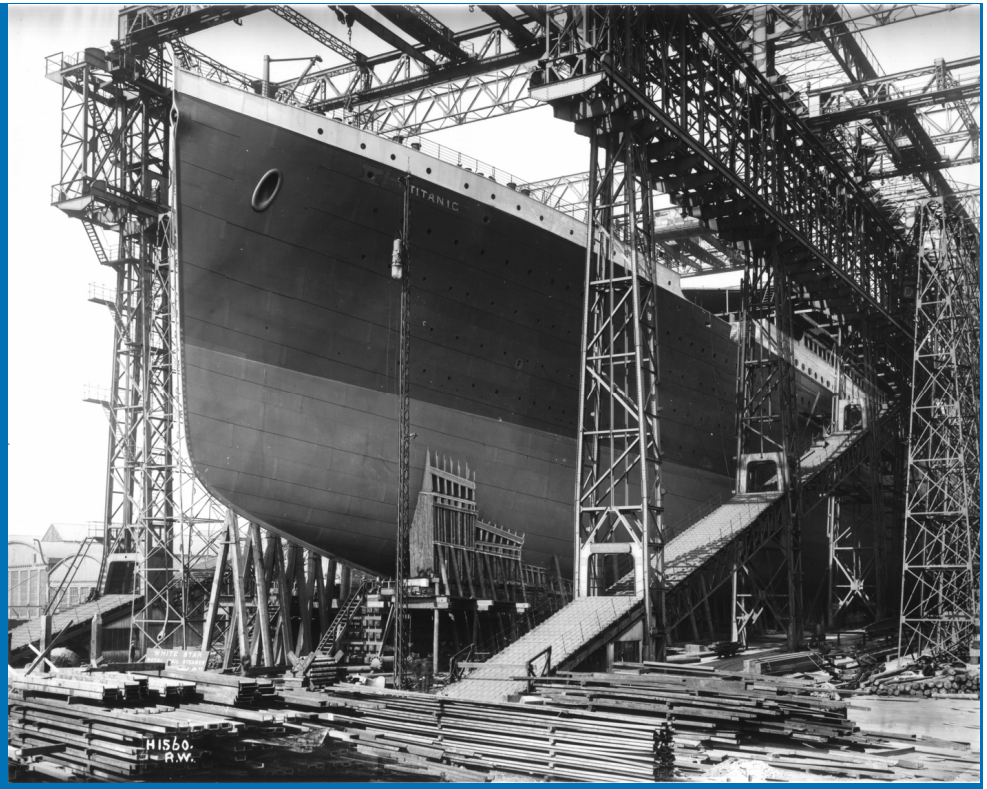


"Could disaster have been prevented?"

Case study– Second set of lessons from Titanic

New publication authored by Mark Kozak-Holland, HP Services, May 8th, 2008
Presentation for PMI xxx
www.lessons-from-history.com

Objectives: This is the second presentation on *Titanic's* construction project and voyage

- How risks were managed (and not) across construction project and into operation.
- Type of risks in each project lifecycle stage.
- It questions the project leadership, who was the PM.
- It determines whether risk could have been better mitigated, or the principle stakeholders more carefully managed.
- Californian's role in the disaster and risk adversity.

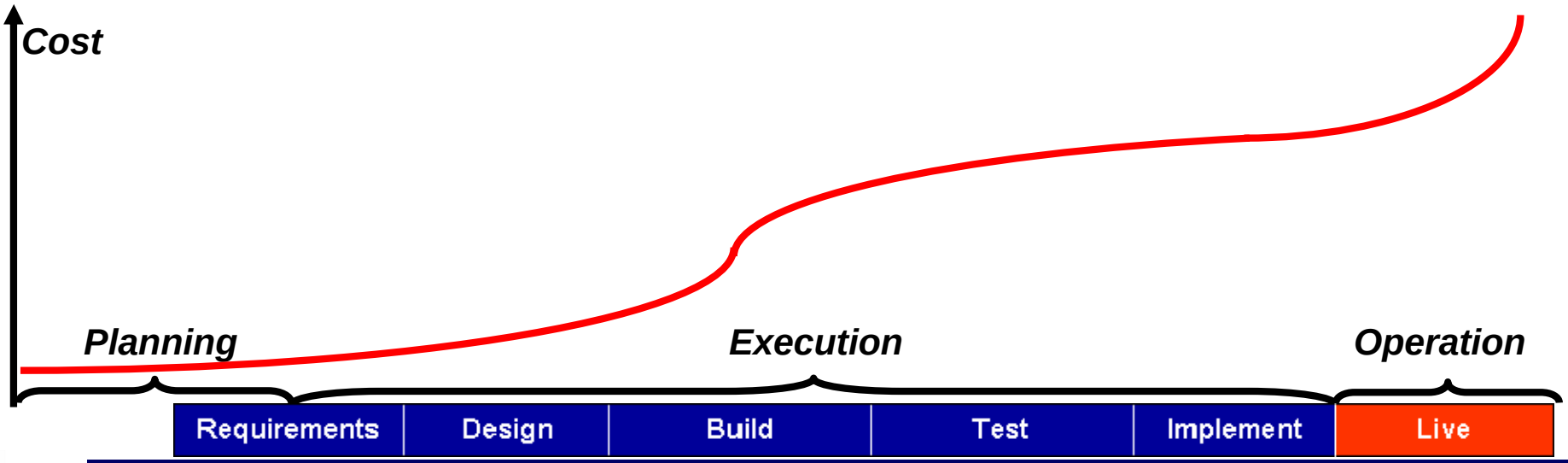
- Please prepare questions for the end.

