

Cyber Security

Implementation and Challenges
of IMO Cyber Security Guidelines

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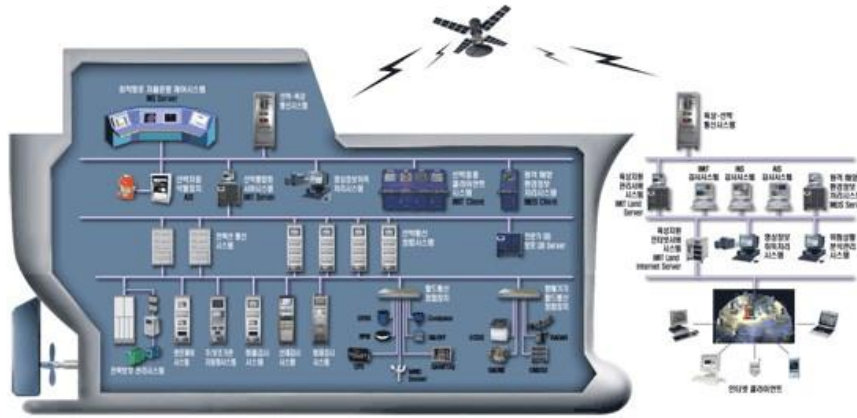
Chapter 2 IMO CYBER GUIDELINES

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CH 1 INTRODUCTION

Increasing Dependency on ICT

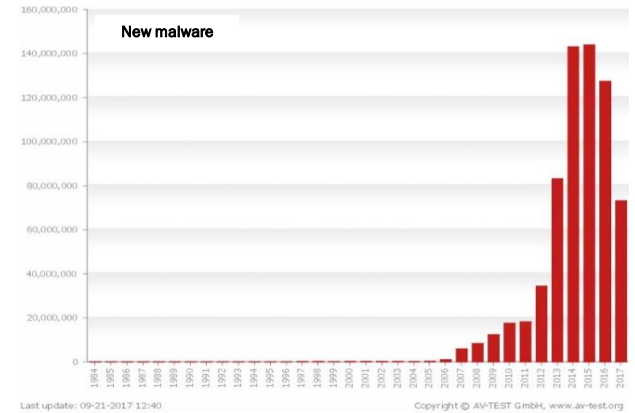


Source : MARINE DIGITECH, 2017

Drawback

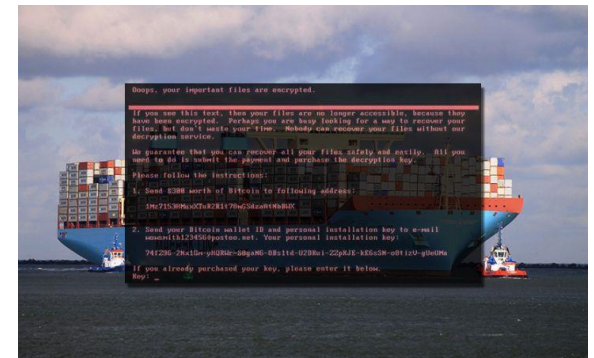
Benefit

- Logistics cost reduction
- Maritime incidents risk reduction
- Crew workload reduction
- Easy data collection and analysis for operation and monitoring, etc.



Source : AV-TEST Institute , 2017

- Increase of risk on cyber threat
- Over **250,000** new malicious programs every day.



- Cyber attack in maritime industry
- Maersk Shipping Reports \$300M Loss Stemming from NotPetya Attack in 2017.

