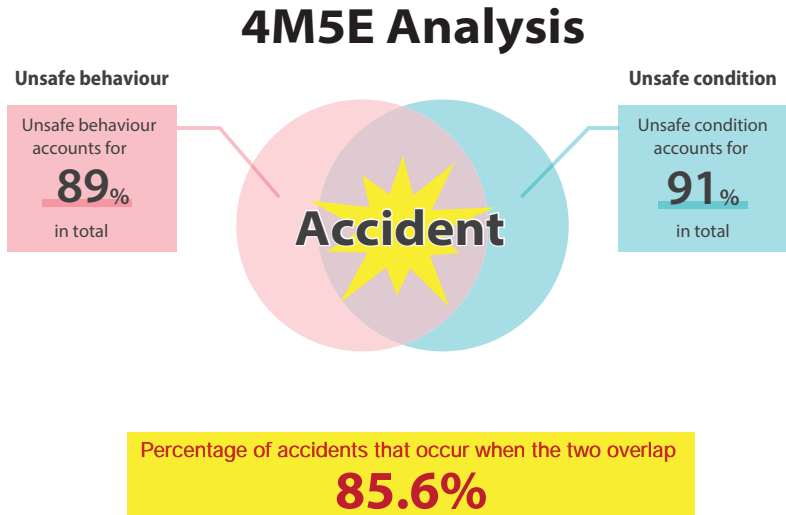


## Attachment 1

**1 Site investigation**

- Carry out investigation in as much detail as possible, ideally by a third party (such as a surveyor or marine consultant etc.)

**2 Analysis of site investigation report**

- Clarify accident cause/s (4M) using a classification table and so on.
- Organize these into a matrix to examine the facts.
- Furthermore, clarify which items need to be inspected/investigated again.

**3 Once the above have been established, compile this information into an accident cause/s matrix (unsafe behaviour and unsafe conditions).**

- Refine relevant items.
- Carry out a Why Why Analysis.

**4 Once the above 3 has been completed**

- Classify the direct cause, indirect cause and root cause of the accident referring to the 4M5E table.
- Devise a countermeasure for every 5E item.

**5 Carry out and verify countermeasure based on the above**

Brush up with PDCA cycle.

## Causes behind Maritime Accidents (4M)

1. Man	2. Machine
<ol style="list-style-type: none"> <li>1 Psychological factors</li> <li>2 Emotional factors</li> <li>3 Organizational factors</li> <li>4 Individual skill factors</li> <li>5 Management of health and working environment</li> </ol>	<ol style="list-style-type: none"> <li>1 Design flaw in the machinery</li> <li>2 Defective protection against hazards</li> <li>3 Lack of fundamental safety (design and ergonomic arrangement)</li> <li>4 Lack of consideration regarding ergonomic factors</li> <li>5 Lack of standardization</li> <li>6 Lack of machinery and facility maintenance, etc.</li> </ol>
<b>3. Media</b> (Medium connecting Man and Machine)	<b>4. Management (Control factors)</b> Vessel, Ship Owner/Ship management company
<ol style="list-style-type: none"> <li>1 Lack of information regarding work to be carried out</li> <li>2 Work preparedness. Inadequate working conditions</li> <li>3 Inappropriate work method</li> <li>4 Inadequate working space</li> <li>5 Poor working environment conditions</li> </ol>	<ol style="list-style-type: none"> <li>1 Inadequate management (organizational)</li> <li>2 Inadequate/incomplete regulations and procedure manual</li> <li>3 Inadequate safety management planning</li> <li>4 Lack of education and training</li> <li>5 Inadequate layout arrangement</li> <li>6 Inadequate supervision of his/her subordinates</li> </ol>

## Attachment 2-2

## Maritime Accidents 4M Classification List

Man	Human factors that cause errors The vessel, shipowner and ship management company	1 Psychological	2 Emotional	3 Organizational	4 Individual skills	5 Management of health and working environment
		<ul style="list-style-type: none"> <li>Impulsive action: <ul style="list-style-type: none"> <li>Human instinct: where there is a tendency to concentrate on only one thing, unable to see what is occurring peripherally, unaware of hazards (Human beings are sometimes only able to see one thing at a time)</li> </ul> </li> <li>Forgetful: <ul style="list-style-type: none"> <li>Human beings are limited in that they cannot memorize everything (Human beings sometimes forget)</li> </ul> </li> <li>Habituation behaviour: <ul style="list-style-type: none"> <li>Bad habit. Human beings have moments of inattention</li> </ul> </li> <li>Personal problems: <ul style="list-style-type: none"> <li>Relationship between strength to resist stress and stress tolerance</li> </ul> </li> <li>Unconscious acts: <ul style="list-style-type: none"> <li>Human beings are sometimes careless</li> </ul> </li> <li>Effects of the human mind that one is unable to control (Carl Gustav Jung) <ul style="list-style-type: none"> <li>Sense of urgency and sensitivity:</li> </ul> </li> <li>High ability to identify differences in sensory stimuli strength, and can identify factors that impair safety or life</li> <li>Mental shortcuts: <ul style="list-style-type: none"> <li>Human beings are sometimes in a hurry</li> </ul> </li> <li>Does not properly complete a part of the work procedure in order to finish it quickly</li> <li>Use of unsafe behaviour to make haste (cutting corners) <ul style="list-style-type: none"> <li>Cuts corners: <ul style="list-style-type: none"> <li>Breaks the rules due to extra work all of a sudden or fatigue</li> </ul> </li> </ul> </li> <li>Human beings are sometimes lazy and human beings sometimes transgress when no one is looking) <ul style="list-style-type: none"> <li>Judgement based on speculation: subjective decision and wishful observation (Human beings sometimes make assumptions)</li> </ul> </li> <li>Confirmation bias and experience of success or failure influence subjective judgement and wishful observation <ul style="list-style-type: none"> <li>Mistakes and perceptual illusions:</li> </ul> </li> <li>Visual and auditory (Human beings sometimes do not notice and occasionally make mistakes) <ul style="list-style-type: none"> <li>Habituation phenomenon: <ul style="list-style-type: none"> <li>False success experience (Human beings have moments of inattention)</li> </ul> </li> </ul> </li> <li>The ability to acquire an experience of success is not only achieved by the person experiencing something first hand, but may also be acquired through observing another's experience <ul style="list-style-type: none"> <li>Personality: <ul style="list-style-type: none"> <li>Unsafe behaviour caused by individual characteristics</li> </ul> </li> </ul> </li> <li>Human beings sometimes become emotional, etc..</li> </ul>	<ul style="list-style-type: none"> <li>Fatigue</li> <li>Lack of sleep</li> <li>Alcohol, medicine or disease</li> <li>Physical ability (sight, forearm strength, muscle strength and good reflexes)</li> <li>Ageing</li> </ul>	<ul style="list-style-type: none"> <li>Desire and will- ingness</li> <li>Leadership and teamwork</li> <li>Communication</li> <li>Commitment (responsible inter- vention)</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate knowledge <ul style="list-style-type: none"> <li>Inadequate or in- appropriate knowl- edge about the work to be carried out</li> </ul> </li> <li>Work content not understood or misunderstood</li> <li>Lack of a sense of urgency and awareness</li> <li>Mistakes regard- ing work procedure and forgetfulness</li> <li>Lacks basic knowledge of the work</li> <li>Inadequate skills <ul style="list-style-type: none"> <li>Unaccustomed to work, inexperi- enced, inadequate skills</li> </ul> </li> <li>Not enough training <ul style="list-style-type: none"> <li>The belief that the work done is satisfactory, when objectively it is in- adequate</li> </ul> </li> <li>Poor work ethic <ul style="list-style-type: none"> <li>Not "ready" to work</li> <li>Intentionally dis- honest regarding work, and breaks the rules</li> <li>Covers-up or tolerates dishonest work</li> <li>Protective wear not worn</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Health check not implemented prior to working</li> <li>Tool box meeting was not implement- ed</li> </ul>

Example (1/3)

