CONSTELLATION CYBER CONSULTANCY

Cyber Vulnerability Solutions

INMEX SMM INDIA

4-6 October 2023
Bombay Exhibition Centre,
Mumbai

Technology for **Continuous Cyber Monitoring** on Marine Vessels.

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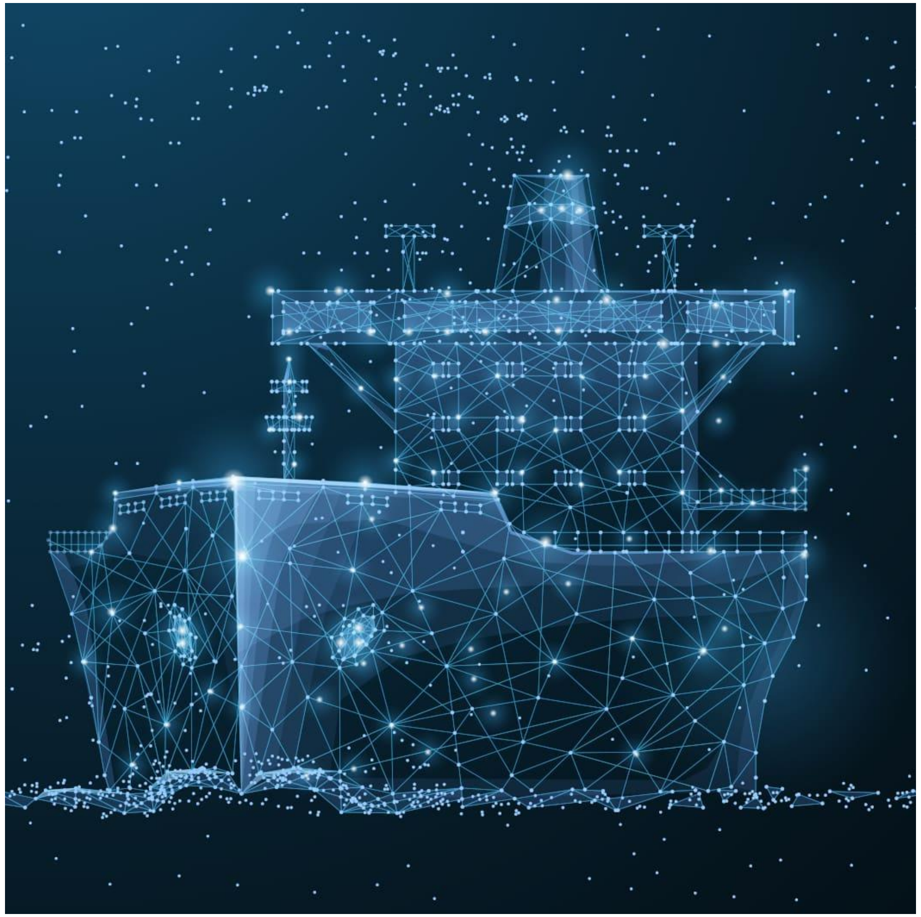
Prelude

“The increase in remote monitoring and autonomous control, IoT and digitalization has made marine industry much more susceptible to attack.”

