The Nautical Institute

The world´s leading international professional body for qualified mariners

Was it operator error
or
human error?

Commodore David Squire, CBE, FNI, FCMI

Editor, Alert!

The international Maritime Human Element Bulletin

A Nautical Institute project, sponsored by Lloyd's Register Educational Trust

Improving the awareness of the Human Element in the maritime industry

The International Maritime Human Element Bulletin

Alert!

- 80% of accidents at sea are caused by *Human Error*
  - *Operator Error*
- All accidents at sea are as a result of *human error…*it is invariably the human input to the design, manufacture or operation of a system that has been a contributory factor

The Nautical Institute

Operator Error
or
Human Error?


Bringing it all together...
It makes sense...
...it's Common Sense
Garbage Out....
nightmare!
www.he-alert.org
editor@he-alert.org

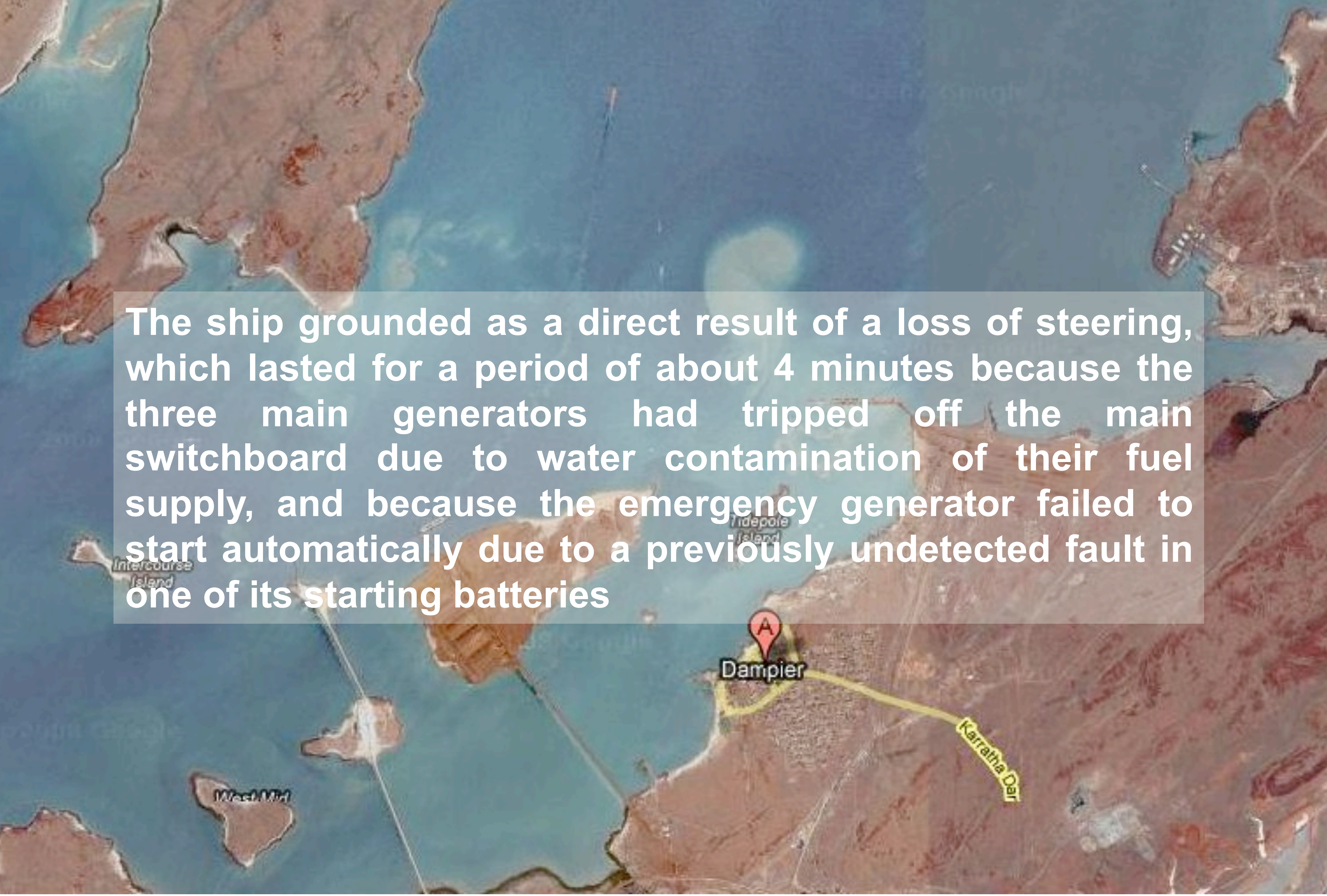
Alert!

Grounding of the bulk carrier ***Hanjin Dampier***

http://www.atsb.gov.au/publications/investigation_reports/2002/MAIR/pdf/mair184_001.pdf

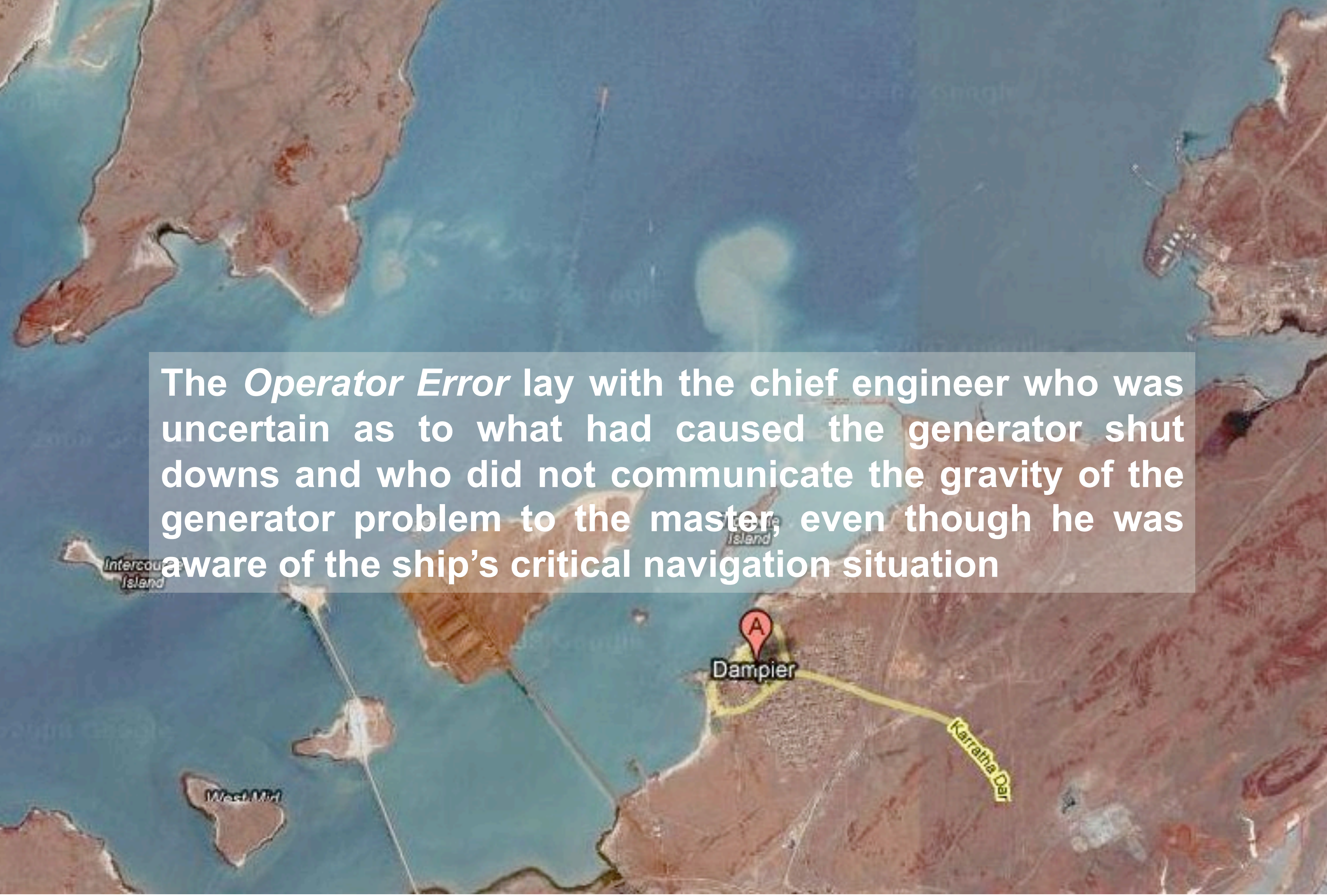
Australian Government
Australian Transport Safety Bureau

MARINE SAFETY INVESTIGATION
REPORT 184



The ship grounded as a direct result of a loss of steering, which lasted for a period of about 4 minutes because the three main generators had tripped off the main switchboard due to water contamination of their fuel supply, and because the emergency generator failed to start automatically due to a previously undetected fault in one of its starting batteries

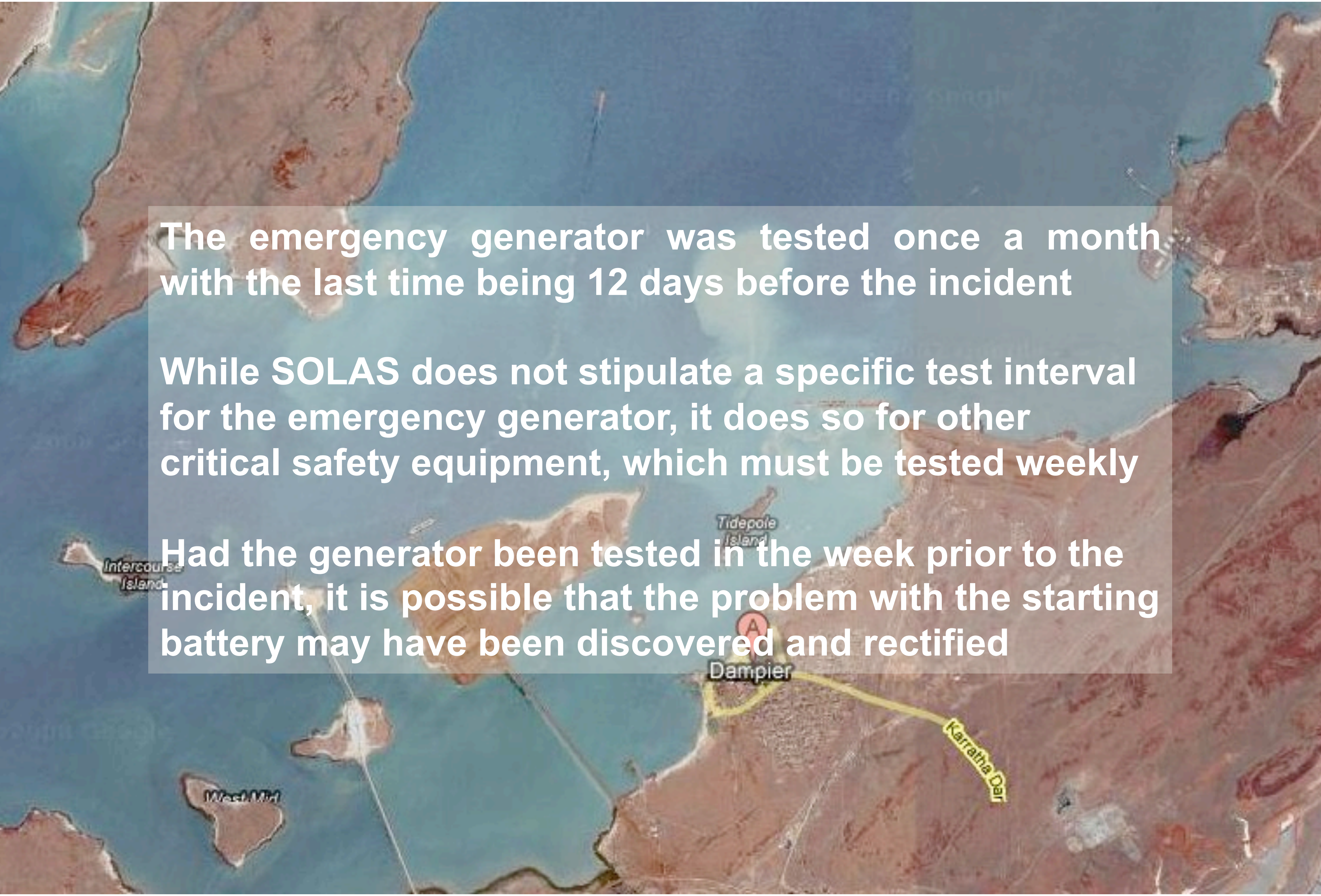
The *Operator Error* lay with the chief engineer who was uncertain as to what had caused the generator shut downs and who did not communicate the gravity of the generator problem to the master, even though he was aware of the ship's critical navigation situation

