/19.2.2.3.2 applicable to all passenger ships (for those constructed before 1 July 2011, the requirement shall be met not later than the first survey* after 1 July 2012).*

However, the recommendations given below may emphasize the necessity for having some of the above requirements reconsidered.

It must be pointed out that the adoption of these recommendations may permit an improvement in the ship's survivability during a casualty as the one involving the Costa Concordia; although they may not be sufficient to render the ship unsinkable when more than two watertight compartments are flooded.

6.2.1 STABILITY

For what concern the stability related issues, it is recommended that the following items are considered with the aim of improving the existing requirements:

- 1. double-skin for protecting the WTCs containing equipment vital for the propulsion and electrical production;*
- 2. limiting of the down flooding points on the bulkhead deck to be discussed in the light of Part B-2 of Chapter II-1 of SOLAS 74, as amended*
- 3. provision of a computerized stability support for the master in case of flooding; and*
- 4. interface between the flooding detection and monitoring system and the on board stability computer, taking into consideration regulations II-1/8-1 and 22-1 of Chapter II-1 of SOLAS 74 as amended.*

Initiatives in 1. and 2., above, are meant to be addressed to new ships while the discussion on the content of 3. and 4. should be extended to both new and existing ships.

6.2.2 VITAL EQUIPMENT AND ELECTRIC DISTRIBUTION

The following issues need to be discussed for possible improvements of the existing requirements:

- 1. discontinuity between compartments containing ship's essential systems (such as propulsion sets or main generators sets) in order to preserve their functional integrity (reference should be done to regulation II-2/21, SOLAS 74 as amended);*
- 2. more detailed criteria for the distribution, along the length of the ship, of bilge pumps and requirement for the availability of at least one pump having the capacity to drain huge quantities of water (reference should be done to regulation II-1/35-1, SOLAS 74 as*

amended);

3. relocation of the main switchboard rooms above the bulkhead deck (reference should be done to regulation II-1/41, SOLAS 74 as amended);

The above mentioned recommendations number 1, 2 and 3 are meant to be addressed to new ships only.

4. relocation of the UHF radio switchboard above the bulkhead deck, for all existent ships which are provided with this equipment below this deck, and for the new ships, it should be located above the bulkhead deck.

6.2.3 EMERGENCY POWER GENERATION

Regarding the emergency source of electrical power (ref. regulation II-1/42, SOLAS 74 as amended), the following should be considered:

1. increasing the emergency generator capacity to feed also the high capacity pump(s) mentioned in the previous paragraph "VITAL EQUIPMENT AND ELECTRIC DISTRIBUTION";

2. provision of a second emergency diesel generator located in another main vertical zone in respect to the first emergency generator and above the most continuous deck. In this respect, the definition of "most continuous deck" in the light of SOLAS regulation II-1/42.1.2 seems to be necessary. This second generator could be dimensioned on the basis of selected services. The related manufacturing and handling should be as follows:

a) new emergency diesel generators are made according to aimed and specific building techniques in order to guarantee a unailing and long-lasting functioning;

b) regulate in an optimal way the functioning tests, planning them once a week, under a significant load (at least 50%) and of at least two hours duration for both the emergency diesel generators.

3. provision of an emergency light (both by UPS and emergency generator) in all cabins in order to directly highlight the life jacket location.

Although the above recommendations are meant to address new ships, considerations on the applicability of items 2. and 3. also to existing ships is suggested.

6.3.4 OPERATIONAL MATTERS

The event demonstrated that there is the need for verifying the actuality of provisions contained in international instruments, such as SOLAS, STCW and ISM Code related to different issues such as:

1. bridge management, considering aspects such as the definition of a more flexible use of the resources (that may be tailored for responding to ordinary, critical, emergency conditions), an enhanced collective decision making process and "thinking aloud" attitude;

2. Bridge Team Management course for certifications renewal should be mandatory by the 1st January 2015;

3. Principles of Minimum Safe Manning (resolution A.1047(27) as amended by resolution A.955(23)) that should be updated to better suit to large passenger ships. A mandatory application of these principles is also considered desirable;

4. muster list, showing the proper certification/documentary evidence necessary for crew members having safety tasks;

5. inclusion of the inclinometer measurements in the VDR.

The above items could be applicable to both new and existing ships.

6.3.4 EVACUATION ANALYSIS

1. For new ships, it would be useful to require an evacuation analysis to be carried out at the early stage of a project (ref. regulation II-2/13-7.4, SOLAS 74 as amended), extending in mandatory way the above regulation, actually limited to ro-ro passenger ships.

2. Regarding the embarkation ladders: with the ship listed at an angle exceeding 20°, it was demonstrated that traditional embarkation ladders were more useful. Therefore, in the light of the above mentioned details drafted in Para 4.6.1.4, it may be necessary to consider whether the minimum number of embarkation ladders (one) on each side should be increased (SOLAS 74 as amended reg. III/11.7)

6.3.5 SAR

This casualty gives us special lessons also in terms of SAR experience.

Despite the main, unbelievable lesson learnt is, the delay and the missing information by the ship, we would warn the IMO about other issues, to recommend each SAR Organization for providing its resources by the following tools:

- SAR patrol boat supplied with fix fenders, blocked in the upper side of the hull, to approach safe other ships/boats in case of extraordinary evacuation of persons. This should be able to load at least 100 passengers in their deck;

- Divers speleologist, able to rescue, even in dark condition, persons standing into the ravines of ships/wrecks.

All the lessons learned and the consequent above mentioned recommendations have been shared with the relevant Flag State Office.

7TH PHASE. THE TRIALS

Italy has been consistently ranked as the most corrupt country within the Eurozone, according to Transparency International's annual surveys. In the WTO's Global Competitive Index it ranks 49th out of 144. For business competitiveness, it ranked 106th, nestled between Honduras and Sierra Leone.

ITALIAN CRIMINAL LAW

Italian criminal law is divided into two parts: there are the rules describing the types of crimes codified both in the Criminal Code and in special legislation, and there are the other rules, contained in the Code of Criminal Procedure, governing the investigations of crimes, the arrest, charging, trial of accused etc., up to the final decision.