- Adam Rizika, Head of Strategy, Naval Dome

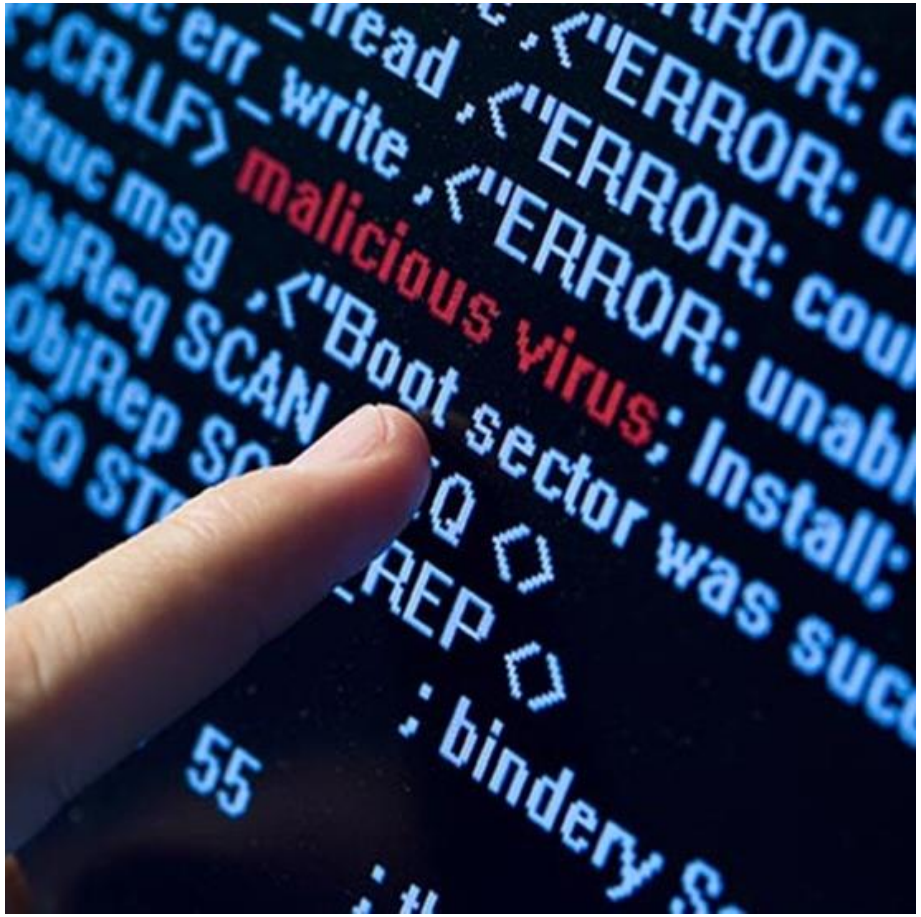
Real Case

- In an incident, a Cyber attack was launched on a marine vessel with just a USB stick.
- An OEM service technician unwittingly used the USB stick with malicious software containing three zero-day exploits.



Causes leading to the problem.

- **Shortage** of operational technology (OT) cyber domain skilled staff.
- **Lack** of security awareness.
- Using security controls that are **slow to evolve** and be implemented.
- **Inadequate** cybersecurity measures, such as insufficient network segmentation can make it easier for attackers to gain access.
- IT-centric approach to an OT environment, causing **mismatch** between vessel systems and equipment and their supporting software.



Source: OnSecurity.io
https://www.onsecurity.io/blog/offshore-drilling-rigs-vulnerable-to-cyber-attacks/

Existing Cyber Threats as of 2023

Marine infrastructure are vulnerable to a range of cyber threats due to their **interconnected and digitally controlled nature.**

These threats can have serious **economic, environmental, and safety implications.**

- RANSOMWARE ATTACKS
- SOCIAL ENGINEERING
- REMOTE ACCESS EXPLOITATION
- DATA LEAKAGE
- INSIDER THREATS
- INTELLECTUAL PROPERTY THEFT
- PHISHING
- SUPPLY CHAIN ATTACKS

Cybersecurity Fact of 2023

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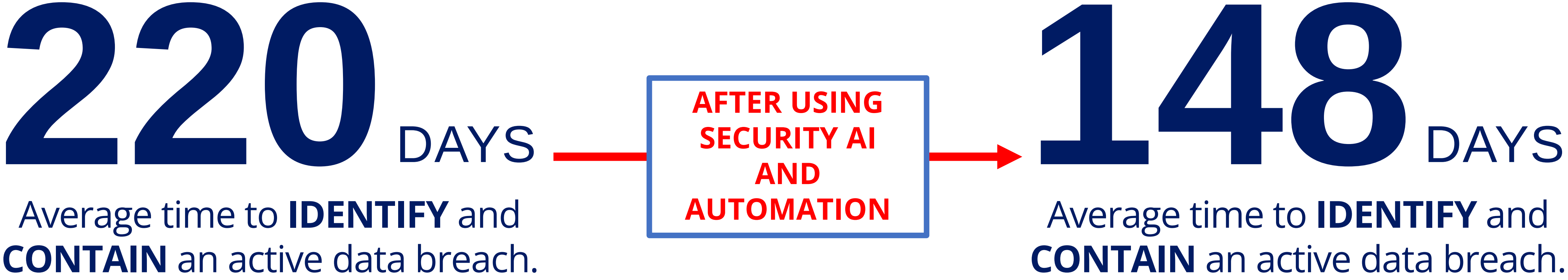


220 DAYS

Average time to **IDENTIFY** and **CONTAIN** an active data breach.