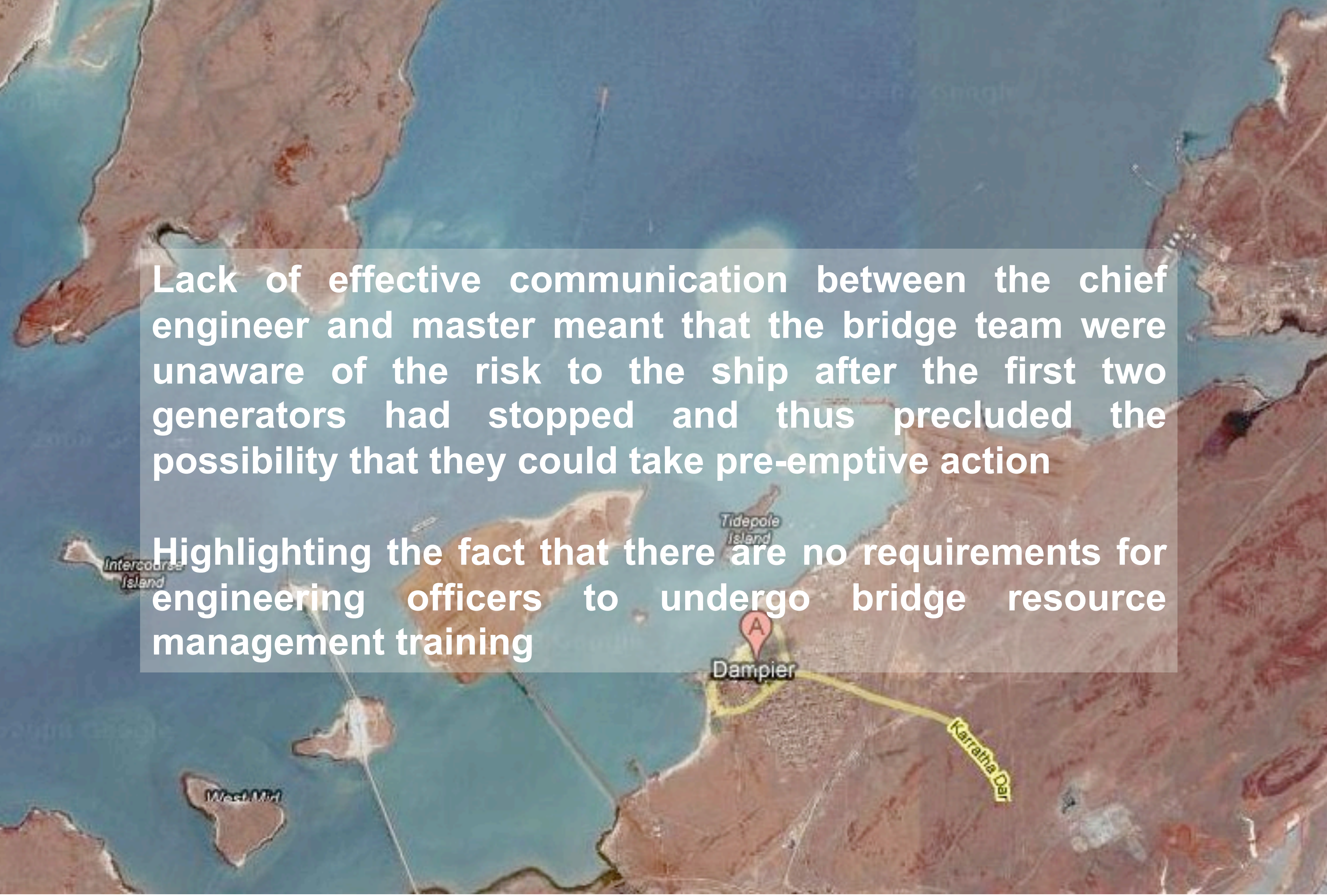


The emergency generator was tested once a month with the last time being 12 days before the incident

While SOLAS does not stipulate a specific test interval for the emergency generator, it does so for other critical safety equipment, which must be tested weekly

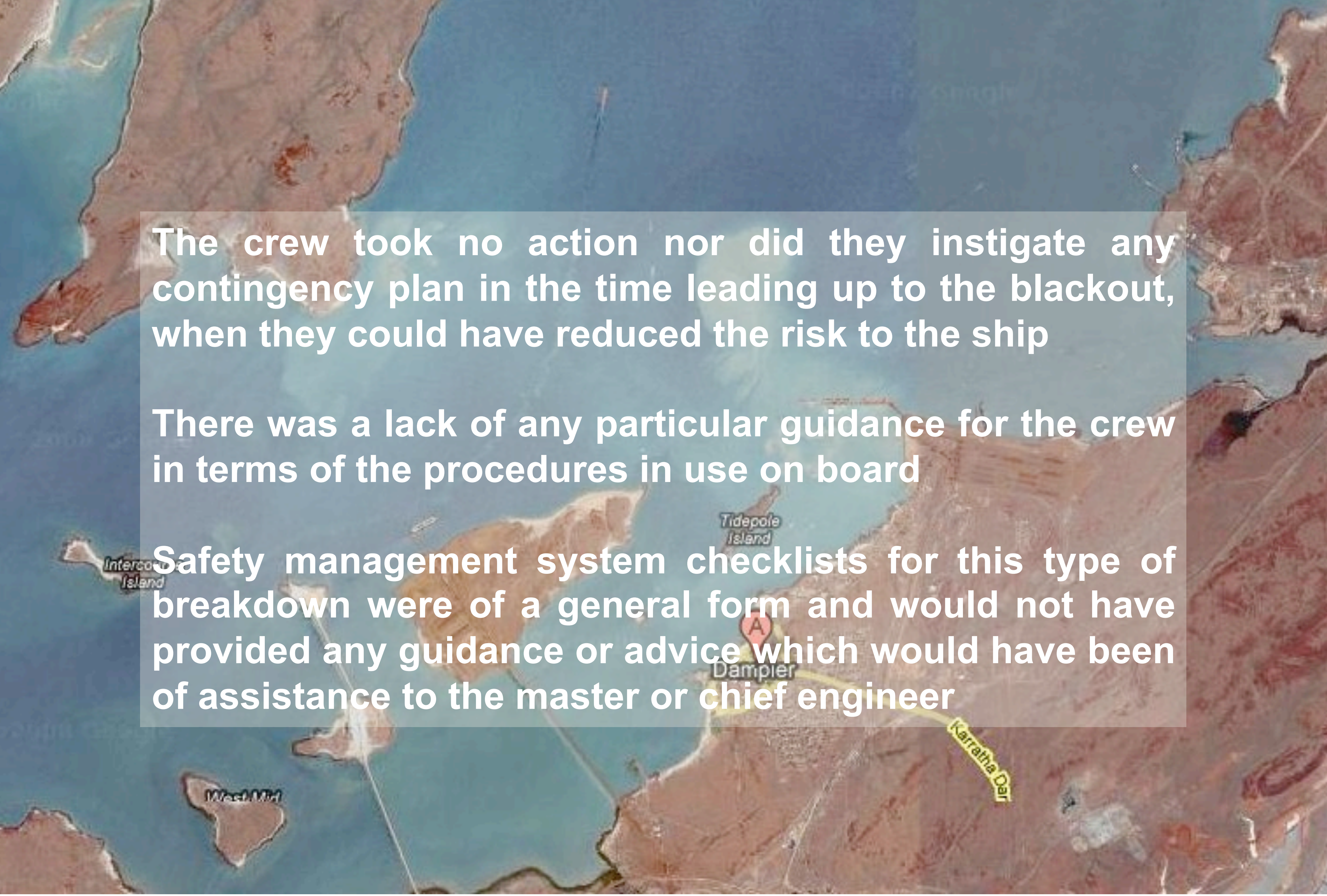
Had the generator been tested in the week prior to the incident, it is possible that the problem with the starting battery may have been discovered and rectified





Lack of effective communication between the chief engineer and master meant that the bridge team were unaware of the risk to the ship after the first two generators had stopped and thus precluded the possibility that they could take pre-emptive action

Highlighting the fact that there are no requirements for engineering officers to undergo bridge resource management training



The crew took no action nor did they instigate any contingency plan in the time leading up to the blackout, when they could have reduced the risk to the ship

There was a lack of any particular guidance for the crew in terms of the procedures in use on board

Safety management system checklists for this type of breakdown were of a general form and would not have provided any guidance or advice which would have been of assistance to the master or chief engineer

Although the ship’s safety management system provided for periodic training for such emergency situations, this scenario had last been practiced more than ten months prior to the incident