The preliminary investigations phase

Once the Public Prosecutor's office has received a crime report, he is obliged to start the preliminary investigations and he has a maximum of six months to a year (depending on the nature of the crime) to carry out a systematic examination of the person who may have committed the crime and the questioning of witnesses.

the request for a trial must contain some formal requirements and, among them, the most important is a statement of the alleged criminal act, the aggravating circumstances, together with an indication of sources of evidence acquired.

At the hearing, the Judge can either close the case without the necessity of a trial or order the case go to trial, by means of a "decree ordering a trial"

The Trial

Trial hearings are normally public. For unexplained reasons, this case was not, even though it was held in an auditorium capable of holding 1000 persons with only 200 seats occupied.

The trial is the heart of the process: first of all, preliminary and introductory issues will be verified and discussed, then the witnesses and consultants will be heard both for the prosecution and/or the defence.

The defendant, at his request, has the right to have the last word. After all the evidence has been heard and once the Public Prosecutor and the defence lawyers have argued their cases, the Judge retires to make his decision.

Appeals

After being found guilty, the defendant, but also the Public Prosecutor if he is not satisfied with the decision, can bring an action. The former to clear his name or to reduce the previous sentence, the latter to get the conviction of the accused or an increase in the penalty. Judgment is normally based on the verbal evidence heard during the trial, so that the defendant does not have to appear again.

Appeal before the Supreme Court is provided only for some questions of law as the facts already heard in the lower court, are no longer questionable.

Plea bargaining

Plea-bargaining is widely used in the Italian system. It has to be granted by the competent judge, further to the agreement of the offender with the prosecuting authorities, on condition that the punishment agreed is not higher than five years' imprisonment. The law considers a plea bargain to be substantially equivalent to a conviction sentence (Article 444 of the Italian Code of Criminal Procedure), but according to case law the affirmation of guilt has a lower value because criminal responsibility was not proven in the course of a criminal trial.

It is accepted as an agreement between the accused and the Prosecutor on the extent of the penalty to be applied and, implicitly, on the affirmation of guilt. This proceeding allows a defendant to take advantage of a discount of up to one-third of the original penalty. The agreement must be presented to the Judge who can accept or reject it. If the Judge accepts the agreement, the judgment becomes final rapidly. Otherwise the decision can only be challenged in the Supreme Court.

From this it can be seen, regardless of the plea bargain agreed, the implication could be that those named, either in Italy or abroad, by admitting to a criminal charge, could find that they have a criminal record.

The Trial.

Italian magistrates will be asked to investigate claims that Costa Cruises, owner of the Concordia ocean liner which ran aground off the Italian coast 11 days ago, tried to cover up a similar incident in 2005, when their Fortuna vessel allegedly struck rocks near Sorrento.

Roberto Cappello, who was working as an official photographer for the company at the time, said that the Fortuna appeared to hit rocks during a close approach to the coast near the southern port in May 2005. He said photographs he took showing the listing cabins and damage to the vessel were confiscated by company officials. His allegations will this week be passed to magistrates investigating the Concordia disaster, in which 32 people are feared to have died.

Mr Cappello's claims came as divers recovered the bodies of two women from the capsized cruise liner, which is resting half-submerged near the port of Giglio island. That brings the number of bodies found to 15, with 17 others still missing. Experts are also expected to begin pumping fuel from the ship today in an effort to prevent an environmental disaster in the area.

Costa Cruises has insisted that close sail-bys of the type that ended in tragedy at Giglio on 13 January have never been endorsed by the company. But the Concordia captain, Francesco Schettino, who is accused of abandoning ship ahead of his passengers and could be charged with manslaughter, has told the preliminary investigations judge, Valeria Montesarchio, that Costa Cruises encouraged passenger-pleasing close approaches "at Sorrento, Capri and everywhere" to "create publicity". It would appear that not only did the company endorse these regular sailbys but this was also known to the Coastguard.

The 2005 incident is said to have occurred on the Costa Fortuna liner that left Savona for Palermo on the 24 April. "The incident happened on the first Friday of May," said Mr Cappello. "It was early in the evening, about 7pm. I was in my cabin. We were close, very close to the shore – about 200 metres – when we hit. There was a loud bang. At first I didn't know that the ship had hit rocks. The first thing we were aware of was the ship listing from left to right. Elsewhere on the ship I saw that plates had fallen from tables. People were obviously aware that something had happened and they were frightened but there wasn't an immediate explanation from officials."

He said the ship appeared to zig-zag in the water "like a snake", but carried on at a slower pace and docked in Palermo. "We were later told that the ship had hit a whale – really. You'd have laughed if the whole thing wasn't so serious and frightening," he said. Mr Cappello said that he went down into the keel where he saw and photographed a gash in the ship "the depth of arm and tens of metres long". He also saw that a propeller blade on the left side was broken

"But when we disembarked, Costa Crociere (Cruises) officials made me hand over the files on my camera. I was basically threatened. They said that as someone on a contract with them I was obliged to hand over all the images in the camera or there would be trouble," he said, adding: "I believe the company knew about these close sail-bys and even encouraged them. But it's taken the deaths of many people for it to really be exposed."

Carlo Rienzi, president of the national consumer group Codacons, which is leading a class action against Costa Cruises, is sending Mr Cappello's claims to Francesco Verusio, the Grosseto prosecuting magistrate who is heading the criminal investigation.

A spokesman for Costa Cruises said that the company would not comment on any developments relating to the disaster during the judicial investigation.

April 15, 2013, Costa Crociere SPA, declared that the company was a, 'damaged party'.

*"After the poor victims, Costa is the most damaged party having lost a 500 million euro ship," Costa attorney **Marco De Luca** said. He said he is seeking damages from Schettino and the other defendants "as the penal code says 'who is guilty of a crime has to pay for it.'"*

However, it has been suggested that in fact the Company, after all the settlements, had gained rather than lost.