AFTER USING SECURITY AI AND AUTOMATION

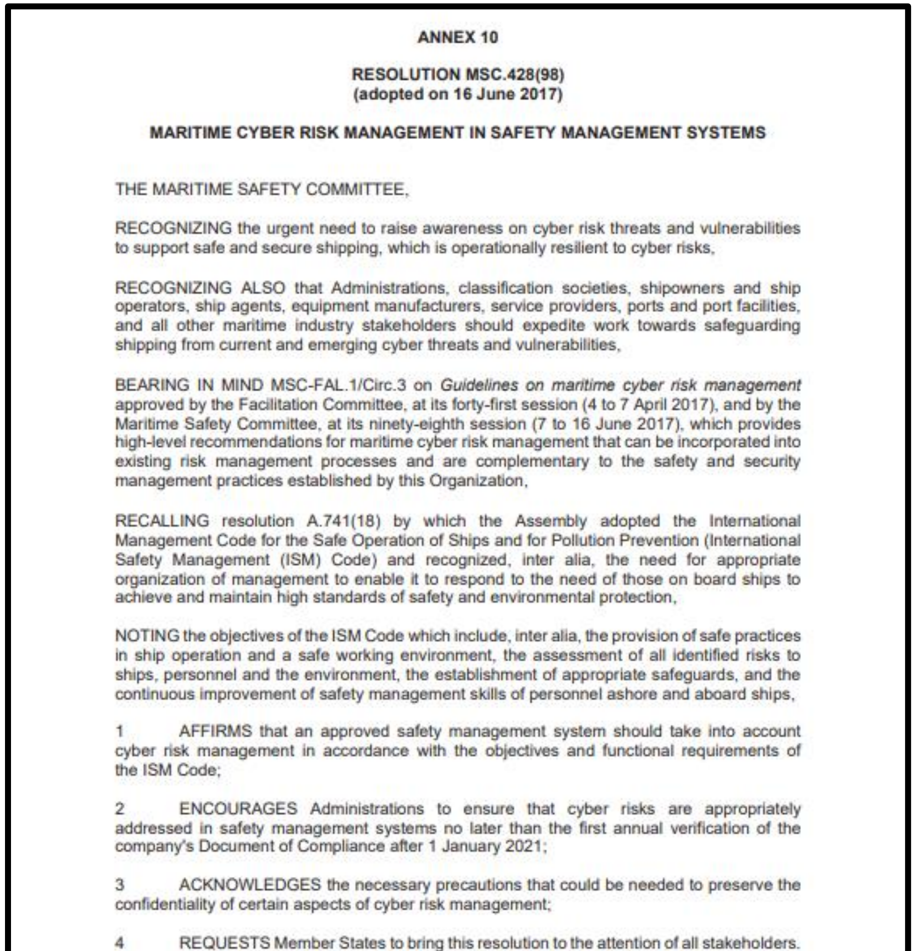
148 DAYS

Average time to **IDENTIFY** and **CONTAIN** an active data breach.

SOURCE: IBM REPORT 2023

Existing Marine Cybersecurity Framework

INTERNATIONAL MARITIME ORGANIZATION



ANNEX 10

RESOLUTION MSC.428(98)
(adopted on 16 June 2017)

MARITIME CYBER RISK MANAGEMENT IN SAFETY MANAGEMENT SYSTEMS

THE MARITIME SAFETY COMMITTEE,

RECOGNIZING the urgent need to raise awareness on cyber risk threats and vulnerabilities to support safe and secure shipping, which is operationally resilient to cyber risks,

RECOGNIZING ALSO that Administrations, classification societies, shipowners and ship operators, ship agents, equipment manufacturers, service providers, ports and port facilities, and all other maritime industry stakeholders should expedite work towards safeguarding shipping from current and emerging cyber threats and vulnerabilities,

BEARING IN MIND MSC-FAL.1/Circ.3 on *Guidelines on maritime cyber risk management* approved by the Facilitation Committee, at its forty-first session (4 to 7 April 2017), and by the Maritime Safety Committee, at its ninety-eighth session (7 to 16 June 2017), which provides high-level recommendations for maritime cyber risk management that can be incorporated into existing risk management processes and are complementary to the safety and security management practices established by this Organization,

RECALLING resolution A.741(18) by which the Assembly adopted the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management (ISM) Code) and recognized, inter alia, the need for appropriate organization of management to enable it to respond to the need of those on board ships to achieve and maintain high standards of safety and environmental protection,

NOTING the objectives of the ISM Code which include, inter alia, the provision of safe practices in ship operation and a safe working environment, the assessment of all identified risks to ships, personnel and the environment, the establishment of appropriate safeguards, and the continuous improvement of safety management skills of personnel ashore and aboard ships,