Machine	Mechanical factors such as machinery not working properly or being out of order					
	On the vessel mainly					
	<p>1 Design flaw in the machinery</p> <p>Inadequate safety consideration regarding facility and machinery design</p> <p>Inadequate protection functions on facilities and machines</p> <p>Lacking in strength, durability and fatigue strength</p> <p>Control program defect</p> <p>Inadequate performance and functions</p> <p>Defect in construction material and work</p> <p>Carried out</p> <p>Placement of inappropriate machines</p>	<p>2 Defective protection against hazards</p> <p>No protection</p> <p>(guard, cover, safety fence, insulating mat, etc.)</p> <p>Has protection, but it is easily deactivated</p> <p>Has protection, but it is inadequate</p> <p>Protection available, but the durability of this is problematic</p> <p>Inadequate fixing (lashing), shielding or nothing at all</p> <p>Inadequate indication of dangerous areas, range and levels</p>	<p>3 Lack of fundamental safety (design and ergonomic arrangement)</p> <p>Fool Proof</p> <p>Should function in a way so as not to cause a hazard even when operated incorrectly</p> <p>Fail-safe</p> <p>Maintain safety even if it breaks down</p> <p>Fail Tolerance</p> <p>function Even during malfunction, the S/B machine has a back-up</p> <p>Redundancy</p> <p>To have many backup systems</p> <p>Safety Interlock</p>	<p>4 Lack of consideration regarding ergonomic factors</p> <p>Affordance</p> <p>Intuitive structure or layout</p> <p>Usability</p> <p>Operability and a layout which is easy to access, yet difficult for errors to be made</p> <p>Universal design</p> <p>Designed so that anyone can use it</p>	<p>5 Lack of standardization</p> <p>Facilities violating laws and regulations, ISO/JIS or standards on board (company-specific)</p> <p>Inadequate safety measures such as equipment failure (e.g. power cut, residual pressure treatment, etc.)</p> <p>Danger warning on usage not relayed to the operator</p>	<p>6 Lack of machinery and facility maintenance, etc.</p> <p>Failure or breakdown of equipment, machinery sensors etc.</p> <p>Unrepaired breakdown or operation during fixing</p> <p>Inadequate machinery and facility maintenance</p> <p>Deterioration of machinery, equipment etc.</p> <p>Periodic maintenance has not been carried out</p> <p>Lack of spare parts and supplies</p> <p>Re-using of used spare parts which cannot be re-used</p>
Media	Media connecting Man with Machinery					
	The vessel, shipowner and ship management company					
	<p>1 Lack of information regarding work to be carried out</p> <p>Inadequate or no work method, work procedure or work standard</p> <p>Inadequate or no Safety Management Code or SMS Manual</p> <p>Lacking or no information or instructions regarding necessary work</p> <p>Information regarding work (safety) is not understood</p> <p>Did not see information about work</p> <p>No or difficult to see displays and signs</p> <p>No signal or warning, or not audible enough</p> <p>Vague and confusing working assignment</p> <p>or personnel allocation</p> <p>Lack of information regarding work to be carried out</p> <p>There is no safety standard on board (company-specific)</p> <p>There is no operating manual or literature on safety precautions</p> <p>Mistakes regarding the work procedure</p>	<p>2 Inadequate work preparedness and working conditions</p> <p>Unsuitable working posture</p> <p>(too narrow, high, low etc.)</p> <p>Working in the same position for an extended length of time</p> <p>Monotonous work</p> <p>"Unreasonableness," "waste" and "inconsistency" during work are to be eliminated</p> <p>Inappropriate use of machinery and equipment</p> <p>Inappropriate use of tools and equipment</p> <p>Technical and physical hardship</p>	<p>3 Inappropriate work method</p> <p>Vital points of work not specified or not clear</p> <p>Floor condition (obstacles, bumps, uneven, slopes etc.)</p> <p>Inappropriate placement, stacking or propping up of objects</p> <p>Inadequate layout arrangement of machinery, equipment, containers, fixtures etc.)</p> <p>Used beyond specification (use) limits</p> <p>Inappropriate working environment management</p>	<p>4 Inadequate working space</p> <p>Work space is too narrow Keeping the work space neat and tidy while work is being conducted</p> <p>Dedicated or maintenance space not clearly specified</p> <p>Machinery or arrangement of which may easily cause an error or an accident</p> <p>Working in dangerous proximity (between people or between man and machinery)</p> <p>Safety aisles, areas and passages for maintenance not secured</p> <p>Acquisition of Work Permit and confirmation of Media (working environment)</p>	<p>5 Poor working environment conditions</p> <p>Uncomfortable temperature or humidity</p> <p>Inappropriate lighting</p> <p>(too dark, bright, or too changeable)</p> <p>Working in bad weather</p> <p>Noise and severe vibrations</p> <p>Not neat and tidy (4S: sort, set in order, shine and kept spotless)</p> <p>Inappropriate arrangement of local ventilation and ventilating equipment</p> <p>Inappropriate management of working environment (Media)</p> <p>Powdery dust and harmful rays (e.g. during welding operations)</p>	

Example (2/3)

Management							
Management factors and organization	On the vessel	<p>1 Inadequate management (organizational)</p> <p>Inadequate itemized legal implementation (person responsible, visibly recognizable, inspection, etc.)</p> <p>Repeating the same or similar accidents</p> <p>Risk assessment is not carried out</p> <p>"Hiyari-Hatto" (near miss) scenarios not carried out</p> <p>Violations and oversight of the rules on a daily basis</p> <p>Inadequate communication and sharing of information between supervisors and work colleagues, among the vessel, shipowner and ship management company or between shipowner and ship management company</p>	<p>2 Inadequate/incomplete regulations and procedure manual</p> <p>Inadequate or inappropriate contents in Safety Management Code or SMS Manual. Or, is there a point of contact to report inadequate adherence to the Safety Management Code or SMS Manual or non-compliance which may not be widely known among the crew?</p> <p>Inadequate education and creation of work method and procedure manual</p> <p>Inadequate education and review of work method and procedure manual</p> <p>Inadequate or no irregular work procedure manual</p>	<p>3 Inadequate safety management planning</p> <p>Work schedule is vague</p> <p>Deviation between PMS (Planned Maintenance System) and implementation</p> <p>Inadequate safety measures and risk assessment while working</p> <p>Unexpected work or work which was not planned in the schedule</p> <p>Unsuitable work that relies on excessive concentration and an individual's memory</p> <p>Inappropriate or inadequate work time table and personnel assignment</p> <p>Prolonged work</p> <p>Inadequate communication or meeting prior to work (including between/among departments)</p>	<p>4 Lack of education and training</p> <p>Inadequate planning of education and training on board (pre-boarding, annually, every few years, etc.)</p> <p>Inadequate guidance and education (including OJT) for workers</p> <p>Inadequate safety training for supervisors and managers</p> <p>Daily safety guidance (e.g. provision for on-site inquiries, etc.) is not carried out</p>	<p>5 Inadequate layout arrangement</p> <p>Absence of on-site managers such as leaders and supervisors</p> <p>Inadequate consideration of qualifications (knowledge), experience (skills) and physical capacity (good health)</p> <p>Inadequate consideration of work specifications and characteristics, and attitudes and behaviours of individuals</p> <p>Lack of consideration and measures for aged or young crew</p>	<p>6 Inadequate supervision of his/her subordinates</p> <p>Inappropriate work instructions (5W1H)</p> <p>Lack or shortage of Ho-Ren-So (reporting, contacting, and consultation) on board and between vessel and company</p> <p>Inadequate communication between leaders and subordinates</p> <p>Information about hazards is not shared</p> <p>Inadequate take over regarding personnel assignment</p>
		<p>1 Inadequate management (organizational)</p> <p>Inadequate safety management due to budget cutting and cost-cuts (Inadequate safety management due to personnel assignment and deterioration of machinery)</p> <p>Excessive quota for crew and unreasonable operations</p> <p>Inadequate itemized legal implementation (person responsible, visibly recognizable, inspection, etc.)</p> <p>Repeating the same or similar accidents</p> <p>Risk assessment is not carried out</p> <p>"Hiyari-Hatto" (near miss) scenarios not carried out</p> <p>Violations and oversight of the rules on a daily basis</p> <p>Inadequate periodical vessel inspections</p> <p>Vague roles, responsibilities and competence regarding health and safety duty</p> <p>Inadequate communication and sharing of information between supervisors and work colleagues, among the vessel, shipowner and ship management company or between shipowner and ship management company.</p>	<p>2 Inadequate/incomplete regulations and procedure manual</p> <p>Inadequate or inappropriate contents in Safety Management Code or SMS Manual</p> <p>Inadequate understanding of work method without proper procedure manual and education</p> <p>Inadequate education and review of work method manual</p> <p>Inadequate or no irregular work procedure manual</p>	<p>3 Inadequate safety management planning</p> <p>Work plan or schedule is vague</p> <p>Deviation between PMS (Planned Maintenance System) and implementation</p> <p>Inadequate safety measures and risk assessment while working</p> <p>Inadequate management for unexpected work or work which was not planned in the schedule</p> <p>Unsuitable management of work that relies on excessive concentration and an individual's memory</p> <p>Inappropriate or inadequate work time table and personnel assignment management at the office on land</p> <p>Inadequate communication or meeting prior to work (including between/among departments)</p>	<p>4 Lack of education and training</p> <p>Inadequate planning of education and training from company departments (pre-boarding, annually, every few years, etc.)</p> <p>Inadequate guidance and education for workers</p> <p>Inadequate safety training for supervisors and managers</p> <p>Daily safety guidance (e.g. provision for on-site inquiries during vessel visits, etc.) is not carried out</p>	<p>5 Inadequate layout arrangement</p> <p>Inadequate of on-site managers such as leaders and supervisors</p> <p>Inadequate consideration of qualifications (knowledge), experience (skills) and physical capacity (good health)</p> <p>Inadequate consideration of work specifications and characteristics, and attitudes and behaviours of individuals</p> <p>Lack of consideration and measures for aged or young crew</p>	<p>Inadequate supervision of crew</p> <p>Inappropriate work instructions (5W1H)</p> <p>Lack or shortage of Ho-Ren-So (reporting, contacting, and consultation) on board and between vessel and</p> <p>Information about hazards is not shared</p> <p>Inadequate explanation for crew prior to boarding</p>

Example (3/3)

# Example

Accident cause assessment: Prioritized according to the scale of the cause

Attachment 4

Maritime Accident Accident Causes (Unsafe Behaviour)

Cause (Unsafe behaviour)		Man																					
		Human factor (The vessel, shipowner and ship management company )																					
		1 Psychological								2 Emotional				3 Organizational									
		Impulsive action	Forgetful	Habituation behaviour	Personal problems	Unconscious acts	Sense of urgency and sensitivity	Mental shortcuts	Cuts corners	Judgement based on speculation	Mistakes and perceptual illusion	Habituation phenomenon	Personality	Fatigue	Lack of sleep	Alcohol, medicine or disease	Physical ability	Ageing	Desire and willingness	Leadership and teamwork	Communication	Commitment (responsible intervention)	
1	Why did the 2/O not notice the image captured on ARPA?			○					○			○											
	Why did he think he could pass starboard to starboard?									○													
	Why did he think that the bearing of the other vessel was changing?								○		○												
	Why did he not continue checking?								○			○											
2	Why was low visibility not reported to the Master												○	○									○
	Why did he not comply with the Safety Management Code?		○			○					○	○											
5	Why did the superintendent request that the vessel navigate with only one radar?	○					○	○				○											
	Why was the radar not repaired before port departure?						○	○		○		○											
6	Why did the Master approve navigation with only one radar?	○				○	○					○											
	Why did he not request that the radar be repaired prior to port departure?								○	○		○											
XX																							
XX																							

Why Why Analysis to be conducted according to each item that was extracted from the Summary of Related Facts

Summary of Related Facts No.