With regard to compensation, the protocol of 2002 to the Athens Convention relating to the carriage of passengers and their luggage by sea, 1974 was not mentioned. This was probably because it did not come into force until 23 April 2014. It substantially increases the ship's limits of liability compared to the 1974 Athens Convention, both as concerns death of or personal injury to passengers, as well as loss of or damage to passengers' vehicles and luggage.

May 22, 2013 . The Italian judge Pietro Molino, at a closed-door hearing in the town of Grosseto, agreed to prosecutors' request that only Captain Francesco Schettino be tried on charges of manslaughter, causing the shipwreck and abandoning the vessel while many of its 4 252 passengers and crew were still aboard.

"It must be reiterated that the accused Schettino almost exclusively (sic) carries the weight for the striking chain of errors committed,"

This is very strange as at the first inquiry, Prosecutor General Deidda was adamant that the Company should also be prosecuted for its management failings stating;

"problems and incredible acts of irresponsibility regarding safety and organisation" and notes: "The employer is guarantor and has responsibility. Decisions taken by the shipping company should be under close scrutiny".

July 16th. 2013. The trial that was supposed to take place on the 15th April, 2013, at Grosseto, commenced with only Captain **Schettino** accused. The other accused persons who had accepted plea bargains were sentenced to prison with a term of time served without trial.

February 11th 2015. Captain Schettino was sentenced by the court at Grosseto to 16 years one month in jail and to pay, jointly with the ship owner, €30 000:- to each of 110 civilian parties, €5 000:- to each of another 50 civilian parties, € 300 000:- to two civilian parties, € 500 000:- to four other civilian parties, € 1 500 000:- to further two civilian parties and other sums to 100's of other civilian parties.

The Appeal

12th May 2017. Captain Schettino appealed but lost in all instances and is now in in jail.

FINAL ANALYSIS

First Phase; The Collision.

If we accept that the initiation of this close approach to the Island of Giglio came from the Captain, then we must also accept that the company acceded to this as part of the passenger entertainment package not just on this ship but others within the fleet. However, the question remains as to why this was done at night without any announcement of the approach to the passengers and therefore few passengers to watch. For some reason, the inquiry seemed to question the presence of other personnel on the bridge. This again is very common and should not interfere with the navigation of the ship which carries on regardless. There is no record of the Officer of the Watch engaging with these people therefore we must assume that the functions of the watch carried on as normal.

It always has been the prerogative of the Captain to invite selected guests onto the bridge but with the permission of the Officer of the Watch, who is in charge of the bridge until the Captain assumes that responsibility. I note that one of the knee jerk reactions of the entertainment managements is to ban all non-operational persons from the bridge.

By the strict interpretation of the rules of navigation the distance off land was unsafe at the

speed the ship was making through the water, but then the same could be said for the vast majority of ships who speed in fog, make passage of rivers and fjords, and pass through narrow straits none of which, should the steering fail, could avoid collision with land or grounding. The cruise ships that venture into ice waters sailing close to ice bergs for passenger amusement are often a considerable distance away from any rescue services should they be needed. This is not to condone the practice but simply to state that such speed and distances from land is not uncommon. With reference to speed, one consideration is that the slower a ship proceeds, the slower it reacts to the helm orders. Thus on large ships, at slow speeds, the navigation in confines areas becomes more difficult and requires considerable skill and I speak from experience having commanded ships far larger than the Costa Concordia.

What this case deals with is a close approach purely for entertainment. A far different case than that of ships required by the nature of their business to make such navigation.

The Captain disobeyed the company's rules on the use of the phone on the bridge, however I wonder if that rule applies if the company calls the Captain on the phone while he is on the bridge?

To ask as to the depth of water off the island is a strange request. If the Captain had any doubt, then he should not be there.

I conclude that he was remiss in his prime duty, that of the care of those on board and his ship.

I do not concur with the remarks on the Captains eyesight not being adjusted or his failure to wear his glasses. On a modern ships bridge, especially a cruise ship there are many screens all emitting light that the bridges cannot be completely darkened. His eyesight was proven by the fact that he was the first person on the bridge to see the foam from the waves on the rocks. Further as the ship was approaching the land where the only lights would come from isolated dwellings, there was nothing to see ahead.

The chart was wrong for the navigational purpose of close approach to land. Ships occasionally have to use such charts in emergency cases for close approach or entering a port or even do so without a chart at all, using the excellent pilot books for reference. When this is done, it is with considerable care, especially constant navigational oversight and reducing speed. I do not find that the speed for this ship to be exceptional, but in the circumstances of the chart in use, then the speed should have been reduced.

He did not know the position of his ship. I find it strange than any captain can go on his bridge without checking the ship position as this is a standard procedure on any ship by a competent Master. Instead he placed total reliance on the bridge officers who proved to be incompetent for the positions they held.

Making any such close approach should require the Master to order all W/T doors closed, regardless of their use. It would again seem that in this fleet, the leaving of these doors open was common place therefore the fault is also in the guidance from the Company to the fleet in general as to the W/T door policy to conform with the IMO legislation and recommendations.

The Senior Officer of the watch failed to alter course in time to make the turn correctly, thus placing the ship .28 cables inside the intended course line. There was no position taken before the alteration or one directly after. This would have shown the ship was now heading for the reef.

It would seem that they made no reference to their radars and there was no attempt to use parallel indexing assisting them in keeping their distance off the land. They did not advise the Master of the failure to alter course at the designated time or the ships position. As the second officer of the watch was responsible for fixing the ships position, I question what he was doing throughout this approach and why he also remained silent.

It is stated in the safety report that the handover between the OOW and the Captain did not correctly occur. Of course, when possible the handover should be carried out properly with the position of the ship being verified and agreed together with the course and speed. The traffic situation should be clarified and of course the handover should not occur during or just prior to a change of course. Finally, the handover should not take place until the officer assuming navigational control of the ship is fully satisfied as to the situation. This is the normal expectation. However, in an emergency situation, which most Captains have experienced at some time, the captain has the absolute right and indeed must assume immediate command. On these occasions there is usually insufficient time to for the formalities and the simple, 'I have the Con' is enough. In this occasion, therefore that Captain's take over was necessary and appropriate for the situation. However, the Captain had not ascertained the position of the ship or that the alteration of course had to be more robust and that the new course should be changed to place the ship back on the intended course line that would take the ship clear of the rocks.

