

CYBERSECURITY LANDSCAPE AND THREATS TO MARITIME OPERATIONS

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Cybersecurity Advisor Program

Cybersecurity and Infrastructure Security Agency



CISA Mission and Vision

Cybersecurity and Infrastructure Security Agency (CISA)

Mission:

- Lead the collaborative national effort to strengthen the security and resilience of America's critical infrastructure

Vision:

- A Nation with secure, resilient, and reliable critical infrastructure upon which the American way of life can thrive



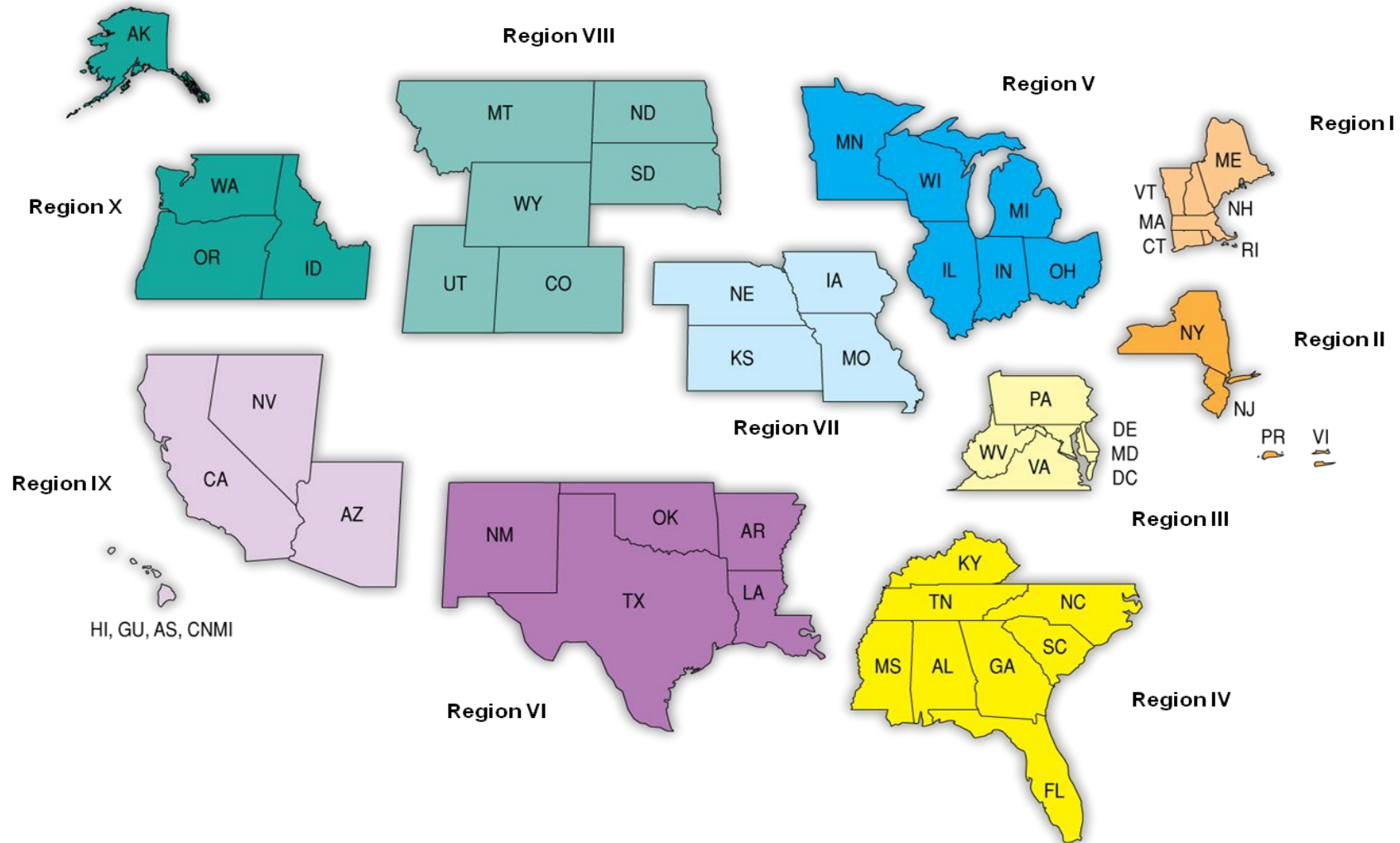
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CYBERSECURITY ADVISOR PROGRAM