Example (1/3)

Cause (Unsafe behaviour)	Man										Machine				
											Mechanical factors such as machinery not working properly or being out of order				
	4 Individual skills								5 Management of health and working environment		Mainly on the vessel				
	4-1 Inadequate knowledge			4-2 Inadequate skills			4-3 Poor work ethic								
	Inadequate knowledge about the work	Work content not understood or misunderstood	Lack of a sense of urgency and awareness	Mistakes regarding work procedure/forgetfulness	Lacks basic knowledge of the work	Unaccustomed to work, inexperienced, inadequate skills	Not enough training	The belief that the work done is satisfactory, when objectively it is inadequate	Not "ready" to work	Intentionally dishonest regarding work, and breaks the rules	Cover up or tolerates dishonest work	Protective wear not worn	Health check not implemented prior to working	Tool box meeting was not implemented	Lack of machinery and facility maintenance, etc.
1	Why did the 2/O not notice the image captured on ARPA?														
	Why did he think he could pass starboard to starboard?														
	Why did he think that the bearing of the other vessel was changing?														
	Why did he not continue checking?														
2	Why was low visibility not reported to the Master														
	Why did he not comply with the Safety Management Code?														
5	Why did the superintendent request that the vessel navigate with only one radar?														
	Why was the radar not repaired before port departure?														
6	Why did the Master approve navigation with only one radar?														
	Why did he not request that the radar be repaired prior to port departure?														
XX															
XX															

Example (2/3)



Cause (Unsafe behaviour)		Media	Management										Necessity of re-investigation	
		Media connecting Man with Machinery	Management factors and organization											
		The vessel, shipowner and ship management company	On the vessel					Shipowner and Ship management company						
In , write down a direct cause which was investigated based on the facts After , write down the root cause using the Why Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4 M Classification List.														
1	Why did the 2/O not notice the image captured on ARPA?													
	Why did he think he could pass starboard to starboard?													
	Why did he think that the bearing of the other vessel was changing?													
	Why did he not continue checking?													
2	Why was low visibility not reported to the Master													
	Why did he not comply with the Safety Management Code?													
5	Why did the superintendent request that the vessel navigate with only one radar?													
	Why was the radar not repaired before port departure?													
6	Why did the Master approve navigation with only one radar?													
	Why did he not request that the radar be repaired prior to port departure?													
XX														
XX														

The number in the circle applies to the number in Attachment 2-2 (Maritime Accidents 4M Classification List) e.g.: Vessel 2 Inadequate/incomplete regulations and procedure manual Inadequate or inappropriate contents in ISM Code or SMS Manual

Example (3/3)

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Cause (Unsafe behaviour)												Machine																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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		4-1 Inadequate knowledge		4-2 Inadequate skills		4-3 Poor work ethic																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
In _____, write down a direct cause which was investigated based on the facts. After _____, write down the root cause using the Why Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4M Classification List.		Inadequate or inappropriate knowledge about the work to be carried out.		Unaccustomed to work, inexperienced, inadequate skills		Not enough training			Protective wear not worn					Tool box meeting was not implemented					Lack of standardization					Lack of machinery and facility maintenance, etc.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		Work content not understood or misunderstood		Lacks basic knowledge of the work		The belief that the work done is satisfactory when objectively it is inadequate			Covers up or tolerates dishonest work					Health check not implemented prior to working					Lack of consideration regarding ergonomic factors					Lack of fundamental safety (design and ergonomic arrangement)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		Lack of a sense of urgency and awareness		Makes mistakes regarding work procedure/forgetfulness		Intentionally dishonest regarding work, and breaks the rules			Defective protection against hazards					Design flaw in the machinery					Lack of fundamental safety (design and ergonomic arrangement)					Defective protection against hazards																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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## Attachment 6

Maritime Accident Analysis using 4M5E and Countermeasure List  
(Unsafe behaviour)

	Man	Machine	Media	Management	
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	On the vessel	Shipowner and ship management company
<b>Risk factors</b> ( Direct cause and indirect/root cause )	The vessel, shipowner and ship management company  1. Why the did 2/O not notice the image captured on ARPA? (1- , , , and 4-1- ) 2. Why was low visibility not reported to the Master? (1- , , , 2- and 3- ) 6. Why was navigation approved using only one radar? (1- , , , , 4 - 1- , , , 4-2- and 4-3- ) Shipowner and ship management company 5. Why was it requested that the vessel navigate with only one radar?	2. Why was No. 1 radar left out of order? (Re-examination necessary)		1. Why was low visibility not reported to the Master? (2- and 6- ) 4. Why was navigation approved using only one radar? (1- , 2- , 3- and -3)	1. Why was low visibility not reported to the Master? (2- and 6- ) 3. Why was it requested that the vessel navigate with only one radar?
<b>Education</b> Education and training Knowledge, skills, consciousness, being given information, etc.	<ul style="list-style-type: none"> <li>• Training in behaviour psychology Learn to notice things</li> <li>• Education to reinforce habitually that optical illusions/errors and assumptions can cause a risky behaviour</li> </ul>			<ul style="list-style-type: none"> <li>• Thorough compliance with work procedure</li> </ul>	<ul style="list-style-type: none"> <li>• Thorough compliance with work procedure</li> </ul>
<b>Engineering</b> Technology and engineering Engineering counter-measure		<ul style="list-style-type: none"> <li>• Pursue the cause behind the failure and formulate measures ( Re-examination necessary)</li> </ul>			
<b>Enforcement</b> Thorough guidance and enforcement Standardization, proceduralization, alerting, reward and punishment KYT, campaigns etc.				<ul style="list-style-type: none"> <li>• Thoroughly clarify procedures for low visibility in the procedure manual</li> <li>• Create a procedure manual that states that a vessel is not to leave port while an important nautical auxiliary instrument is out of order</li> </ul>	<ul style="list-style-type: none"> <li>• Thoroughly clarify procedures for low visibility in the procedure manual</li> <li>• An important nautical auxiliary instrument was also out of order</li> </ul>
<b>Examples</b> Case studies, counter-measures and rules Lead by example, experience of success, introduce model cases, "Hiyari-Hatto" (near misses), etc.	<ul style="list-style-type: none"> <li>• Gain a sense of experience using navigation simulations, for example</li> </ul>				<ul style="list-style-type: none"> <li>• Implementation of navigational simulation training</li> </ul>
<b>Environment</b> Working environment, office internal management, on-board organization, etc.				<ul style="list-style-type: none"> <li>• Formulate a procedure for internal company reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Formulate a procedure for internal company reporting</li> </ul>

## Attachment 7

## Maritime Accident Analysis using 4M5E and Countermeasure List (Unsafe condition)

	Man	Machine	Media	Management	
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	On the vessel	Shipowner and ship management company
Risk factors ( Direct cause and indirect/root cause )		2. Why was No. 1 radar left out of order?		2. Why was there no time to place a repair order while in port?	2. Why was there no time to place a repair order while in port?
<b>Education</b> Education and training Knowledge, skills, consciousness, being given information, etc..				• Lack of risk awareness regarding the danger of navigating with a radar left out of order Education about important nautical instruments	• Lack of risk awareness regarding the danger of navigating with a radar left out of order Education about important nautical instruments
<b>Engineering</b> Technology and engineering Engineering counter-measure		• Pursue the cause behind the failure and formulate measures ( Re-examination necessary)			
<b>Enforcement</b> Thorough guidance and enforcement Standardization, proceduralization, alerting, reward and punishment KYT, Campagnes etc..				• Review Safety Management Code (handling important equipment)	•
<b>Examples</b> Case studies, counter-measures and rules Lead by example, experience of success, introduce model cases, "Hiyari-Hatto" (near misses), etc.					
<b>Environment</b> Working environment, office internal management, on-board organization, etc.					