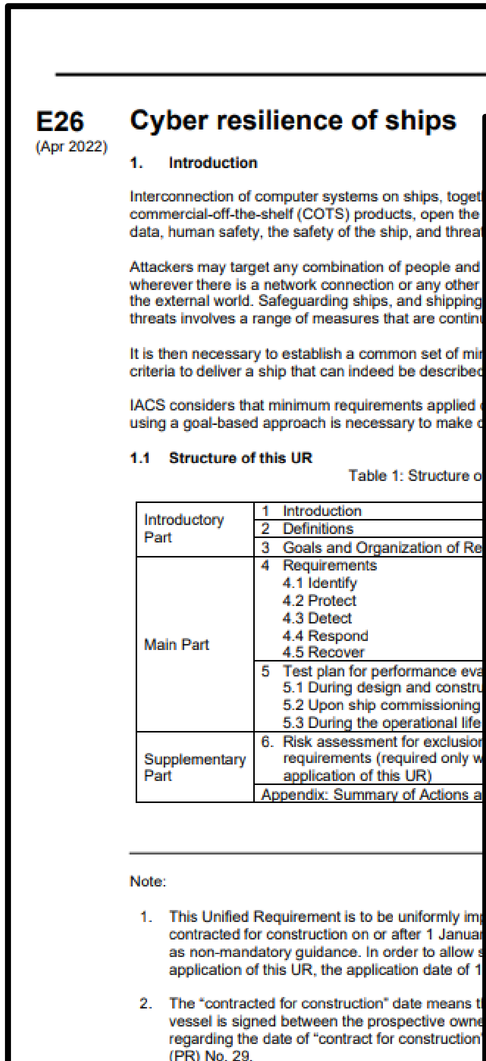
1 AFFIRMS that an approved safety management system should take into account cyber risk management in accordance with the objectives and functional requirements of the ISM Code;

2 ENCOURAGES Administrations to ensure that cyber risks are appropriately addressed in safety management systems no later than the first annual verification of the company's Document of Compliance after 1 January 2021;

3 ACKNOWLEDGES the necessary precautions that could be needed to preserve the confidentiality of certain aspects of cyber risk management;

4 REQUESTS Member States to bring this resolution to the attention of all stakeholders.

IACS International Association of Classification Societies



E26

E26 (Apr 2022) Cyber resilience of ships

1. Introduction

Interconnection of computer systems on ships, toget
commercial-off-the-shelf (COTS) products, open the
data, human safety, the safety of the ship, and threa

Attackers may target any combination of people and
wherever there is a network connection or any other
the external world. Safeguarding ships, and shipping
threats involves a range of measures that are contin

It is then necessary to establish a common set of mi
criteria to deliver a ship that can indeed be describe

IACS considers that minimum requirements applied
using a goal-based approach is necessary to make

