



Trafi

Finnish Transport Safety Agency

Utilization of Safety Information in the Finnish Transport Safety Agency

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*Responsible traffic.
Courage and co-operation*

Agenda

- **Preface**
- **Challenges of the Current Approach**
- **Event Risk Classification and Safety Factors**
- **First Results**
- **Next Steps**
- **Questions**

"Transport system authority"

- We issue permits, approvals and other decisions, and prepare legal rules for the transport sector.
- We arrange examinations, handle taxation and registration matters, and provide reliable information services.
- We oversee the transport market as well as compliance with rules and regulations governing the transport system.
- We ensure the functionality of the transport system, even in emergency conditions and when normal operations are disrupted.
- We create opportunities for the development of intelligent transport.
- We inform the public of various transport options.

Safety Data Collection – main sources

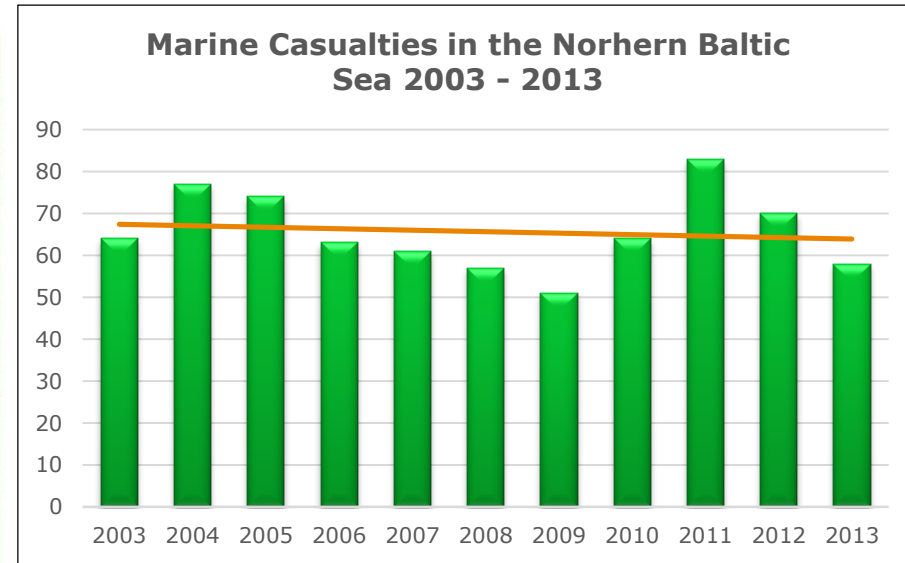
- Accidents world wide (Lloyd´s List Intelligence, IMO, IHS Fairplay)
- Accidents in Europe (EMSA)
- Accidents in the Baltic Sea (HELCOM)
- Accidents in Finland (Trafi)
- Port State Control (ParisMoU/EMSA)
- Flag State Control (Trafi)
- VTS incident reports (Finnish Transport Agency)
- Pilotage reports (Finnpilot Pilotage Ltd)
- ***AIS data (Finnish Transport Agency – 2015?)***
- ***Finnish shipping companies accident and incident reports– 2015?)***
- Qualitative data e.g. accident investigations, interviews, studies...

Accidents in the Northern Baltic Sea

TABLE 2. Marine casualties involving merchant vessels in the northern Baltic Sea in 2003–2013, broken down by ship type

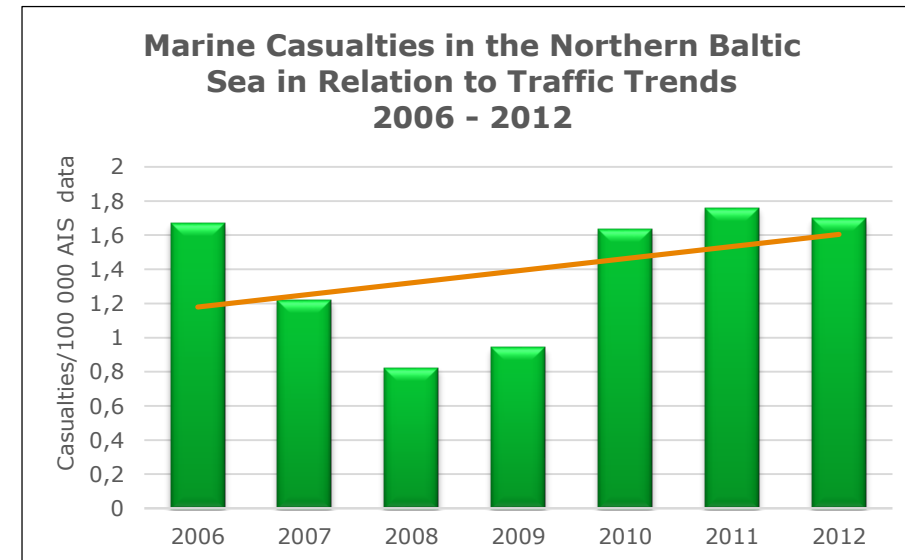
Ship type	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Tugboat	6	8	3	6	6	2	2	6	2	2	2	45
Bulk carrier	5	1	3				2	2	4	3	2	22
Refrigerated vessel		3	5		1	2	3			1		15
Ice breaker	4	2			2		1	3	6	2	3	23
Gas tanker						1					2	3
Fishing vessel		2		1	1	3				1	4	12
Chemical tanker	2	1	6	5	6	4	1	3	6	2	2	38
Container ship	1	2	1	2	1	3	1	2	8	3		24
Dry cargo ship	24	27	28	28	29	16	17	23	27	21	15	255
Passenger ship	4	7	5	8	4	4	2	3	2	9	11	59
Marine research vessel			1									1
Buoy tender						1	1	2				4
Barge		2	2	2	1				3			10
Ro-ro cargo ship	8	4	1	2	3	3	1	3	7	8		40
Ro-ro passenger ship	3	14	10	3	4	7	9	9	11	9	10	89
Dredger							5			2	1	8
Tanker	6	3	5	3	3	5	3	7	4	4	4	47
Other vessel	1	1	4	3		6	3	1	3	3	2	27
Total	64	77	74	63	61	57	51	64	83	70	58	722