Each item number (bold and red coloured) corresponds to the Summary of Related Facts No. in the Attachment 3  
The number in the circle applies to the number in Attachment 2-2 (Maritime Accidents 4 M Classification List)

## Attachment 8

## Movements of Vessel A and Vessel B

Time	AIS Position of Vessel A		AIS Position of Vessel B		Vessel B's bearing, distance, CPA and TCPA as observed from Vessel A				
	North latitude	East longitude	North latitude	East longitude	Bearing	Distance	CPA	TCPA	
06:45:00	34° 34 min. 03.5 sec.	135° 15 min. 34.3 sec.	34° 37 min. 56.5 sec.	135° 22 min. 44.50 sec.	<056.6>	7.08	Nautical miles	-	-
Ship's course <040> reducing speed at 15.1 kts Pilot A Visually confirmed Vessel B		Ship's course <235> at a speed of 14.1 kts							
06:50:00	34°35min. 02.2 sec.135°16min. 33.4 sec.		34°37min. 14.9 sec.	135°21min. 33.80 sec.	<061.7>	4.69	Nautical miles	-	-
	Ship's course <040> reducing speed at 14.9 kts		Ship's course <235> at a speed of 14.2 kts Visually confirmed Vessel A						
06:53:00	34°35min. 35.6 sec.	135°17min. 06.8 sec.	34°36min. 55.4 sec.	135°20min. 8.90 sec.	<068.0>	3.35	Nautical miles	1.07 Nautical miles	6.64 mins.
	Ship's course <041> reducing speed at 14.8 kts		Ship's course <253> at a speed of 14.0 kts						
	Master A Visually confirmed Vessel B		Started steering to starboard side while heading for Kobe Central Fairway						
06:55:00	34°35min. 58.4 sec.	135°17min. 29.8 sec.	34°36min. 53.5 sec.	135°20min. 21.00 sec.	<069.1>	2.53	Nautical miles	0.22 Nautical miles	6.51 mins.
	Ship's course <041> reducing speed at 14.6 kts		Ship's course <293> at a speed of 13.8 kts						
	Pilot A Instructed vessel to steer to port side in order to head for Kobe Rokko Island East Waterway								
06:57:00	34°36min. 20.6 sec.	135°17min. 51.5 sec.	34°37min. 02.5 sec.	135°19min. 49.60 sec.	<068.1>	2.13	Nautical miles	0.22 Nautical miles	5.69 mins.
	Ship's course <032> reducing speed at 13.8 kts		Ship's course <294> at a speed of 13.8 kts						
	Pilot A Started steering to port side while heading for Kobe Rokko Island East Waterway								
07:00:45			Instructed vessel to starboard at an angle of 10°as he felt there was a danger of collision		-	-		-	-
07:01:00	34°37min. 08.5 sec.	135°18min. 17.5 sec.	34°37min. 24.6 sec.	135°18min. 47.80 sec.	<056.8>	0.49	Nautical miles	0.08 Nautical miles	1.81 mins.
	Ship's course <006> reducing speed at 12.3 kts		Ship's course <297> at a speed of 13.8 kts						
	Pilot A Half Ah'd Instructed Hard Port								
07:02:10			Called Vessel A twice via VHF Instructed Nav. Full		-	-		-	-
07:02:49	34°37min. 29.9 sec.	135°18min. 21.0 sec.	34°37min. 29.9 sec.	135°18min. 21.00 sec.	Collisions			0.00 Nautical miles	0.00 mins.





## Attachment 9

## Table of Events Leading up to the Accident

Time (hrs : mins)	Vessel B's bearing and distance as observed from Vessel A		Vessel A		Vessel B	
	Bearing	Distance	Pilot A	Master A, C/O A, 3/O A and Cadet A	Master B	Navigation Officer B
05 : 00 Approx.			Boarded south of Tomogashima Channel. Started discussing pilotage plan with Master A. Instructed Nav. Full up to 18.0 kts.	Master A Received pilotage plan instructions from Pilot A.		
			Bridge: Master A, Pilot A, C/O A, Cadet A and AB A		Bridge: Master B, Navigation Officer B and AB B	
06 : 10 Approx.			From past experience as a pilot, <b>he assumed</b> the crew of Vessel <b>to be trustworthy</b> . <b>Assumed that</b> Master A had a shared understanding of the navigation plan.		Departed Osaka bound for Kobe RC-4 (Kobe Rokko Island)	
06 : 31 Approx.						Informed port radio via VHF of the approximate time he would be passing through the breakwater to RC-4. Obtained information (e.g. vessel anchorage) from Vessel B.
06 : 35 Approx.			Instructed to gradually reduce the speed to S/B Full in the port			
06 : 44 ~ 45 Approx.	<057>	7.08 nautical miles	Informed port radio via VHF of the approximate time he would be passing through the breakwater to RC-7. Obtained information from Vessel B. <b>Did not report it to Master A.</b>			
			Visually confirmed Vessel B			
06 : 50 Approx.	<062>	4.69 nautical miles			Confirmed the Vessel A (at bow and distance approximately at 4.0 nautical miles) and <b>started look-out of the movement via radar and visually.</b>	

Time ( hrs : mins )	Vessel B's bearing and distance as observed from Vessel A		Vessel A		Vessel B	
	Bearing	Distance	Pilot A	Master A, C/O A, 3/O A and Cadet A	Master B	Navigation Officer B
06 : 52 Approx.			<div>3/O A ascended and manned the bridge to take over from C/O A</div> <div>3/O A ascended and manned the bridge to take over from C/O A</div>		Steered to starboard heading for Kobe Central Fairway.	
06 : 53 Approx.	<067>	3.49 nautical miles		<div>Master A visually confirmed Vessel B at approximately 25.0 degrees on its starboard bow. Because Master A did not hear from the Pilot that Vessel B would head for Kobe Central Fairway, he assumed that there would be no risk of collision judging by the his vessel's relative position with the other ship and that it would be heading in a southwest direction (Outgoing Osaka Bay) . Started discussing port entry work with the C/O. A</div>	While steering to starboard, instructed a course of <290>	
06 : 54 Approx.					Instructed a course of <293>. Recognized crossing point with Vessel A	
06 : 55 Approx.	<069>	2.53 nautical miles	<div>Assumed crew of Vessel A were paying attention to the movement of Vessel B, because Master A and C/O A were watching the ECDIS. He also confirmed Vessel B visually by pointing.</div> <div>After that, he did not notice when Master A and C/O A were discussing port entry work at the sea chart table.</div> <div>Instructed vessel to steer to port side in order to head for Kobe Rokko Island East Waterway.</div>		<div>Concerned about decreasing CPA, but assumed that the vessel could pass the bow, according to the vector indicated on ARPA.</div> <div>Assumed that the vessel would reach port quicker if speed was increased to Nav. Full.</div>	

Time ( hrs : mins )	Vessel B's bearing and distance as observed from Vessel A		Vessel A		Vessel B	
	Bearing	Distance	Pilot A	Master A, C/O A, 3/O A and Cadet A	Master B	Navigation Officer B
06 : 57 Approx.	<067>	1.77 nautical miles	Because Vessel A was in the middle of reducing speed in relation to Vessel B, it was assumed that Vessel B could pass the bow, and Vessel A continued to steer to port side along with reducing speed.  Did not notice Cadet A reporting.	Cadet A Reported to Pilot A and 3/O A, because he was worried about a risk of collision with Vessel B  Master A, 1/O A and 3/O A Did not pay attention to Cadet A reporting.		
07 : 00 Approx.					Visually confirmed that Vessel A started steering to port side, felt there was a risk of collision, and instructed Nav. Full and hard to starboard 10°.	
07 : 01 Approx.	<057>	0.49 nautical miles	Sailing close to East Fairway, instructed to the main engine Half Ahead.  Visually confirmed their position in relation to Vessel B. Ordered hard to starboard, because he felt there was a risk of collision with Vessel B.	Master A Heard Pilot A's instructions hard to port, but when looking in the direction of the bow, felt there was a danger of collision.		
07 : 02 Approx.	Dangerously close			Master A Instructed 3/O A D.Slow Ahead.  3/O A According to the Master's order, operated engine telegraph for D.Slow Ahead  Did not respond to Vessel B's VHF call  Master A Operated engine telegraph for full speed sternway by himself	Blew a whistle  Blew a whistle	Called Vessel A by VHF.  Called Vessel A by VHF.
07 : 02 : 49 Approx.	Collision					

Reference No.	Identified problems from survey findings				Direct cause		Accident cause evaluation	Re-examination necessity
					Unsafe behaviour	Unsafe conditions		
	Date	Time	Caused by	Check facts and problem areas				
1	XX May	05 : 00 Approx.	Pilot A	Felt that the crew of Vessel A had received thorough training in BRM and assumed them to be trustworthy. Also, assumed that Master A had a shared understanding of the navigation plan.	○		4	
2	XX May	06 : 44 Approx.	Pilot A	Visually confirmed Vessel B, but did not inform the Master of port radio information (Vessel B bound for RC-7).	○		3	
3	XX May	06 : 53 Approx.	Master A	Assumed that Vessel B would keep its distance when passing the starboard side of Vessel A.	○		5	
4	XX May	06 : 53 Approx.	Master A	Did not mention the movement of Vessel B to Pilot A. Also, as Pilot did not talk to him about Vessel B, he started discussing port entry work near the sea chart table with 1/O A.	○		6	
5	XX May	06 : 55 Approx.	Pilot A	Although he felt that there was no change of bearing between Vessel A and Vessel B, he assumed crew of Vessel A were paying attention to the movement of Vessel B, because Master A and 3/O A were watching the radar and ECDIS. Pilot A himself confirmed Vessel B visually by pointing.	○		1	
6	XX May	06 : 57 Approx.	Pilot A	Assumed that Vessel B would pass their bow, and continued to steer to port side.	○		2	
7	XX May	06 : 57 Approx.	Pilot A	Did not notice the Cadet reporting.	○		7	
8	XX May	06 : 57 Approx.	Master A and 3/O A	Did not notice the Cadet reporting earlier.	○		8	
9	XX May	07 : 02 Approx.	Pilot A, Master A and 3/O A	Did not respond to Vessel B's VHF call.	○		9	
10	XX May	06 : 57 Approx.	Master B	Was concerned about decreasing DCPA, but assumed that vessel B could pass the bow Vessel A, according to the predicted course Vessel A on the radar.	○		10	
11	XX May	06 : 57 Approx.	Master B	Assumed that the vessel would reach port quicker if speed was increased to Nav. Full.	○		11	
12			Master B and ship management company B	Did not instruct navigation officer to report and lookout thoroughly. ( BRM is was not implemented )	○		12	○
13			Pilots Associations	Were the pilots obliged to take BRM training periodically?	○		13	
14			Master A	Non-compliance with Safety Management Code	○		14	○
15			Ship management company A	Non-compliance with Safety Management Code	○		15	○