1.1 Structure of this UR

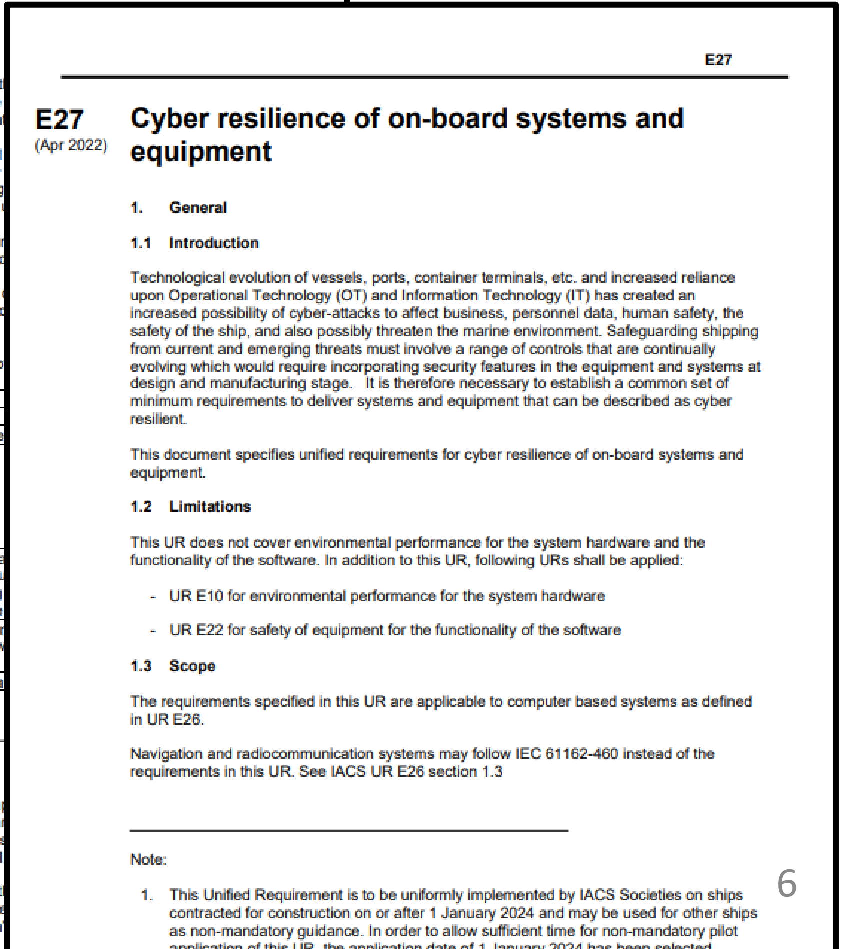
Table 1: Structure o

Introductory Part	1 Introduction
	2 Definitions
	3 Goals and Organization of Re
Main Part	4 Requirements 4.1 Identify 4.2 Protect 4.3 Detect 4.4 Respond 4.5 Recover
	5 Test plan for performance eva 5.1 During design and constru 5.2 Upon ship commissioning 5.3 During the operational life
Supplementary Part	6. Risk assessment for exclusio requirements (required only w application of this UR)
	Appendix: Summary of Actions a

Note:

1. This Unified Requirement is to be uniformly im
contracted for construction on or after 1 Janua
as non-mandatory guidance. In order to allow
application of this UR, the application date of 1

2. The "contracted for construction" date means t
vessel is signed between the prospective owne
regarding the date of "contract for construction
(PR) No. 29.



E27

E27 (Apr 2022) Cyber resilience of on-board systems and equipment

1. General

1.1 Introduction

Technological evolution of vessels, ports, container terminals, etc. and increased reliance upon Operational Technology (OT) and Information Technology (IT) has created an increased possibility of cyber-attacks to affect business, personnel data, human safety, the safety of the ship, and also possibly threaten the marine environment. Safeguarding shipping from current and emerging threats must involve a range of controls that are continually evolving which would require incorporating security features in the equipment and systems at design and manufacturing stage. It is therefore necessary to establish a common set of minimum requirements to deliver systems and equipment that can be described as cyber resilient.

This document specifies unified requirements for cyber resilience of on-board systems and equipment.

1.2 Limitations

This UR does not cover environmental performance for the system hardware and the functionality of the software. In addition to this UR, following URs shall be applied:

- UR E10 for environmental performance for the system hardware
- UR E22 for safety of equipment for the functionality of the software

1.3 Scope

The requirements specified in this UR are applicable to computer based systems as defined in UR E26.

Navigation and radiocommunication systems may follow IEC 61162-460 instead of the requirements in this UR. See IACS UR E26 section 1.3

Note:

1. This Unified Requirement is to be uniformly implemented by IACS Societies on ships contracted for construction on or after 1 January 2024 and may be used for other ships as non-mandatory guidance. In order to allow sufficient time for non-mandatory pilot application of this UR, the application date of 1 January 2024 has been selected

Existing Cyber Risk Mitigation

To achieve effective continuous cyber monitoring, a combination of technologies and strategies can be employed, maintaining operational integrity and safeguard against disruptions.

- Network intrusion and detection system (NIDS)
- Security orchestration, automation and response (SOAR)
- Security information and event management (SIEM) system
- Encryption and secure communication
- Endpoint protection
- Vulnerability assessment
- Anomaly Detection
- Security awareness training
- Multi-factor authentication
- Remote monitor and management

Source from: National Institute of Science and Technologies (NIST)