Source: NorthBaccD 2014

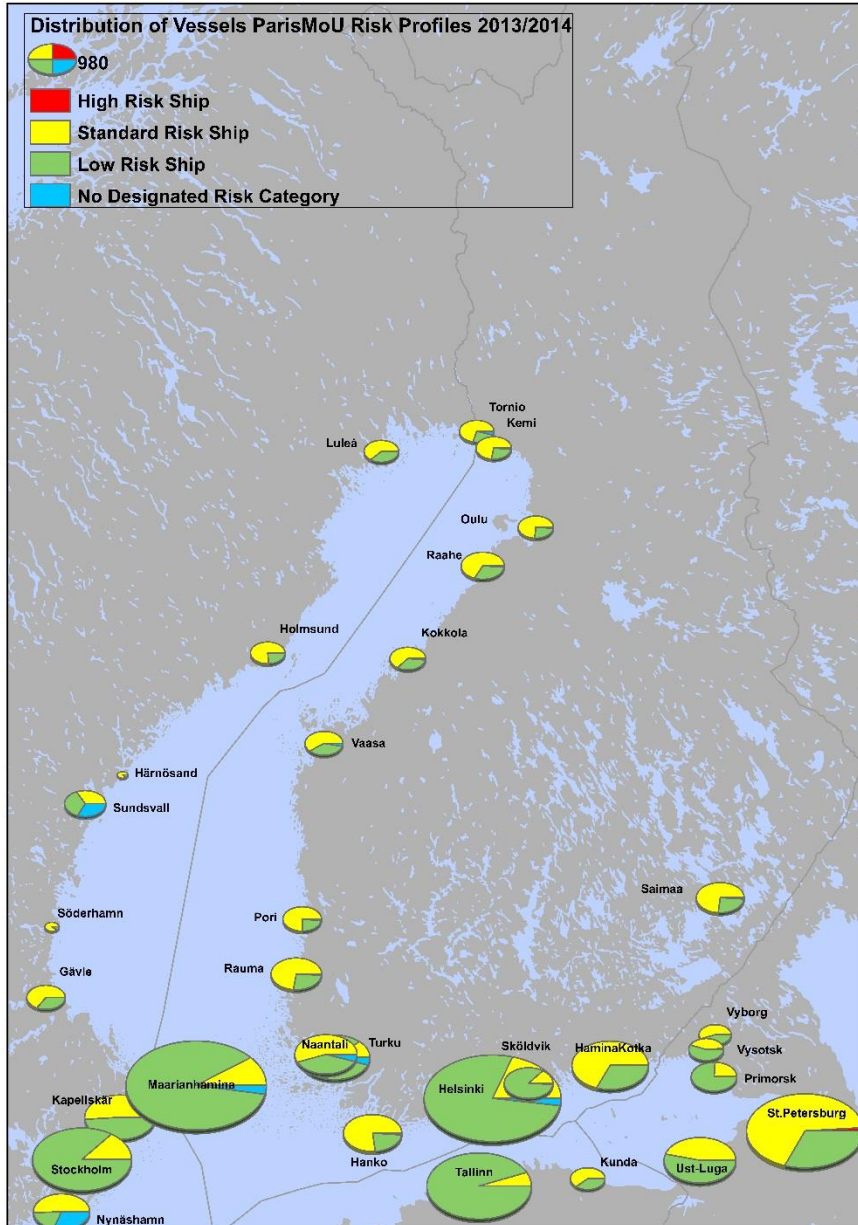


YLE 2012

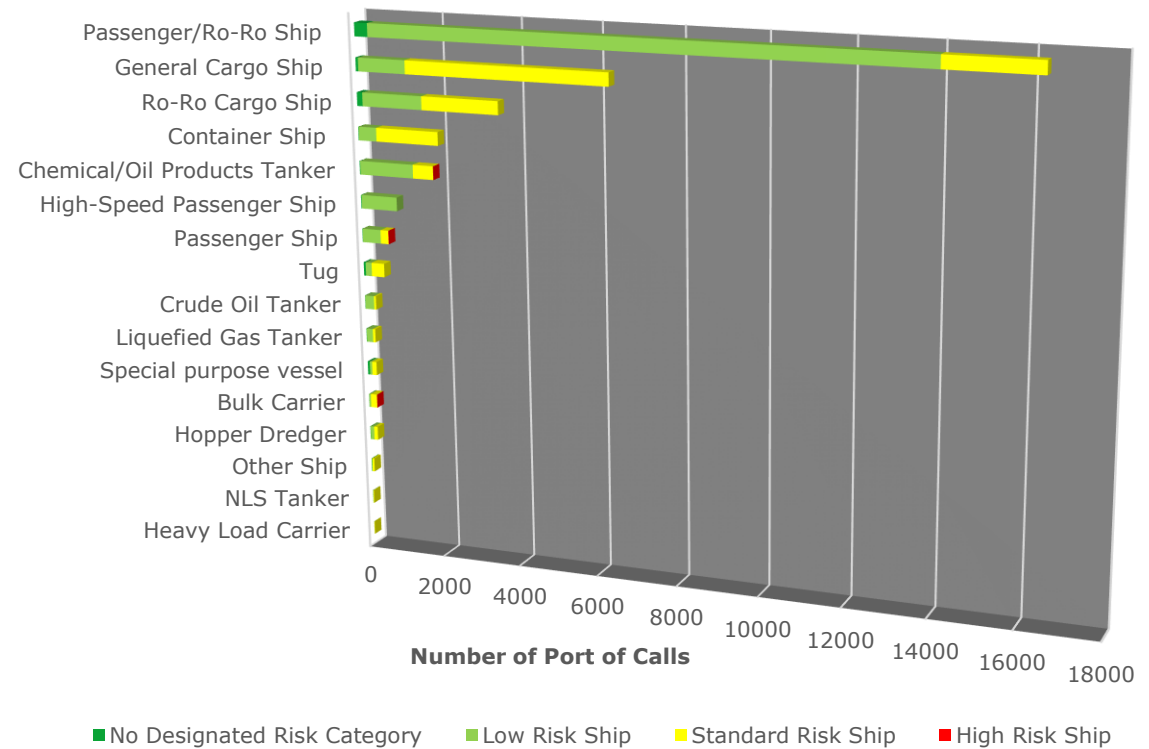
26.8.2015



Distribution of Vessels ParisMoU Risk Profiles in the Northern Baltic Sea



Risk Profiles of Ships making port calls in Finland 2014



STATE OF SAFETY: Generally quite good and stable – number of very serious casualties low and no major accidents during the past 10 years. Ships' risk profiles generally good.

http://www.trafi.fi/en/about_trafi/annual_safety_reviews

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What about risk of accident?