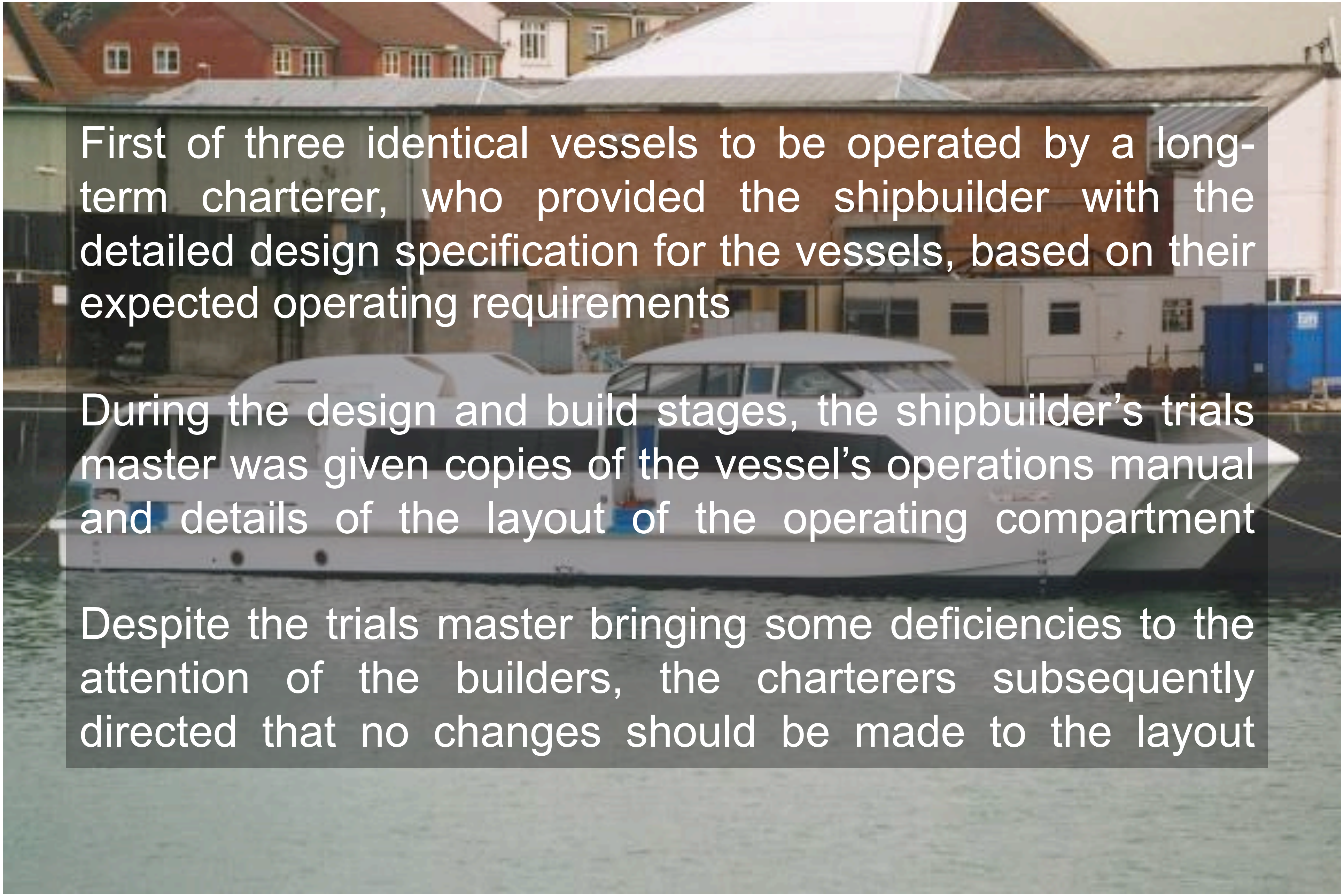
Human Errors

- The procedures for, and frequency of, testing emergency power generation arrangements on ships
- The lack of bridge/engine room resource management training for ships' engineers
- The failure of onboard continuation safety training for the crew

Grounding of the High speed passenger craft ***Katia***

MAIB

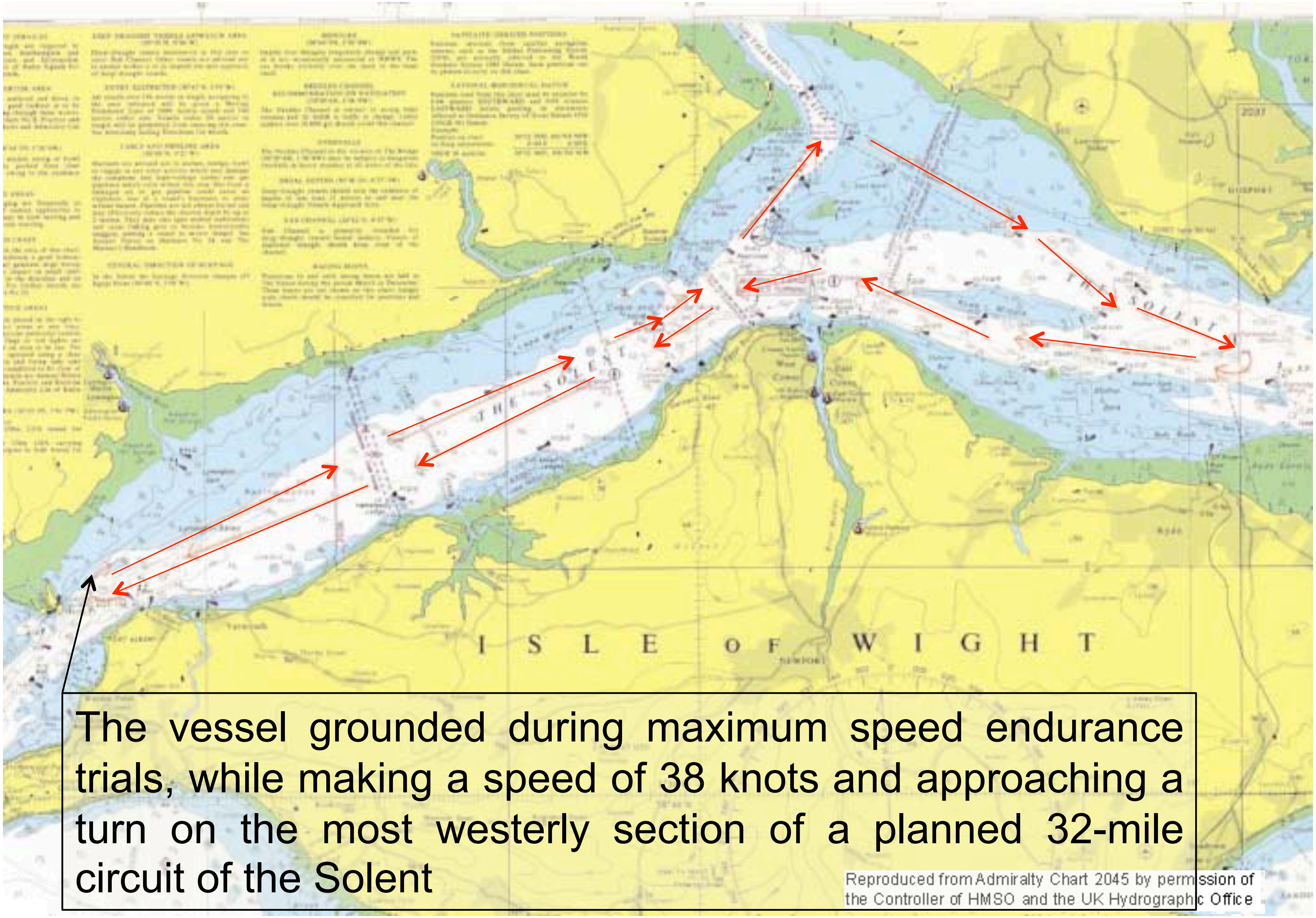
http://www.maib.gov.uk/cms_resources/Katia.pdf



First of three identical vessels to be operated by a long-term charterer, who provided the shipbuilder with the detailed design specification for the vessels, based on their expected operating requirements

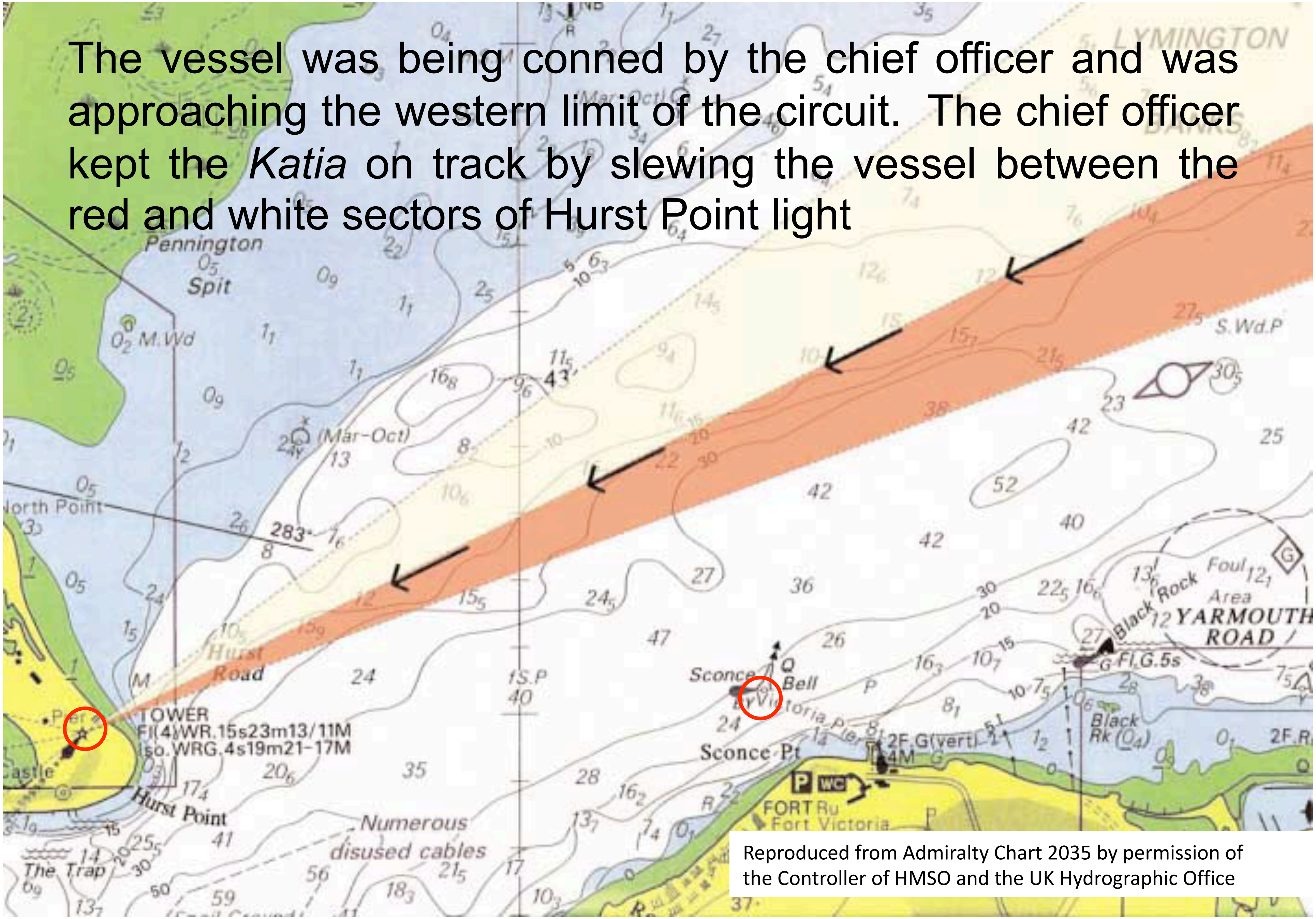
During the design and build stages, the shipbuilder's trials master was given copies of the vessel's operations manual and details of the layout of the operating compartment

Despite the trials master bringing some deficiencies to the attention of the builders, the charterers subsequently directed that no changes should be made to the layout