What is project failure? A project consumes resources but fails to deliver

1. Acceptable Return on Investment (ROI)
   - terminated before completion
   - poorly scoped so resources insufficient
   - incorrectly defined, resulting low adoption or insufficient value
   - produced no learning lessons
2. A proposed
   - exceeds budget
   - exceeds time
   - doesn't meet specifications

When can a project fail – 3 points - during the project, into implementation, or into operation

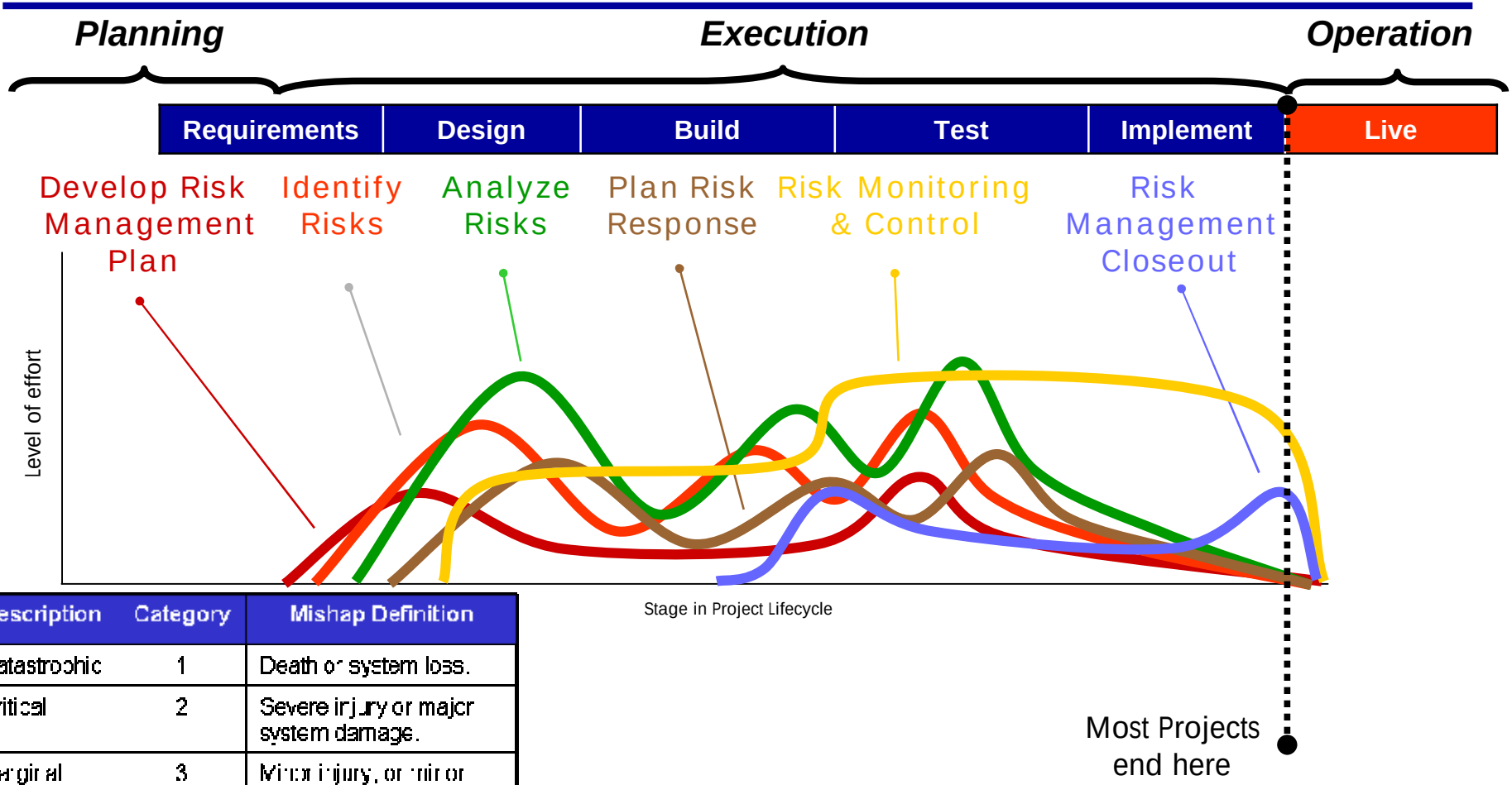
1. When cancelled or aborted during project.
   - Standish Group report “Chaos” (31.1% of projects canceled before completed. 52.7% of projects cost 189% of original estimates).
2. During implementation, usually critical failure
   - Solution built and undergone testing.
3. Weeks/months into operation, most expensive failures.
   - Project deemed completed and successful.
   - Unpredictable, unexpected and costly.