A major contributor to the accident was the failure of the First Officer to understand the correct procedure for the Master taking command of the bridge. He assumed that as the Captain was present at the front of the bridge then the Master was now in command. He then should have approached the Master and advised him at the very least, of the present course and speed and that the ship should be altering course.

It is difficult to understand that, when the Captain did alter course he did not alter onto the correct course but instead reduced the alteration, taking the ship closer inside the course line. This again demonstrates that he did not know the position of the ship but was relying on instinct and visual. Again the bridge officers remained silent.

His method of altering course was unusual in the fact that he gave courses to steer rather than helm orders followed by the course to steer. This style of order gives the indication as to how much wheel the command requires and in which direction before the helmsman adjusts the helm as the course approaches. The Master's approach could be confusing to a helmsman whose English was poor and Italian non-existent. While unusual, there is no ordered or set rule as to how this is given.

On the Captain seeing the foam from the waves on the rocks, he gave the order to alter course but, instead of a large course alteration that would have taken the ship clear, chose to make a moderate alteration. There was no questioning of the reason why this was done unless it was an association in the Captains mind with the poor stability of these ships when making large alterations of course and the resultant accident occurring from the heel.

By this time the 3rd officer was stationed by the Helmsman as he had demonstrated by a previous mistake his poor understanding of English. We now have a situation where the ship is closing with rocks, still no accurate position of the ship, watertight doors not closed and the helmsman not fully understanding the orders but still left on the wheel. Why did the 3rd officer not take the wheel or order the Cadet to do so? Just one mistake by a helmsman should have been cause to replace him immediately in such a tight navigational situation.

Any reduction of speed at this stage would be pointless. If anything an increase would have improved the speed of turn.

In these last moments the Captain was attempting to make the correct action. By putting the wheel hard to starboard, the bow was falling clear of the rocks but this was also swinging the stern towards them. Once the head was clear he was attempting to stabilise the turn which would have stopped the stern swing towards the rock and this would have taken the ship clear.

As shown by the study of the Universities of Brescia and Pisa, if this mistake had not occurred the ship would have cleared the rocks. This was a theory at the time of the safety inquiry but instead of being thoroughly investigated was summarily dismissed as 'the ship would have hit the rocks regardless', stated by the head of the inquiry without any accompanying calculations. Neither was it in time for the trial where it was again dismissed. It was available and offered for the appeal but it's admission was refused again with no

reason given.

The helmsman now made the final mistake and put the wheel the wrong way, although immediately picked up and corrected. This was too late and the ship collided with the reef. As with the Titanic, the damage occurred during an avoiding action and tore down the ship's side. It was the worst place to collide.

Responsibilities.

Despite the incorrect information given initially by the Company CEO, he admitted to the Senate inquiry that this entertainment' navigation was known and encouraged by the company not just on this ship but throughout the fleet. If the company had not encouraged this, the incident would not have happened. The Company knew that this ship and probably all the others were making such passenger entertainment sailbys. They certainly knew that this ship had made this particular manoeuvre before under the same Master and others. The safety report failed to examine this properly together with the fact the company initially denied this. There was no mention or examination of the previous accident in similar circumstances in 2010 and why the company did not stop such navigational amusements after that occasion.

The Captain had limited experience in command and his officers and crew were incompetent for the positions they held. It is the Company who promote and appoint officers and crew to a ship.

The captain had allowed his perceived celebrity position to encourage his behaviour to the extent that it interfered with his professional duties. He failed in his navigation of the ship, his duty of care to those on board and his leadership of his officers in his expectation of the performance of their duties with due diligence.

The question of the charts was not pursued by the inquiry. The ship had been making such 'sailbys' before so this must have been done again without the correct chart. Was the chart indented for and if so why was it not supplied? If it was not, they why did the navigating officer not advise the Captain?

The first Officer, as the senior watch keeper, failed in his duties to continue his watch until properly relieved. He failed to alter course properly placing the ship onto a dangerous course. He failed to order the fixing of the ships position before and after the turn. He failed to observe the rocks ahead and warn the Captain.

The language difficulty, which will also be heard of later, is a most serious and, as we have shown, dangerous problem amongst the operational staff of these ships. It would be, to those not of the marine industry, unbelievable that those on the bridge have difficulty in communicating with each other and that even a senior engineer admitted that he had difficulties understanding orders in English and Italian. There is no official testing standard required by SOLAS and although this has been raised with the IMO many times, they have failed to enact legislation for this. Can you imagine the airline industry behaving in such a fashion? If they did, no one would fly, but they have a strict standard which is applied with rigour.

Instead we leave the existing SOLAS requirements to the companies to test. It is obvious this was not done. Strangely, just prior to this, the Company applied to the Flag State to change the operating Language on board the ship to Italian. On this ship, the crew was composed of 46 different nationalities, with the only common language, even if poor, English. This meant that orders were being given in both languages to the confusion of many.

The company failed in its responsibility to ensure that the crew could communicate, especially the operating staff. Further it changed its language to Italian and both the Flag State and company are guilty of failing to ensure that Italian could be understood by the operating staff.

The IMO failed to ensure that the proper testing criterion for language proficiency is adopted at sea by legislation

The Company, The Flag State and the IMO must bear responsibility for this failure which contributed considerably to the deaths on board.

The question as to why the Captain failed to make a large alteration of course when first seeing the foam from the rocks could be answered by the accidents that have occurred previously.

The *Crown Princess*, another Carnival Cruise ship was leaving Florida in calm weather for New York. Twice the ship suddenly and violently listed starboard injuring Nearly 300 passengers were injured, some seriously. Strangely, it was again a passenger who notified the coastguard, not the ship. The Coast Guard made contact with the ship and they were advised that the ship would return to the port. This return was delayed by the coastguard until they were assured that the ship was manageable by inspection. the *Crown Princess* docked. The accident, according to the investigation report, was due to incorrect operation by the captain and his crew of the autopilot system causing a high degree of helm to be used.