- **We can make quite reliable risk assessments concerning typical accidents -> assessments of major accidents are done by the universities**
- **Safety data is still harvested rather than analyzed and used in daily operational activities**
- **Inputs to improve safety are coming mostly from top to bottom**
 - **Rules and regulations (IMO,EU etc.)**
 - **Inspection campaign (Paris MoU)**
- **In aviation the safety inputs are coming from bottom to top and from top to bottom**

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Tiedosta toimenpiteisiin (“From Data to Action”) - project



“How to maximize the positive safety impact without ignoring other important strategic values, such as environmental sustainability and reliability of the transport system”.

- **Safety data analyzed and used actively**
- **More safety inputs from bottom to top than nowadays for maritime administration**
- **ARMS Methodology for Risk Assessment**

Event Risk = Incident in certain time and place
-> Safety Issue = Several similar events (e.g.)

**ARMS - Event Risk Classification (ERC) matrix
MARITIME version**

Question 2

What was the effectiveness of the remaining barriers between this event and the most credible accident scenario?

Effectice	Limited	Minimal	Not effective
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250	503	2 503	12 500
50	102	502	2500
10	21	101	500
2	4	20	100
1			

Risk Categories

	Very high accident risk -> Take action immediately
	High accident risk -> High priority
	Medium accident risk -> Medium priority
	No/low accident risk -> Low priority

Question 1

If this event had escalated into an accident outcome, what would have been the most credible outcome?

High capacity catastrophic accident	An accident which involves large number of loss of lives or catastrophic environmental damages according to Polescale.
Very serious casualty to ships Very serious occupational accident	Unwanted event(s) which involves total loss of the ship, or a death or severe pollution, where appropriate.
Serious casualty to ships Serious occupational accident	Casualties or injuries which do not qualify as "very serious casualty".
Less serious casualty to ships Less serious occupational accident	Minor technical damage or minor injuries
No accident outcome	No potential damage or injury could occur

The ARMS ERC effectiveness ratings

Effectiveness rating	Definition
Effective	An abnormal situation, more demanding to manage, but with still a considerable remaining safety margin
Limited	An abnormal situation, more demanding to manage, but with still a considerable remaining safety margin
Minimal	Some barrier(s) were still in place but their total effectiveness was 'minimal'
Not effective	An accident was not avoided, or the only thing separating the event from an accident was pure luck or exceptional skill, which is not trained nor required.

Typical accident scenarios

Major tanker or passenger ship accidents such as Exxon Valdez, Erika, Estonia, Costa Concordia.
Fire/explosion onboard or sinking of ship. Consequences are total loss of the ship, loss of life or severe pollution according to Polescale.
Grounding or collision with another ship. Consequences are limited structural damages to the vessel and they require vessels drydocking. Event(s) that has resulted in an injury to a person causing incapacitation for short time period. Moderate environmental damages according to Polescale.
Contact with infrastructure during harbour manoeuvring. Consequences are minor structural damages to vessel with no risk to health and/or life (e.g. dents, scratches). Nil or minor marine environment damages according to Polescale.
Any event which could not escalate into an accident, even if it may have operational consequences (e.g. diversion, delay, individual sickness)

***Incident report = accidents, near miss cases, violations etc.**

Maritime Safety Factors

- Assumed pre-requisites for safe operation



Fundamental safety factors

Manoeuvrability

Availability of propulsion

Controllability of ship stability

Capability to stop ship and seakeeping ability

Awareness of ship position in relation to the correct safe route

Capability to maintain survivable conditions aboard ship

Structural integrity and damage stability

Capability to evacuate (escape routes, equipment, emergency communications)

Competencies (with respect to different crew categories)

Leadership and teamwork

Communication

Knowledge

Application of procedures and knowledge

Management of ship's route and related automation/equipment

Manual steering of ship

Ship manoeuvring in port

Situation awareness (including anticipation)

Problem-solving and decision-making

Workload management

Knowing and respecting operational limitations

Shipload planning and loading: stowage, appreciation of cargo characteristics, volume.

Limitations concerning the route, speeds, etc.

Fitness for work

Vigilance level

Psycho-physical performance level

Procedures practices and culture

Adapted to real operational situations

Quality and clarity

Operational planning

Anticipating demanding operations and situations

Managing a multitude of cultures (and languages)

Adequate focus on safety in the presence of commercial pressures

Ergonomics and redundancy

Usability of bridge automation (ergonomics, HCI)

Ergonomics in how information is presented

Adequate redundancy within the crew (deck officers)

Availability of timely and reliable information

Aboard ship

Between the ship and the external world

External safety factors

Manageability of external threats (e.g. restricted waters, fairways, infrastructure)

Manageability of threats related to conditions (e.g. weather, visibility, ice, currents)

Manageability of threats caused by other vessels

Manageability of exceptional phenomena and situations (icebergs, pirates)