Why do projects fail?

- **Many reasons**
  - **People, process, and technology**
- **At each project stage:**
  - **Poor User Input**
  - **Stakeholder Conflicts**
  - **Vague Requirements**
  - **Poor Cost, Schedule Estimation**
  - **Skills Not Match Job**
  - **Hidden Costs of Going "Lean and Mean"**
  - **Failure to Plan**
  - **Scope Creep**
- **Reason for PMBOK 9 knowledge areas**

In today's projects risk management should be continuous through each project stage



Description	Category	Mishap Definition
Catastrophic	1	Death or system loss.
Critical	2	Severe injury or major system damage.
Marginal	3	Minor injury, or minor system damage.
Negligible	4	Less than minor injury, or system damage

So what were the risks in project planning in Titanic's construction project

Risk Identification	Probability	Analyze	Mitigation
Define inaccurate scope, financials (costs/return), schedule and resources	30%	Critical	Set up change request, management. Monitored scope throughout project
Select wrong vendor to meet contractual obligations	30%	Critical to catastrophic	Builder's reputation, scrutinized delivery, set up contract & penalties. Monitored through project
Mis-alignment of stakeholder goals or expectations	30%	Critical to catastrophic	White Star and Harland & Wolf developed vision jointly
Poor communication in project team and externally	30%	Critical	Communication plan and strategy, very focused on marketing efforts of Ismay

Risks in project execution - requirements

Risk Identification	Probability	Analyze	Mitigation
Capture inaccurate functional & non-functional requirements	40%	Critical to catastrophic	Much effort paid. Met laid out requirements and expectations on ultimate customer experience
Not meet Government regulations	30%	Critical	Met regulations over number of lifeboats and segregation of classes
Stakeholders goals may conflict	30%	Critical to catastrophic	One principal stakeholder Bruce Ismay consulted through project

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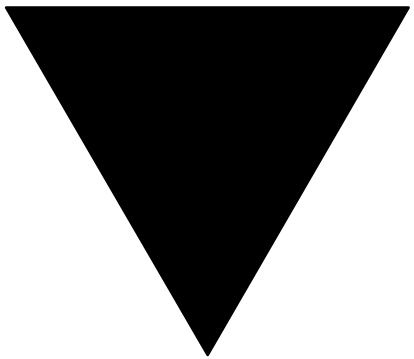
Price:

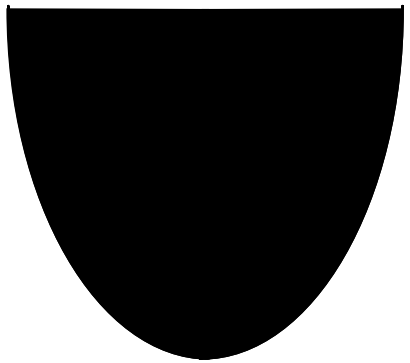
1st class suite - $4,350,
2nd class suite - $1,750,
3rd class ticket - $30.

