

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, he assumed the crew of Vessel to be trustworthy.		Departed Osaka bound for Kobe RC-4 (Kobe Rokko Island)	
06 : 31 Approx.			Assumed that Master A had a shared understanding of the navigation plan.			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. Did not report it to Master A.			
			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 started look-out of the movement via radar and visually.	

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 style="border: 1px dashed black; padding: 2px;">3/O A ascended and manned the bridge to take over from C/O A</div> <div style="border: 1px solid black; padding: 2px;">3/O A ascended and manned the bridge to take over from C/O A</div>		<div style="border: 1px solid black; padding: 2px;">Steered to starboard heading for Kobe Central Fairway.</div>	
06 : 53 Approx.	<067>	3.49 nautical miles		<div style="border: 1px solid black; padding: 2px;">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>	<div style="border: 1px solid black; padding: 2px;">While steering to starboard, instructed a course of &lt;290&gt;</div>	
06 : 54 Approx.					<div style="border: 1px solid black; padding: 2px;">Instructed a course of &lt;293&gt;. Recognized crossing point with Vessel A</div>	
06 : 55 Approx.	<069>	2.53 nautical miles	<div style="border: 1px solid black; padding: 2px;">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. After that, he did not notice when Master A and C/O A were discussing port entry work at the sea chart table. Instructed vessel to steer to port side in order to head for Kobe Rokko Island East Waterway.</div>		<div style="border: 1px solid black; padding: 2px;">Concerned about decreasing CPA, but assumed that the vessel could pass the bow, according to the vector indicated on ARPA.</div> <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">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.	<div style="border: 1px dashed black; padding: 2px;">Cadet A Reported to Pilot A and 3/O A, because he was worried about a risk of collision with Vessel B</div> <div style="border: 1px solid black; padding: 2px;">Master A, 1/O A and 3/O Did not pay attention to Cadet A reporting.</div>		
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	<div style="border: 1px solid black; padding: 2px;">Sailing close to East Fairway, instructed to the main engine Half Ahead.</div> <div style="border: 1px solid black; padding: 2px;">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.</div>	<div style="border: 1px solid black; padding: 2px;">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.</div>		
07 : 02 Approx.	Dangerously close			<div style="border: 1px solid black; padding: 2px;">Master A Instructed 3/O A D.Slow Ahead.</div> <div style="border: 1px solid black; padding: 2px;">3/O A According to the Master's order, operated engine telegraph for D.Slow Ahead</div> <div style="border: 1px solid red; padding: 2px; color: red; text-align: center;">Did not respond to Vessel B's VHF call</div> <div style="border: 1px solid black; padding: 2px;">Master A Operated engine telegraph for full speed sternway by himself</div>	<div style="border: 1px solid black; padding: 2px;">Blew a whistle</div> <div style="border: 1px solid black; padding: 2px;">Blew a whistle</div>	<div style="border: 1px solid black; padding: 2px;">Called Vessel A by VHF.</div> <div style="border: 1px solid black; padding: 2px;">Called Vessel A by VHF.</div>
07 : 02 : 49 Approx.			Collision			

Reference No.	Identified problems from survey findings				Direct cause		Accident cause evaluation	Re-examination necessity
	Date	Time	Caused by	Check facts and problem areas	Unsafe behaviour	Unsafe conditions		
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 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												
	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 illusions	Habituation phenomenon	Personality	Fatigue	Lack of sleep	Alcohol, medicine or disease	Physical ability	Ageing	Resilience and will/ingress	Leadership and teamwork	Communication	Concurrent (responsive intervention)	
In <input type="text"/> , write down a direct cause which was investigated based on the facts. After <input type="text"/> , 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.																						
Pilot A																						
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?								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>		
Was there not enough time to confirm?	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>														
Was it because the vessel belonged to his affiliated shipping company?								<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>												
2. Why was information on Vessel B not reported to Master A?								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Assumed that the Master understood because he also checked Vessel B.							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
5. Why did he think the crew were paying attention to Vessel B?								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Why did he assume confirmation was not needed because the crew were monitoring the ECDIS?	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
6. Why did he assume that Vessel B would pass their bow, and continued to steer to port side?			<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>											
Why did he not check the change of relative bearing or DCPA?	<input checked="" type="checkbox"/>							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>												
7. Why did he not notice Cadet A reporting?			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>										<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Why did he not pay attention to Cadet A as well?								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>												
Why did he believe that Cadet A's skills were insufficient?			<input checked="" type="checkbox"/>					<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>												
9. Why did he not respond to Vessel B's VHF call?	<input checked="" type="checkbox"/>																					
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													
	4 Individual skills						5 Management of health and working environment													
	4-1 Inadequate knowledge		4-2 Inadequate skills		4-3 Poor work ethic															
Mechanical factors such as machinery not working properly or being out of order						Mainly on the vessel														
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 machinery and facility maintenance, etc.														
						Lack of standardization														
						Lack of consideration regarding ergonomic factors														
						Lack of fundamental safety (design and ergonomic arrangement)														
						Defective protection against hazards														
						Design flaw in the machinery														
						Tool box meeting was not implemented														
						Health check not implemented prior to working														
						Protective wear not worn														
						Covers up or tolerates dishonest work														
						Intentionally dishonest regarding work, and breaks the rules														
						Not "ready" to work														
						The belief that the work done is satisfactory when objectively it is inadequate														
						Not enough training														
						Unaccustomed to work, inexperienced, inadequate skills														
						Lacks basic knowledge of the work														
						Mistakes regarding work procedure/forgetfulness														
						Lack of a sense of urgency and awareness														
						Work content not understood or misunderstood														
						Inadequate or inappropriate knowledge about the work to be carried out														
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 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.																												
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																