Pilotage

Icebreaker assistance

Towage

VTS operations

Port operations

Example 1. Violation of Contravened Regulations Rule 10/b ii on March 2014



No Scenario

250	503	2 503	12 500
50	102	502	2500
10	21	101	500
2	4	20	100
1			



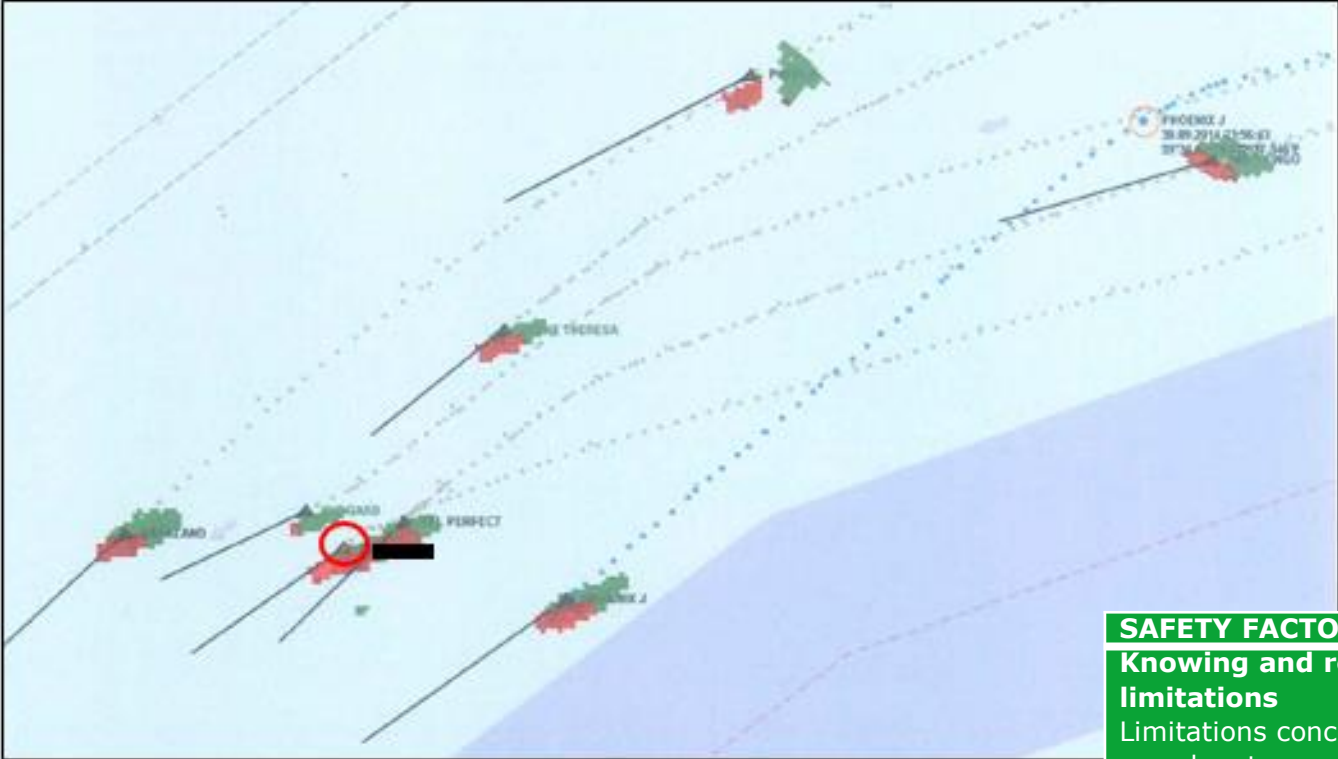
SAFETY FACTOR	Negative	Positive
Knowing and respecting operational limitations Limitations concerning the route, speeds, etc.	-1	

Example 2. Violation of Contravened Regulations Rule 10/b i on September 2014



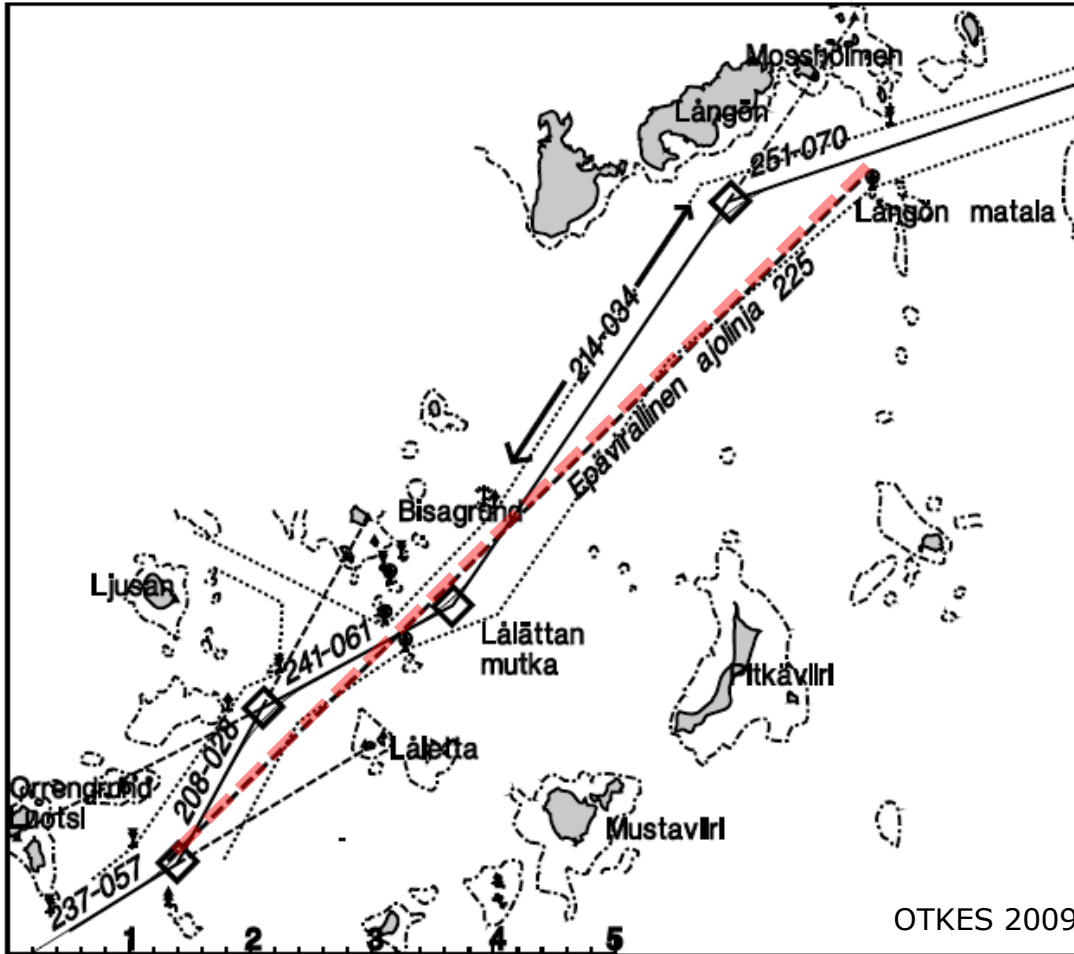
Scenario: Collision

250	503	2 503	12 500
50	102	502	2500
10	21	101	500
2	4	20	100
1			



SAFETY FACTOR	Negative	Positive
Knowing and respecting operational limitations Limitations concerning the route, speeds, etc.	-102	
Availability of timely and reliable information Between the ship and the external world	-102	
Competencies Situation awareness (including anticipation)	-102	
External safety factors VTS operations		+102
Manageability of threats caused by other vessels		+102