Mauretania



15% faster

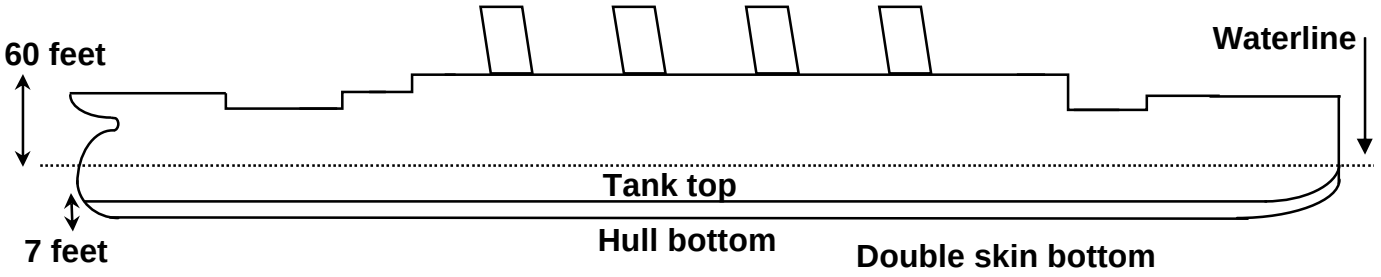
Olympic



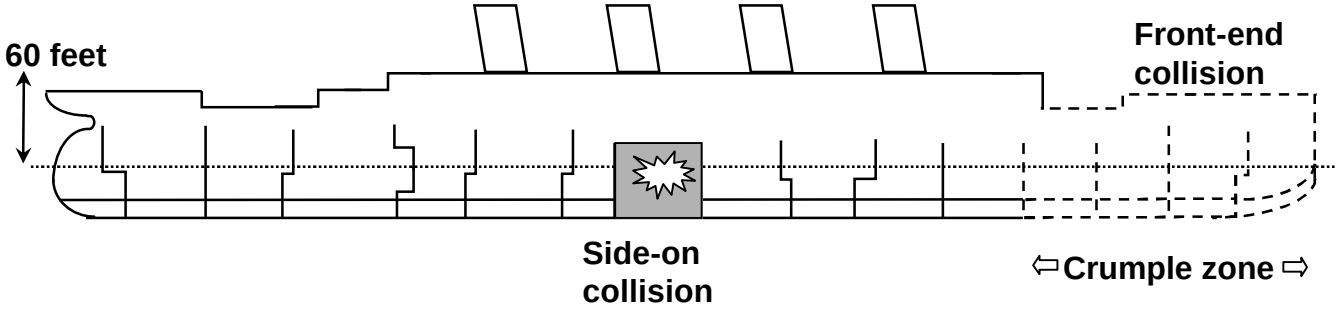
23% greater capacity

Risks in design identifies potential risks to ship and modeling worse case scenarios through ship builders model (static testing).

- **Running aground**



- **Collisions**



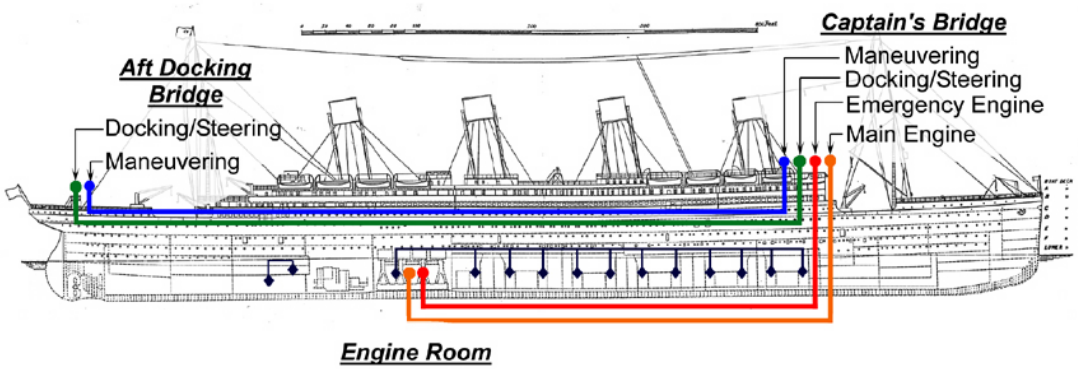
•1910 White Star's 'Baltic' and the 'Standard' had been in a head on collision the result of an eastbound ship cutting too far to the north.

Risks in project execution – design includes addressing functional and non-functional requirements

Risk Identification	Probability	Analyze	Mitigation	
No early warning of danger areas weather or sea conditions	50%	Catastrophic	Marconi Room, wireless messages, & crows nest	p
Warning the bridge in time to take evasive action	30%	Catastrophic	Crows nest and forepeak lookout post, and phones from lookouts back to bridge	p
Run aground could rip open bottom	10%	Catastrophic	Double hull	ý
Collide with other ship	10%	Catastrophic	Compartments – crumple zone front end, or side rupture	ý
Collide with objects like iceberg	10%	Catastrophic	Compartments – crumple zone front end	ý
Large wave could capsize	0.05%	Catastrophic	Large size of ship, balanced keel	p
Unable to evacuate ship	10%	Catastrophic	Escape routes and flow through ship with easy access to lifeboats	ý
Enough lifeboat places	10%	Catastrophic	Enough lifeboats on board	ý