Accident cause assessment: Prioritized according to the scale of the cause

Attachment 11

Vessel A and B Collision Accident Maritime Accident Cause (Unsafe Behaviour): Pilot A

Cause (Unsafe behaviour)		Man																				
		Human factor (The vessel, shipowner and ship management company )																				
		1 Psychological									2 Emotional					3 Organizational						
In , write down a direct cause which was investigated based on the facts. After , write down the root cause using the Why Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4M Classification List.		Impulsive action	Forgetful	Habituation behaviour	Personal problems	Unconscious acts	Sense of urgency and sensitivity	Spatial shortcuts	Cuts corners	Judgement based on speculation	Mistakes and perceptual illusion	Habituation phenomenon	Personality	Fatigue	Lack of sleep	Alcohol, medicine or disease	Physical ability	Ageing	Unsafe and willingness	Communication intervention	Leadership and teamwork	
Pilot A																						
1	1. Why was it assumed that the crew of vessel A had been thoroughly trained in BRM and that Master A had a shared understanding of the Passage Plan?																					
	Was there not enough time to confirm?																					
	Was it because the vessel belonged to his affiliated shipping company?																					
2	2. Why was information on Vessel B not reported to Master A?																					
	Assumed that the Master understood because he also checked Vessel B.																					
5	5. Why did he think the crew were paying attention to Vessel B?																					
	Why did he assume confirmation was not needed because the crew were monitoring the ECDIS?																					
6	6. Why did he assume that Vessel B would pass their bow, and continued to steer to port side?																					
	Why did he not check the change of relative bearing or DCPA?																					
7	7. Why did he not notice Cadet A reporting?																					
	Why did he not pay attention to Cadet A as well?																					
	Why did he believe that Cadet A's skills were insufficient?																					
9	9. Why did he not respond to Vessel B's VHF call?																					
Total number of circled items		4		4		2		3	7	10	2	3								4	6	2

Summary of Related Facts No.

Cause (Unsafe behaviour)		Man														Machine					
																Mechanical factors such as machinery not working properly or being out of order					
																4 Individual skills					
4-1 Inadequate knowledge		4-2 Inadequate skills		4-3 Poor work ethic																	
In _____, write down a direct cause which was investigated based on the facts. After _____, write down the root cause using the Why Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4M Classification List.		Inadequate or inappropriate knowledge about the work to be carried out	Work content not understood or misunderstood	Lack of a sense of urgency and awareness	Mistakes regarding work procedure/forgetfulness	Lacks basic knowledge of the work	Unaccustomed to work, inexperienced, inadequate skills	Not enough training	The belief that the work done is satisfactory when objectively it is inadequate	Not 'ready' to work	Covers up or tolerates dishonest work	Intentionally dishonest regarding work, and breaks the rules	Protective wear not worn	Health check not implemented prior to working	Tool box meeting was not implemented	Design flaw in the machinery	Defective protection against hazards	Lack of fundamental safety (design and ergonomic arrangement)	Lack of consideration regarding ergonomic factors	Lack of standardization	Lack of machinery and facility maintenance, etc.
Pilot A																					
1	1. Why was it assumed that the crew of vessel A had been thoroughly trained in BRM and that Master A had a shared understanding of the Passage Plan?																				
	Was there not enough time to confirm?																				
	Was it because the vessel belonged to his affiliated shipping company?																				
2	2. Why was information on Vessel B not reported to Master A?																				
	Assumed that the Master understood because he also checked Vessel B.																				
5	5. Why did he think the crew were paying attention to Vessel B?																				
	Why did he assume confirmation was not needed because the crew were monitoring the ECDIS?																				
6	6. Why did he assume that Vessel B would pass their bow, and continued to steer to port side?																				
	Why did he not check the change of relative bearing or DCPA?																				
7	7. Why did he not notice Cadet A reporting?																				
	Why did he not pay attention to Cadet A as well?																				
	Why did he believe that Cadet A's skills were insufficient?																				
9	9. Why did he not respond to Vessel B's VHF call?																				
Total number of circled items																					

Example (2/3)

Cause (Unsafe behaviour)		Media		Management										Necessity of re-investigation				
		Media connecting Man with Machinery		Management factors and organization														
		The vessel, shipowner and ship management company		On the vessel					Shipowner and Ship management company									
In , write down a direct cause which was investigated based on the facts. After , write down the root cause using the Why Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4M Classification List.		Lack of information regarding work to be carried out	Work preparedness/inadequate working conditions	Inappropriate work method	Inadequate work space	Poor working environment conditions	Inadequate management/organization	Inadequate/incomplete regulations and procedure manual	Inadequate safety management planning	Lack of education and training	Inadequate layout arrangement	Inadequate supervision of his/her subordinates	Inadequate management/organization	Inadequate/incomplete regulations and procedure manual	Inadequate safety management planning	Lack of education and training	Inadequate layout arrangement	Inadequate supervision of his/her subordinates
Pilot A																		
1	1. Why was it assumed that the crew of vessel A had been thoroughly trained in BRM and that Master A had a shared understanding of the Passage Plan?																	
	Was there not enough time to confirm?																	
	Was it because the vessel belonged to his affiliated shipping company?																	
2	2. Why was information on Vessel B not reported to Master A?																	
	Assumed that the Master understood because he also checked Vessel B.																	
5	5. Why did he think the crew were paying attention to Vessel B?																	
	Why did he assume confirmation was not needed because the crew were monitoring the ECDIS?																	
6	6. Why did he assume that Vessel B would pass their bow, and continued to steer to port side?																	
	Why did he not check the change of relative bearing or DCPA?																	
7	7. Why did he not notice Cadet A reporting?																	
	Why did he not pay attention to Cadet A as well?																	
	Why did he believe that Cadet A's skills were insufficient?																	
9	9. Why did he not respond to Vessel B's VHF call?																	
Total number of circled items							1						1					

Example (3/3)

The number in the circle applies to the number in Attachment 2-2 (Maritime Accidents 4M Classification List)

## Attachment 12

### Vessel A and B Collision Accident Accident Cause (Unsafe Behaviour): Master A and Master B

Cause (Unsafe behaviour)		Man																					
		Human factor (The vessel, shipowner and ship management company )																					
		1 Psychological							2 Emotional					3 Organizational									
		Impulsive action	Forgetful	Habituation behaviour	Personal problems	Unconscious acts	Sense of urgency and sensitivity	Mental shortcuts	Cuts corners	Judgement based on speculation	Mistakes and perceptual illusion	Habituation phenomenon	Personality	Fatigue	Lack of sleep	Alcohol, medicine or disease	Physical ability	Ageing	Desire and willingness	Leadership and teamwork	Communication	Commitment (responsible)	
In , write down a direct cause which was investigated based on the facts. After , write down the root cause using the Why Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4M Classification List.																							
Master A (Master of Vessel A)																							
3	3. Why did he assume that Vessel B would pass the starboard bow?																						
	Why did he not continue monitoring Vessel B?	○																					
4	4. Why did he not ask the pilot about the movement of Vessel B, and instead discuss port entry with C/O A?	○																					
	Why did he not re-confirm the movement of Vessel B?																						
8	8. Why did he not pay attention to Cadet A's reporting?																						
	Why did he believe that Cadet A's skills were insufficient?																						
Total number of circled items		2	2		1			2	3	3	1	1								2	2		
Master B (Master of Vessel B)																							
10	10. Why did he think that Vessel B could pass the bow of Vessel A, even though he was concerned about the decreasing DCPA?	○																					
	Why did he only not confirm the ARPA?																						
	Why did he not have the Navigation Officer report on the change of relative bearing and so on?																						
11	11. Why did he believe that the vessel would reach port quicker if speed was increased to Nav. Full?	○																					
Total number of circled items		2	2		1			2	2	3	2									1	1		

Summary of Related Facts No.



[illegible]

Cause (Unsafe behaviour)	Media					Management										Necessity of re-investigation		
	Media connecting Man with Machinery					Management factors and organization												
	The vessel, shipowner and ship management company					On the vessel					Shipowner and Ship management company							
In , write down a direct cause which was investigated based on the facts. After , write down the root cause using the Why Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4M Classification List.	Lack of information regarding work to be carried out	Work preparedness/inadequate working conditions	Inappropriate work method	Inadequate work space	Poor working environment conditions	Inadequate/incomplete regulations and procedure manual	Inadequate management/organization	Lack of education and training planning	Inadequate safety management	Lack of education and training	Inadequate layout arrangement	Inadequate supervision of his/her subordinates	Inadequate/incomplete regulations and procedure manual	Inadequate/incomplete regulations and procedure manual	Inadequate safety management planning	Lack of education and training	Inadequate layout arrangement	Inadequate supervision of his/her subordinates
<b>Master A (Master of Vessel A)</b>																		
3. Why did he assume that Vessel B would pass the starboard bow?																		
Why did he not continue monitoring Vessel B?																		
4. Why did he not ask the pilot about the movement of Vessel B, and instead discuss port entry with C/O A?																		
Why did he not re-confirm the movement of Vessel B?																		
8. Why did he not pay attention to Cadet A's reporting?																		
Why did he believe that Cadet A's skills were insufficient?																		
<b>Total number of circled items</b>						1						1						
<b>Master B (Master of Vessel B)</b>																		
10. Why did he think that Vessel B could pass the bow of Vessel A, even though he was concerned about the decreasing DCPA?																		
Why did he only not confirm the ARPA?																		
Why did he not have the Navigation Officer report on the change of relative bearing and so on?																		
11. Why did he believe that the vessel would reach port quicker if speed was increased to Nav. Full?																		
<b>Total number of circled items</b>						1						1						

