#2 – CLOSE UP
(Human)

https://www.mitma.gob.es/recursos_mfom/2012costaconcordia.pdf

[12]*Marineinsight.com*, 2022. [Online]. Available: https://www.marineinsight.com/naval-architecture/case-study-capsizing-of-costa-concordia/. [Accessed: 24- Jul- 2022].

What a fine idea to start the new year sailing along the Mediterranean!
Breathtaking panorama, fun and entertainment on board of Costa Concordia, a massive, elegant cruise ship, piloted by Captain Francesco Schettino. It was one the ships of the well-known and reputable Costa Crociere company, which has been operating since the mid-1900's, until the capsizing of the Costa Concordia, left a long lasting scar on the company and on cruise ships in general.

What exactly happened?

It was January 13th, 2012 when the Costa Concordia was sailing along Italian waters from Civitavecchia to Savona with just over 4,000 people on board. During its trip, the ship deviated from its planned route at the Isola del Giglio (a small island off the western coast of Italy). Shortly after this deviation, the ship struck one of its sides on a series of reefs called "Le Scole" The contact caused a 60-meter tear on the hull of the ship causing rapid flooding and eventually leading to its capsizing. Luckily, because of the close proximity to the shore, and thus shallow waters, a great majority of the people onboard managed to make it out alive without much harm but a big scare.
Despite the vast amount of technology relative to ocean-bed mapping, route planning and wind analysis, the cruise ship still managed to strike the reefs and capsize.

Why did it happen?

Cruise ships often perform what is called a sail-by maneuver whereby they deviate slightly from their planned course and sail nearby an island to give passengers a closer look at the island. These deviation courses however are also planned and analyzed in such a way so as to avoid grounding in shallow waters or rocks below the water. This is something that the Costa Concordia itself had already done in the past, however, this time was significantly different.
The ship's deviation course required it to stay approximately 457 meters clear of the coast. As it turns out, this minimum safety distance was not respected and the captain rather ended up sailing around 300 meters off the coast, a distance which certainly was not safe and suitable for a cruise ship of that size. This mistake was due to negligence and overconfidence of the captain who claimed to have deactivated the radar alarm system (a system which gives out an alarm when the ship is dangerously close to objects in water or in shallow water) because he had performed the same maneuver 3-4 times in the past already and believed he knew the part of the sea very well. By deactivating the radar alarm system, the captain had no way of being informed ahead of time of his error and by the time he realized how dangerously close he was to the reefs, he no longer could turn the ship away fast enough and ended up hitting the side of the ship against said reef leading to its capsizing. There was absolutely no issue with the ship or any of its functionalities nor did the environment prove precarious, this costly accident was simply due to negligence and utter irresponsibility of the captain of the ship.

What could have been done?

In this case, we see that the cause of the accident is rather straightforward, it was solely due to sheer human error and irresponsibility. Regardless of that, there are still a few recommendations that apply based on ISO 12100's 3 step method.

Step 1: Inherently safe design measures

Despite the captain's negligence, the easiest way to avoid situations such as these from occurring again is banning the possibility of having sail-by maneuvers. Sail-by maneuvers intrinsically incur more risk because the ship deliberately goes excessively close to land, whilst it is still possible to be safe doing such maneuvers, the margin for error becomes a lot bigger and hence the risk also increases accordingly. Additionally, demanding that captain's never deviate the ship off the planned course is also another way to ensure greater safety and avoid unnecessary hazards.

Step 2: Safeguarding and complementary measures

Secondary safety measures should always be present, in the event that sail-by maneuvers are still being done, it should be required that the radar alarm system never be deactivated in situations like that to avoid or minimize the effect of human misjudgment and to facilitate the process for the captain of the ship. Additionally, there should be correspondence between ship captains and maritime authorities in order for there to be greater monitoring of what is happening with the ship. If maritime authorities could have tracked in real-time the location of the ship they could have noticed the danger and given appropriate instructions to the captain. It could also be demanded that maritime authorities have an overview of which systems are activated/deactivated on the ship to ensure that regulations are always followed and that safety is never compromised due to human negligence/error.

Step 3: Information for use

In the event that the risk is still not low enough, there should be communication between the captain and other relevant personnel on the ship when a route deviation is to occur and there should be a general consensus amongst them before this action can be taken. Additionally, it could also be required that the captain must ask permission from maritime authorities prior to performing such an action. These are additional elements which can help in minimizing the risks to a suitable enough degree. By spreading the responsibility amongst multiple personnel, the likelihood of an individual, such as the captain, committing a significant mistake is much lower.

This case exhibits the importance of how human performance, in terms of equipment and technical systems, largely dictates the associated level of risk. Whilst a system, from a technical and performance standpoint can be inherently safe, there are several human factors that contribute and affect these levels. Therefore, it is vital that the humans working with said systems also keep safety and Safety by Design principles in the forefront and must use that to guide their operations.

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[13]"Maritime history: Costa Concordia disaster", *Safety4sea*, 2022. [Online]. Available: https://safety4sea.com/maritime-history-costa-concordia-disaster/. [Accessed: 24- Jul- 2022].

[14]*Mitma.gob.es*, 2022. [Online]. Available: https://www.mitma.gob.es/recursos_mfom/2012costaconcordia.pdf. [Accessed: 24- Jul- 2022].