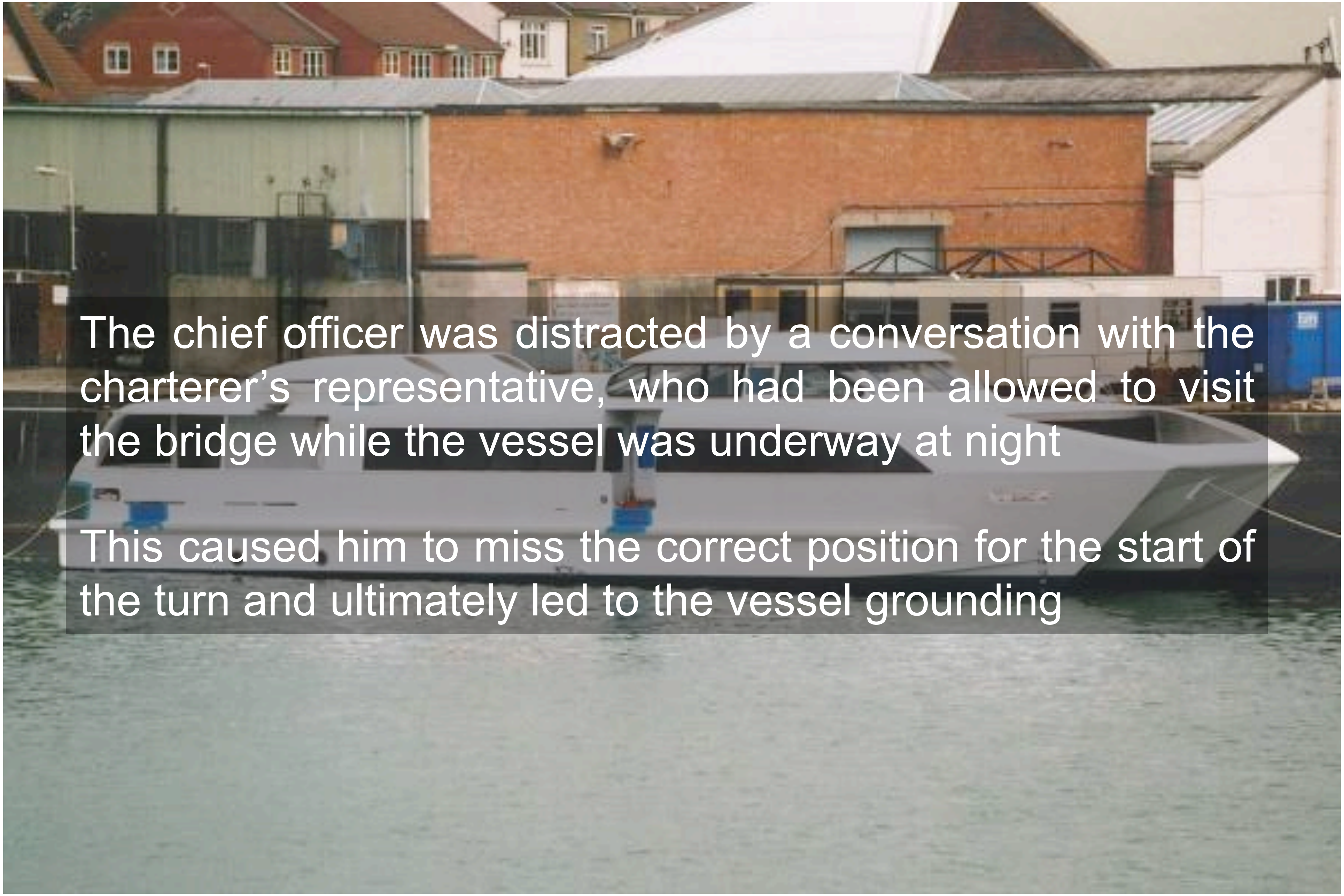


The vessel grounded during maximum speed endurance trials, while making a speed of 38 knots and approaching a turn on the most westerly section of a planned 32-mile circuit of the Solent

The vessel was being conned by the chief officer and was approaching the western limit of the circuit. The chief officer kept the *Katia* on track by slewing the vessel between the red and white sectors of Hurst Point light

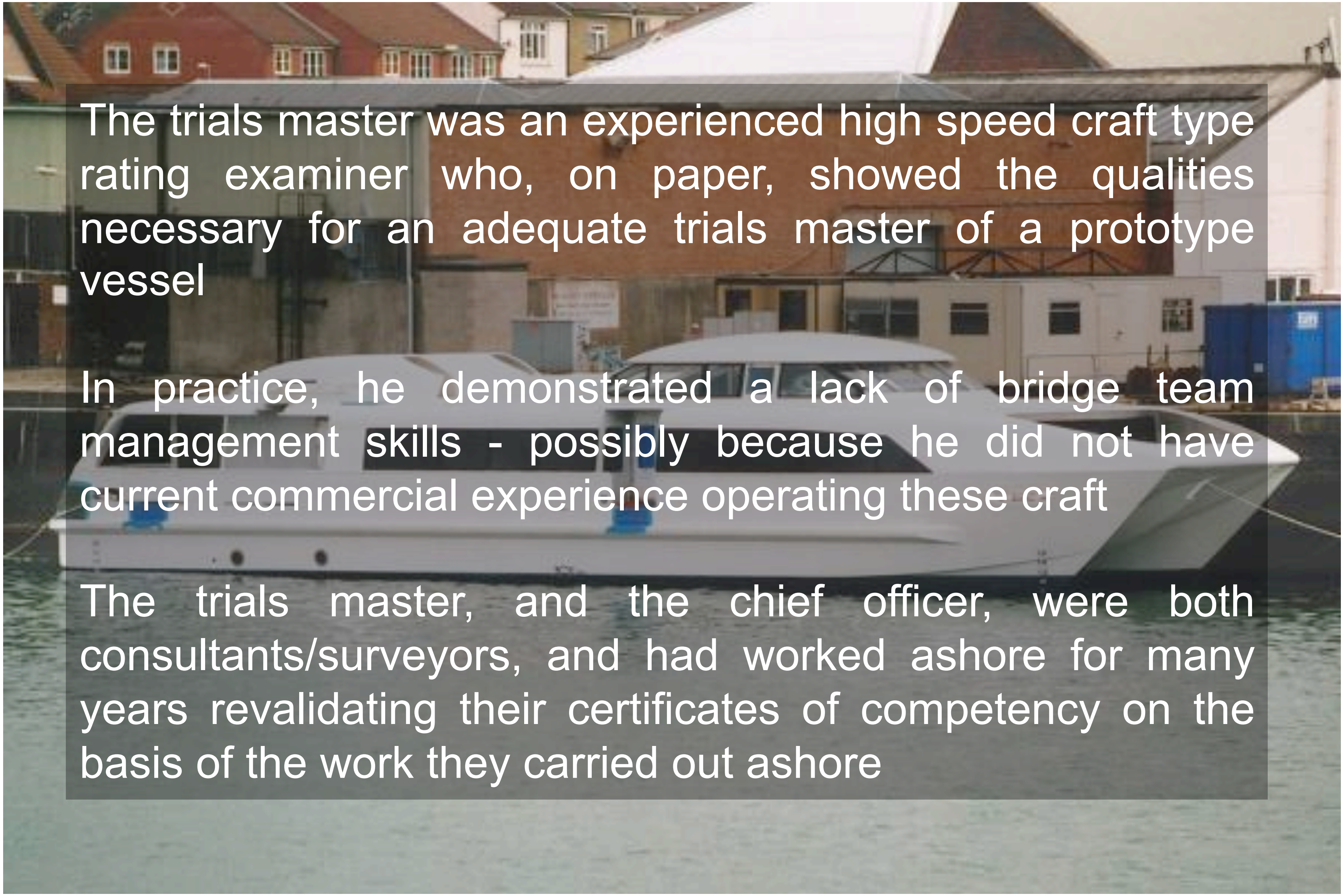


Reproduced from Admiralty Chart 2035 by permission of the Controller of HMSO and the UK Hydrographic Office



The chief officer was distracted by a conversation with the charterer's representative, who had been allowed to visit the bridge while the vessel was underway at night

This caused him to miss the correct position for the start of the turn and ultimately led to the vessel grounding



The trials master was an experienced high speed craft type rating examiner who, on paper, showed the qualities necessary for an adequate trials master of a prototype vessel

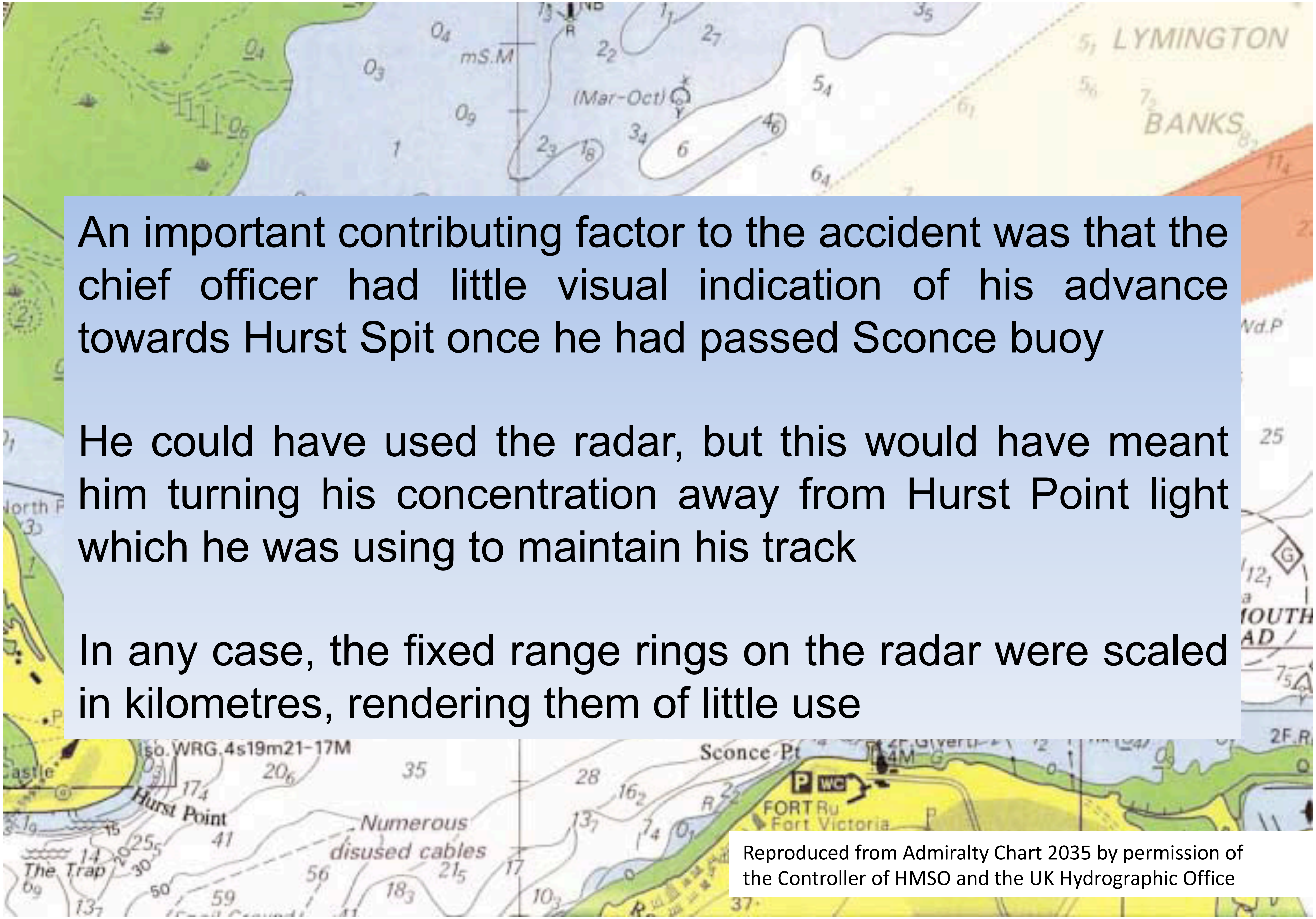
In practice, he demonstrated a lack of bridge team management skills - possibly because he did not have current commercial experience operating these craft

The trials master, and the chief officer, were both consultants/surveyors, and had worked ashore for many years revalidating their certificates of competency on the basis of the work they carried out ashore

An important contributing factor to the accident was that the chief officer had little visual indication of his advance towards Hurst Spit once he had passed Sconce buoy

He could have used the radar, but this would have meant him turning his concentration away from Hurst Point light which he was using to maintain his track

In any case, the fixed range rings on the radar were scaled in kilometres, rendering them of little use