New Proposed Solution for Application

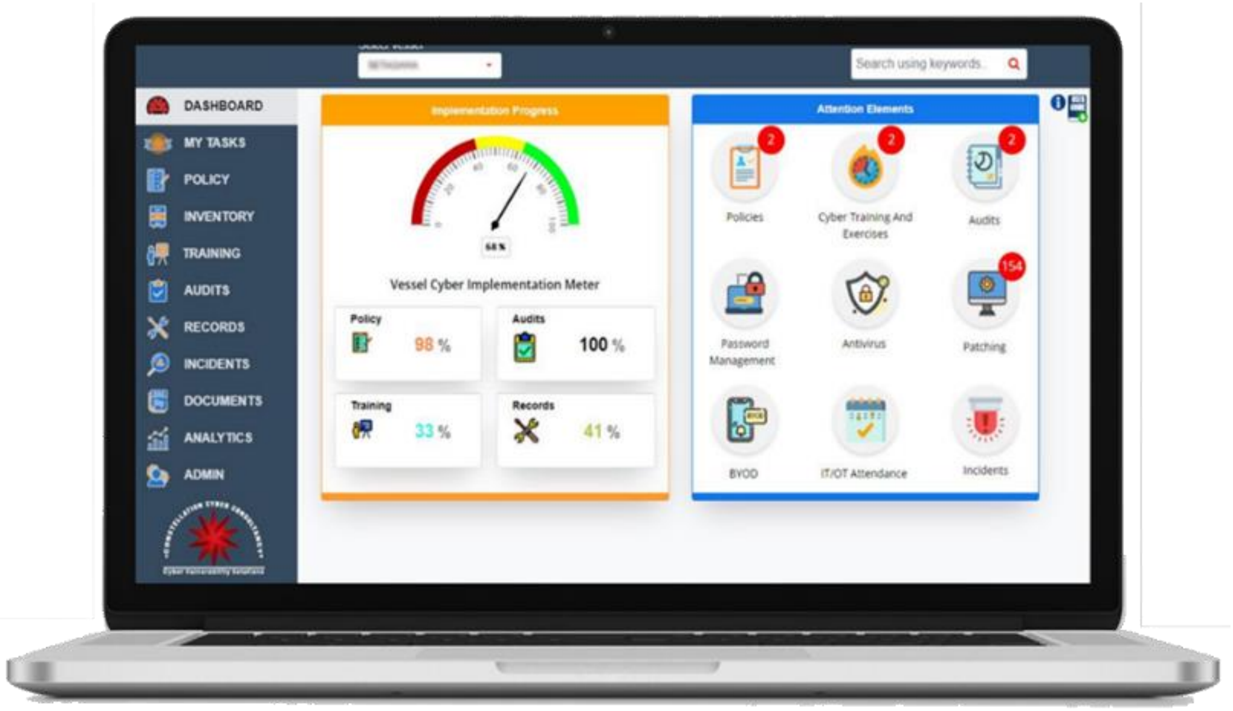
1. A system capable of **identifying, containing, eradicating, and recovering** from any security incident.

2. Integration of security information and event management platforms and other **external systems and tools.**

3. **Machine learning algorithm** for anomaly detection and behavioral analysis to identify any suspicious activities or potential security breaches.

4. Assesses an organization's assets, **evaluates their potential value**, and compares that value to potential dark web prices to estimate potential losses in case of a data breach or security incident.