Example (3/3)

The number in the circle applies to the number in Attachment 2-2 (Maritime Accidents 4M Classification List)

## Attachment 13

## Vessel A and Vessel B Collision Accident Analysis using 4M5E and Countermeasure List (Unsafe behaviour): Pilot A

	Man	Machine	Media	Management	
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	On the vessel	Shipowner and ship management company
Risk factors ( Direct cause and indirect/ root cause )	<b>1 Psychological</b> 1. Why was it assumed that the crew of vessel A had been thoroughly trained in BRM and that Master A had a shared understanding of the Passage Plan? ( 1- , and ~ ) 2. Why was information on Vessel B not reported to Master A? ( 1- ~ ) 5. Why did he think the crew were paying attention to Vessel B? ( 1- , and ~ ) 6. Why did he assume that Vessel B would pass their bow, and continued to steer to port side? ( 1- , , and ) 7. Why did he not notice Cadet A reporting? ( 1- and ) 9. Why did he not respond to Vessel B's VHF call? ( 1- ) <b>3 Organizational Related Facts 1, 2, 5, 5, 7 and 9</b> Why could he not exert leadership as a conning officer? Why could he not communicate with the Master?			13. Incomplete BRM including pilot ( 2- )	13. Incomplete BRM including pilot ( 2- ) 13. Not enough training about psychological factors invites human error ( 2- )
<b>Education</b> Education and training Knowledge, skills, consciousness, being given information, etc..	<b>Cause</b> • Human beings face difficulty thinking differently about something once they have it set in their mind. • The pilot is also a member of the Bridge. It would have been naive not to have considered him part of the BRM structure. <b>Recurrence Prevention Countermeasures</b> • BRM re-training • Training in psychology (mental state of mind)				
<b>Engineering</b> Technology and engineering Engineering countermeasure					
<b>Enforcement</b> Thorough guidance and enforcement Standardization, proceduralization, alerting, reward and punishment KYT, Campagnes etc..					Recurrence Prevention Countermeasures • Thorough guidance and creation of procedure manual for pilotage regarding BRM ( Pilots associations)
<b>Examples</b> Case studies, countermeasures and rules Lead by example, experience of success, introduce model cases, "Hiyari-Hatto" (near misses), etc.					Recurrence Prevention Countermeasures • Introduce model cases, BRM training and training that covers mental state of mind(Pilots associations)
<b>Environment</b> Working environment, office internal management, on-board organization, etc.					

Each item number (bold and red coloured) corresponds to the Summary of Related Facts No. in the Attachment 3  
 The number applies to the number in Attachment 2-2 (Maritime Accidents 4M Classification List)

	Man	Machine	Media	Management	
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	On the vessel	Shipowner and ship management company
Risk factors (Direct cause and indirect/root cause)	<p><u>Master A</u></p> <p>1. Psychological</p> <p>3. Why did he assume that Vessel B would pass the starboard bow, without continuously monitoring Vessel B?</p> <p>4. Why did he start discussing port entry work with C/O A?</p> <p>8. Why did he not pay attention to Cadet A's reporting? ( 1- , , and ~ )</p> <p>3. Organizational factors ( Related Facts No. 3, 4, 8 and 9)</p> <p>Why could he not exert leadership as a Master A?</p> <p>Why could he not communicate with the Ship's Bridge personnel including Pilot A?</p> <p><u>Master B</u></p> <p>1. Psychological</p> <p>10. Why did he think that Vessel B could pass the bow of Vessel A even though he was concerned about the decreasing DCPA? ( 1- , and )</p> <p>10. Why did he not confirm visually and only check ARPA data? ( 1- , and )</p> <p>11. Why did he believe that the vessel would reach port quicker if speed was increased to Nav. Full? ( 1- , , ~ and )</p> <p>3. Organizational ( Related Facts No. 10 and 11)</p> <p>Why could he not exert leadership as a Master B ?</p> <p>Why could he not communicate with the Ship's Bridge personnel?</p>			<p>Vessel A</p> <p>14. Why did he not comply with the Safety Management Code? ( 2- )</p> <p>4. Why did he interrupt lookout duty to start discussing port entry work with C/O A in the middle of S/B? ( 2- )</p> <p>Vessel B</p> <p>12. Did not instruct navigation officer to report and lookout thoroughly. ( BRM was not implemented ) ( 2- )</p>	<p>Ship management company A</p> <p>15. Why did he not comply with the Safety Management Code? ( 1- )</p> <p>4. Why did he interrupt lookout duty to start discussing port entry work with C/O A in the middle of S/B? ( 1- )</p> <p>Ship management company B</p> <p>12. Did not instruct navigation officer to report and lookout thoroughly. ( BRM was not implemented ) ( 2- )</p>
Education Education and training Knowledge, skills, consciousness, being given information, etc..	<p><u>Master A</u></p> <p>Cause</p> <ul style="list-style-type: none"> <li>Human beings face difficulty thinking differently about something once they have it set in their mind.</li> <li>Collapse of communication (the foundation of BRM)</li> <li>Mistakes regarding work prioritization</li> </ul> <p>Recurrence Prevention Countermeasures</p> <ul style="list-style-type: none"> <li>BRM re-training (especially leadership training)</li> <li>Re-training of Safety Management Code (SMS)</li> </ul> <p><u>Master B</u></p> <ul style="list-style-type: none"> <li>Human beings face difficulty thinking differently about something once they have it set in their mind.</li> <li>Collapse of communication (the foundation of BRM)</li> </ul> <p>Recurrence Prevention Countermeasures</p> <ul style="list-style-type: none"> <li>BRM re-training (especially leadership training)</li> <li>Re-training of Safety Management Code (SMS)</li> </ul>				

	Man	Machine	Media	Management	
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	On the vessel	Shipowner and ship management company
<b>Engineering</b> Technology and engineering Engineering Engineering countermeasure					
<b>Enforcement</b> Thorough guidance and enforcement Standardization, proceduralization, alerting, reward and punishment KYT, Campagnes etc..				Vessel A • Review and thorough compliance with work procedure regarding the Safety Management Code (SMS ) when a Pilot is on board Vessel B • Review and comply with the Safety Management Code regarding duties on departure and entry, narrow channels, reduced visibility and so on.	Ship management company A • Review, training and education and make the work procedure commonly known regarding the Safety Management Code (SMS ) when a Pilot is on board (duty system) Ship management company B • Review, training and education and make the Safety Management Code commonly known regarding duties on departure and entry, narrow channels, reduced visibility and so on.
<b>Examples</b> Case studies, countermeasures and rules Lead by example, experience of success, introduce model cases, "Hiyari-Hatto" (near misses), etc.					
<b>Environment</b> Working environment, office internal management, on-board organization, etc.					

Each item number (bold and red coloured) corresponds to the Summary of Related Facts No. in the Attachment 3

The number applies to the number in Attachment 2-2 (Maritime Accidents 4M Classification List)

## Attachment 15

## Vessel A and B Collision Accident Human Behavioural Traits and Human Error (Psychological Analysis)

Time	Movement	Who?	Behaviour	Human characteristics	P psychology
06 : 10	Vessel A After passing Tomogashima Channel, changed course to the northeast for Kobe Rokko Island Berth.	Pilot A	From past experience as a pilot, he assumed the crew of Vessel A to be trustworthy.	Human beings sometimes make assumptions	Confirmation bias People unconsciously collect information that supports what they believe.
		Pilot A	Assumed that Master A had a shared understanding of the navigation plan.	Human beings sometimes make assumptions Human beings are sometimes lazy. Did not explain procedure sufficiently enough to the Master after boarding.	Normalcy bias Assumed everything would be fine, because this method had been fine up until now. Confirmation bias Only collected information that supported what he/she believed.
06 : 45 Approx.		Pilot A	Informed port radio via VHF of the approximate time he would be passing through the breakwater to RC- 7. Obtained information from Vessel B. Did not report it to the Master.	Human beings sometimes forget Forgot though he learned the effectiveness of sharing information during BRM training. Human beings are sometimes lazy. Thought that it would be too tedious to explain the procedure to the Master.	Social loafing Thought he need not explain and that someone else would notice later.
06 : 52 Approx.	Vessel B After passing Osaka Offshore Landfill Site (Osaka Bay Phoenix Center), the Master steered to starboard heading for Kobe Central Fairway.	Master B	Steered to starboard without checking the movement of Vessel A.	Human beings sometimes do not notice Human beings have moments of inattention Human beings are sometimes only able to see one thing at a time Human beings are sometimes in a hurry Although Master B understood that there might have been a risk of collision if he steered to starboard, he was concerned about entering port late if he was to follow the originally scheduled course.	Normalcy bias People ignore negative information and underestimate phenomena saying "I'm special, nothing can hurt me!"
06 : 53 Approx.	Vessel A After passing Tomogashima Channel, changed course to the northeast for Kobe Rokko Island Berth.	Master of A	Visually confirmed Vessel B at approximately 25.0 degrees on its starboard bow. Because Master A did not hear from the Pilot that Vessel B would head for Kobe Central Fairway, he assumed that there would be no risk of collision judging by his vessel's relative position with the other ship and that it would be heading in a southwest direction (Outgoing Osaka Bay ).	Human beings have moments of inattention Human beings sometimes make assumptions Human beings are sometimes lazy. Did not confirm movement of Vessel A.	Normalcy bias People unconsciously collect information that supports what they believe. Confirmation bias Only collected information that supported what he/she believed. (Thought it was fine because she crossed the stern of the Vessel B. Social loafing Assumed that Pilot A would take care of the entire procedure.
			Started discussing port entry work with 1/O A.	Human beings are sometimes only able to see one thing at a time Prioritizing tasks proved to be difficult.	Confirmation bias Social loafing Assumed that the Pilot A would take care of the entire procedure.