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										
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	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	Communication	Leadership and teamwork	Commitment (responsible)
<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>	<b>2</b>	<b>2</b>	<b>1</b>				<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>1</b>							<b>2</b>	<b>2</b>		
<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>	<b>2</b>	<b>2</b>	<b>1</b>				<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>								<b>1</b>	<b>1</b>		

Summary of Related Facts No.



Cause (Unsafe behaviour)											Machine									
	4 Individual skills										5 Management of health and working environment				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								Mainly on the vessel					
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	Intentionally dishonest regarding work, and breaks the rules	Covers up or tolerates dishonest work	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 arrangements)	Lack of consideration regarding ergonomic factors	Lack of standardization	Lack of machinery and facility maintenance, etc.
<b>Master A (Master of Vessel A)</b>																				
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?																			
	<b>Total number of circled items</b>																			
	<b>Master B (Master of Vessel B)</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?																			
	<b>Total number of circled items</b>																			

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 supervision of his/her subordinates	Inadequate layout arrangement	Lack of education and training	Inadequate safety management planning	Inadequate/incomplete regulations and procedure manual	Inadequate management/ organization	Inadequate supervision of his/her subordinates	Inadequate layout arrangement	Inadequate supervision of his/her subordinates
<b>Master A (Master of Vessel A)</b>																				
3																				
Why did he not continue monitoring Vessel B?																				
4																				
4																				
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?																				
<b>Total number of circled items</b>							1									1				
<b>Master B (Master of Vessel B)</b>																				
10																				
10																				
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?																				
<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)

	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><b>1 Psychological</b></p> <p>1. Why was it assumed that the crew of vessel A had been thoroughly trained in BTM and that Master A had a shared understanding of the Passage Plan? (1- , and ~ )</p> <p>2. Why was information on Vessel B not reported to Master A? (1- ~ )</p> <p>5. Why did he think the crew were paying attention to Vessel B? (1- , and ~ )</p> <p>6. Why did he assume that Vessel B would pass their bow, and continued to steer to port side? (1- , , and )</p> <p>7. Why did he not notice Cadet A reporting? (1- and )</p> <p>9. Why did he not respond to Vessel B's VHF call? (1- )</p> <p><b>3 Organizational Related Facts 1, 2, 5, 5, 7 and 9</b></p> <p>Why could he not exert leadership as a conning officer? Why could he not communicate with the Master?</p>			13. Incomplete BRM including pilot (2- )	13. Incomplete BRM including pilot (2- ) 13. Not enough training about psychological factors invites human error (2- )
Education Education and training Knowledge, skills, consciousness, being given information, etc..	<p><b>Cause</b></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>The pilot is also a member of the Bridge. It would have been naive not to have considered him part of the BTM structure.</li> </ul> <p><b>Recurrence Prevention Countermeasures</b></p> <ul style="list-style-type: none"> <li>BTM re-training</li> <li>Training in psychology (mental state of mind)</li> </ul>				
Engineering Technology and engineering Engineering countermeasure					
Enforcement Thorough guidance and enforcement Standardization, proceduralization, alerting, reward and punishment KYT, Campaigns etc..					Recurrence Prevention Countermeasures • Thorough guidance and creation of procedure manual for pilotage regarding BRM (Pilots associations)
Examples 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)
Environment 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
<p>Risk factors ( Direct cause and indirect/root cause )</p>	<p><b>Master A</b>                      1. Psychological                      3. Why did he assume that Vessel B would pass the starboard bow, without continuously monitoring Vessel B?                      4. Why did he start discussing port entry work with C/O A?                      8. Why did he not pay attention to Cadet A's reporting? ( 1- , , and ~ )                      3. Organizational factors ( Related Facts No. 3, 4, 8 and 9)                      Why could he not exert leadership as a Master A?                      Why could he not communicate with the Ship's Bridge personnel including Pilot A?</p> <p><b>Master B</b>                      1. Psychological                      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 )                      10. Why did he not confirm visually and only check ARPA data? ( 1- , and )                      11. Why did he believe that the vessel would reach port quicker if speed was increased to Nav. Full? ( 1- , , ~ and )                      3. Organizational ( Related Facts No. 10 and 11)                      Why could he not exert leadership as a Master B ?                      Why could he not communicate with the Ship's Bridge personnel?</p>			<p><b>Vessel A</b>                      14. Why did he not comply with the Safety Management Code? ( 2- )                      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><b>Vessel B</b>                      12. Did not instruct navigation officer to report and lookout thoroughly. ( BRM was not implemented) ( 2- )</p>	<p><b>Ship management company A</b>                      15. Why did he not comply with the Safety Management Code? ( 1- )                      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><b>Ship management company B</b>                      12. Did not instruct navigation officer to report and lookout thoroughly. ( BRM was not implemented) ( 2- )</p>
<p>Education                      Education and training Knowledge, skills, consciousness, being given information, etc..</p>	<p><b>Master A</b>                      Cause                      • Human beings face difficulty thinking differently about something once they have it set in their mind.                      • Collapse of communication (the foundation of BTM)                      • Mistakes regarding work prioritization</p> <p><b>Recurrence Prevention Countermeasures</b>                      • BTM re-training (especially leadership training)                      • Re-training of Safety Management Code (SMS )</p> <p><b>Master B</b>                      • Human beings face difficulty thinking differently about something once they have it set in their mind.                      • Collapse of communication (the foundation of BTM)</p> <p><b>Recurrence Prevention Countermeasures</b>                      • BTM re-training (especially leadership training)                      • Re-training of Safety Management Code (SMS )</p>				