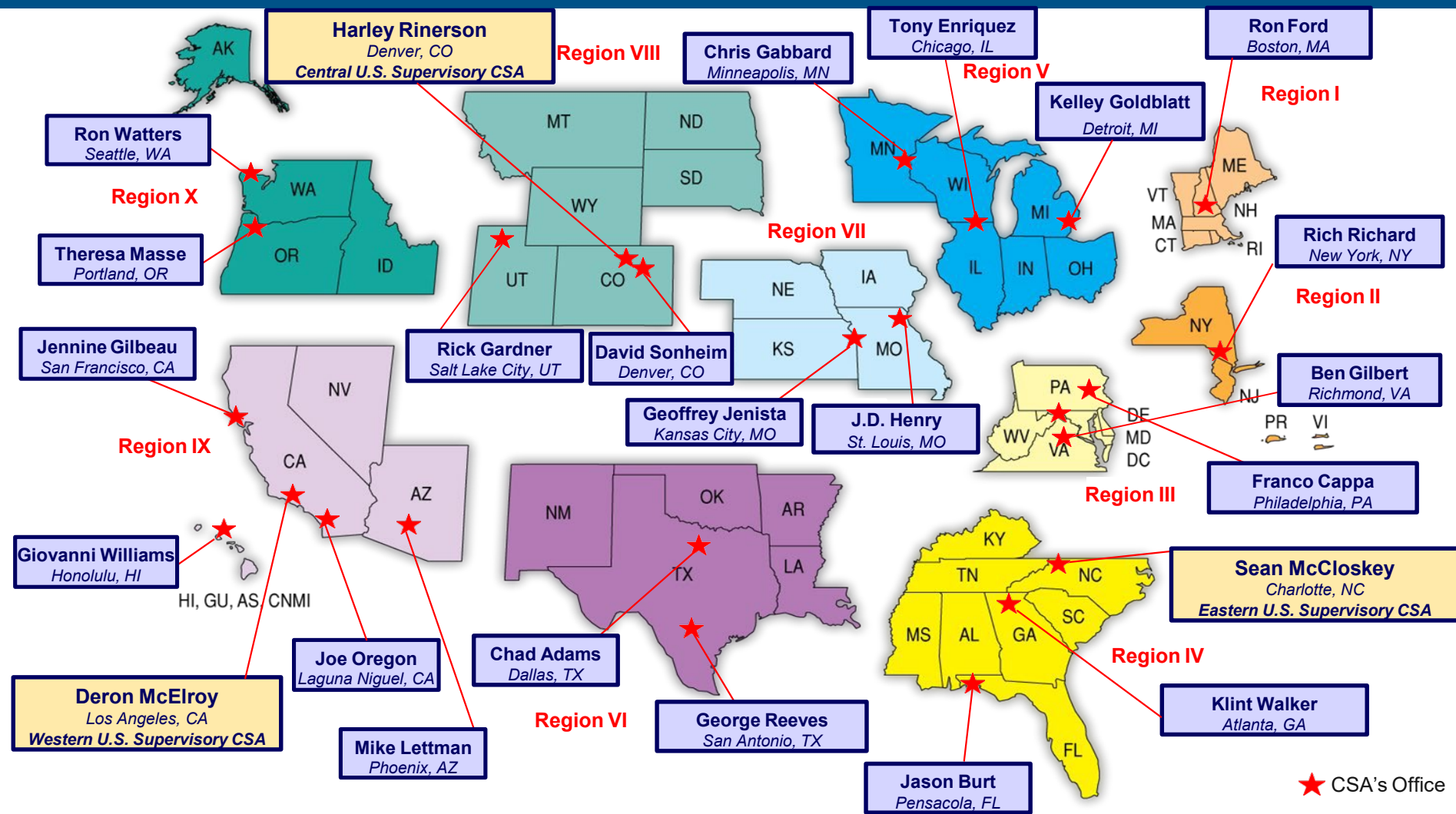


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CSA Regionally Deployed Personnel



CSA Regionally Deployed Personnel



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Serving Critical Infrastructure

KEY ACTIVITIES:



16 CRITICAL INFRASTRUCTURE SECTORS:



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CYBER THREATS



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Today's Risk Landscape

America remains at risk
from a variety of threats:



ACTS OF TERRORISM



CYBER ATTACKS



EXTREME WEATHER



PANDEMICS



ACCIDENTS
OR TECHNICAL
FAILURES

PORT FACILITY

CYBERSECURITY RISKS

Port Components at Risk

- 1 Facility Access**

The degradation or disruption of systems used to identify and direct cargo, truck drivers, and facility personnel can cause significant congestion or the closure of the terminal until systems restoration is complete.
- 2 Terminal Headquarters – Data**

Malicious actors may access information systems within the terminal in order to access sensitive client and cargo information. Malicious actors may also attempt to use this information to steal cargo or smuggle illicit cargo through the terminal.
- 3 Terminal Headquarters – Ransomware**

The manipulation or destruction of data, most commonly seen in ransomware attacks, can disrupt operations within a facility until systems and data can be restored from reliable, isolated backups. Previous attacks have resulted in facilities being partially or completely offline for days, resulting in significant business losses.
- 4 Operational Technology (OT) Systems**

OT Systems – systems, devices, and communications links used to control physical processes at ports, including cargo handling equipment and pumps – are being increasingly incorporated into maritime facilities. The compromise of OT systems could cause changes to cargo movements, interrupt port operations, and cause physical damage to equipment and safety risks for personnel.
- 5 Positioning, Navigation, and Timing (PNT)**

Position, Navigation, and Timing is pervasive throughout the Maritime subsector, and plays an essential role in many maritime functions such as vessel navigation and port logistics. Loss of PNT services would disrupt vessel movements in the port and complex logistics systems at port facilities. Loss of PNT could also lead to collisions and allisions, resulting in potential damage to fixed infrastructure, pollution, release of hazardous material, fires, loss of life, vessel sinking, and blocking of a navigable channel.
- 6 Vessel**

Compromised systems aboard a vessel or inside a port facility could lead to the compromise of additional waterside or landside systems. Interconnectivity between berthed vessels and maritime facilities through the sharing of Wi-Fi, network connections, USB storage devices, etc. can lead to system compromises that otherwise may not have occurred.



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MARITIME CYBER INCIDENTS

29 Sept 2020 – **Ransomware Attack** – Four largest Maritime Shipping companies attacked since 2017

- 2020 – French shipping co CMA CGM – **Ransomware**; Mediterranean Shipping Company – **Malware**;
- 2018 – COSCO – **Ransomware**; 2017 – APM Maersk – **NotPetya Ransomware/wiper**

30 Dec 2020 – **Maritime Industry on high alert** – Managing Director, Global Maritime Consultants Group (CMCG)

- “The maritime industry will remain a target of cyber-criminals in 2021 and the world’s shipping fleets will need to be on high alert for cyber-attacks as the industry recovers from the damage caused by the global pandemic.”
- “The recent cyber-attacks on companies such as Google demonstrate the sophistication and capabilities of many of the cyber-criminals who have set their sights on the maritime sector.”

2 Jun 2021 – **Ransomware Attack** – Massachusetts Steamship Authority

- Travel delays experienced due to attack on Steamship Authority’s website.
- Website offline for > 7 days; affecting routes to Martha’s Vineyard and Nantucket

Carnival Cruise Lines – Attacked 3 times; Norwegian Cruise Line hit by Ransomware – Dec 2020

Sources:

<https://www.securityweek.com/ransomware-attack-hits-nantucket-marthas-vineyard-ferry-service>

<https://www.dailymail.co.uk/news/article-9646583/China-hacked-MTA-failed-control-NY-subway-Ransomware-cripples-Marthas-Vineyard-ferry.html>

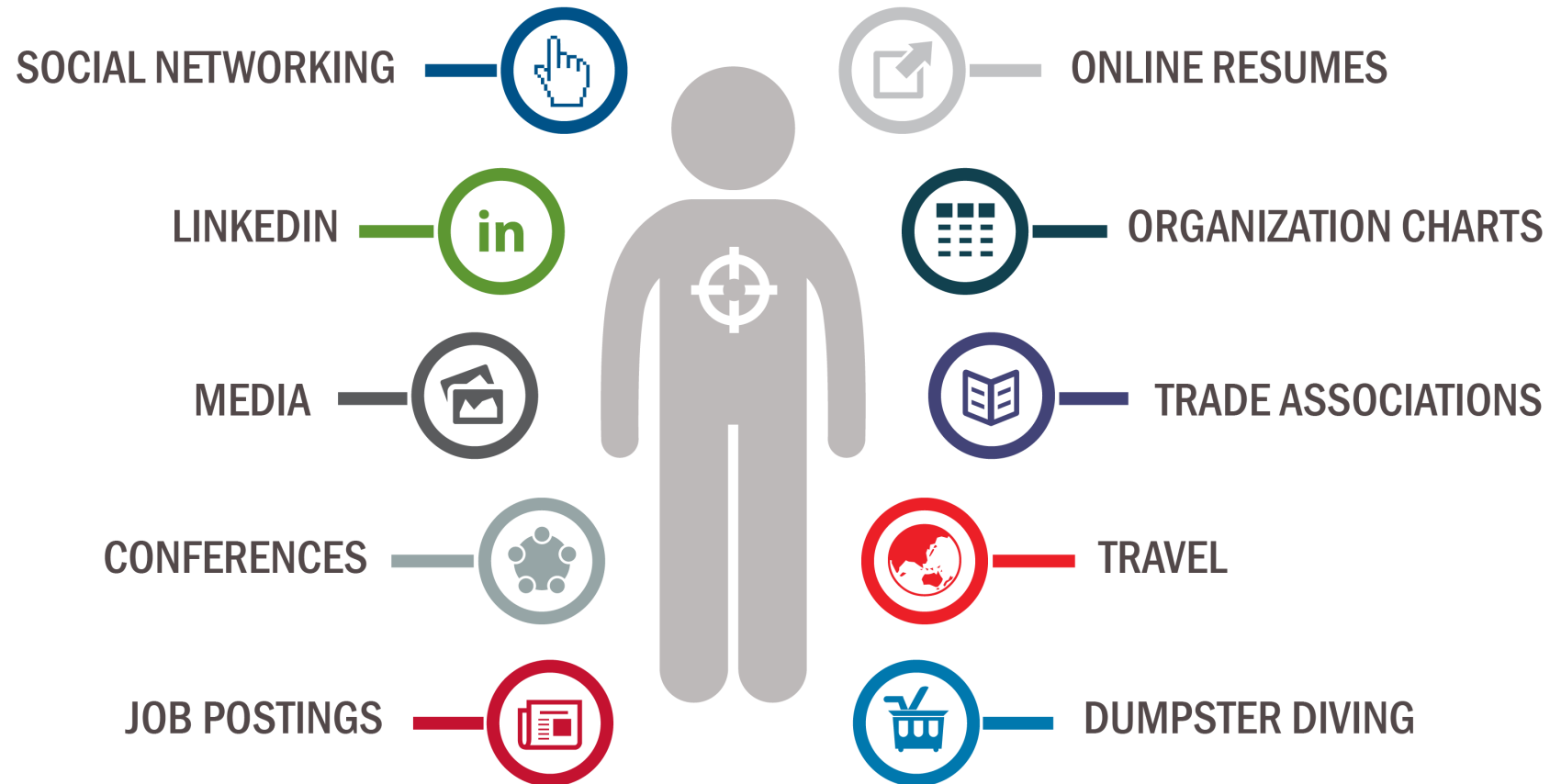
<https://seanews.co.uk/security/cyber-security/cybersecurity-will-remain-a-maritime-threat-in-2021/>