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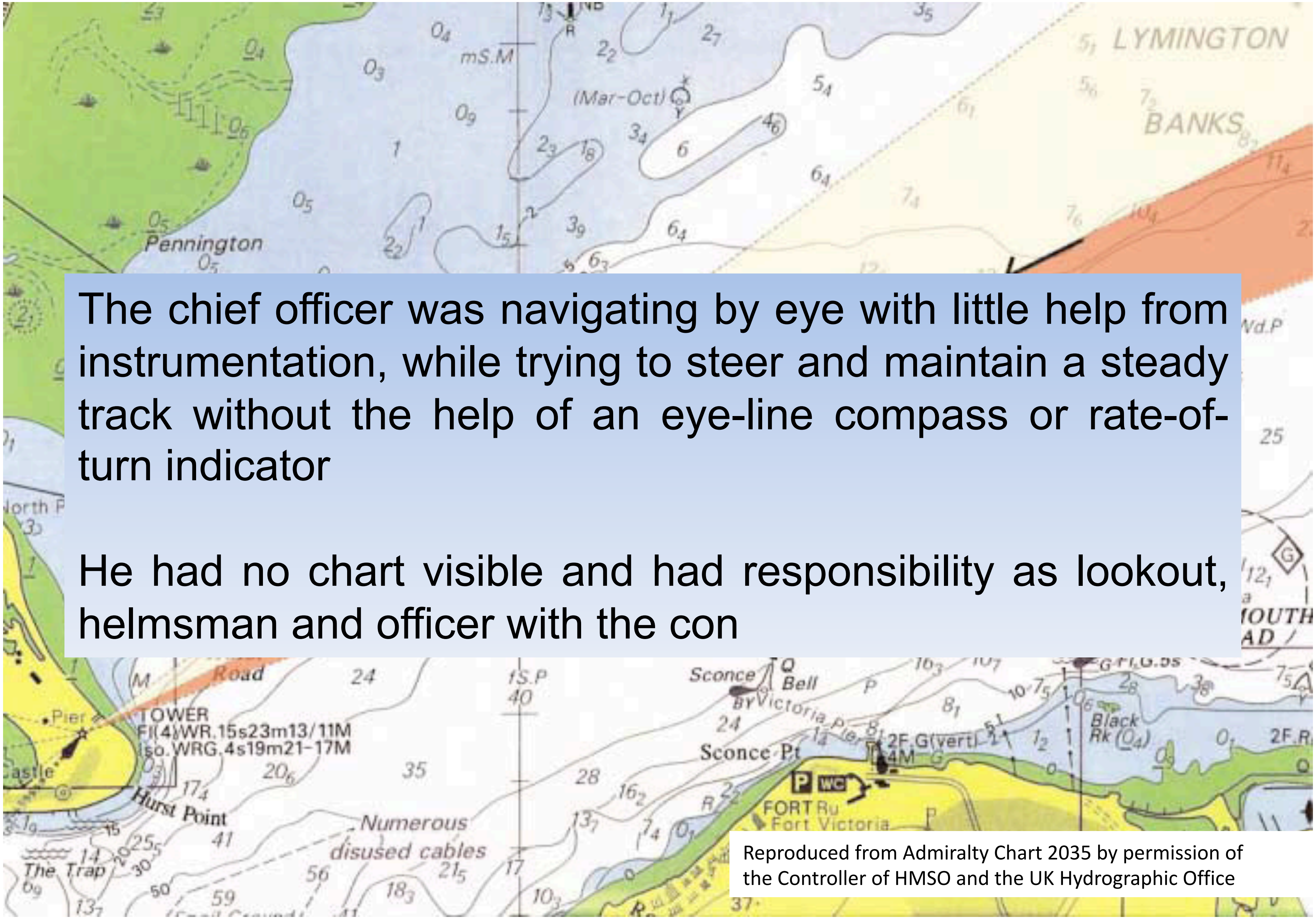
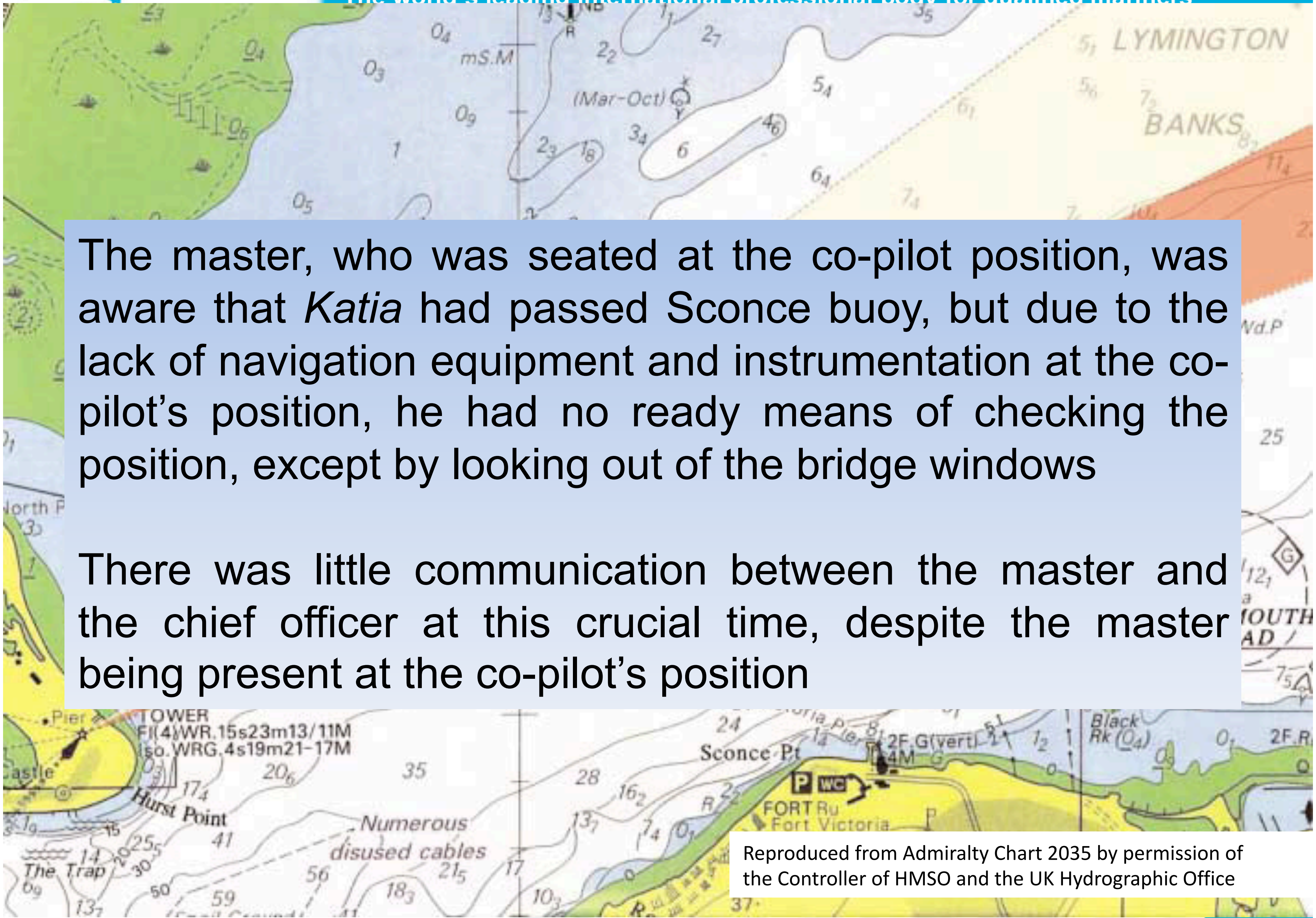


The chief officer was navigating by eye with little help from instrumentation, while trying to steer and maintain a steady track without the help of an eye-line compass or rate-of-turn indicator

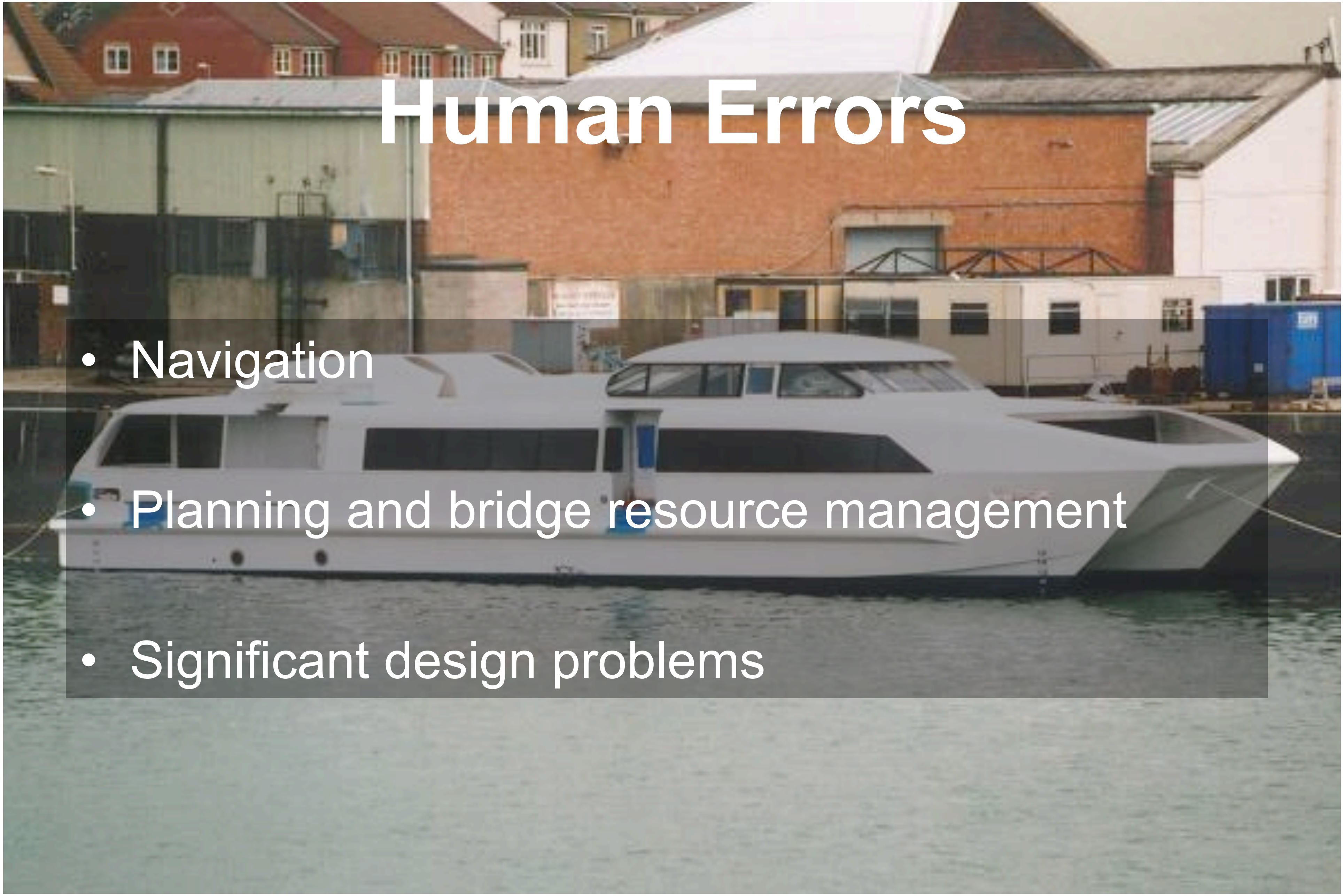
He had no chart visible and had responsibility as lookout, helmsman and officer with the con