Time	Movement	Who?	Behaviour	Human characteristics	P sychology
06 : 55 Approx.	Vessel A Headed for the entrance of Kobe Rokko Island East Waterway and started steering to port side	Pilot A	Assumed crew of Vessel A were paying attention to the movement of Vessel B, because Master A and 1/O A were watching the ECDIS. Pilot A himself confirmed Vessel B visually by pointing.	Human beings sometimes make assumptions  Human beings are sometimes lazy.  Because of this assumption, he did not instruct crew clearly.	Social loafing  Assumed bridge shift personnel were paying attention.
			Did not notice when the Master and 1/O of A were discussing port entry work at the sea chart table.	Human beings sometimes do not notice	Confirmation bias  Thought that the situation was not as sever as it may have seemed.
			Instructed vessel to steer to port side in order to head for Kobe Rokko Island East Waterway.	Human beings have moments of inattention  Started steering to port side while cutting across.	Normalcy bias  Assumed everything would be fine, because this method had been fine up until now.
				Human beings sometimes make assumptions  Assumed that the vessel could pass the bow of Vessel B, as they were reducing speed.	People ignore negative information and underestimate phenomena saying "I'm special, nothing can hurt me!"
06 : 57 Approx.	Vessel A Headed for the entrance of Kobe Rokko Island East Waterway and started steering to port side	Pilot A	Because Vessel A was in the middle of reducing speed in relation to Vessel B, it was assumed that Vessel B could pass the bow, and Vessel A continued to steer to port side along with reducing speed.	Human beings sometimes make assumptions  Assumed that the vessel could pass the bow of Vessel B, as they were reducing speed.	Normalcy bias  Assumed everything would be fine, because this method had been fine up until now.  People ignore negative information and underestimate phenomena saying "I'm special, nothing can hurt me!"
		Pilot A, Master A and 3/O A	Did not notice Cadet A reporting.	Human beings sometimes do not notice	Psychological reactance  Did not trust Cadet A's reporting. Did not want to do what he was told.  This may be the so called cocktail-party effect.
	Vessel B Steered north-westerly heading for the entrance of Kobe Central Fairway	Master B	Concerned about decreasing CPA, but assumed that the vessel could pass the bow, according to the vector indicated on ARPA.	Human beings sometimes make assumptions  Human beings have moments of inattention  Human beings are sometimes lazy.  Human beings are sometimes only able to see one thing at a time  Only confirmed information via ECDIS and ARPA	Normalcy bias  People ignore negative information and underestimate phenomena saying "I'm special, nothing can hurt me!"

## Attachment 16

### Vessel E Ōshima Bridge Collision Accident: Human Characteristics, Human Error and Psychology

Date and time	Movement	Who?	Behaviour	Human characteristics	Psychology
13 Oct. approx.	Navigating en route to Qingdao.	2/O E	Created Passage Plan: Onsan - Etajima		
			• 2/O E did not confirm information regarding Obatake-Seto (including bridge beam height) using pilot directions	Human beings sometimes forget: Forgot the procedures of the Safety Management Code	
				Human beings are sometimes lazy: Knew the procedure, but cut corners	Normalcy bias Human beings have the characteristic to underestimate or ignore information regarding him or herself.
			• Worked according to the following procedure when creating a Passage Plan		
			1 ) Created using software for ordering charts h	Human beings sometimes make mistakes: The software was not for creating Passage Plans	Peer pressure
			Copied the data over to the ECDIS	Human beings are sometimes lazy: Knew the procedure, but cut corners	• Human beings are prone to make a judgement or decision influenced by somebody else s ideas and thoughts.
			3 ) Did not input Draft and Air Draft data into the ECDIS	Human beings are sometimes careless, Human beings sometimes forget	
			As a result, although some warnings were detected by the route check function of ECDIS, as the vessel s Draft and Air Draft had not been input, the warning for Ōshima Bridge showed up as “Unconfirmed” and was thus overlooked.	While it may be easy to use convenient software for ordering charts, if ECDIS is not used correctly then it will return incorrect results	• When normalcy bias and peer pressure are combined, a deviation from what was the standard occurs. Then, as a result, and in no time at all, this then becomes the new standard.
16 Oct. approx	When moored at Qingdao	Master E	The next Master E took over from the previous Master		
			• The previous Master had checked and signed the Passage Plan document for Qingdao under his command. He only checked a summary of the Passage Plan between Qingdao-Onsan, and Onsan-Etajima, and did not sign for it.	Human beings are sometimes lazy: Neglected to take over properly	Normalcy bias Human beings have the characteristic to underestimate or ignore information regarding him or herself.
			• Master E believed that the previous Master had confirmed this because the Passage Plan had already been created.	Human beings sometimes make assumptions: It was assumed that the previous Master had approved the Passage Plan up until completion of voyage discharge	Social loafing There is the psychological tendency to cut corners in the belief that someone else will take care of it
20 Oct. approx	When moored at the port of Onsan	Master E	The Master E checked the Passage Plan between Onsan-Etajima with 2/O E using the ECDIS. However, this was not carried out in detail.	Human beings sometimes make assumptions: Based on the above, he assumed that the Passage Plan had been entered into the ECDIS correctly	
				Human beings are sometimes lazy: Knew the procedure, but cut corners	
21 Oct.					
08:30	Departed the port of Onsan.			No specific problem	No specific problem
22:00	The west of Heigun Island	Master E	Manned the bridge in preparation for navigating the narrow channel		
22 Oct.					



Date and time	Movement	Who?	Behaviour	Human characteristics	Psychology
00:00	Ōshima (west of Yashiro Island)	2/O E	Duty take over from 3/O E		Confirmation bias There is the psychological tendency to underestimate something People are unconsciously prone to believe only "what they want to believe" and "information that supports what they believe" rather than purposefully seeking information to the contrary.
		Master E	As Master E felt uneasy about the height of the bridge, he ordered 2/O E to confirm it.	Human beings are sometimes careless: Master E could not reconfirm in advance.  Human beings sometimes do not notice, Human beings sometimes forget At the time of approving the Passage Plan, it was believed that preparation for navigating the narrow channel had been carried out, thus no double check was conducted	When investigating two conflicting opinions, there is a tendency to set a high value on affirmative information, disvalue or even take no notice of negative information.
		2/O E	2/O E tried in vain to ascertain information regarding the height of the bridge beam using pilot directions	Human beings sometimes panic Had he remained calm, he may have been able to have confirmed it, but instead panicked	Panick It is said that self-induced panic tends to occur when there are high levels of mental stress among the group, especially in an emergency. Unable to calmly judge the situation, this leads to the taking of drastic measures. • When there is imminent threat to one's values or oneself.
00:09	Ōshima (north west of Yashiro Island)	2/O E	Tried to check the height of the bridge beam operating the ECDIS, but did not notice the bridge beam's height which was displayed	Human beings sometimes do not notice, Human beings sometimes panic  Had he remained calm, he may have been able to have confirmed it, but instead panicked	• There was no solution Even if there were a solution, it would have only benefited a limited number of crew. (E.g. There was only one exit, or limited capacity) • The sound of an explosion was heard.
00:11	Ōshima (north west of Yashiro Island)	Master E 2/O E	Bridge manning checked for bridge lights, but were unable to see them due to it being too dark.	Human beings sometimes panic Was unable to calmly judge the situation at hand	
		Master E	Master E worried about being pressed by the westerly current. Continued to navigate to the east at half ahead	Human beings sometimes panic Abort Point: Was there a clear plan if the Passage Plan got interrupted or if there were non-returnable points? ( Re-examination necessary)	
00:26	Shortly before Hakata-Ōshima Bridge	2/O E	2/O E instructed hard to starboard and the AB responded to the order.	Human beings sometimes panic Took right to manoeuvre instead of Master	
00:27	Shortly before Hakata-Ōshima Bridge	Master E	Shortly after Master E ordered midships, the 1st, 3rd and 4th cranes and the aft mast collided with the bridge in succession.	Panicked The entire bridge team panicked, and were unable to calmly judge the situation.	
00:36	East of Hakata-Ōshima Bridge	Master E	Although Master E made a call to the agency requesting them to report this to the Japan Coast Guard, the person in charge at the agency could not hear what was being explained well, thus it did not get reported		
			Master E kept navigating because it seemed that there was no appropriate point of anchor in the vicinity and it would be safe to continue to the destination		
04:00	Off the Port of Kure.	Master E	Started anchor mooring		

Reference No.	Identified problems from survey findings				Direct cause		Accident cause evaluation	Re-examination necessity
					Unsafe behaviour	Unsafe conditions		
	Date	Time	Caused by	Check facts and problem areas				
1	13 Oct. approx.		2/O E	Created Passage Plan: Onsan - Etajima without checking the bridge beam height of Ōshima Bridge. Abort Point procedure was unclear	○		1	○
				Did not input Draft, Air Draft and Safety isobaths data into the ECDIS				
				Created Passage Plan using nautical chart ordering software and copied the data over to the ECDIS as is				
2	16 Oct.		Master E	Believed that the previous Master had checked and signed the Passage Plan both between Qingdao-Onsan and between Onsan-Etajima.	○		5	
3	20 Oct.		Master E and 2/O E	Passage Plan between Onsan-Etajima were not confirmed in detail on the ECDIS.	○		2	
4	22 Oct.	00:00	Master E	As Master E felt uneasy about the height of the Ōshima Bridge, he ordered his 2/O E to confirm it.	○		4	
5	22 Oct.	00:00	2/O E	2/O E did not confirm bridge beam height using pilot directions and the ECDIS	○		3	
6	22 Oct.	00:11	Master E	Continued navigating without confirming the height of the bridge beam	○		6	
7			Ship management company E	No intervention was taken into account whatsoever, regarding the vessel's Passage Plan	○		6	