<https://www.zdnet.com/article/all-four-of-the-worlds-largest-shipping-companies-have-now-been-hit-by-cyber-attacks/>



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HOW ARE **YOU** TARGETED?



Social Engineering Red Flags



FROM

- I don't recognize the sender's email address as someone I **ordinarily communicate with**.
- This email is from **someone outside my organization and it's not related to my job responsibilities**.
- This email was sent from **someone inside the organization** or from a customer, vendor, or partner and is **very unusual or out of character**.
- Is the sender's email address from a **suspicious domain** (like micorsoft-support.com)?
- I **don't know the sender personally** and they were **not vouched for** by someone I trust.
- I **don't have a business relationship** nor any past communications with the sender.
- This is an **unexpected or unusual email** with an **embedded hyperlink** or an **attachment** from someone I haven't communicated with recently.



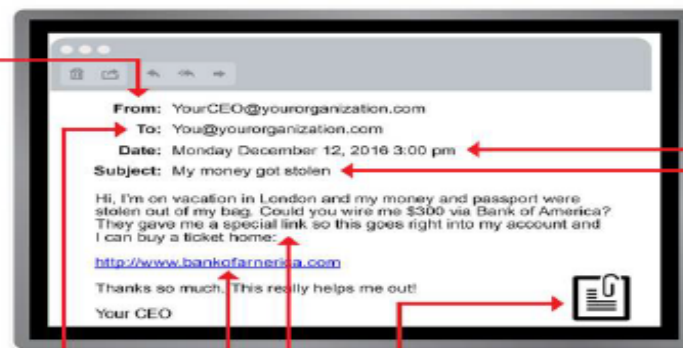
TO

- I was cc'd on an email sent to one or more people, but I **don't personally know** the other people it was sent to.
- I received an email that was also sent to an **unusual mix of people**. For instance, it might be sent to a random group of people at my organization whose last names start with the same letter, or a whole list of unrelated addresses.



HYPERLINKS

- I hover my mouse over a hyperlink that's displayed in the email message, but the **link-to address is for a different website**. (This is a **big red flag**.)
- I received an email that only has **long hyperlinks with no further information**, and the rest of the email is completely blank.
- I received an email with a **hyperlink that is a misspelling** of a known web site. For instance, www.bankofamerica.com — the "m" is really two characters — "r" and "n."



DATE

- Did I receive an email that I normally would get during regular business hours, but it was **sent at an unusual time** like 3 a.m.?



SUBJECT

- Did I get an email with a subject line that is **irrelevant** or **does not match** the message content?
- Is the email message a reply to something I **never sent or requested**?



ATTACHMENTS

- The sender included an email attachment that I **was not expecting** or that **makes no sense** in relation to the email message. (This sender doesn't ordinarily send me this type of attachment.)
- I see an attachment with a possibly **dangerous file type**. The only file type that is **always safe to click on is a .txt file**.



CONTENT

- Is the sender asking me to click on a link or open an attachment to **avoid a negative consequence** or to **gain something of value**?
- Is the email **out of the ordinary**, or does it have **bad grammar** or **spelling errors**?
- Is the sender asking me to click a link or open up an attachment that **seems odd or illogical**?
- Do I have an **uncomfortable gut feeling** about the sender's request to open an attachment or click a link?
- Is the email asking me to look at a **compromising or embarrassing picture** of myself or someone I know?

Especially under the prevailing conditions – Always Pause and Ask:

Is this message expected?

Do I recognize the sender of this email?

Is there something odd about the email address?

Verify the email address/domain by hovering the cursor over an email address or embedded link, without clicking; the actual destination appears in a text box or bubble.

Is there a needlessly urgent call to action in the email?

Is the action sought odd or unfamiliar?

Are my network access credentials requested after clicking to open a link?

NEVER enter user name and password in these circumstances!

Be Attentive – and Protect Yourself and the Network



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PHISHING EXAMPLE #1

To: <Stakeholder List>

From: Apples Customer Relations <freeapplesforyou@apple.org>

Subject: Free iPad – Just Complete a Survey!

Want the new iPad or iPad Mini? I got mine free from this site: <https://apple.com/giveaway> !!!!!

We would like to invite you to be part of a brand new pilot program to get our new product in the hands of users before official release. This assures that any issues or errors are mitigated before the release.

If you are accept to participate in this programall we ask is that you submit a survey at the end of the Pilot. You be able to keep iPad at the end for free!

Apples Customer Relationships Office

Apples Campus, Cupertino, California 95114



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PHISHING EXAMPLE #2

To: <Stakeholder List>
From: OBRM <OBRM@organization.org>
Subject: Future Budget Plans

In the coming weeks, our state's leadership will be working to draft a plan to prevent long term financial issues and ways to avoid human resource reductions. All departments within the State Government are being directed to draft a plan to help meet projected budget shortages and find ways to reduce spending within the State Government.

We have been asked to work more efficiently with less. As a result, many budgets and programs are also facing significant reduction. The Office of Budget and Resource Management has developed a draft plan that will address any potential budget shortcomings.