Source : threatpost, 2017

CH 1 INTRODUCTION

International Response to Cyber Threats in Maritime Industry

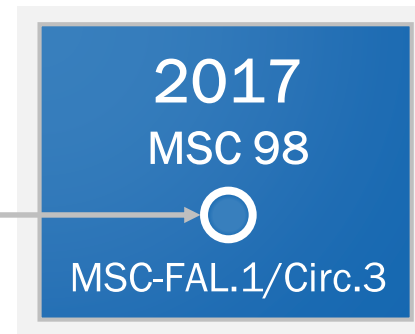
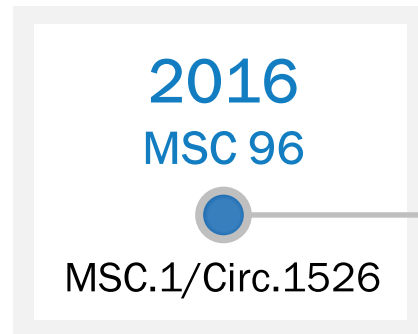


CH 1 INTRODUCTION

Brief summary of IMO Cyber Guidelines



INTERIM
GUIDELINES ON
MARITIME CYBER
RISK MANAGEMENT



GUIDELINES ON
MARITIME CYBER
RISK MANAGEMENT

GUIDELINES ON MARITIME CYBER RISK MANAGEMENT

- Urgent need to raise awareness on cyber risk threats and vulnerabilities
- High-level recommendations on maritime cyber risk management to safeguard shipping from current and emerging cyber threats and vulnerabilities
- Functional elements that support effective cyber risk management.

Additional guidance and standards

- US NIST Framework for Improving Critical Infrastructure Cyber security
- The Guidelines on Cyber Security Onboard Ships produced and supported by BIMCO, etc.
- ISO/IEC 27001 standard on Information technology – Security techniques – Information security management systems – Requirements

CH 1 INTRODUCTION

Cyber Risk Management



Goal : To support safe and secure shipping, which is operationally resilient to cyber risks

Identify

Protect

Detect

Respond

Recover

Identify

Define personnel **roles and responsibilities** for cyber risk management and **identify the systems, assets, data and capabilities** that, when disrupted, pose risks to ship operations

Protect

Implement risk control processes and measures, and contingency planning to protect against a cyber-event and ensure continuity of shipping operations

Detect

Develop and implement activities necessary to **detect a cyber-event in a timely manner**

Respond

Develop and implement **activities and plans to provide resilience and to restore systems** necessary for shipping operations or services impaired due to a cyber-event

Recover

Identify measures to back-up and restore cyber systems necessary for shipping operations impacted by a cyber-event

CH 3 IMPLEMENTATION and CHALLENGES

Implementation by KOREAN REGISTER

Cyber Security Risk Assessment for a Ship



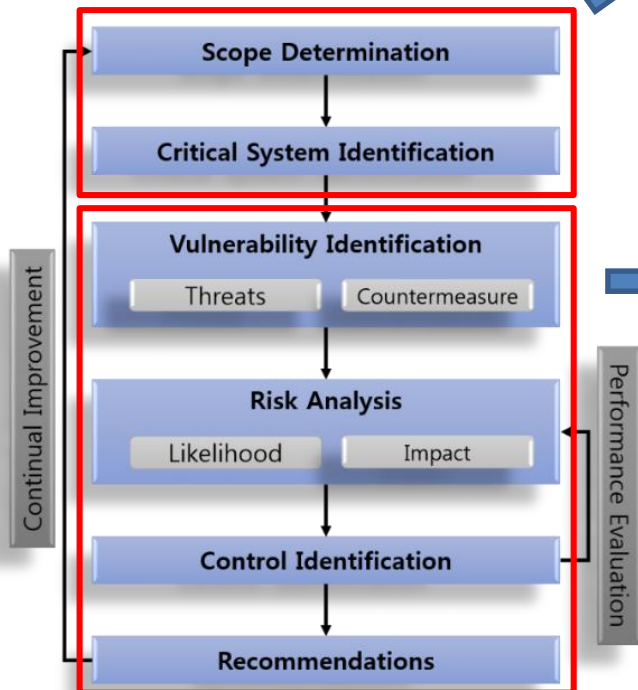
C: Confidentiality Index, I: Integrity Index, A: Availability Index