In 2010, another large Carnival cruise ship navigating the middle of the Gulf of Mexico had to make an emergency manoeuvre to avoid an "obstacle" that, while not having been identified from the bridge passengers claimed to have spotted it and found that the ship was heading straight for it. 60 passengers were injured. These incidents were discussed within Carnival and these discussions may well have influenced the Captain of the Costa Concordia in his reluctance to use hard helm to avoid the rocks.

The Captain had nothing to do with the design of the ship which is entirely in the hands of the building yard, the owners and Class with little involvement by the Flag State. If they are building ships that cannot take avoiding action in accordance with SOLAS legislation and without injuring hundreds of passengers, then I suggest we have to examine class as to why they are approving such designs. Again the inquiry failed to investigate this.

The Damage

The damage was such that all on board felt the blow from contact with the rocks and the immediate list of the ship. Shortly after the engine room lost power and the emergency generator failed shortly after that. The safety inquiry made extensive inquiries as to this failure which had such an effect on the forthcoming events.

It must be noted that the Engineering officers kept the bridge advised as to the situation and continued in their endeavours to correct the emergency generator fault. The ship was then on emergency battery power which regrettably did not supply power to the pumps or the steering motors.

There were a number of reported emergency cabin light failings leaving the occupants in the dark.

The passengers and crew were advised that the only damage was to the generators and that the power would be restored shortly. Then advice continued and passengers were advised to go to their cabins. As it was obvious to everyone that the situation was far more serious, this caused distrust in the information being given and added to the early stages of a panic situation. This was enhanced by many of the crew not being able to communicate properly either in English or Italian, including a senior engineer officer.

While the flooding of the ship was put down to the number of watertight compartments being breached, despite witnesses' statements admitting to closing and opening of watertight doors and the considerable number of W/T doors on the ship, this was not properly investigated by the safety inquiry.

The ship had authority to open certain W/T doors for working purposes however, from statements it would seem that crew could open doors as they required. Despite the ship

statements it would seem that crew could open doors as they required. Despite the ship making a passage close to land, these doors were not ordered to be closed until after the accident.

The Captain, knowing the close approach that the ship was about to make should have ordered all W/T doors well before arrival off the coast of Giglio. This was the Captain's responsibility.

It is difficult to understand why the ship had been approved for 25 W/T doors. The safety inquiry made no attempt to investigate this although, as the company would have had to submit documentation to both the Class and the Flag state authorities to support this requirement as it was against the principle of the SOLAS legislation for W/T doors, all such documentation would have been easily available to the inquiry.

The responsibility for this lies with the Company, RINA and the Italian CG and this should have been investigated.

If they have allowed such openings in the bulkheads there is a good possibility they have done the same with other ships.

Phase 3 The Abandonment

From the culminated and overwhelming evidence of those who were there and the analysis by expert opinion it is obvious that immediately following the accident, the Captain suffered severe traumatic shock which lead to acute stress disorder, enhanced by guilt complex. This is recognised by the armed forces, the police, the fire brigades and even industry ashore so why not at sea? Why was this not investigated? I cannot imagine a more traumatic event for a Captain to experience. The Captain was poorly represented as his defence team should immediately have raised this at the trial but failed to do so. Even so, the inquiry should have recognised what had happened and investigated this especially as many passengers are still classified as still suffering from this!

The Captain was in no mental condition to issue any sensible orders after this event and this should also have been recognised by the next in command, the 2nd Captain who was present on the bridge, and he should have immediately taken command. He failed to do so. This was the cause of the delay in ordering the muster and commencing the disembarkation.

The inquiries and the trials concentrated on this delay as this being the main cause of the deaths of the passengers even though this was beyond the control of the Captain, he was found guilty and sentenced.

From this comes a most important question. Can you prosecute someone for actions carried out while suffering from a mental condition that has the classic symptoms of denial?

Another failure of the Safety report was the proper examination of the reasons why the life-rafts were not lowered and that three lifeboats failed to lower. The life-raft failure has very serious implications for all the cruise ship industry as 25% of all those on board these ships have to use these for their survival.

Can we believe that 66 life rafts of 69 on board failed to launch, or was there another reason? I suggest that the majority of the crew made a decision not to use these and instead used the lifeboats which were reserved for the passengers. If this indeed occurred, then the deaths which occurred after the majority of the boats had been launched are the responsibility of those crew taking the passenger places to the extent that hundreds of them were left behind.

It is most important that this be investigated and this should be an IMO investigation, not left to the flag state. It is regrettable that the Scandinavian manufacturers of the life-rafts, who certainly know the truth, were not called to give evidence and have refused to answer repeated inquiries into this matter.

Regarding the lifeboats, the failure of the telescopic davits, causing the failure of launching of three lifeboats released by pressurized gas bottles, should have been properly investigated, especially as work had recently been carried out by the manufacturers to

modify these by extra power packs to push the davits out. What was wrong with the davits to require this? was the modification carried out correctly?

Considering that 450 passenger seats were lost because of this failure, and this could be a reason for some loss of life or injuries, why was the Finnish Company concerned not investigated and called to give evidence?

Further to this we have evidence that even at an angle of 15 degrees, 5 degrees less than the required launching angle, lifeboats did not lower correctly. Again, no investigation, by the Italian Investigation board, CLIA, The IMO, and EMSA. Where were the calls for investigation by the International Chamber of shipping and the ITF? is unbelievable that such a major accident with the potential of such disaster only averted by the direction of the wind, could occur with so little concern by those agencies that are purportedly dedicated to the safety of life at sea.

The ship was sailing with many of those crew responsible for the operation of these lifesaving craft being uncertificated or with their certification expired, completely against the SOLAS regulations. This meant that a number of these could not be launched as no one knew how to launch them but that is too easy an explanation for such a large number not to be launched.