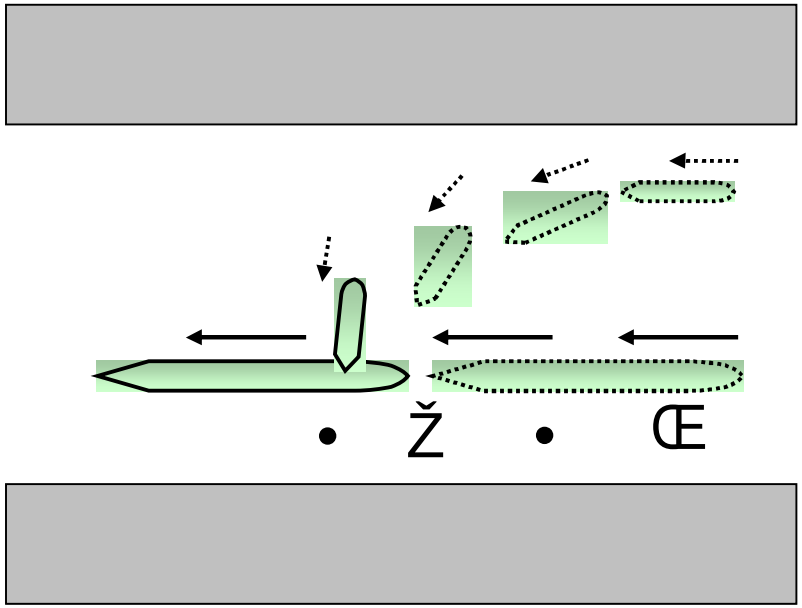
Risks in project execution - build

Risk Identification	Proba bility	Analyze	Mitigation
Technical difficulties in building a ship	20%	Critical	Tried and trusted techniques used no different to building wooden ships
Integration and Test to a single point	20%	Critical to catastrophic	Choice of right builder, iterative approach
Use of unproven emerging technology	20%	Critical to catastrophic	Potential delays, penalties with builder
Long construction project 6 years. Changes in business model, technology, or events	20%	Critical	Expectation that these would be managed and incorporated



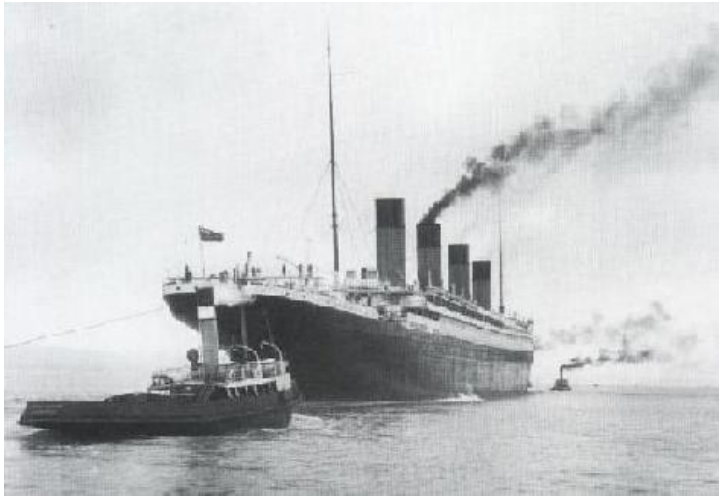
Risks in operation - faith in Olympics track record, and mitigating Titanic's risk

- Dropped propeller
- Tugboat
- Hawke incident – no contingency impact to schedule



Risks in project execution – test

Risk Identification	Probability	Analyze	Mitigation
Inadequate sea trials failure to test	20%	Critical to catastrophic	Sea trials planned
Not transferring track record and lessons learned from Olympic	20%	Critical to catastrophic	Transferring lessons from Olympic by using same captain, officers and crew
Not addressing defects	20%	Critical to catastrophic	Thomas Andrews accompanied ship as PQA and continually inspected/tested
Not meeting Government tests	30%	Critical to catastrophic	Board of Trade inspectors and lifeboat drills



Risks in project execution – implementation

Risk Identification	Probability	Analyze	Mitigation
White Star may accept delivery although it does not meet goals	10%	Critical	Customers asked to declare acceptance criteria as each release is planned
April worst month for icebergs, winter unseasonably mild.	90%	Critical to catastrophic	Sailing path moved 10 miles south.
Traversing “Iceberg Alley”	90%	Critical to catastrophic	A well known feature of the North Atlantic to experienced mariners.
Fate of French liner Niagara known, similar fate could happen	10%	Critical to catastrophic	Pay attention to ice warnings

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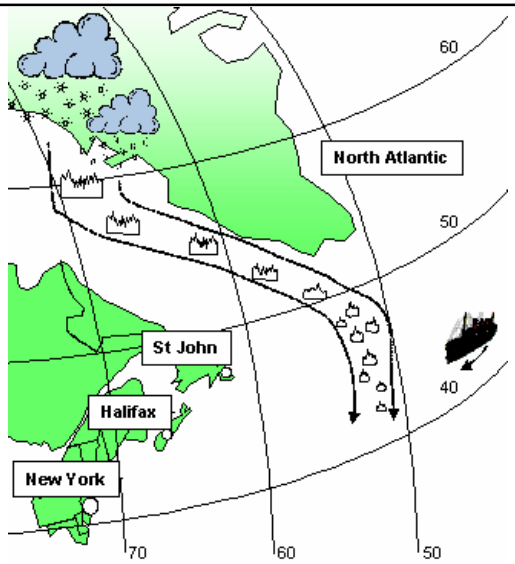
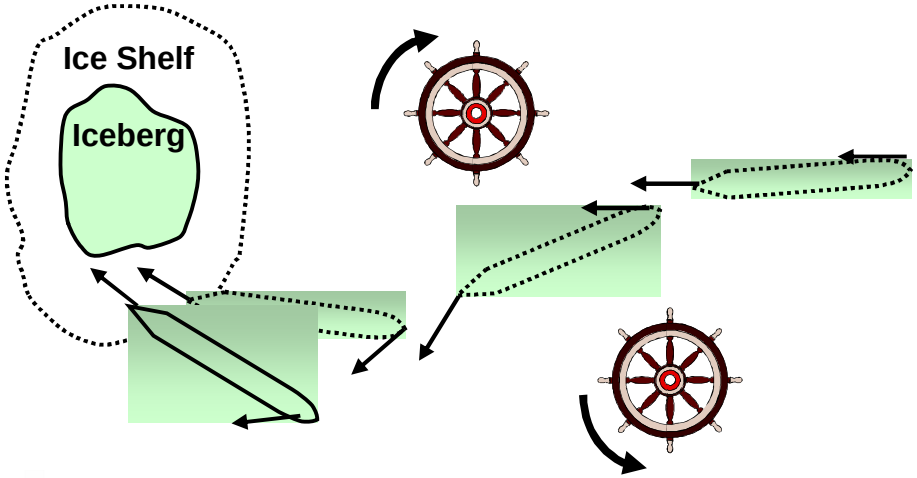