To learn more about the budget and how your program maybe affected, please visit <https://www.organization.org/budget>

If you have any questions or concerns, we'd love to hear them. Please emails us here budget@organization.org

Office of Budget and Resource Management



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OPERATIONAL RISK & CYBER RESILIENCY

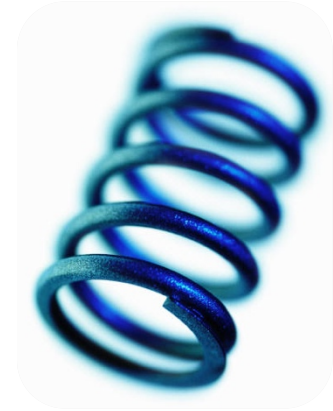


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Resilience Defined

“... the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents...”

- Presidential Policy Directive 21
February 12, 2013



Protect (Security)	Sustain (Continuity)
Perform (Capability)	Repeat (Maturity)



Emergent Property of Operational Resilience

- The **emergent property** of infrastructure requires an entity to
 - Prevent disruptions from occurring and
 - Respond quickly and recover from disruptions in its most critical business processes.
- Emergent property of operational resilience is essential to critical infrastructure.



What Is An Emergent Property?

- Consider your health.
 - How do you become healthy?
 - Can you buy good health?
 - Can you “manufacture” good health?
- *Good health* and *resilience* are both emergent properties.
- They develop – or emerge – from what we do.



Operational Resilience in Practice

Operational resilience emerges from what we do, such as:

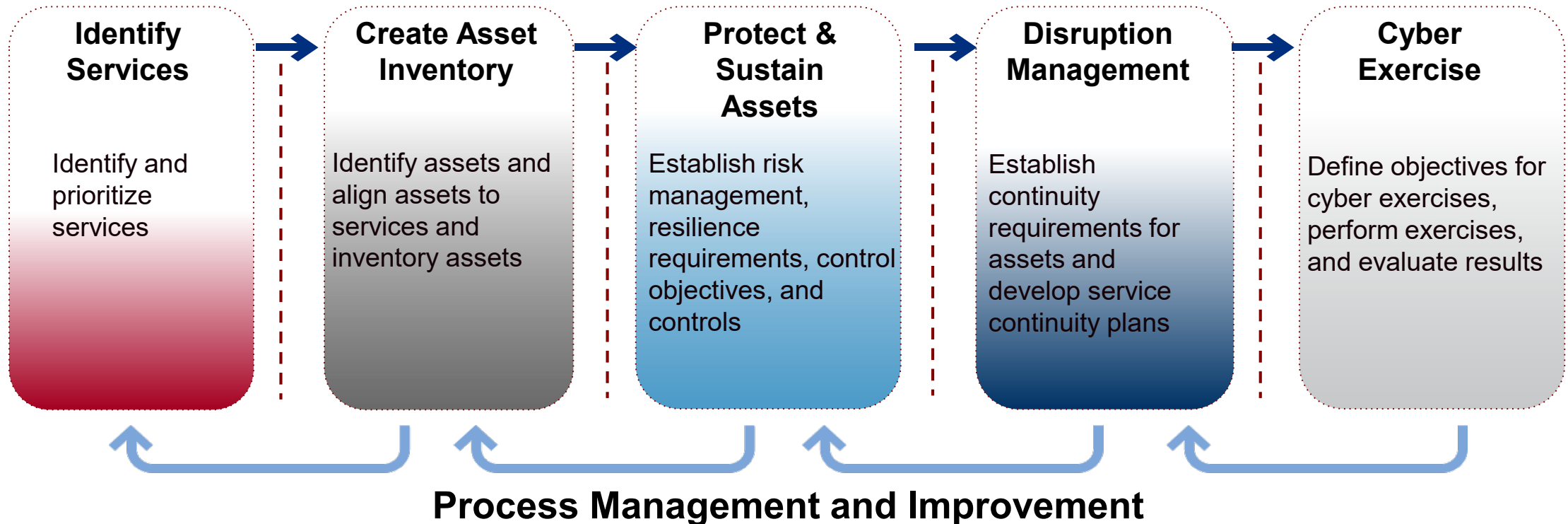
- Identifying and mitigating risks,
- Planning for and managing vulnerabilities and incidents,
- Performing service-continuity processes and planning,
- Managing IT operations,
- Managing, training, & deploying people,
- Protecting and securing important assets, and
- Working with external partners.



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Working toward Cyber Resilience

Follow a framework or general approach to cyber resilience.
One successful approach includes:



CISA CYBER SERVICES



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Criticality of Periodic Assessments

- Periodic assessments are essential for resilience
- Can't protect if you don't know what needs protection
- Can't fix what needs if you don't know what's wrong



Protected Critical Infrastructure Information Program

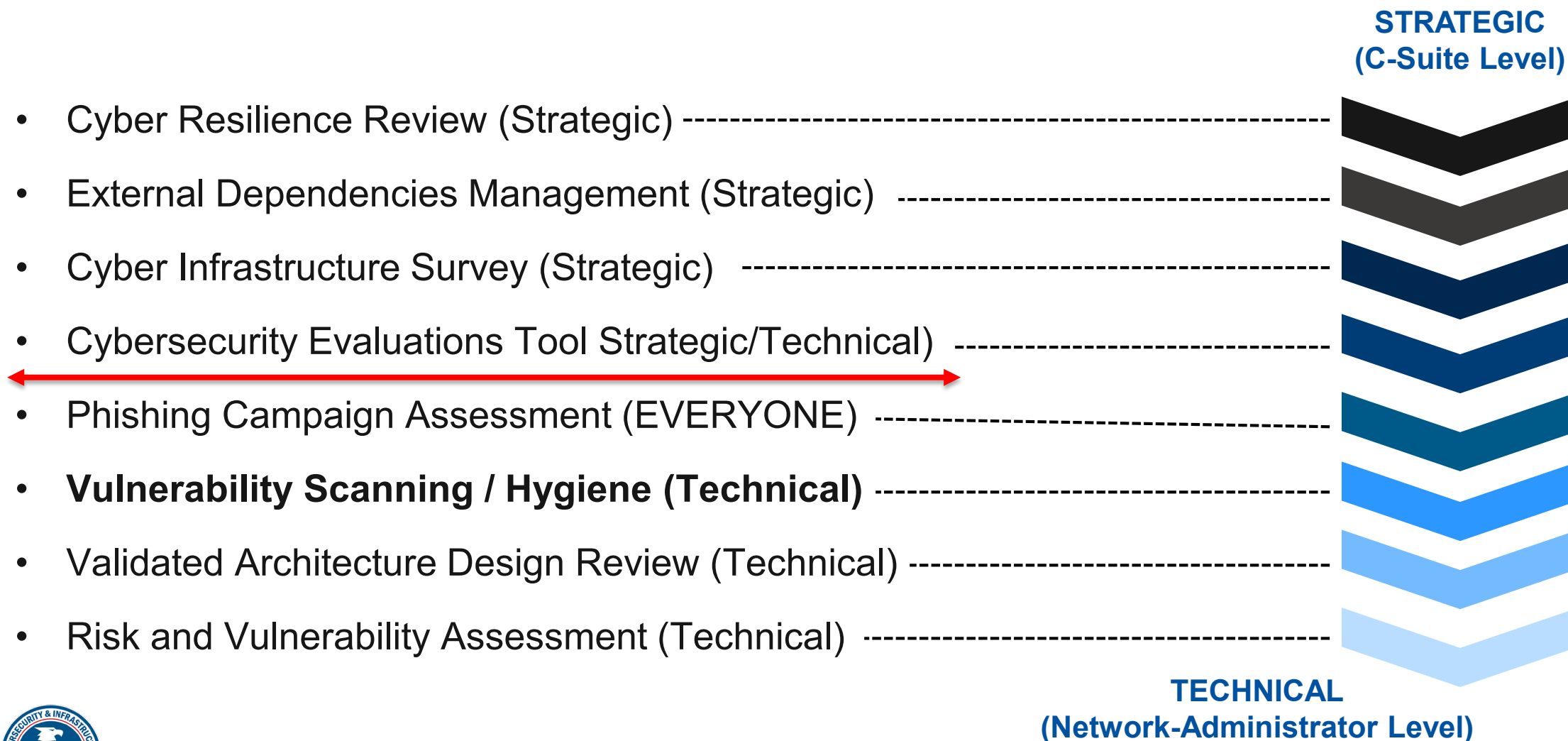
Protected Critical Infrastructure Information (PCII) Program Guards Your Information