Example 3. M/T CRYSTAL PEARL, RAMMING OF EDGE MARK LÅLÄTTAN ON 26 JANUARY 2009



Accident: Contact

250	503	2 503	12 500
50	102	502	2500
10	21	101	500
2	4	20	100
1			

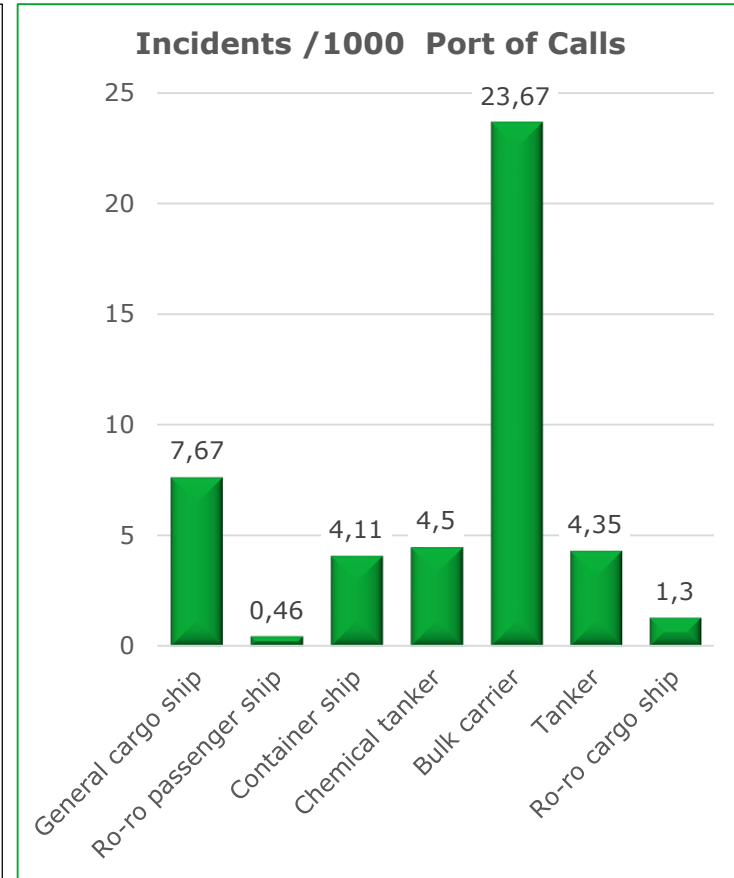
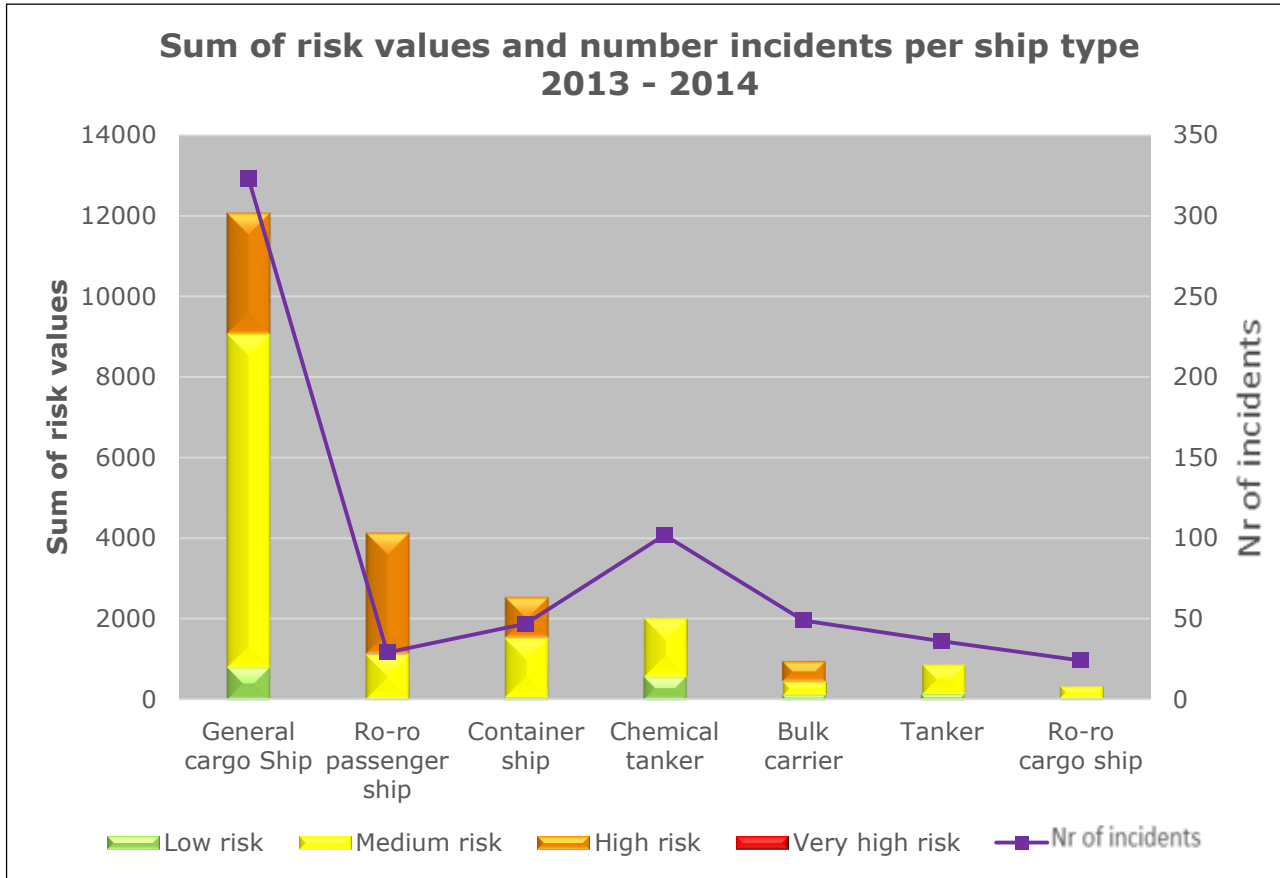
SAFETY FACTOR	Negative	Positive
Knowing and respecting operational limitations Limitations concerning the route, speeds, etc.	-500	
Competencies Communication	-500	
Situation awareness (including anticipation)	-500	
Procedures, practices and culture Adapted to real operational situations	-500	
Fundamental safety factors Structural integrity and damage stability		+500