The NEW platform for Continuous Cyber Compliance



CYBER SOLUTION WITH REAL TIME VISUALISATION OF COMPLIANCE ON BOARD

COMPLIANCE MONITORING

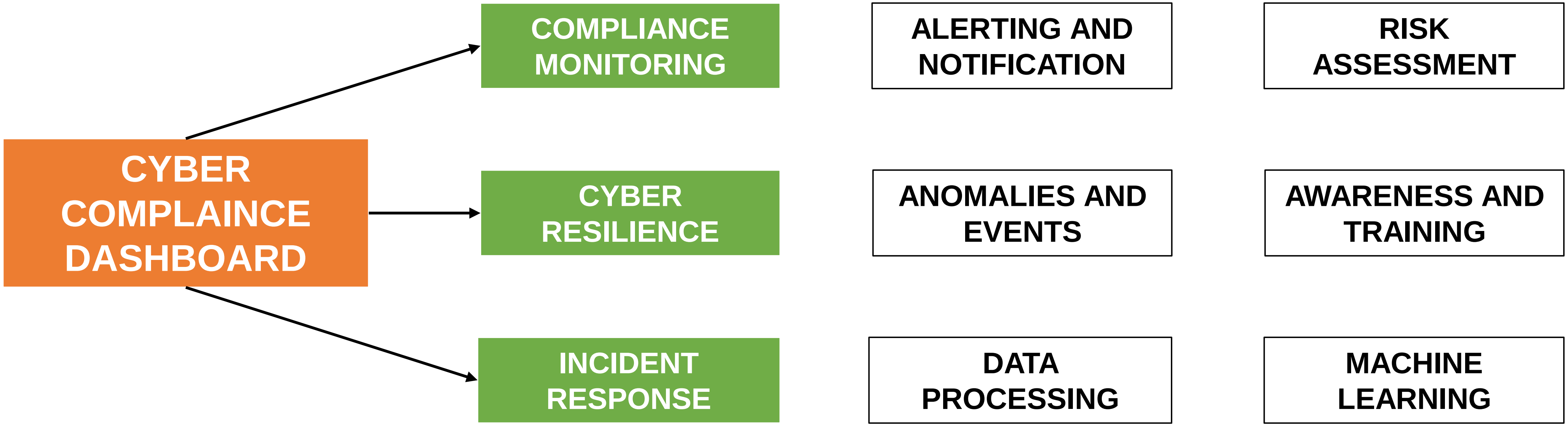
CYBERSECURITY ALERTS

REAL-TIME DATA PROCESSING

AWARENESS AND TRAINING

Potential Features of the Application

Assure compliance with up-to-date cybersecurity policies using a dedicated compliance monitoring solution to review the vessels assets' cybersecurity and governance.



Compliance Monitoring by the Cyber Application

- **Performance dashboard** with overview of compliance status, allowing stakeholders to monitor progress and make informed decisions.

- **Monitor network and system events** continuously to identify unusual patterns or behavior and Automated Solutions for Managing and Mitigating the event.

- **Flexibility in monitoring tool** to handle emergencies and unexpected events that could impact compliance and reputation, such as cybersecurity breaches.

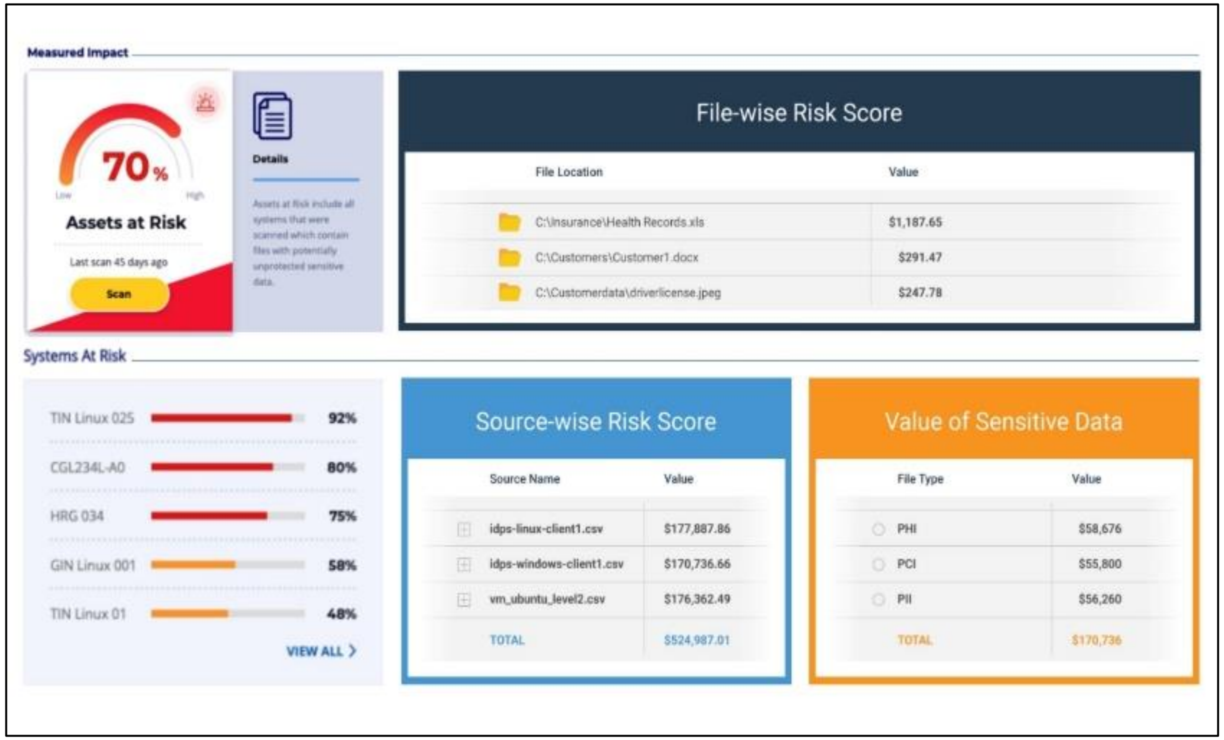
- **Machine Learning** for evaluating the cyber resilience of vessels in real-time through risk scoring, threat modeling, and gap analysis.

- **Priority based Alerting System** to indicate critical assets that needs to be addressed immediately during a breach.

Monetary-Value based File Evaluation

Raise awareness across the Board Management by **putting a “dollar” value on your files** and system by comparing your exposure in the digital space with the Dark Web.