- Sensitive critical infrastructure information voluntarily given to CISA is protected by law from
 - Public release under Freedom of Information Act requests,
 - Public release under State, local, tribal, or territorial disclosure laws,
 - Use in civil litigation and
 - Use in regulatory purposes.



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Range of Cybersecurity Services



TECHNICAL
(Network-Administrator Level)

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VULNERABILITY SCANNING / HYGIENE



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Vulnerability Scanning / Hygiene

Purpose: Assess Internet-accessible systems for known vulnerabilities and configuration errors.

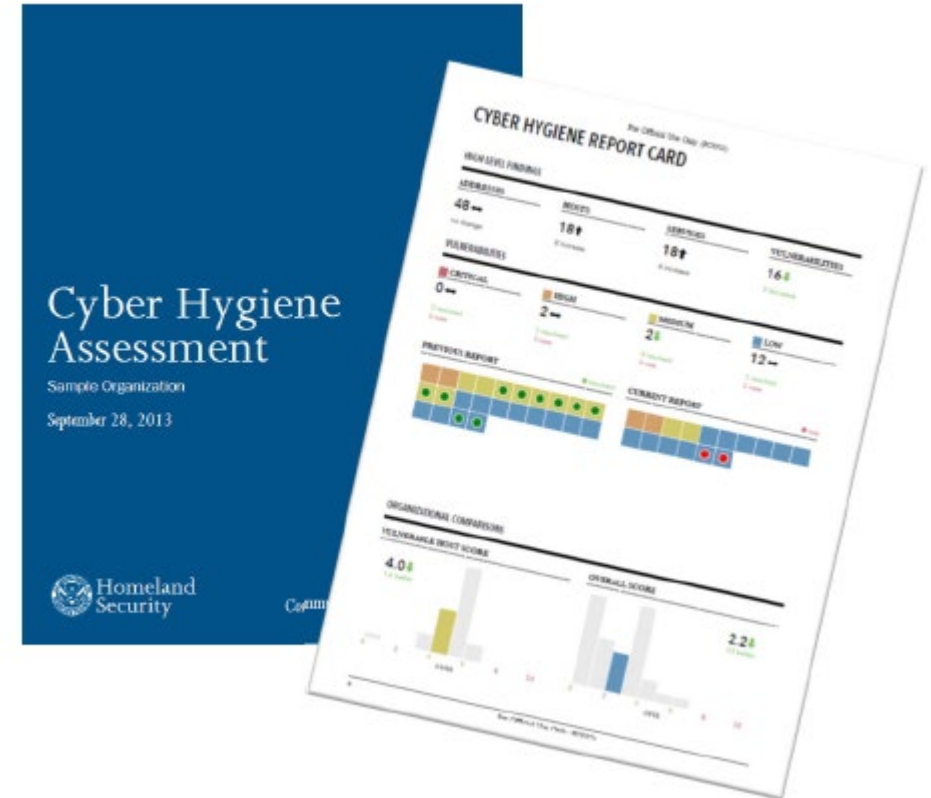
Delivery: Identify public-facing Internet security risks, through service enumeration and vulnerability scanning online by CISA.

Benefits:

- Continual review of system to identify potential problems
- Weekly reports detailing current and previously mitigated vulnerabilities
- Recommended mitigation for identified vulnerabilities

Network Vulnerability & Configuration Scanning:

- Identify network vulnerabilities and weakness



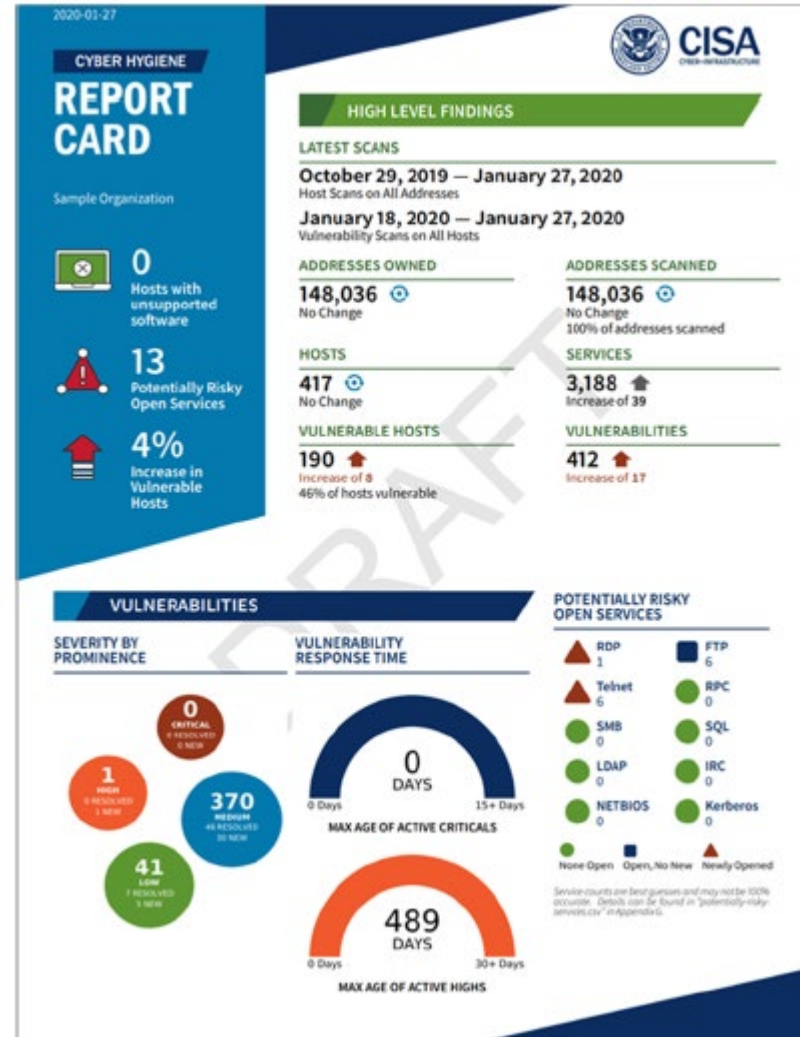
Cyber Hygiene Report Card

High Level Findings

- Latest Scans
- Addresses Owned
- Addresses Scanned
- Hosts
- Services
- Vulnerable Hosts
- Vulnerabilities