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Risk Values and Number of Incidents per Ship Type 2013-2014

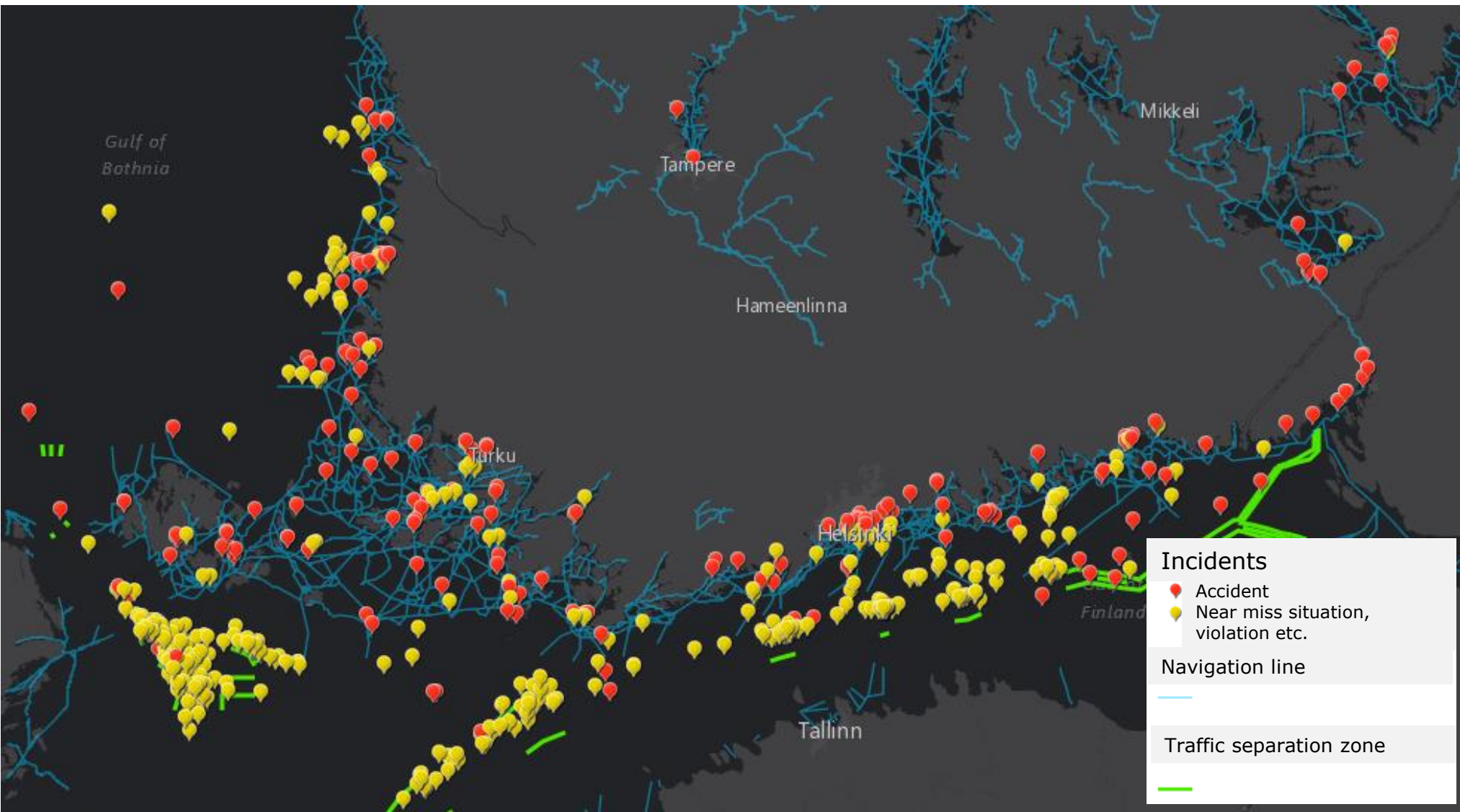


Focus is on risk value peaks. "Fixing" starts from the highest risk category. Example of safety issue:

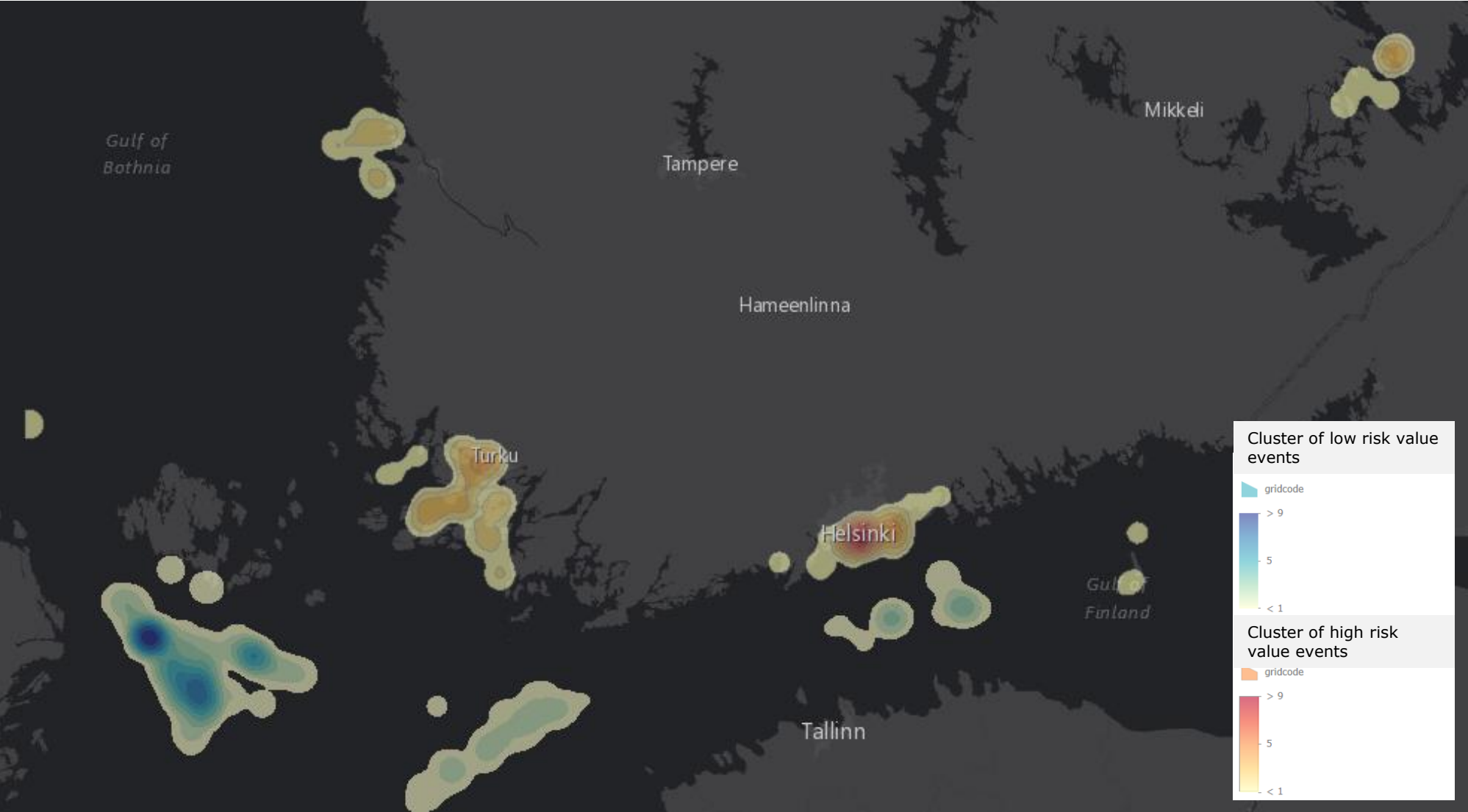
- Collision risk between ropax ship and sailboat**

Total nr of incidents=718
Sources: Trafi and Transport Agency

Spatial Distribution of Maritime Accidents 2004 – 2014 and Other Incidents 2013 - 2014



Spatial Cold Spots and Hot Spots Based on Incidents and Their Event Risk Values



Main Categories of Maritime Safety Factors 2014

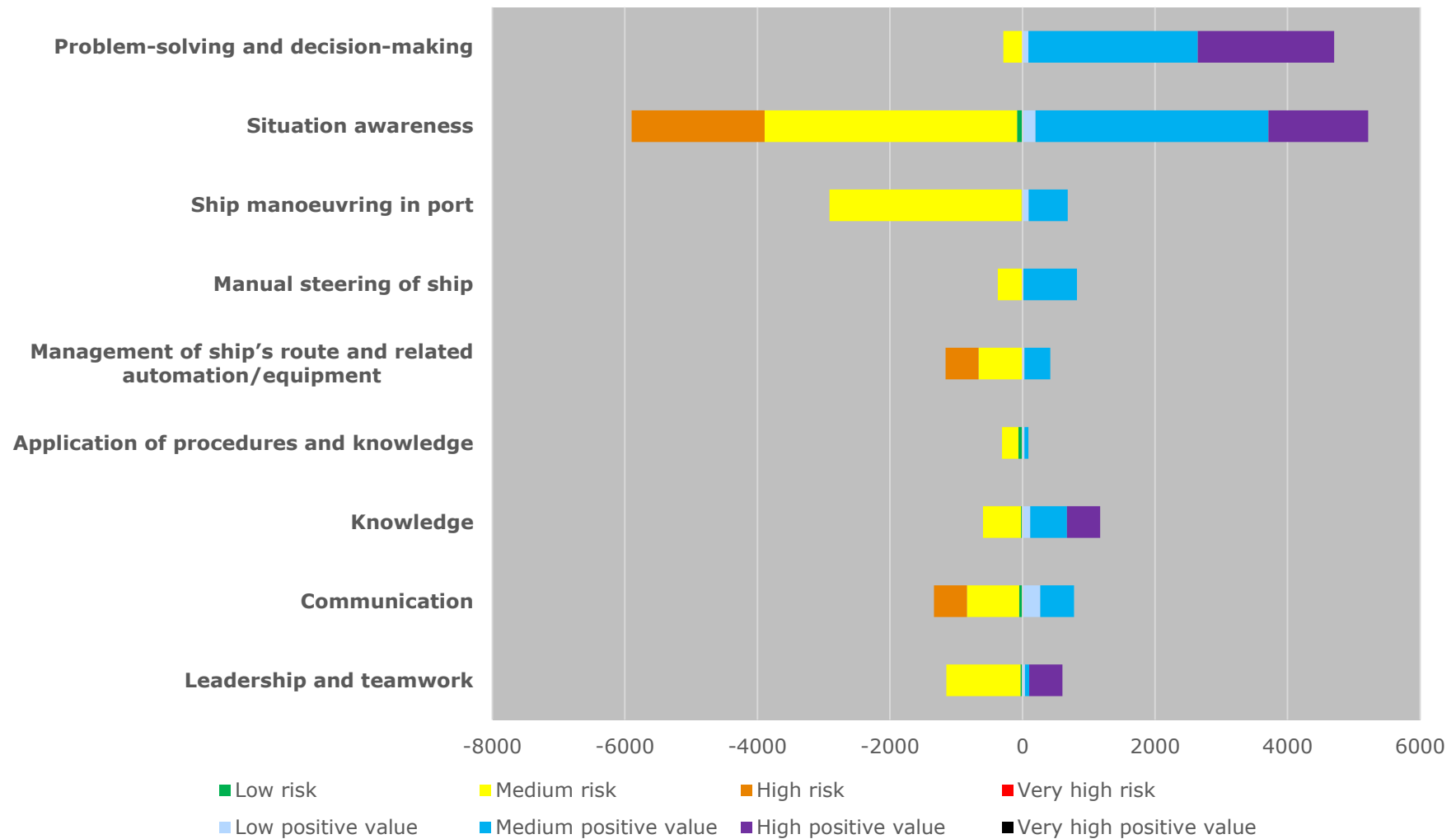
- Why Things Go Wrong or Right?