No.	Category	Assets	Model	Software / Application	Manufacturer	Interlocking or Related Equipment	Location	Redundancy / Substitute	Value				Criticality Index
									C	I	A		
14	SNS	CCR, ECR, Ship's office PC	-	Windows 7, 10	ACER, LENOVO		Bridge, ship's office, CCR, ECR		2	2	2	2	2
15	NCS	Auto Pilot System	PR-6412A-E2-SS2		TOKIMEC INC.	Steering Gear, VDR, Speed Log, AMS, Gyro compass	Bridge	Local control	2	3	3	3	3
16	NCS	Gyro Compass	TG-8000		TOKIMEC INC.	VDR, Speed Log, ECDIS, Radar, AIS, DGPS, Inmarsat-F, Magnetic Compass	Bridge	Magnetic Compass	3	3	4	4	4
17	NCS	Magnetic Compass with Azimuth Sensor	SH-165A1		TOKIMEC INC.	Auto pilot system & Gyro compass	Bridge	Gyro Compass	2	3	3	3	3
18	NCS	No.1 & 2 Marine Radar System	JMA-9932-SA JMA-9922-6XA		J.R.C	DGPS, VDR, ECDIS, Gyro Compass, Speed Log, AIS	Bridge	X Band, S Band	3	3	4	4	4
19	NCS	No.1 & 2 ECDIS			RAYTHEON	Gyro Compass, Speed Log, DGPS, AIS, Echo Sounder, NAVTEX, Wind Indicator, Radar	Bridge	Redundancy	3	4	5	4	4
20	NCS	No.1 & 2 DGPS Navigator	JLR-770MK II		J.R.C	Gyro Compass, VDR, AIS, Radar, NAVTEX, GMDSS, ECDIS, ODM, Speed Log	Bridge	Redundancy	3	3	4	4	4
21	NCS	Auto Identification System (AIS)	IHS-1R2		J.R.C	Gyro Compass, DGPS,	Bridge		2	2	2	2	2

[Asset Criticality Analysis]

Asset	Threats	Threat Agents / Motivation	* Potential Cause (Hazards)	Potential Consequence	Existing Controls	VI	TI	Cr	RI	Proposed Controls (Responsibility)	Res Risk			
											VI	TI	Cr	RI
No.1 & 2 ECDIS	Careless use of external storage media	Crew, external party / accidental or intentional	* Malicious use of USB * External storage device	Asset damage, loss of functionality, data deletion, virus, collision, grounding	1) USB scanning 2) Anti virus vaccine for ships PCs	4	4	4	16	1) Strengthen USB policy (USB scanning policy) 2) Cyber security Training for existing and new crew 3) Dedicated USB only for ECDIS update	2	4	4	8
	Computer virus	Crew, third party / accidental or intentional	* Chart update with infected external storage media	Asset damage, loss of functionality, data deletion, virus, collision, grounding	1) Anti virus vaccine for ships PCs 2) Recovery plan (backup disk) 3) Redundancy (two marine ECDIS systems) 4) Paper chart (emergency folio only) 5) Service technicians available world wide	4	4	4	16	Recommendation 1) Restricted use of USB drive 2) Use of encrypted USB drive 3) ECDIS update with CD provided by vender (use portable CD-rom drive)	2	4	4	8

[Report of Cyber Risk Assessment]



CH 3 IMPLEMENTATION and CHALLENGES

What should be done further?

Challenges

1

Promote cyber security activities

- Policy support by government
- Incentives by insurance company

2

Find proper measures for ship

- Cost-effective measures
- Operating technology such as propulsion system, cargo management system, etc.

3

Develop cooperative global community

- Sharing cyber incident report
- Responding cyber incident together
- Developing practice guidelines

- As ships become digitalized, integrated and automated, **cyber security is considered as being essential.**
- **Cyber security risk management seems be hard for shipping companies** because cyber security is new concept for them.
- Through KR's cyber security activities with shipping companies, KR found that **cyber security is just one of existing security for ships and should be continuously managed.**
- **There are some challenges :**
 - Promote cyber security activities
 - Find proper measures for ship
 - Develop cooperative global community

Thank you for your attention!

Providing the best services,
Creating a better world

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