

1 Problem

What	Problem(s)	Cruise ship partially sinks
When	Date	January 13, 2012
	Different, unusual, unique	Captain took ship off course; ship severely listed, preventing deploying all lifeboats
Where	State, city	Off the coast of Italy off island of Giglio
	Facility, site	Costa Concordia
	Task being performed	Vessel diverted onto unauthorized route

Impact to the Goals		
Safety	11 confirmed deaths (24 passengers missing)	
Environmental	Potential for oil spill	
Customer Service	Evacuation of ship	
Production-Schedule	Loss of use of ship	\$85-\$95 million
	Decrease in bookings	?
Property, Equip, Mtls	Damage to ship	~\$575 million
Labor, Time	Rescue & recovery efforts	?
		Total cost of this incident >\$650 million

2 Analysis

The impact to the safety goal - dead and missing passengers and crew - were caused by the ship running aground on rocks and some issues with the evacuation process. The ship ran aground on rocks because it got too close to the island in a manually programmed unauthorized deviation of the ship's route, potentially to provide passengers with a better view. This deviation in route, sometimes called a "fly by", had been previously authorized by the company. No crewmembers questioned the change in route by the Captain, noting that onboard he is solely responsible for the ship. Although the ship contains alarms meant to warn the crew when the ship goes off-course, these alarms are deactivated when the

There were some issues with the evacuation of the ship, though as the company notes, not due to the evacuation procedure, which was externally reviewed in November. Rather the issues were caused by the severe list of the ship (it was leaning almost completely to one side), which affects the ability to use the lifeboats. Additionally, some of the passengers (who had just come aboard) had not yet completed a lifeboat drill. The drill is required to be performed within 24 hours of boarding the ship and was scheduled for the morning after departure. The grounding occurred just 3.5 hours after departure.

3 Solutions

No.	Action Item	Cause
1	Remove fuel from ship	500,000 gallons of fuel onboard
2	Restrict ship access to area	Ship ran aground on rocks
3	Review policy of when to hold lifeboat drills	Lifeboat drill not yet held
4	Require drill before leaving port	Lifeboat drill required within 24 hours of departing

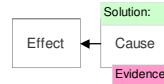
COSTA CONCORDIA

Cause Mapping is a Root Cause Analysis method that captures basic cause-and-effect relationships supported with evidence.

Cause Map

Cruise Ship Grounded

"The route of the vessel appears to have been too close to the shore, and the captain's judgment in handling the emergency appears to have not followed standard Costa procedures."
- Pier Luigi Foschi, Chairman & CEO of Costa Cruises

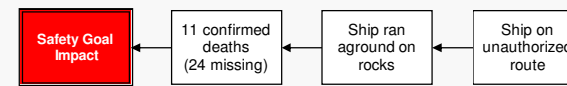


CAUSE MAPPING

Problem Solving • Incident Investigation • Root Cause Analysis

- Step 1 Problem** - What's the Problem?
- Step 2 Analysis** - Why did it happen?
- Step 3 Solutions** - What will be done?

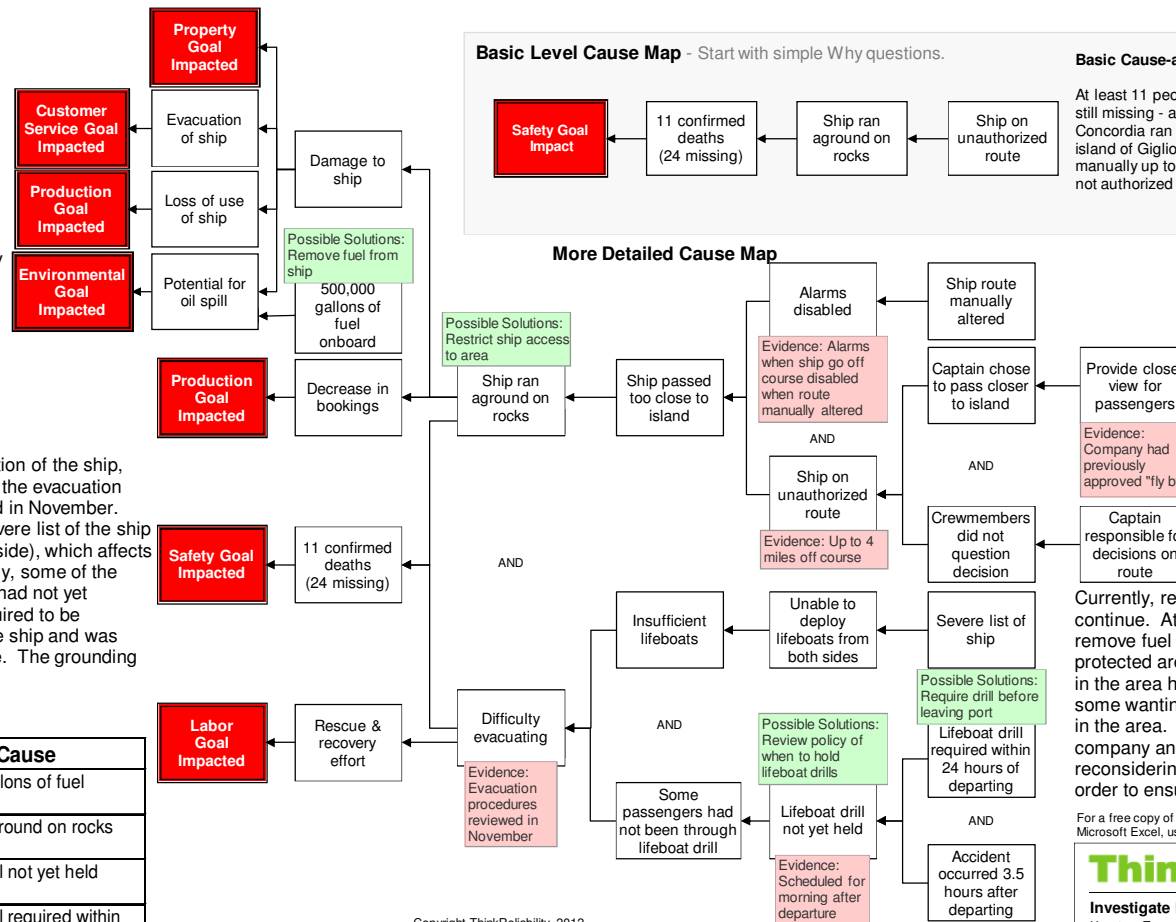
Basic Level Cause Map - Start with simple Why questions.



Basic Cause-and-Effect

At least 11 people have been killed - with 24 still missing - after the cruise ship Costa Concordia ran aground on rocks near the island of Giglio, Italy. The ship was taken manually up to 4 miles off course on a route not authorized by the company.

More Detailed Cause Map



Currently, rescue and recovery efforts continue. Attempts are being made to remove fuel from the ship, which is in a protected area. Concern about cruise ships in the area have previously been raised, with some wanting to limit ships that are allowed in the area. Additionally, both the cruise ship company and the government are reconsidering the timing of lifeboat drills in order to ensure the best results for

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