Why was the cruise director, who has no part in the safety management system or the command aspect of the ship ordering passengers away from their muster station into a dangerous task of crossing the ship to the opposite side? Was there not a deck officer present? If there were no orders emanating from the executive officers, then leadership has to come from somewhere and his frustration could be understood. If he was trying to place the passengers into what he considered safety then he cannot be criticised for doing his best. This shows a complete failure in leadership and a robust command structure on this ship and the ease in which it failed when under pressure.

While this is the immediate fault of those on board, it is the Company that must demand such a structure and support those who exercise this. Again there was no investigation.

With the Captain suffering from traumatic stress disorder, why did those other officers around him not take immediate action to call a muster and prepare the boats for launch? Apart from their lack of leadership and failure to carry out their duties, could there be another reason? Let us not forget that for years the IMO, despite warnings from professional seamen, had been permeating the marine industry with the dangerous concept that the ship is the best lifeboat. Translated that means keep everyone on board until you are certain the ship is about to sink, as modern ships are designed not to sink. This nonsense has been picked up by crews around the world, as those who warned the IMO knew it would and I suggest that this affected the decision to immediately go to muster and begin launching the boats, thus causing a further delay. There was no other reason. The ship was very close to land and even a harbour. The weather was fine and no danger to the boats.

The IMO must accept a degree of responsibility for perpetuating this absurd theory which had already been discredited by the Titanic sinking, and for the deaths that occurred.

Chaos

The mind-set for the chaos was already set in motion by the obvious deception in the preliminary announcements made regarding the collision being a power failure. This caused distrust.

Crew walking round with their lifejackets on with the few who could speak English telling passengers it was nothing did not help as did the fact that very few could speak English and tell them what was happening.

The increasing list of the ship again with no explanation. This caused a number of passengers and crew to head for the lifeboats regardless of any muster. This in turn meant that when the muster was announced and those passengers remaining went to their stations they

found that their places were already being taken by those who arrived before and disregarded any set boat, often because they did not know their boat number.

As the list and crowd increased the narrow boarding area became packed with persons trying to board the boats. The lack of properly trained crew supervised by responsible officers again added to the growing panic. Now many crew were also trying to board the boats and fighting was breaking out.

Many were without lifejackets as they were on the upper decks when the ship began to list and were reluctant to go to their cabins lower down in the dim light to retrieve their lifejackets. Fighting over lifejackets also broke out. There was no control or discipline being imposed by those of the ships still on board. Passengers now began to take control themselves, in some cases even taking control of the boats as the crew when lowered on the water were incapable of controlling the boats properly. Instead of using their own life rafts they were assigned to, crew went to the lifeboats adding to the crush.

Now passengers were being injured in the crush and struggles. Some people began to fall or jump over the side to swim to the nearby rocks. As the list neared 20 degrees, the bridge and command had been abandoned and it became everyone for themselves. In the attempt to find boat space or safety within the ship, passengers began to die. Crew pushed passengers aside to take places in the remaining boats. The abandonment had now changed into a rescue. By this stage there were over 1000 people left on board, as counted by the shore rescue services who had now taken charge of the rescue.

There were exceptions to the generally poor and, in many cases, disgraceful behaviour of the crew. Incredibly, the deputy mayor of Giglio, Mario Pellegrini, boarded the ship when the Captain and his officers had left, and took charge of some of the rescue operations. According to Mario Pellegrini, who was mired in the chaos above, two officers worked with him to supervise the escape attempt: the doctor, Sandro Cinquini, and especially young Simone Canessa, the same officer who earlier in the evening told the Coast Guard the ship had suffered only a blackout. Canessa's role in the evacuation has not been mentioned publicly; yet according to Pellegrini, he was the single most effective crewman still working to evacuate the ship during the long night's most harrowing hours. *"When I got up there and saw Simone, he was the boss, he was the only one up there really helping,"* says Pellegrini. *"When he realized I was there to help; he saw we could work together. He was fantastic. Simone, I think, created a whole escape route. He was at the top. I did my best to help him."*

Mention must also be made of a number of the engineering staff who resolutely persevered with the emergency generator. Even the cruise director continued to assist passengers until he fell and became injured. Unfortunately, these were few in number compared to those who abandoned their stations and placed themselves before those who they were supposed to protect.

Responsibility.

While the Captain was responsible for the grounding of the vessel, he did not kill or injure of these people. With the ship in calm waters so close to land and with readily available shore assistance, everyone should have been recovered without loss or injury. The Captain was mentally incapable of any decisive act of leadership. It was the 2nd Captain and the other deck officers who failed during the abandonment phase.

It was the Company who failed to ensure that the common language should be English as the majority of the mixed nationality crew, especially the operational crew and their passengers could understand this better than any other national language.

It was also the Company that failed to ensure that all key personnel could speak and understand English and, as Italian was now the operational language, Italian as well.

It was the Company that failed to ensure that the lifeboat and life raft crews had training and

It was the Company that failed to ensure that the lifeboat and life raft crews had training and certification.

It was the Company that broke SOLAS legislation over the training, the failure to require warm clothing to be brought by the passengers.

It was the Company that failed to act on the captain's complaints as to the poor training and ability of the crew.

Then in turn it was the Flag State Marine Administration that failed to ensure that the language spoken by the key personnel was that that they all could speak and understand.

It was the IMO that failed to enact legislation to ensure that language capability, especially for operational and key personnel in an emergency can be clearly spoken and understood. They have known this for many years and failed to take action. Again people have died because of this organisation.

Codacons, which is a non-profit organization involving associations working for consumer's rights protection and is one of the most important and representative consumer's association in Italy is claiming that electrical problems may have contributed directly to the deaths of several passengers who are thought to have died in the stricken vessel's lifts. The organisation's lawyer Giuliano Leuzzi, said it was feared that four victims may have drowned while trapped in the elevators.

The safety report should make mention that there is no IMO legislation regarding the lifts. This is urgently needed in order that they should return to a deck in order that those inside can escape. Further that when the main power fails on board, then these lifts cannot be used.