The master, who was seated at the co-pilot position, was aware that *Katia* had passed Sconce buoy, but due to the lack of navigation equipment and instrumentation at the co-pilot’s position, he had no ready means of checking the position, except by looking out of the bridge windows

There was little communication between the master and the chief officer at this crucial time, despite the master being present at the co-pilot’s position

Human Errors



- Navigation
- Planning and bridge resource management
- Significant design problems

Near Grounding of passenger freight ferry ***Aretere***

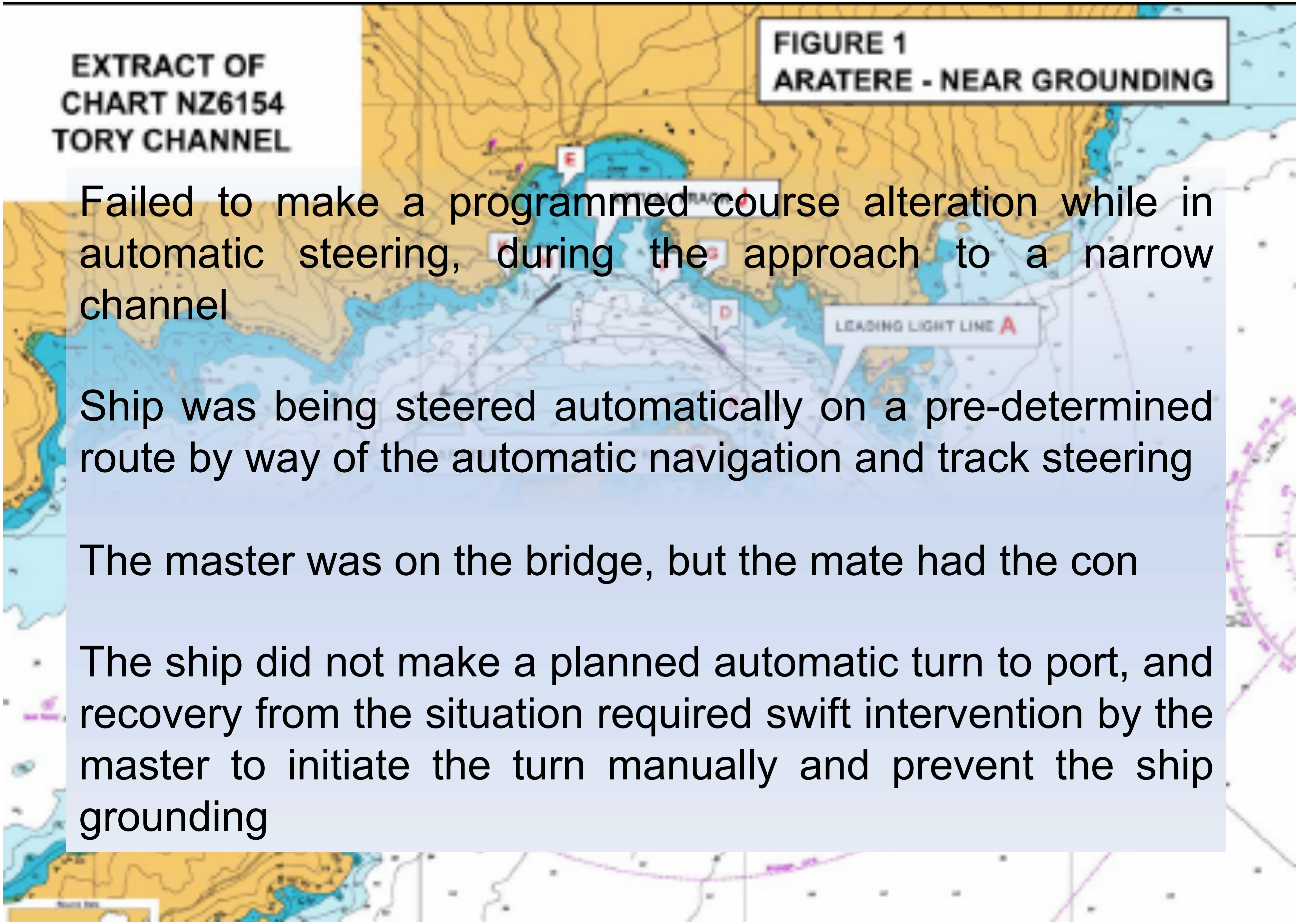
KEEPING YOUR SEA SAFE FOR LIFE

Maritime Safety

MARITIME SAFETY AUTHORITY OF NEW ZEALAND

Kia Maanu Kia Ora

http://www.maritimenz.govt.nz/publications/accidents/reports/
Aratere-043567-mnz-accident-report2004.pdf



Failed to make a programmed course alteration while in automatic steering, during the approach to a narrow channel

Ship was being steered automatically on a pre-determined route by way of the automatic navigation and track steering

The master was on the bridge, but the mate had the con

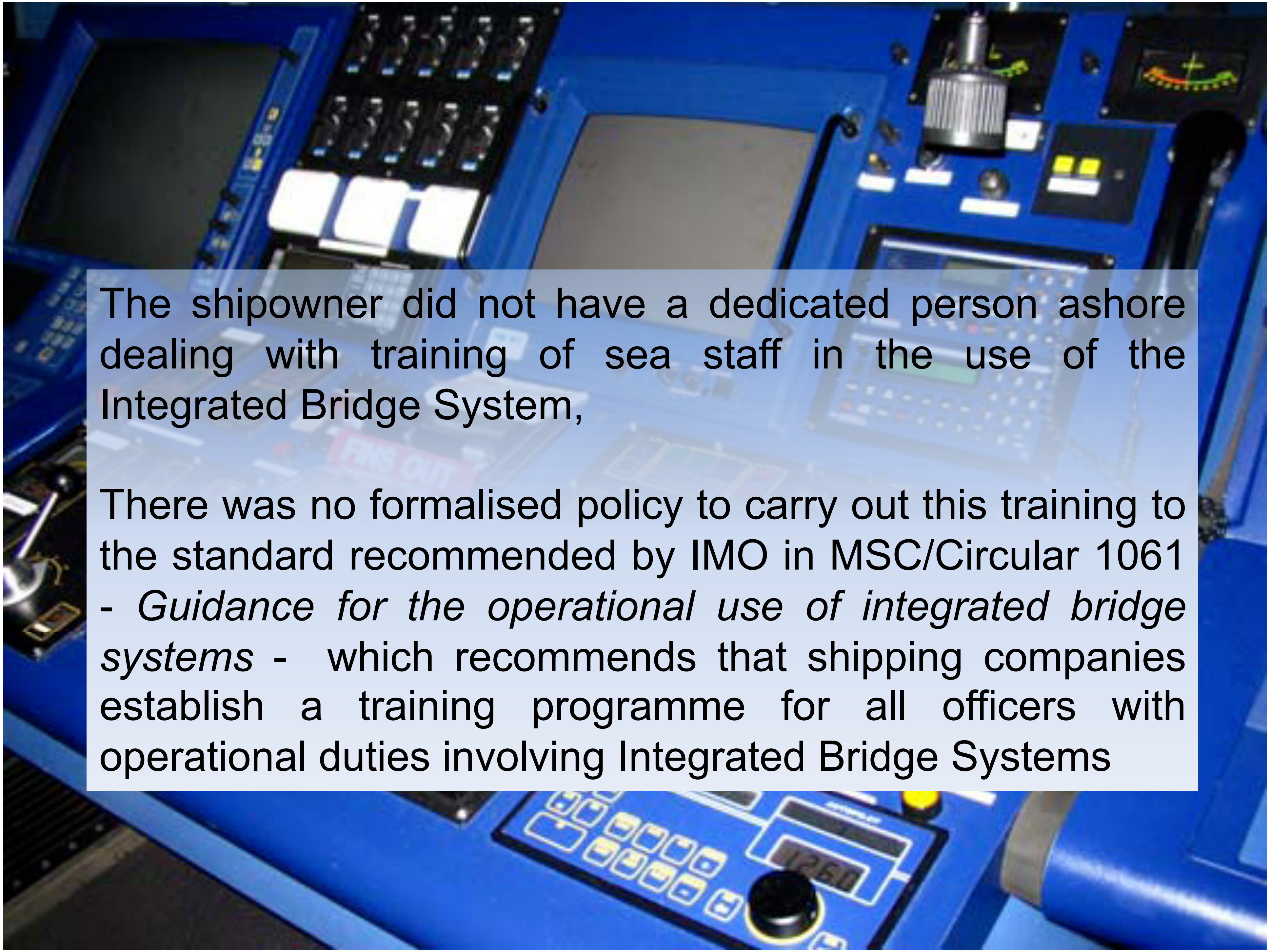
The ship did not make a planned automatic turn to port, and recovery from the situation required swift intervention by the master to initiate the turn manually and prevent the ship grounding

The ARPA radar navigation system probably defaulted from the ANTS mode to autopilot mode without the change being noticed by the mate or master

The ship was fitted with an Integrated Bridge System, which complied with international standards and IMO guidelines

The manufacturer ran courses on its Integrated Bridge System, and the original crew had received training in its use prior to the commissioning of the ship, some 6 years previously

Training for the master and the mate in the operation of the Integrated Bridge System and of the ANTS consisted of 2 weeks' 'hands-on' familiarisation on board while the ship was in service, given by other officers experienced in the use of that equipment



The shipowner did not have a dedicated person ashore dealing with training of sea staff in the use of the Integrated Bridge System,

There was no formalised policy to carry out this training to the standard recommended by IMO in MSC/Circular 1061 - *Guidance for the operational use of integrated bridge systems* - which recommends that shipping companies establish a training programme for all officers with operational duties involving Integrated Bridge Systems