Vulnerabilities

- Severity by Prominence
- Vulnerability Response Time
- Potentially Risky Open Services



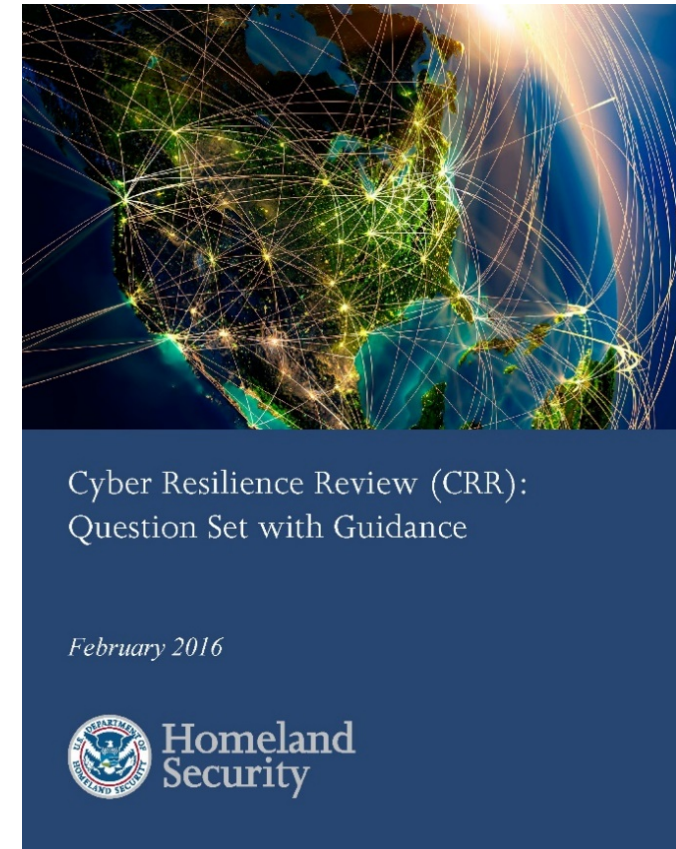
CYBER RESILIENCE REVIEW



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Cyber Resilience Review

- **Purpose:** Evaluate operational resilience and cybersecurity practices of critical services.
- Delivery: Either
 - CSA-facilitated, or
 - Self-administered
- Benefits include: Helps public and private sector partners understand and measure cybersecurity capabilities as they relate to operational resilience and cyber risk

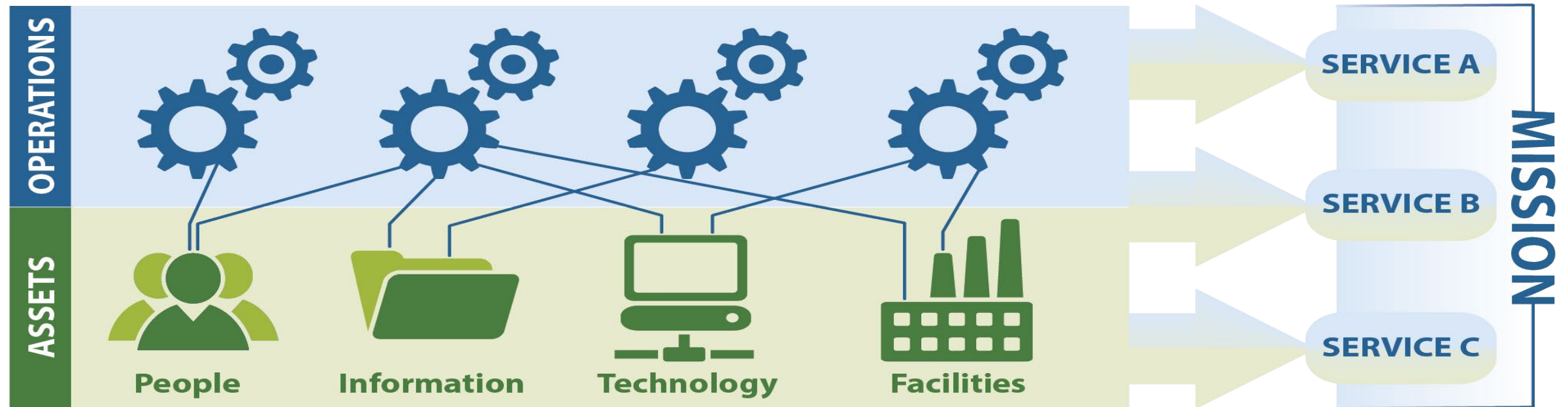


CRR Question Set & Guidance

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Critical Service Focus

Organizations use **assets (people, information, technology, and facilities)** to provide operational **services** and accomplish **missions**.



Cyber Resilience Review Domains

Asset Management

Know your assets being protected & their requirements, e.g., CIA

Configuration and Change Management

Manage asset configurations and changes

Controls Management

Manage and monitor controls to ensure they are meeting your objectives

External Dependencies Management

Know your most important external entities and manage the risks posed to essential services

Incident Management

Be able to detect and respond to incidents

Risk Management

Know and address your biggest risks that considers cost and your risk tolerances

Service Continuity Management

Ensure workable plans are in place to manage disruptions

Situational Awareness

Discover and analyze information related to immediate operational stability and security

Training and Awareness

Ensure your people are trained on and aware of cybersecurity risks and practices

Vulnerability Management

Know your vulnerabilities and manage those that pose the most risk

For more information: <http://www.us-cert.gov/ccubedvp>

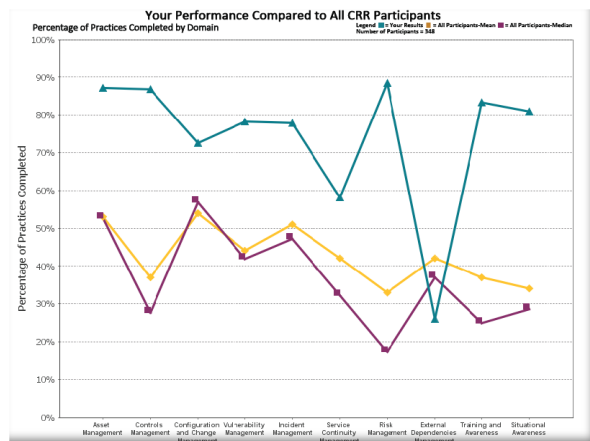


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CRR Sample Report



Each CRR report includes:



Comparison data with
other CRR participants
**facilitated only*



A summary “snapshot”
graphic, related to the **NIST
Cyber Security Framework**.