Risks in operation – Ismays presence increases risk as he overshadows Captain Smith's leadership

- **Why was Ismay on board?**
  - **Ensure ultimate customer experience.**
  - **Beat Olympic's best crossing time.**
  - **Shipping announcement in NY Times.**
- **Relationship boss to employee**
- **Smith showed Niagara telegram to Ismay**
- **Did Smith restrain himself?**
- **Why was Smith so intimidated by Ismay?**

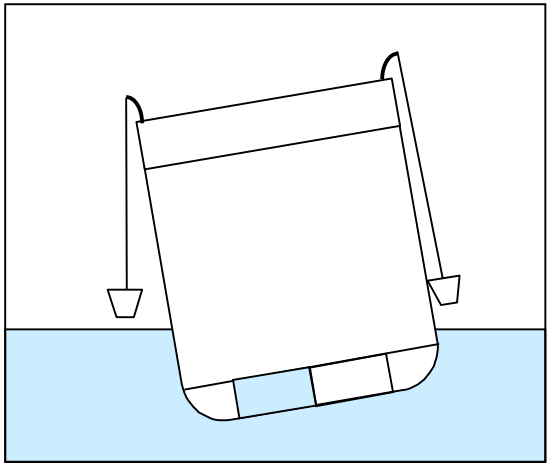
Iceberg alarm raised at 912 yards (3 ship lengths) and Officer Murdoch performs an ‘S’ turn to avoid collision

- Sea of ice (not lookouts’ warning of lone deadly iceberg)
- Band of haze ahead, oily, strange conditions on the North Atlantic that night
- Fuzzy horizon, no wind, flat calm sea, perfect clear night, no moon
- No breakers around blackberg



The officers and crew operated in a state of disbelief unable to perform an effective recovery. Panic ensued amongst passengers.

- Disaster assessment took 20 minutes, and 65 minutes before captain ordered lifeboats filled.
- Poor communication impeded passengers & crew from reacting, possibly deliberate to avoid panic.
- Hierarchical organizational structure and physical segregation controlled information flow.
- Many passengers got up and went back to bed.
- First life-boat left half full reluctance to get in.
- Crew skeptical that anything was serious. Any recovery plan would have been poorly executed.



Evacuation in lifeboats (#s) many of the early launched lifeboats were half empty

Boat #	Time of launch	Total People
6	12:55	28
8	1:10	39
10	1:20	55
12	1:25	42
14	1:30	63
16	1:35	56
2	1:45	26*
4	1:55	40
D	2:05	44
B	Floated off	

Boat #	Time of launch	Total People
7	12:45	27
5	12:55	41
3	1:00	50
1	1:10	12*
9	1:20	56
11	1:25	70
3	1:35	64
4	1:35	70
C	1:40	71
A	Floated off	

* Emergency boats with 40 person capacity

Launching 16 lifeboats took over 90 minutes. The last 2 Englehardts were floated off upside down.

U.S. Senate Inquiry identifies that Ismay is desperate to get back to the UK

- **Day 11 - Testimony of Joseph Bruce Ismay - Recalled.**
- **Message received by Mr. Franklin on April 17:**
  - ***"Most desirable Titanic crew aboard Carpathia should be returned home earliest moment possible. Suggest you hold Cedric, sailing her daylight Friday, unless you see any reason contrary. Propose returning in her myself. Please send outfit of clothes, including shoes, for me to Cedric. Have nothing of my own. Please reply. "***

British Inquiry clears White Star and shifts blame

- **Captain Stanley Lord blamed:**
  - **Took the brunt of the British inquiry**
  - **Did not respond to Titanic**
  - **Lord lost his job for failure to act**
- **British Board of trade blamed:**
  - **Failed to upgrade lifeboat regulations according to growth**

Californian's role has been heart of a controversy, could she have performed a rescue?