Human Errors

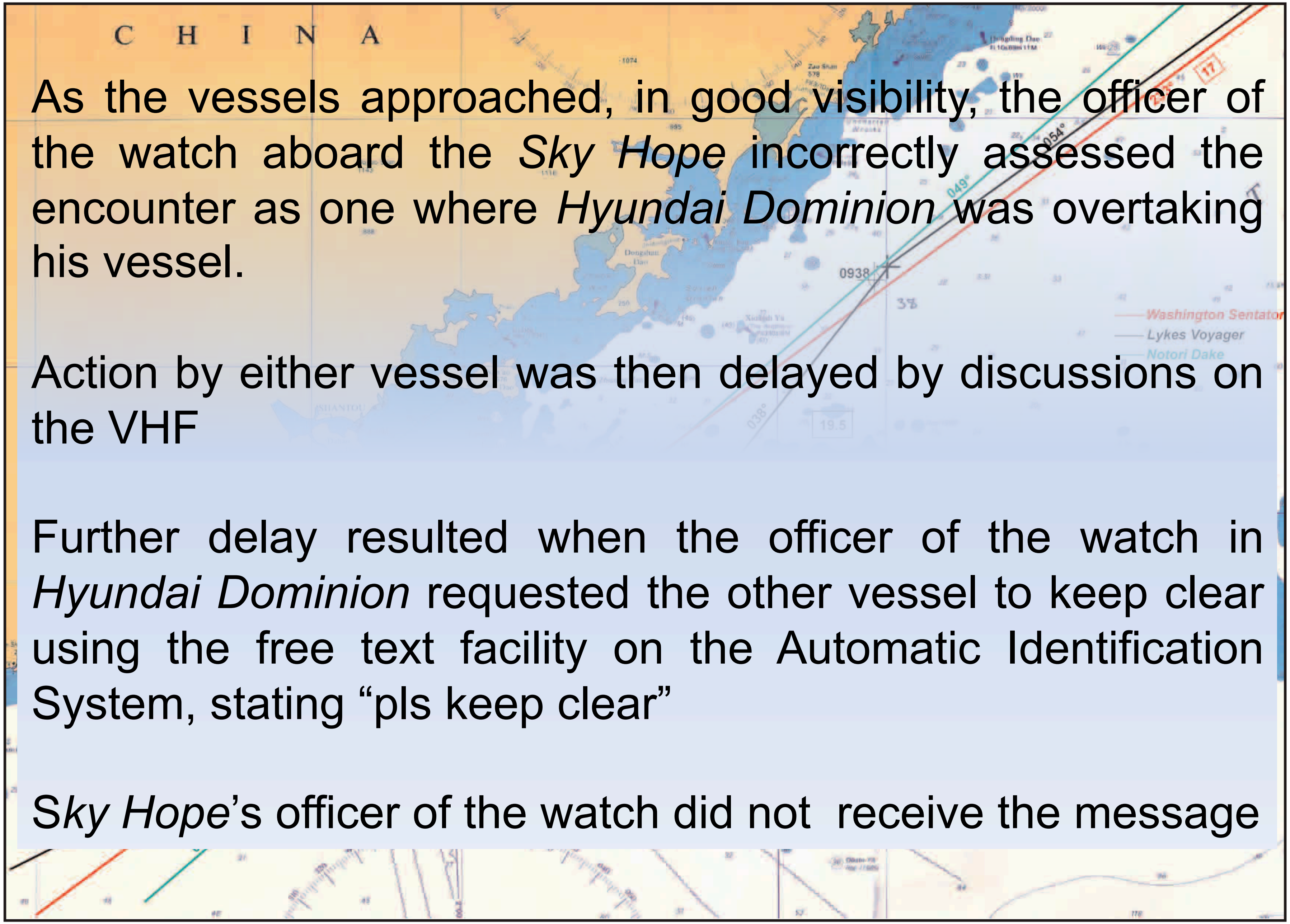
- A lack of proper bridge resource management
- Inadequate training in the use of integrated bridge systems
- A lack of contingency planning for safety-critical situations on board
- No procedures covering the dissemination of information from the international maritime organization

Collision between ***Lykes Voyager*** and ***Washington Senator***

BSU

MAIB

http://www.maib.gov.uk/cms_resources/Lykes%20Voyager.pdf



As the vessels approached, in good visibility, the officer of the watch aboard the *Sky Hope* incorrectly assessed the encounter as one where *Hyundai Dominion* was overtaking his vessel.

Action by either vessel was then delayed by discussions on the VHF

Further delay resulted when the officer of the watch in *Hyundai Dominion* requested the other vessel to keep clear using the free text facility on the Automatic Identification System, stating “pls keep clear”

Sky Hope’s officer of the watch did not receive the message

Extract from BA 1968 showing planned tracks

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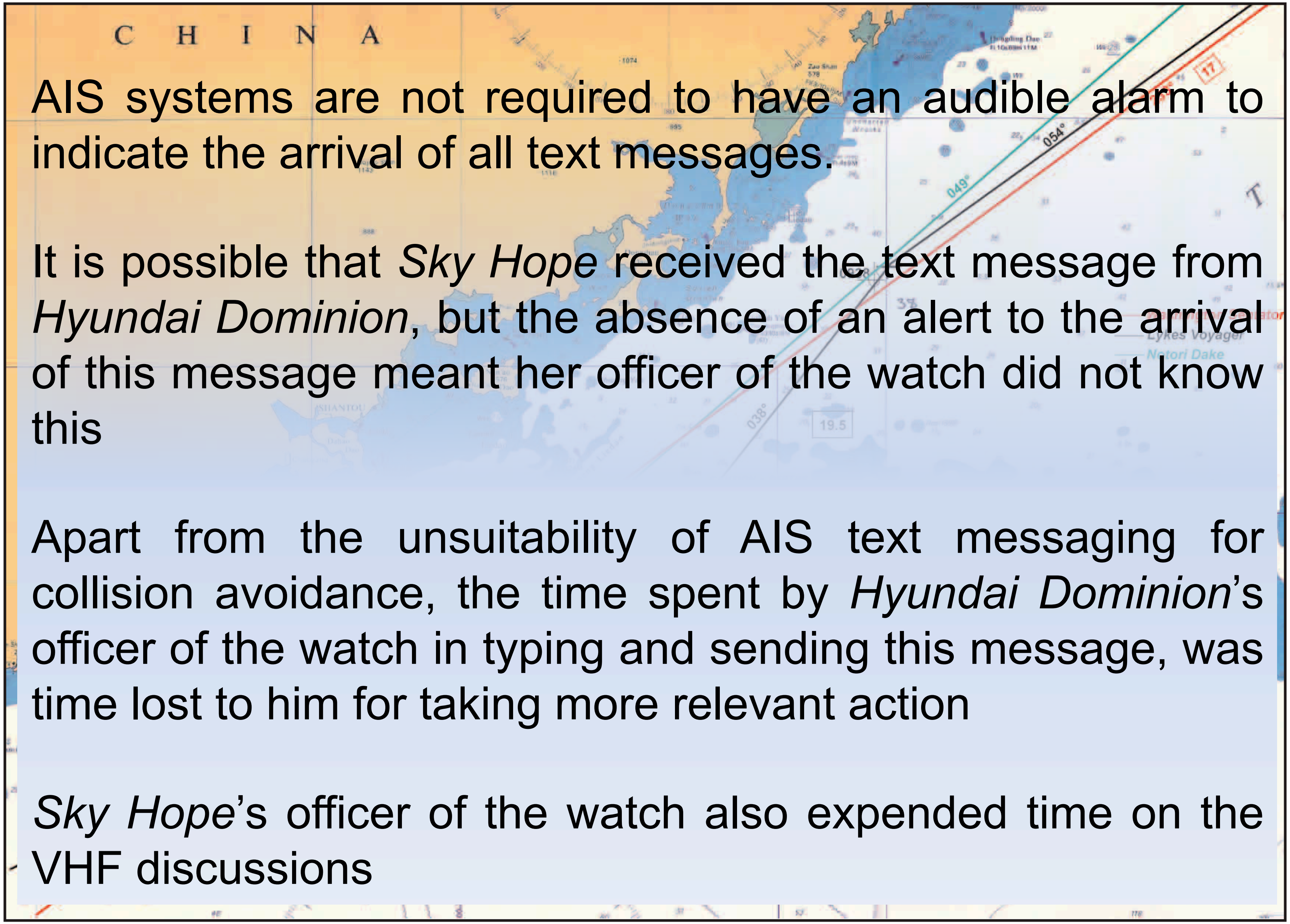

AIS systems are not required to have an audible alarm to indicate the arrival of all text messages.

It is possible that *Sky Hope* received the text message from *Hyundai Dominion*, but the absence of an alert to the arrival of this message meant her officer of the watch did not know this

Apart from the unsuitability of AIS text messaging for collision avoidance, the time spent by *Hyundai Dominion*'s officer of the watch in typing and sending this message, was time lost to him for taking more relevant action

Sky Hope's officer of the watch also expended time on the VHF discussions

Extract from BA 1968 showing planned tracks

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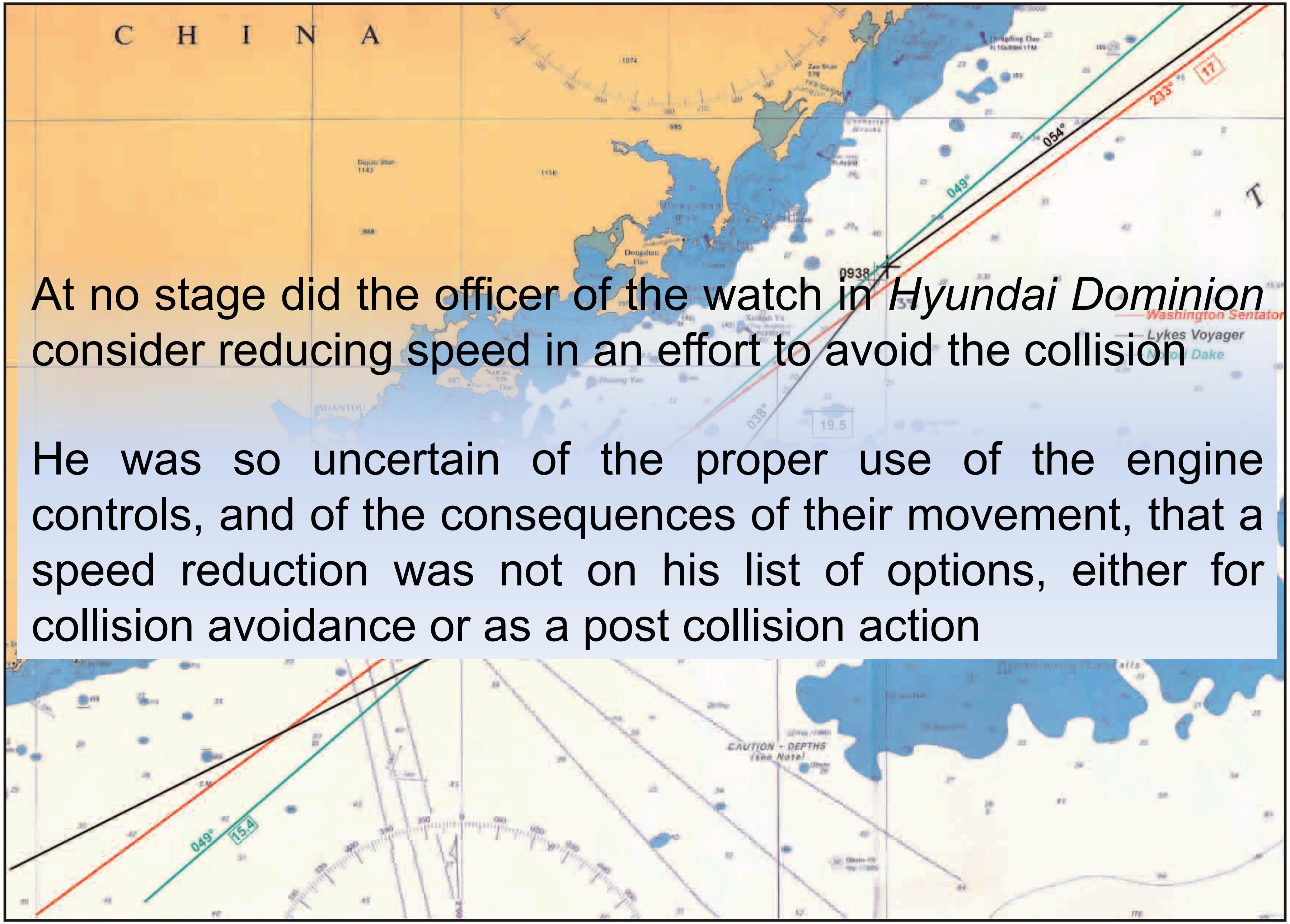

At no stage did the officer of the watch in *Hyundai Dominion* consider reducing speed in an effort to avoid the collision

He was so uncertain of the proper use of the engine controls, and of the consequences of their movement, that a speed reduction was not on his list of options, either for collision avoidance or as a post collision action