	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 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 sychology
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 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 BTM 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 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 psychology
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 severe 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					
			<ul style="list-style-type: none"> <li>2/O E did not confirm information regarding Obatake-Seto (including bridge beam height) using pilot directions</li> </ul>	Human beings sometimes forget: Forgot the procedures of the Safety Management Code	<p><b>Normalcy bias</b></p> <p>Human beings have the characteristic to underestimate or ignore information regarding him or herself.</p>			
			<ul style="list-style-type: none"> <li>Worked according to the following procedure when creating a Passage Plan</li> </ul>	Human beings are sometimes lazy: Knew the procedure, but cut corners				
			<ul style="list-style-type: none"> <li>1 ) Created using software for ordering charts h</li> </ul>	Human beings sometimes make mistakes: The software was not for creating Passage Plans				
						<ul style="list-style-type: none"> <li>Copied the data over to the ECDIS</li> </ul>	Human beings are sometimes lazy: Knew the procedure, but cut corners	<p><b>Peer pressure</b></p> <ul style="list-style-type: none"> <li>Human beings are prone to make a judgement or decision influenced by somebody else's ideas and thoughts.</li> </ul>
						<ul style="list-style-type: none"> <li>3 ) Did not input Draft and Air Draft data into the ECDIS</li> </ul>	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.	<p><b>While it may be easy to use convenient software for ordering charts, if ECDIS is not used correctly then it will return incorrect results</b></p>	<ul style="list-style-type: none"> <li>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.</li> </ul>
16 Oct. approx	When moored at Qingdao	Master E	The next Master E took over from the previous Master		<p><b>Normalcy bias</b></p> <p>Human beings have the characteristic to underestimate or ignore information regarding him or herself.</p>			
			<ul style="list-style-type: none"> <li>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.</li> </ul>	Human beings are sometimes lazy: Neglected to take over properly				
			<ul style="list-style-type: none"> <li>Master E believed that the previous Master had confirmed this because the Passage Plan had already been created.</li> </ul>	Human beings sometimes make assumptions: It was assumed that the previous Master had approved the Passage Plan up until completion of voyage discharge	<p><b>Social loafing</b></p> <p>There is the psychological tendency to cut corners in the belief that someone else will take care of it</p>			
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.	<p>Human beings sometimes make assumptions: Based on the above, he assumed that the Passage Plan had been entered into the ECDIS correctly</p> <p>Human beings are sometimes lazy: Knew the procedure, but cut corners</p>				
21 Oct.								
08:30	Departed the port of Onsan.							
22:00	The west of Heigun Island	Master E	Manned the bridge in preparation for navigating the narrow channel	<b>No specific problem</b>	<b>No specific problem</b>			
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
		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	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. 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	Panic 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.
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	When there is imminent threat to one s values or oneself.
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	<ul style="list-style-type: none"> <li>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)</li> <li>The sound of an explosion was heard.</li> </ul>
		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
	Date	Time	Caused by	Check facts and problem areas	Unsafe behaviour	Unsafe conditions		
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