- Try to find and fix and to make sure that good things will happen again
- General view vs individual shipping company

Total nr of incidents=718
Sources: Trafi, Finnpilot, SIA and Transport Agency

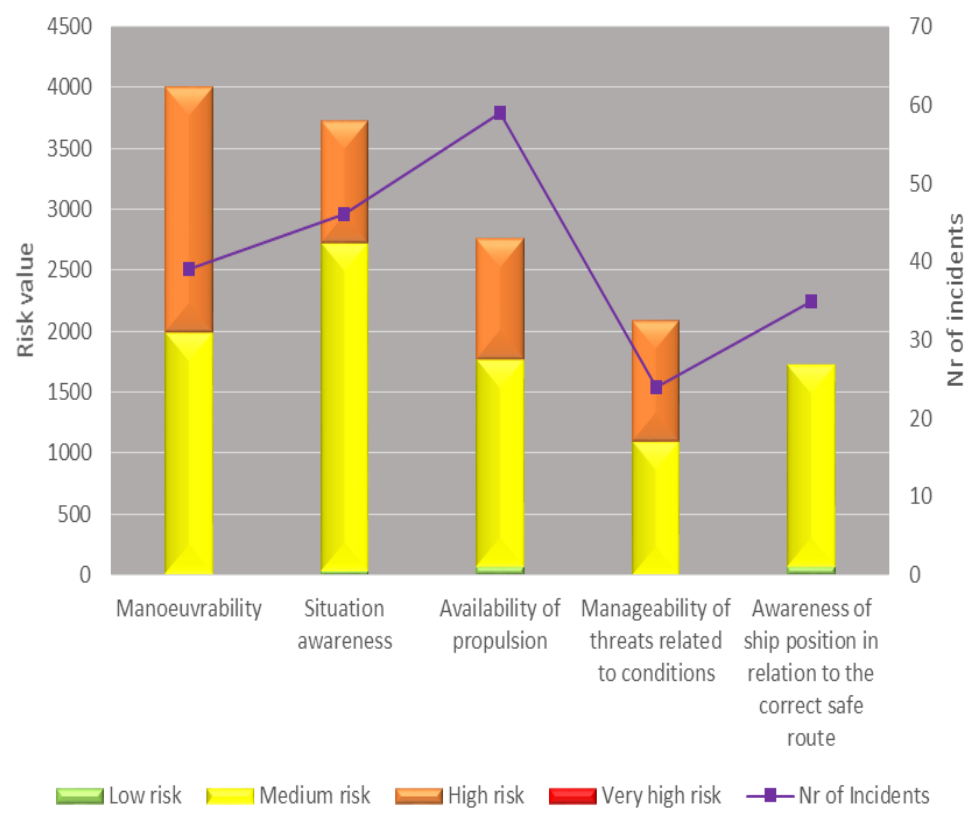
Sub Categories of Competency



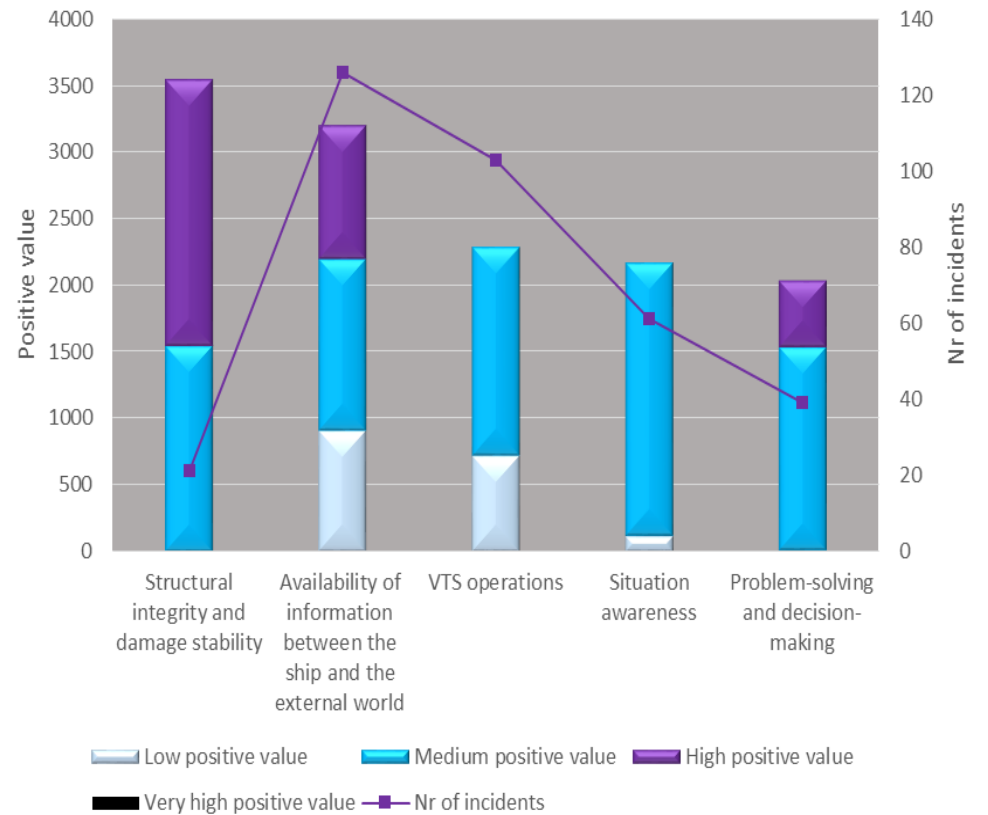
Who has the best tools and responsibility?

Safety Factors Related to Grounding of Ship

Top 5 Negative Safety Factors in Grounding



Top 5 Positive Safety Factors in Grounding



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Risk Assessment of Safety Issues



- **Co-operation**
- **Will to do things in new way**
- **More safety inputs from bottom to top**

Thank you for your attention and be safe!



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Dore: Rime of the Ancient Mariner