- **Data classification system** categorize files into various tiers based on their value.
- **Value** of different types of data are based on factors like **sensitivity, rarity, and demand.**
- Set up tools to **regularly scan the dark web for mentions** of the organization's data or sensitive information.



Measured Impact

Assets at Risk

Last scan 45 days ago

Scan

Details

Assets at Risk include all systems that were scanned which contain files with potentially unprotected sensitive data.

File-wise Risk Score

File Location	Value
C:\Insurance\Health Records.xls	$1,187.65
C:\Customers\Customer1.docx	$291.47
C:\Customerdata\driverlicense.jpeg	$247.78

Systems At Risk

TIN Linux 025	92%
CGL234L-A0	80%
HRG 034	75%
GIN Linux 001	58%
TIN Linux 01	48%

VIEW ALL >

Source-wise Risk Score

Source Name	Value
idps-linux-client1.csv	$177,887.86
idps-windows-client1.csv	$170,736.66
vm_ubuntu_level2.csv	$176,362.49
TOTAL	$524,987.01

Value of Sensitive Data

File Type	Value
○ PHI	$58,676
○ PCI	$55,800
○ PII	$56,260
TOTAL	$170,736

Cybersecurity Awareness and Training

- Cybersecurity awareness and training for marine personnels are essential to mitigate the risks associated with cyber threats and attacks in these critical environments.
- Implementing cybersecurity awareness and training program tailored to the unique challenges of marine vessels can empower personnel to actively contribute to the cybersecurity posture of the rigs, reducing the risk of cyber incidents and operational disruptions.

REGULAR ASSESSMENT

SIMULATED PHISHING

PHYSICAL SECURITY

EMERGENCY RESPONSE

Benefits of using the Cyber Compliance Application

MAINTAINING REGULATORY COMPLIANCE.

The compliance tool can help ensure that the marine vessels are complying with regulations, avoid legal penalties, and improve the overall security of their critical systems and data.

MANAGING MULTIPLE MARINE VESSELS.

Using a network of sensors, Intrusion Detection Systems and AI-driven analytics, a company can constantly evaluate the digital infrastructure of several marine vessels in a single locations.

MONITORING THE SECURITY POSTURE.

Providing real-time data on the status of critical assets, such as their security vulnerabilities and risks, can ensure that the asset is operating in a compliant manner using latest frameworks.

Security vs. Usability Trade-off

- **Security:** High security involves stringent measures, such as complex encryption and restricted access to protect sensitive data and prevent unauthorized access.

- **Usability:** Focuses on making systems or interfaces easy to use and accessible to users with features like user-friendly interfaces and minimal steps required to complete a task.

SECURITY

USABILITY

The challenge is finding the right balance between security and usability.

HANDICAPS with the Compliance Application

- **Resource Constraints** - Limited resources, including power, bandwidth, and computational capacity
- **Data privacy and Compliance** - Legal and compliance challenges related to data privacy and data transfer across borders
- **Human error** - Employees or contractors' on-board marine vessels might inadvertently compromise security protocols.
- **Integration Complexity -** Integrating these systems and ensuring they work seamlessly together can be complex, causing compatibility issues and operational problems.
- **Cost Considerations -** Implementing and maintaining robust cybersecurity measures can be expensive

Advantages with the Compliance Application

- **Maintaining Reputation** - Effective measures for marine vessels to protect the organization's reputation by demonstrating a strong commitment to security and resilience.

- **Preventing Environmental Impact** - Protecting the integrity of marine vessels also reduces the risk of environmental incidents that could result from cyberattacks affecting critical systems.

- **Reduced Downtime** - Identification and response to security incidents can reduce downtime and operational disruptions caused by cyberattacks, ensuring uninterrupted operations.

- **Reduced Attack Surface** - Implementing strong security measures helps reduce the attack surface and limit potential entry points for attackers.

- **Employee Awareness** - Regular security training for employees help foster a cybersecurity-conscious culture, reducing the likelihood of human errors that can lead to breaches

Key Takeaway

- Identifying vulnerabilities in real-time allows marine vessels to proactively responding to threats and remediate before they escalate into major incidents.
- Continuous monitoring solutions are to be scalable and adaptable to evolving threats and asset landscapes by integrating various tools and technologies.
- The solution should be designed with the right balance between usability and security without affecting the overall performance.
- **Foster a culture of cybersecurity responsibility among all personnel involved in marine operations.**

Thank you

LINKEDIN PROFILE

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