- **Captain Lord avoided major collision with ice, ordered full speed astern to stop on edge of extensive ice field. Sent Titanic ice warnings, *"We are stopped and surrounded by ice."***
- **Titanic responded *"Shut up, shut up. I'm busy,"* snubbed Californian's radio operator who turned off radio and went to bed.**
- **After midnight crew saw rockets from big liner but misunderstood.**
- **Captain Lord concluded ship stopped for night and having a party.**

Californian was estimated to be between 8 + 19 miles from Titanic. What if rescue scenario with the Californian? Likely arrival times

- Titanic took about 2 hours 40 mins to sink (11:40-2:20),
- Californian did not see first rocket until 12:45 a.m.
- Lord informed 1:10am, 1 hour to effect rescue.
- Californian's best speed 13 knots.
- Californian earliest arrival 2:45 am

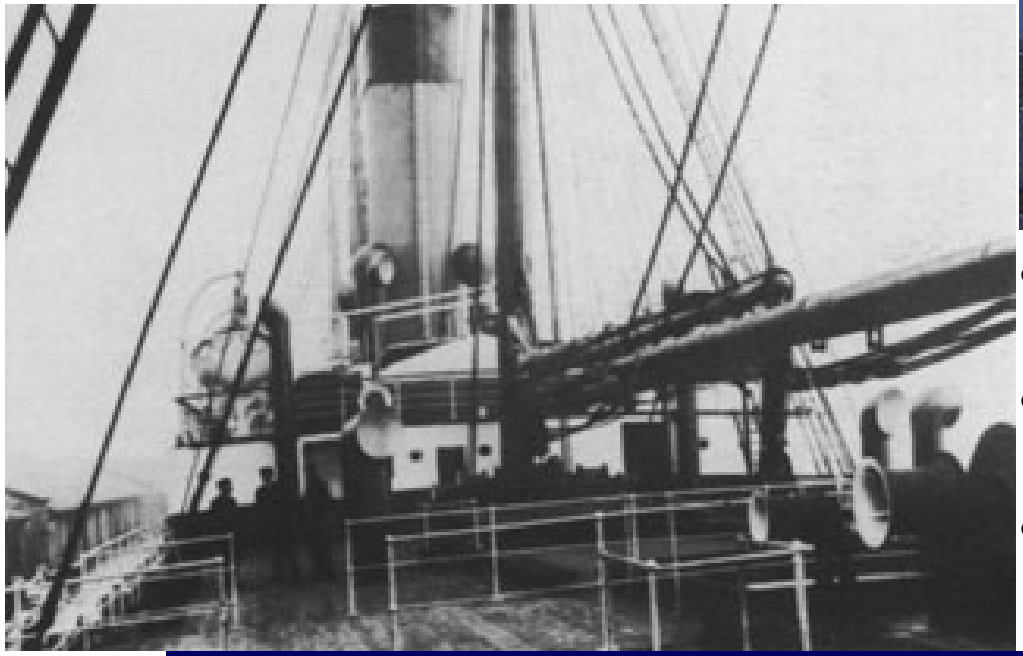
DISTANCE Miles	SPEED	DURATION OF RUN	TIME TO CLEAR ICE	ESTIMATED ARRIVAL TIME
19	13	1:24	0:30	3:05 a.m.
8	13	0:59	0:30	2:40 a.m.

Likely options for transfer of people between ships was unfeasible

- Transfer at sea was time and labor-intensive.
- Pulling up against Titanic and transferring across unfeasible.
- Using lifeboats as ferries required crew of 48 trained seamen.
- 29 seamen and officers, cooks, stewards.
- Californian 6,233 GRT & could carry 218

What if rescue scenario with the Californian

- The small comparative size of Californian with only 6 lifeboats.
- Lord would launch only 2, with 12 man crews.



- Problem of 1500 people trying to get one of 120 seats available.
- 12 men in each boat would have to fend off 1500, swamped.
- Survivors trying to board both sides of lifeboats likely over turn.

Pressures on British Inquiry to save White Star from bankruptcy

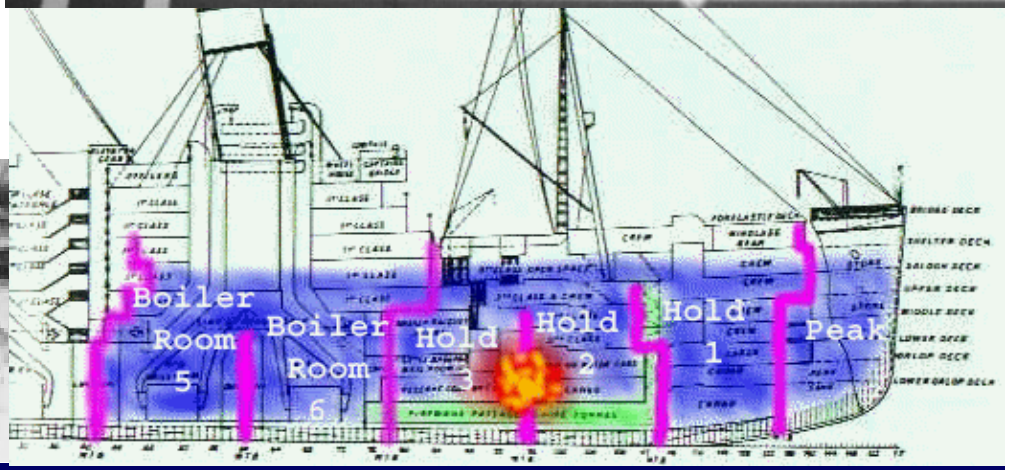
- Worried about German competition.
- The arms race drove the need for ocean liners
  - Kiel canal built in 1907 in anticipation for a great war in Europe
  - Dreadnought race
- Saw European war of 1914 looming
  - Needed large ships for troops and materials.
- Condemned Captain Lord for not responding to Titanic's flares.
- Criticized British Board of Trade for failing to update lifeboat regulations.
- Today private lawsuits would have brought White Star.