Domain performance of
existing cybersecurity
capability and options for
consideration for all responses

DOMAIN 1: ASSET MANAGEMENT

Goal	ML-1	ML-2	ML-3	ML-4	ML-5						
G1	G2	G3	G4	G5	G6	G7	T1	T2	T3	T4	T5

The purpose of Asset Management (AM) is to identify, document, and manage assets during their life cycle to ensure sustained productivity to support critical services. There are seven goals in Asset Management:

- Goal 1 - Identify & prioritize critical services
- Goal 2 - Inventory assets, and establish the authority and responsibility for these assets
- Goal 3 - Establish the relationship between assets and the services they support
- Goal 4 - Manage the asset inventory
- Goal 5 - Manage access to assets
- Goal 6 - Prioritize & manage information assets
- Goal 7 - Prioritize & manage facility assets

The following contains questions asked during the CRR for each goal in the Asset Management domain, and your organization's response to these questions. In cases where the response is noted as "Incomplete" or "No", there is an accompanying Option for Consideration addressing that question.

Goal 1 - Identify & prioritize critical services

1. Are critical services identified? [SC.SG2.SP1] Yes

2. Are critical services prioritized based on analysis of potential impact if these services are disrupted? [SC.SG2.SP1] Incomplete

Q2 CERT-RMM Reference: [SC.SG2.SP1] Identify and prioritize critical services, associated assets, and activities. A fundamental risk management principle is to focus on activities to protect and sustain services and assets that most directly affect the organization's ability to achieve its mission.
Additional Reference: NIST SP 800-34, Revision 1 "Contingency Planning Guide for Federal Information Systems" (pages 15-18)

Goal 2 - Inventory assets, and establish the authority and responsibility for these assets

1. Are the assets that directly support the critical service inventoried? [ADM.SG1.SP1]

Asset Type	Inventory
People	Incomplete
Information	Incomplete
Technology	Incomplete
Facilities	Yes

Q1 CERT-RMM Reference: [ADM.SG1.SP1] Identify and inventory critical assets. An organization must be able to identify its critical assets, document them, and establish their value in order to develop strategies for protecting and sustaining assets commensurate with their value to the services they support.
Additional Reference: NIST SP 800-18, Revision 1, "Guide for Developing Security Plans for Federal Information Systems" (pages 2-3)



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EXTERNAL DEPENDENCIES MANAGEMENT ASSESSMENT



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EDM Assessment Organization and Structure

- ☐ Structure and scoring similar to Cyber Resilience Review
- ☐ Uses one Maturity Indicator Level (MIL) scale with three lifecycle domains.

Relationship Formation

Assesses whether the acquirer evaluates and controls the risks of relying on external entities before entering into relationships with them.

Relationship Management and Governance

Assesses whether the acquirer manages ongoing relationships to maintain the resilience of the critical service, and mitigate dependency risk.

Service Protection and Sustainment

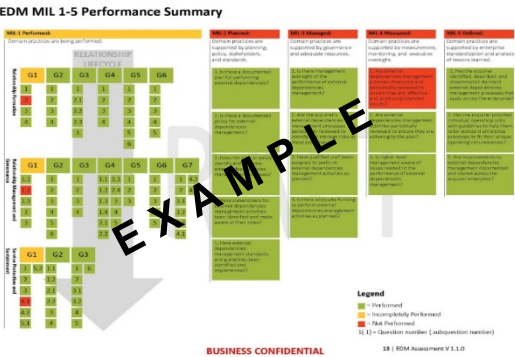
Assesses whether the acquirer accounts for its dependence on external entities as part of its operational activities around managing incidents, disruptions, and threats.



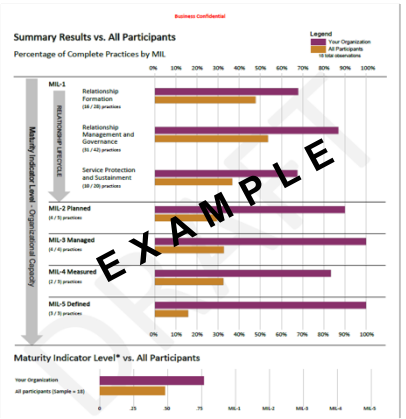
EDM Assessment Report

Each EDM report includes:

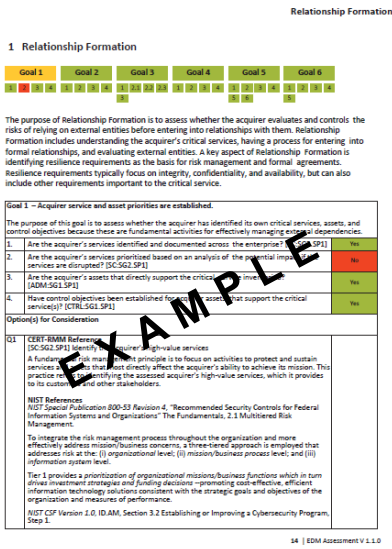
- Performance summary of existing capability managing external dependencies



- Comparison data with other EDM participants



- Sub-domain performance of existing capability managing external dependencies and options for consideration for all responses



CYBER INFRASTRUCTURE SURVEY



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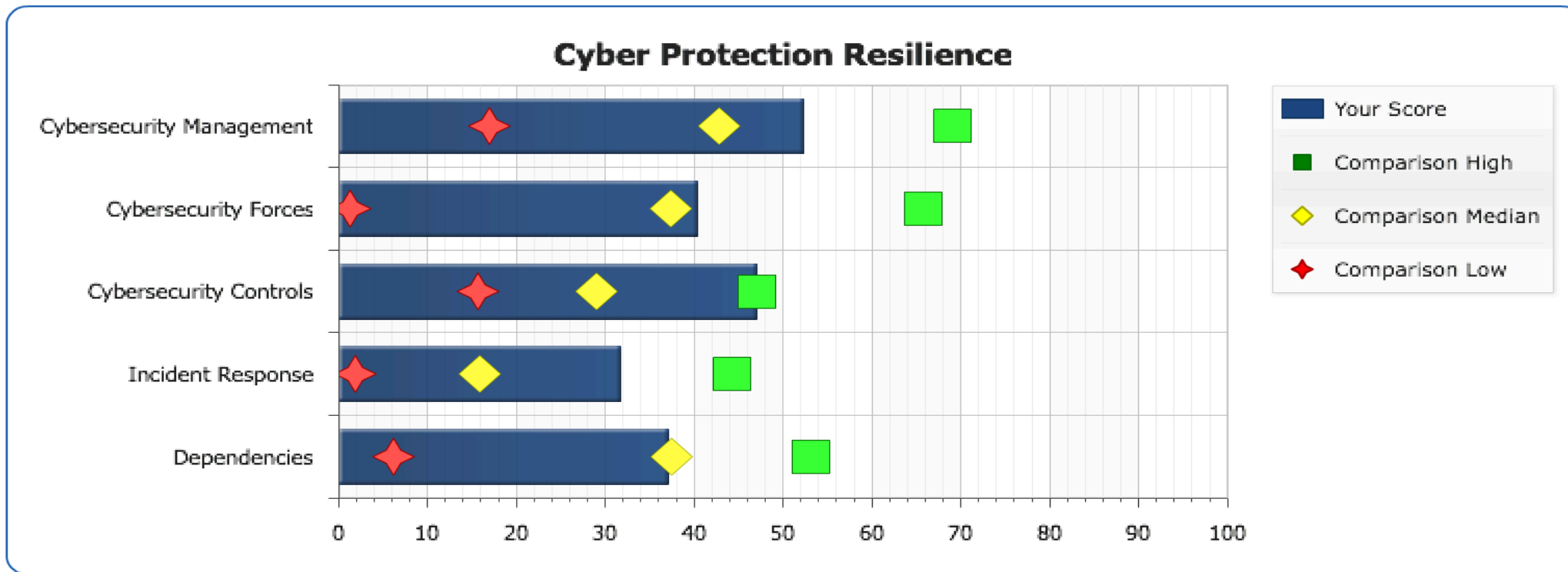
Cyber Infrastructure Survey (CIS)

- Purpose: Evaluate security controls, cyber preparedness, overall resilience.
- Delivery: CSA-facilitated
- Benefits:
 - Effective assessment of cybersecurity controls in place for a critical service,
 - Easy-to-use interactive dashboard to support cybersecurity planning and resource allocation.