As is common in the marine industry today, much work is delegated by the flag state to a responsible organisation, which is the classification societies. Where this is done there must be adequate oversight. Without this, because of the competition between class societies and the influence of large fleet shipping companies, both crew and passengers will continue to suffer from adequate safety provision.

The Master declared that he never would have evacuated 4,000 persons on board until he was quite sure that the ship would have sunk. He listened to the IMO regarding the ship being a lifeboat.

The Captain and the bridge officers were incompetent and their inexcusable errors of judgement were the initial cause of the grounding. There is no question that the Captain was the root cause of the grounding and with his behaviour and that of his officers, the ship was an accident waiting to happen. But with regard to responsibility, he was not alone in this. The senior Officer of the watch bears considerable responsibility for his failure to commence the alteration of course in time to place the ship correctly on the line of the next course, his failure to require an immediate position after the alteration as completed, his failure to follow the correct procedure for the Captain's presence on the bridge and his failure to advise the Captain of the ship being in the wrong position and the danger ahead. He should not have been granted a plea bargain considering his implication in the collision.

Seaworthy and Safe.

A vessel owner has a duty to ensure that his vessel is seaworthy and could face liability for injuries when this duty is breached. Legally defined, a seaworthy ship is one that is fit for any normal perils of the sea, including the fitness of the vessel itself as well as any equipment on it and the skills and health of its crew.

The Hague/Hague-Visby Rules, which apply either by law or by agreement, to the majority of contracts for the carriage of goods by sea also contain an obligation as to seaworthiness. Article 3.1 of these Rules provides that:

“The carrier shall be bound before and at the beginning of the voyage to exercise due diligence to make the ship seaworthy, properly man, equip, and supply the ship, make the holds, refrigerating and cool chambers, and all other parts of the ship in which goods are carried, fit and safe for their reception, carriage and preservation.”

If passengers could be considered as cargo, then the word preservation would seem to apply and the failure of the safety equipment and emergency generator, all of which contributed to the deaths of the passengers could be argued as a failure of the seaworthiness of the vessel for the carriage of passengers.

Safety on the other hand is different and whilst seaworthiness and safety overlap, compliance with one does not necessarily mean compliance with the other. Most minimum safety requirements are incorporated in SOLAS, MARPOL and STCW Conventions and through these into the laws of the majority of maritime states.

In the case of the Costa Concordia, the requirements for the correct certification of those in charge of the life-rafts and lifeboats were not observed. This non-compliance not just put all those on board at risk, but contributed to the deaths and injury of those on board. It is therefore difficult to understand the criminal prosecution for manslaughter of the Captain for a momentary act of incompetence, while the Company and those within that company were not equally charged over this act of non-compliance that must have been known to those in the management and therefore could be considered a pre-meditated act.

EPILOGUE

This has been like putting a Jigsaw together with many pieces still missing. We have a picture, but not the whole story and unless those who know where these pieces are and are willing to come forward, I doubt if the complete story will ever be told.

A short time ago, the cruise/passenger ship era was transformed by the entry of the entertainment industry. Since then, the marine and entertainment industries have been uneasy bedfellows, much like a newly married couple who married for convenience rather than love.

The Marine industry for many years has had one abiding priority and that has been the safety of those on board and the ship, although tempered by cost consideration. This resulted in the fact that while it was important that the passengers enjoyed their time on board, this was not at the expense of safety and all aspects of the ship both design, operation and legislation was formulated to cope with this. Profit came from the carriage of the passengers and the authority of the Master and his executive officers was unquestioned. Their professionalism and ability came before all else with leadership imbued in them from their beginnings of their trade.

The Entertainment Industry, on the other hand, exists to provide entertainment and the greater the entertainment the greater the profit. The comfort of their guests was paramount. Leadership was rarely a matter of concern as was overall safety. Legislation was just a hindrance that could be overcome by what politely could be termed as 'persuasion' which probably accounts for the fact that CLIA, their representative body, gave over 10 million dollars over the last 10 years to US politicians alone.

This is not to say that safety is ignored, however, it does not have the same priority as the marine industry. Equally, the command and leadership of the ship does not have the same priority. The entertainment side feels more comfortable with their own personnel in charge of most of the ship functions than that of the traditional executive or bridge branch thus gradually their command position has been diminished.

This is understandable and probably in normal situations enhances the operation of the ships as a whole. Neither does it mean that the new style of operation is disinterested in the overall safety. However, both industries are still learning how to work together and mistakes inevitably occur during this process. When these occur, what is essential is that we admit to them and by investigation and open discussion, we learn from them to avoid repetition. This often means that there is a need to curb the use of Public Relations and Marketing departments that have inevitably grown with these ships. By their nature, disclosure or acceptance of fault is the last option in any incident and of course, this hinders any investigation, especially in an environment that, with the IMO's constant failure to act on safety matters and the flag states heading their own investigations, allows a liberal scope for obstruction and worse, interference.

In the case of Costa Concordia, the use of 'smoke and mirrors' began from the very start of the incident until the Captain was well and truly behind bars bearing the full blame for the affair.

One must wonder at the interference that was made with the final safety report which left so many unanswered questions, except where the Captain was concerned. It is hard to believe that marine professionals could have written such a soft report leaving so much un-investigated and questions unanswered. They completely avoided the ISM Code which would have pointed directly at the management ashore and, while making points regarding their actions, failed to follow these up. Considering the long delay in publication, and ignoring the rather foolish explanation that the prosecution had taken evidence that they could not get back, I suggest that the better explanation was that, considering the very close relationship between Government and Company and the seemingly very poor standard of the report, certain interested parties held back the release until the report was sanitised to their satisfaction.

The safety report should make mention that IMO legislation is urgently needed regarding the safety of those trapped in these lifts and that they should return to a deck in order that those inside can escape. Further that when the main power fails on board, then these lifts cannot be used.

The IMO must consider the implications of their propagation of the 'ship is a lifeboat' theory. Certainly the present 'hotel' ships cannot be considered that. I do not discount the possibility of designing ships that have a far better chance of this than the present generation but considering the reluctance of many of these companies to even place adequate lifejackets on board, I have a feeling that it will be a long time before we see the changes in design and management attitude required. In the meantime, all ships must be prepared for abandonment and there should be no delay in passengers being mustered by their assigned boats and even being ordered into them to await the final decision. Discomfort is far preferable to a worse alternative.