Accident cause assessment: Prioritized according to the scale of the cause

## Attachment 18

## Maritime Accident Cause (Unsafe Behaviour) Collision with Ōshima Bridge

Cause (Unsafe behaviour)		Man																					
		Human factor (The vessel, shipowner and ship management company)																					
		1 Psychological								2 Emotional				3 Organizational									
		Impulsive action	Forgetful	Habituation behaviour	Personal problems	Unconscious acts	Sense of urgency and sensitivity	Mental shortcuts	Cuts corners	Judgement based on speculation	Stakes and perceptual illusion	Habituation perception	Personality	Fatigue	Lack of sleep	Alcohol, medicine or disease	Physical ability	Ageing	Desire and willingness	Leadership and teamwork	Communication	Commitment (responsible intervention)	
In , write down a direct cause which was investigated based on the facts. After , write down the root cause using the Why-Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4M Classification List.																							
2/O E and Ship management company E																							
1	2/O E created the Passage Plan between Onsan and Etajima without confirming the height of the Ōshima Bridge																						
	Why was the Passage Plan created using nautical chart ordering software?																						
	What was the data copied over to the ECDIS?																						
	Why was Draft and Air Draft data not input into the ECDIS?																						
	Regarding the Passage Plan, why did the management company not intervene?																						
Master E and 2/O E																							
2	Why did the Master E believe that the previous Master had signed the Passage Plan?																						
	Why was the Master E unable to take over effectively from the previous Master?																						
	Why did the 2/O E create the Passage Plan between Onsan and Etajima without confirming the height of the Ōshima Bridge?																						
Master E and 2/O E																							
4	Why did the Master E continue navigating even though he felt uneasy about the height of the bridge?																						
	Why did the 2/O E not re-confirm the height of the bridge beam?																						
Master E																							
6	Why did he continue navigating regardless?																						
	Why was an Abort Point not arranged?																						
Total number of circled items		3	1	3		2	6	4	8	5	1	3											

Cause (Unsafe behaviour)	Man										Machine				
	4 Individual skills										Mechanical factors such as machinery not working properly or being out of order				
	4-1 Inadequate knowledge					4-2 Inadequate skills		4-3 Poor work ethic			5 Management of health and working environment		Mainly on the vessel		
	Inadequate or inappropriate knowledge about the work to be carried out	Work content not understood or misunderstood	Lack of a sense of urgency and awareness	Mistakes regarding work procedure/ forgetfulness	Lacks basic knowledge of the work	Unaccustomed to work, inexperienced, inadequate skills	Not enough training	The belief that the work done is satisfactory, when objectively it is inadequate	Not "ready" to work	Intentionally dishonest regarding work, and breaks the rules	Covers up or tolerates dishonest work	Protective wear not worn			
In , write down a direct cause which was investigated based on the facts. After , write down the root cause using the Why-Why Analysis. Then, circle each applicable cause. Regarding items other than Man (Human factors), enter the sub-item number of each item in the 4-1 Classification List.															
2/O E and Ship management company E															
1	2/O E created the Passage Plan between Onsan and Etajima without confirming the height of the Ōshima Bridge	○	○	○	○	○				○	○				
	Why was the Passage Plan created using nautical chart ordering software?	○	○	○	○	○				○	○				
	What was the data copied over to the ECDIS?	○	○	○	○	○				○	○				
	Why was Draft and Air Draft data not input into the ECDIS?	○	○	○	○	○				○	○				
	Regarding the Passage Plan, why did the management company not intervene?														
	Master E and 2/O E														
2	Why did the Master E believe that the previous Master had signed the Passage Plan?				○										
	Why was the Master E unable to take over effectively from the previous Master?														
	Why did the 2/O E create the Passage Plan between Onsan and Etajima without confirming the height of the Ōshima Bridge?														
	Master E and 2/O E														
4	Why did the Master E continue navigating even though he felt uneasy about the height of the bridge?														
	Why did the 2/O E not re-confirm the height of the bridge beam?	○	○	○	○	○				○	○				
	Master E														
6	Why did he continue navigating regardless?														
	Why was an Abort Point not arranged?	○	○	○	○	○				○	○				
Total number of circled items		6	6	6	6	6				6	6				

Cause (Unsafe behaviour)		Media					Management										Necessity of re-investigation	
		Media connecting Man with Machinery					Management factors and organization											
		The vessel, shipowner and ship management company					On the vessel					Shipowner and Ship management company						
		Lack of information regarding work to be carried out	Work preparedness/inadequate working conditions	Inappropriate work method	Inadequate work space	Poor working environment conditions	Inadequate management/organization	Inadequate/incomplete regulations and procedure manual	Inadequate safety management planning	Lack of education and training	Inadequate layout arrangement	Inadequate supervision of his/her subordinates	Inadequate management/organization	Inadequate/incomplete regulations and procedure manual	Inadequate safety management planning	Lack of education and training	Inadequate layout arrangement	Inadequate supervision of his/her subordinates
2/O E and Ship management company E																		
1	2/O E created the Passage Plan between Onsan and Etajima without confirming the height of the Ōshima Bridge																	○
	Why was the Passage Plan created using nautical chart ordering software?																	
	What was the data copied over to the ECDIS?																	
	Why was Draft and Air Draft data not input into the ECDIS?																	
	Regarding the Passage Plan, why did the management company not intervene?																	
Master E and 2/O E																		
2	Why did the Master E believe that the previous Master had signed the Passage Plan?																	
	Why was the Master E unable to take over effectively from the previous Master?																	
	Why did the 2/O E create the Passage Plan between Onsan and Etajima without confirming the height of the Ōshima Bridge?																	
Master E and 2/O E																		
4	Why did the Master E continue navigating even though he felt uneasy about the height of the bridge?																	
	Why did the 2/O E not re-confirm the height of the bridge beam?																	
Master E																		
6	Why did he continue navigating regardless?																	
	Why was an Abort Point not arranged?																	
Total number of circled items				1				1	1	1		1		2	2	2		1

The number in the circle applies to the number in Attachment 2-2 (Maritime Accidents 4M Classification List)

	Man	Machine	Media	Management	
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	On the vessel	Shipowner and ship management company
Risk factors ( Direct cause and indirect/root cause )	<p>1. 2/O E created the Passage Plan between Onsan and Etajima without confirming the bridge beam height of the Hakata-Oshima Bridge( 1- and ~ )</p> <p>2. Regarding the Passage Plan between Onsan- Etajima, Master E did not receive details from the previous Master.( 1- , and )</p> <p>6. Continued navigating while feeling uneasy about the height of the bridge.( 1- , , and )</p> <p>1. Abort Point: Was there a clear plan if the Passage Plan got interrupted or if there were non-returnable points?( Re-examination necessary) ( 1- , and ~ )</p>		<p>1. Vague setting method of ECDIS (inputting basic data) (1- , ~ and )</p>	<p>3. Vague procedure for confirming and approving the Passage Plan ( 1- and ~ )</p> <p>2. What the Master did receive from the previous Master was vague (1- , and )</p>	<p>7. No intervention was taken into account whatsoever regarding the vessel s Passage Plan (Management 2- , 3- and 4- )</p>
Education  Education and training Knowledge, skills, consciousness, being given information, etc.	<ul style="list-style-type: none"> <li>• Re-training for the personnel in charge of creating the Passage Plan (2/O E)</li> <li>• Re-training regarding handling of Abort Point procedure</li> <li>• Re-training on how to handle feeling uneasiness regarding navigation</li> <li>• Re-training for Master E regarding Safety Management Code</li> </ul>				<ul style="list-style-type: none"> <li>• Formulation of continued training and education for Crew</li> </ul>
Engineering  Technology and engineering Technological countermeasures					

	Man	Machine	Media	Management	
	The vessel, shipowner and ship management company	Mainly on the vessel	The vessel, shipowner and ship management company	On the vessel	Shipowner and ship management company
<b>Enforcement</b> Thorough guidance and enforcement Standardization, proceduralization, alerting, reward and punishment KYT, campaigns etc.	<ul style="list-style-type: none"> <li>• Re-training for taking over from previous Master</li> <li>• In particular, procedure manual compliance regarding the approval procedure of Passage Plans.</li> <li>• Formulation of handling method (procedure) regarding the route check function of ECDIS</li> </ul>		<ul style="list-style-type: none"> <li>• Creation of Passage Plans using ECDIS and a procedure manual on how to utilize the route function</li> </ul>	<ul style="list-style-type: none"> <li>• Thorough compliance with the revised procedure manual</li> </ul>	<ul style="list-style-type: none"> <li>• Review of SMS procedure manual regarding creation, confirmation and approval of Passage Plans. (To include basic setting method of ECDIS)</li> <li>• Guidance and completeness of revised procedure manual for all ships under management</li> <li>• Enforcement of internal auditing</li> </ul>
<b>Examples</b> Case studies, countermeasures and rules Lead by example, experience of success, introduce model cases, "Hiyari-Hatto" (near misses), etc.					
<b>Environment</b> Working environment, office internal management, on-board organization, etc.					



**JAPAN P & I CLUB**  
**日本船主責任相互保險組合**

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