Fate of Olympic – went through a refit

- Already in service for 10 months difficult to modify
- Provided with full compliment of lifeboats
- Dry-docked for installation of inner watertight skin
- Watertight bulkheads extended up to "B" deck
- Ready by the spring of 1913 & back in service
- Olympic, served distinguished 24 year career before being scraped.
- Evaded torpedoes in WW1

Fate of Britannic – went through a refit, with substantial increase in lifeboats

- Britannic, served as hospital ship and sunk by mine in 1916
- New giant sized lifeboat davits capable of holding 3 lifeboats
- Full compliment of lifeboats
- Bulkheads top to bottom



Risk checklist for projects for identifying and managing risk and what was done on *Titanic*

Process	Actions on Titanic	
Establish risk process	Although informal done through the ship builders model	þ
Identify risks	Over 400 years of data and experience in crossing the Atlantic	þ
Assess risks	Modeled worse case failure scenarios and applied various solutions	þ
Mitigate risks	Initially good selection of optimum levels of safety and latest features but compromised these	ý
Manage risks	Omitted full planning and testing stages, and too much weight on Olympic	ý
Monitor risks	Reliance on feedback systems that were compromised, executive stakeholder out of control	ý

How would Titanic's construction project rate to today's SW projects (CMMI level 3) that use disciplines for quality, risk, and defect management

	Activities		Comments
Quality Planning	•Quality goals Quality Management Plan (in PMP)	ý	•No plan but Harland-Wolf reputation based on quality
	•Quality assurance	þ	•For products, but mainly functional requirements
	•Process assurance	ý	•Processes followed but assurance not established
	•Testing methodology	ý	•Some sea trials were planned but somewhat limited
	•Work product inspections	þ	•Static testing through scaled model
	•Controlled deliverable release	ý	•NA (Unless macro view of Olympic/Titanic/Britannic)
Quality Control	Activities ensure deliverables:		
	•Meet customer requirements	þ	•Met functional but compromised non-functional rqts
	•Meet acceptance criteria	þ	•Compromises accepted by White Star
	•Conform to organizational policies	ý	•Failed putting White Star in jeopardy of bankruptcy
	•Are process compliant	ý	
Quality Assuran-ce	•Assure process compliance & project performance	ý	•Awareness that project fell behind schedule
	•Process assurance activities executed by PQA	ý	•Thomas Andrews accompanied ship as PQA
	•Evidence of conformance	ý	•NA
Defect Mgmnt	•Early defect identification and removal	ý	•Some
	•Static testing or peer reviews	þ	•Static testing through scaled model
	•Inspections & document reviews of work products	þ	
Risk Mgmnt	•Define risk management plan as part of the PMP	ý	•No plan but good understanding of risks (400 years)
	•Mitigation and contingency	ý	•Some, but contingency not planned

Lessons learned - what can you take from all this. Your IT project is little different to *Titanic's* project.

- **Roots of *Titanic's* disaster in project, compromises to safety features and elevation of expectations allowed business pressures to override operational procedures.**

- **This lead to numerous violations of the "rules of good seamanship". Probability of failure very high because of inability to recognize introduced risks.**

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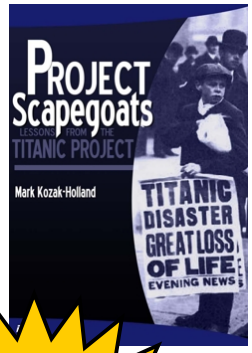

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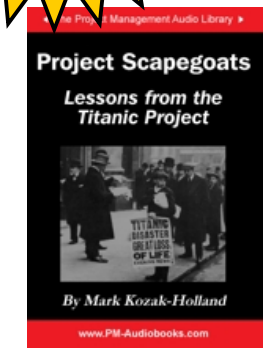

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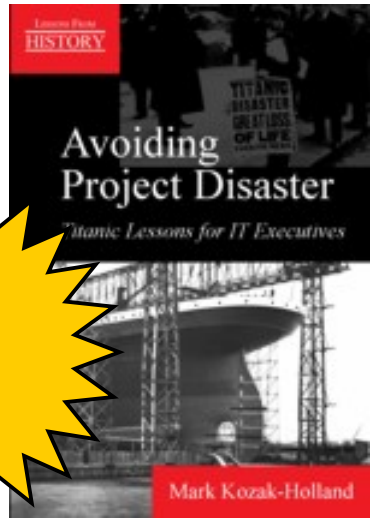

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