The ship abandonment criteria as presented by the IMO, can be seen as deeply flawed. I suggest that the factors I have shown will at least double the evacuation time, which would mean that none of the existing hotel ships can pass the time criteria.

the Criteria for evacuation must be based on worst case scenario rather than the present best case and abandonment be made taking into account all factors of weather, heel and list, darkness, distance from the muster point to the boat embarkation position, number of elderly, infirm and handicapped persons on board, possible fire and smoke and estimated number of intoxicated persons on board. But then this has been known in the marine industry for years with nothing done to correct it.

The ships should be designed to ensure that the muster stations are by the boats with ample space for assembly and even sitting arrangements for passengers to await any embarkation order. Each boat muster station should be supplied with a first aid and triage trained crew member, a first aid pack and a defibrillator. Having such a place to await abandonment would assist in removing a considerable amount of the probable panic situation from the abandonment equation and enable those with minor injuries to be assessed and treated. In the case of the Concordia, many, both passengers and crew were injured in the abandonment and chaos phase and still left on board.

That the muster station be where passengers are supplied with their lifejackets. At the same time, lifejackets be also stored in the public rooms in case of inability to use the muster points.

There should also be a study as to why passengers should embark enclosed lifeboats wearing lifejackets. If anything did go wrong, very few of them would be able to evacuate the lifeboat.

Cruise ships should be required to adopt either double hulls/double side skins exactly the same as the oil and chemical carriers, bulk carriers and container ships, especially those going into icy waters, or two longitudinal bulkheads extending from the collision bulkhead to

the aftermost bulkhead.

That the new re-evaluation lifeboat and life-raft spaces be required for all cruise ships regardless of date of build.

That cruise ships should carry sufficient lifeboats for ALL on board.

That a number of lifeboats specifically designed for disabled or infirm passengers be carried. That the cabins for disabled passengers be required to be on the same or next to the embarkation deck. Until this can be applied that there be a limitation on the number of disabled passengers carried, especially those in wheelchairs.

That man overboard systems be fitted.

That all lifejackets be replaced for a type that incorporates a hood, face mask and crotch strap. That the hood be capable for use in smoke.

That notices be placed on all open upper decks above 4.5 meters stating that it is dangerous to jump from these decks with lifejackets on.

That the procedure for jumping into the water with lifejackets on be stated and demonstrated at the joining musters and a notice be posted in each cabin.

That passengers are advised of the warm clothing requirement before joining and that the wearing of this clothing at the muster be strictly enforced especially on ships sailing in winter months and in ice conditions.

That either all forward facing external lighting except for the navigation lights be extinguished or windows curtained, or that the navigation lights fitted be increased in size and brightness.

That on cruises of over two weeks' duration, every two weeks, all passengers be mustered at their muster point and that all lifeboats are lowered to the embarkation position. That if the the initial muster place is away from the boarding muster position, the muster drill includes the passengers being conducted from the muster point to their lifeboat.

That the uniforms on board reflect the command responsibility and that the operational officers can be well defined from the hotel staff. This will avoid confusion with the operational officers and crew of the ship who will be giving the command orders during any emergency.

That sufficient trained seamen are employed to enable each lifeboat to carry 3 and each life-raft have 1. These should not be hotel or entertainment staff.

Of course I do not expect agreement with all I have said, nor do I claim that I am correct in all my assumptions but this is intended as points for discussion. It might seem that all this is asking too much but as the prime consideration of seamen is the safety of those on board, our function as seamen professionals is to consider all the problems and deal with them before the event rather than the reactive approach currently used. We rely on the IMO and SOLAS regulation for leadership but when that doesn't happen, are we to stand back and wait for the next accident and then the next?

This is exactly what we are doing and each time we point our finger at SOLAS and say, *'The equipment conformed,' 'The design conformed' or 'The ship was manned according to the safe manning certificate,'* as if that can exonerate us from responsibility for those injured or killed. We have a professional voice and I suggest if we used this more often, it would be to the benefit of all those at sea.

Hopefully we can learn from this accident as it could be the last chance we have to get it right. According to Christine Duffy of the Cruise Lines International Association *'We are wholly committed to examining what happened and to identifying lessons that can be learnt'*

wholly committed to examining what happened and to identify lessons that can be learnt.

CLIA then completely ignored the evidence of many failures of the cruise company and the equipment and machinery on board the ship.

Possibly one of the strangest events took place a few months later, but still, even by then, rather disturbing allegations were coming through regarding the behaviour of the crew. In September 2012, [Lloyd's List of London](#) awarded the title of Seafarers of the Year recognising the best professional sailing and ship to the Costa Concordia crew for their exemplary behaviour during the shipwreck which has saved most of the ship's passengers. Many representatives of the leading marine institutions attended the presentation and applauded what can only be termed as the most bizarre presentation for years. One must wonder as to the inducement that initiated such an award which insulted those who died, were injured and traumatised by the events that transpired on that night.

It might seem strange for those who were injured or traumatised to understand, but they were very lucky. The wrong wind direction, and this ship would have drifted into deep water and capsized taking probably thousands with her providing a disaster encompassing those of the Titanic and giving us the greatest peacetime marine disaster in history. The final fortune was that the ship grounded so close to the land and a harbour and immediately the shore rescue services worked so admirably and unceasingly until all those alive were found and brought to safety.

With all the faults, both ashore and on board, the failure of the safety equipment and machinery, boats and life-rafts, the untrained and inexperienced crew, the lack of SOLAS legislated certification, the language problems, the lack of basic navigational skills, the lack of leadership and chain of command, it is impossible to claim that this ship was seaworthy for its prime duty, the carriage of passengers in safety.

I will leave the final comment to an unknown passenger who has obviously been around the marine industry.

“At the end of all this,” he predicted, “it will all be for nothing. You wait and see.”

How True.

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