Extract from BA 1968 showing planned tracks

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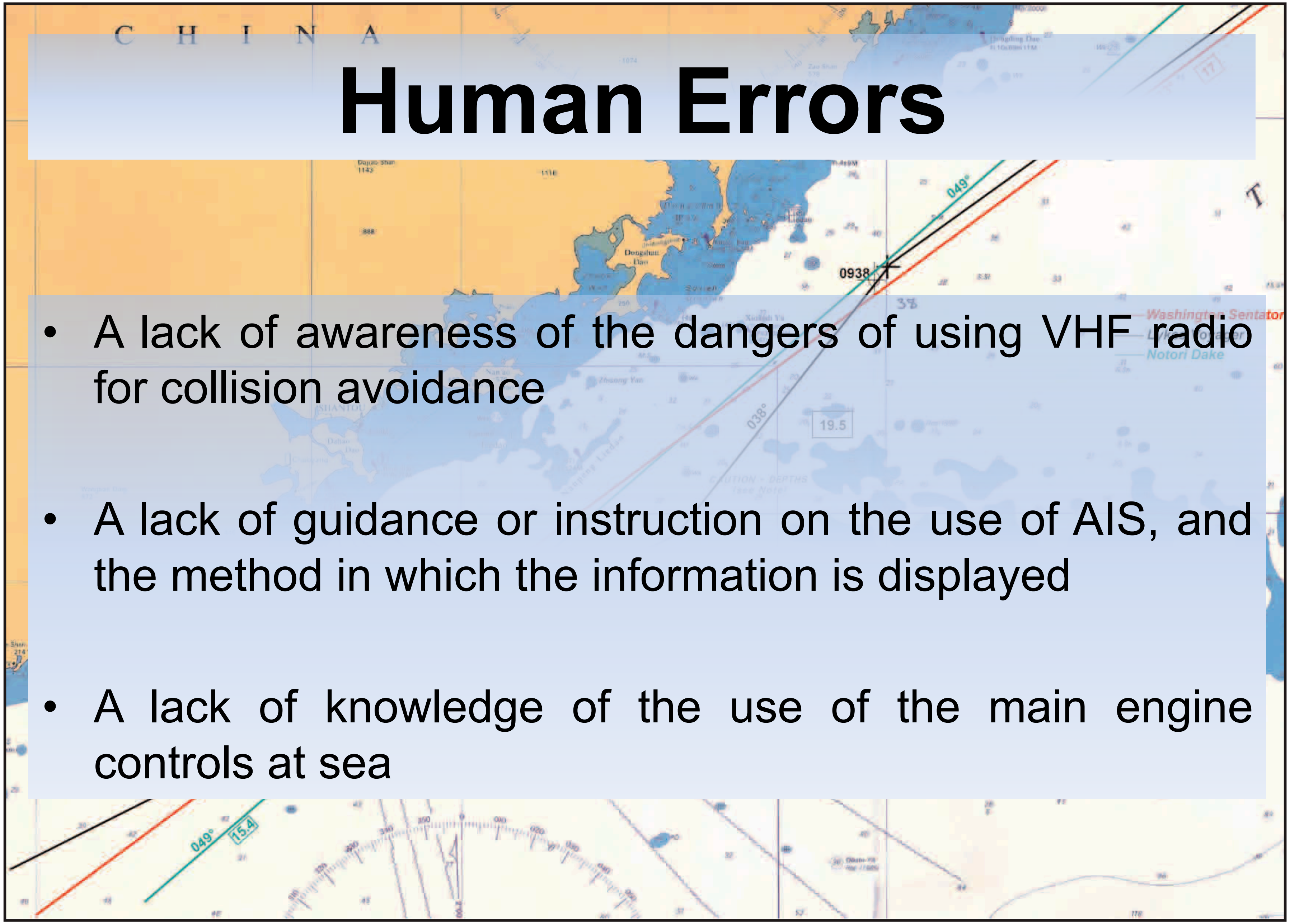


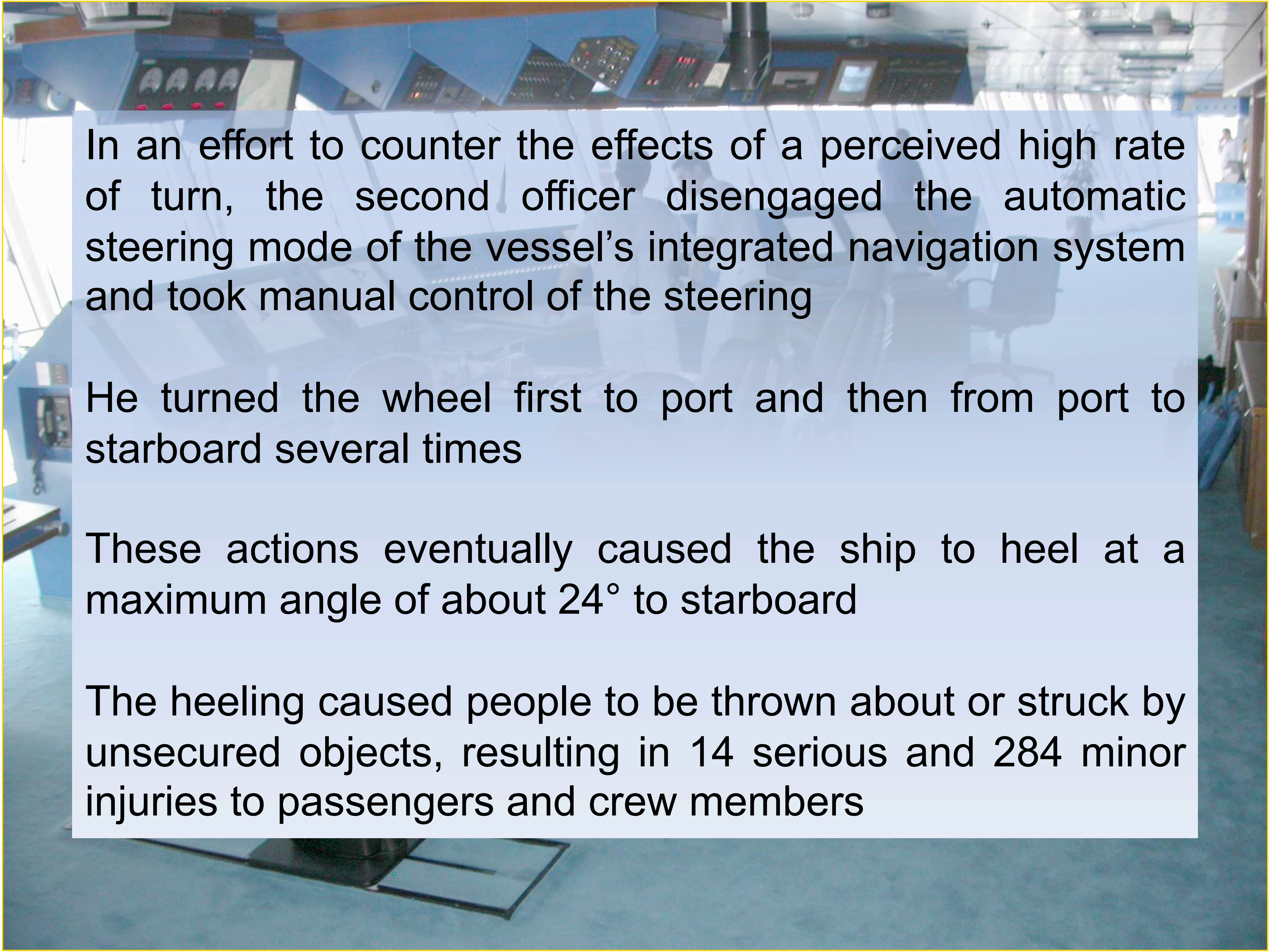
Human Errors

- A lack of awareness of the dangers of using VHF radio for collision avoidance
- A lack of guidance or instruction on the use of AIS, and the method in which the information is displayed
- A lack of knowledge of the use of the main engine controls at sea

Extract from BA 1968 showing planned tracks

Heeling accident aboard the cruise ship ***Crown Princess***

http://www.ntsb.gov/publictn/2008/MAR0801.pdf



In an effort to counter the effects of a perceived high rate of turn, the second officer disengaged the automatic steering mode of the vessel’s integrated navigation system and took manual control of the steering

He turned the wheel first to port and then from port to starboard several times

These actions eventually caused the ship to heel at a maximum angle of about 24° to starboard

The heeling caused people to be thrown about or struck by unsecured objects, resulting in 14 serious and 284 minor injuries to passengers and crew members

The vessel incurred no damage to its structure but sustained considerable damage to unsecured interior components and to cabinets and their contents

Table 1. Sequence of events while the trackpilot was engaged.

Time	Event
1501	Crew shifts steering from manual to trackpilot
1503	Captain notices heading fluctuations
1505:06	Trackpilot rudder limit alarm sounds
1505:38	Captain: "We're wandering all over the place"
1506:09	Captain: "At the moment she is not responding other than 10 degrees at a time"
1506:27	Rudder limit alarm sounds
1507:07	Staff captain increases rudder limit to 10°
1508:00	Rudder limit alarm sounds
1512	Staff captain: "Is it okay now?" Captain: "No"
1513	Staff captain discusses trackpilot settings with captain
1513	New course input to trackpilot, vessel begins turn to port
1514:33	Captain: "Stay in that turn . . . OK, we'll run like that"
1518:14	Captain to second officer: "Okay, you got the conn"
1522	Heading approaches ordered course of 040°, again begins to fluctuate
1522	Captain and staff captain leave bridge
1523	Relief captain leaves bridge

Heeling Accident on M/V *Crown Princess*
Atlantic Ocean off Port Canaveral, Florida
July 18, 2006
DCA06MF018

This three-dimensional animation depicts the heeling accident of the passenger cruise ship M/V *Crown Princess* on July 18, 2006, near Port Canaveral, Florida. The primary display shows the view from the bridge of the ship and the inset displays a chase view.

The animation displays performance data, information from the voyage data recorder, the local time of day, and the heeling degree angle. Selected bridge voice recorder comments at the time they occurred are displayed as text. The rudder command and response and the rate of turn are displayed as indicators. Weather and visibility conditions at the time of the accident are not shown. This animation contains audio voice-over narration.

In examining other heeling accidents and incidents, the NTSB found some common antecedents relating to a lack of familiarity with Integrated Navigation Systems

Integrated Navigation Systems, are sophisticated devices that monitor, display, and control considerable information about a vessel’s position, direction, and path, the sea state in which it operates, and related information about nearby vessels

The systems integrate individual components such as AIS, ARPA, and ECDIS with steering, to allow the display of information and control of components at a single workstation

As both hardware and software technology have advanced, designers have added capabilities to the systems, further increasing an operator's choices in information and vessel control

There were shortcomings in training that may have contributed to the errors in the use of the Integrated Navigation System

Neither the US Coast Guard nor the IMO requires licensed mariners to complete formal instruction before using an Integrated Navigation System

The circumstances of this accident suggest that the navigating officers, while familiar with squat, did not recognize that high vessel speed in shallow water could also adversely affect the precision of vessel steering

Human Errors

- Inappropriate inputs to the Integrated Navigation System by the captain and staff captain, while the ship was travelling at high speed in relatively shallow water
- Failure to stabilize the vessel’s heading fluctuations
- Inadequate training of crew members in the use of Integrated Navigation Systems

The world´s leading international professional body for qualified mariners

Operator Error
or
Human Error?

In the first instance, it is *Operator Error* that causes most groundings, collisions or other navigational accidents

But, it is the root cause of such incidents that can reveal the real *Human Error*, whether this be in terms of poor design or layout of systems, controls and monitoring equipment

OR

a lack of experience

OR

inadequate training, in the operation systems

OR

poor operating procedures or instructions

While 80% of accidents at sea are caused by *Operator Error*; all accidents at sea are as a result of *Human Error* because, when seeking the root causes, it is invariably the human input to the design, manufacture or operation of a system that has been a contributory factor

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