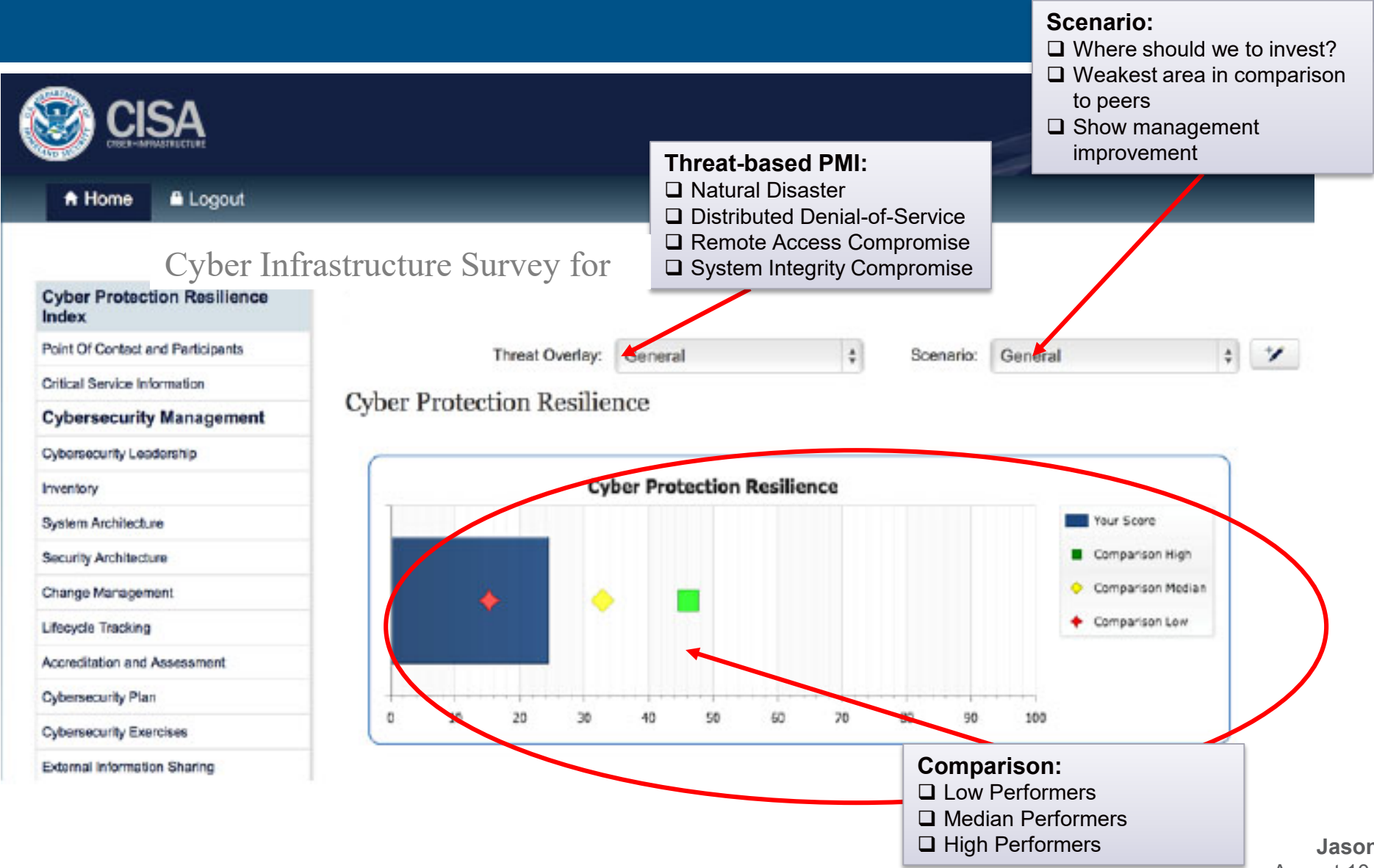


CIS Dashboard - Comparison

- Shows the low, median, and high performers
- Compares your organization to the aggregate

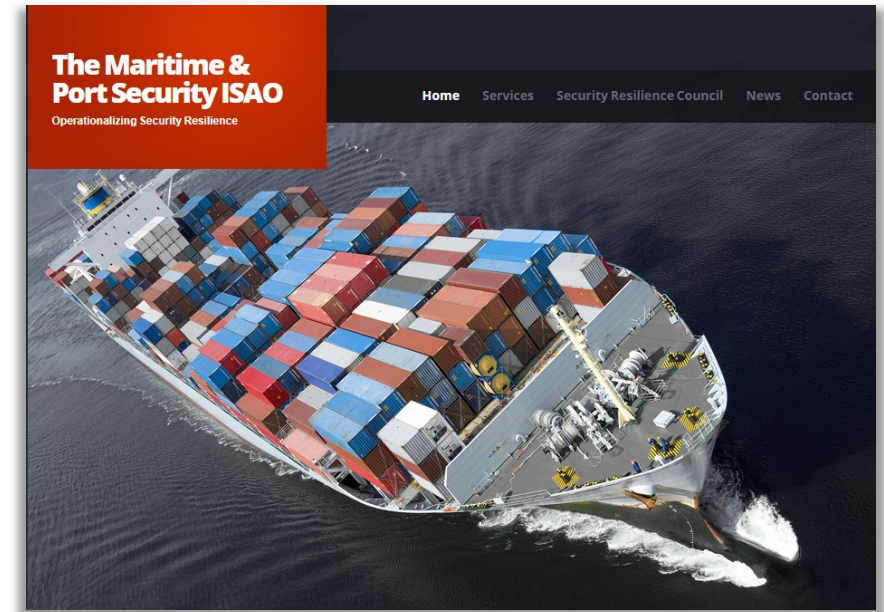


Example of CIS Dashboard



MARITIME CYBERSECURITY RESOURCES

- Port and Maritime Cyber Resilience
www.mpsisao.org
- CISA National Cyber Awareness System
<https://us-cert.cisa.gov/ncas>
- CISA - Stop Ransomware Campaign
<https://www.cisa.gov/stopransomware>
- CISA – Port Facility Cyber Risks
<https://www.cisa.gov/publication/port-facility-cybersecurity-risks>



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Contact



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