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Objectives and Approach

Objective: To help critical infrastructure organizations in the United States improve their management of external dependencies (supply chain).

Two main areas of work:
- External Dependency Management Assessment
- Dependency Analysis Method

Influenced by and based on:
- CERT Resilience Management Model
- ISO/IEC Standards
- NIST CSF
- DHS Cyber Resilience Review
- ITIL
What do we mean by external dependencies management?

Managing the risk of depending on external entities to support your organization’s high value services.

External Dependency Management focuses on external entities that provide, sustain, or operate Information and Communications Technology (ICT) to support the organization.
Service and asset focus

Services and mission capabilities:

Clearing and settlement
Military transportation
Electricity distribution
Anti-submarine warfare
ATM network operations
Fire support
911 Dispatch
Weapons system acquisition
Electronic healthcare records
Supply chain complexity

Essential problems: How to have confidence in resilience processes outside the acquirer’s control, and how to manage the risk when you can’t.
DHS Cyber Resilience Review influence

Legend
- 0
- 1-4
- 5-8
- 9-14
- 15 +

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<thead>
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<td>National Special Events</td>
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<td>Transportation</td>
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<tr>
<td>Water</td>
<td>37</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>309</strong></td>
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From FY2009– Present (as of 11/25/2014) 309 assessments conducted
Policy across ten CRR domains
DHS External Dependency Management Assessment (EDM Assessment) Overview

An examination of organizational practices and maturity to manage external dependency risk. How are we doing, and where can we improve?

Purpose:
• To assess an acquirer’s ability to manage the risks of external dependencies and provide improvement recommendations
• To allow acquiring organizations to compare themselves to peers.

Based on the DHS Cyber Resilience Review and the CERT® Resilience Management Model (CERT® RMM), a process improvement model for managing operational resilience

• Developed by Carnegie Mellon University's Software Engineering Institute
• More information: http://www.cert.org/resilience/rmm.html
EDM Assessment - Domains

<table>
<thead>
<tr>
<th>Domain</th>
<th>Description</th>
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</table>
| RF     | Relationship Formation  
*The purpose of the Relationship Formation domain is to ensure that organizations consider and mitigate external dependency risks before entering into relationships with external entities.* |
| RMG    | Relationship Management and Governance  
*The purpose of the Relationship Management and Governance Domain is to ensure that the organization manages relationships to minimize the possibility of disruption related to external entities.* |
| SPS    | Service Protection and Sustainment  
*The purpose of the Service Protection and Sustainment Domain is to ensure that the organization accounts for dependence on external entities as part of its protection and sustainment activities.* |
EDM Assessment - Architecture Overview

Focused Activity

3 EDM Domains

Required
(What to do to achieve the capability)

MIL Level 1: Domain Goals

MIL Levels 2 - 5 [per Domain]

Expected
(How to accomplish the goal)

MIL Level 1: Domain Practice Questions

MIL Levels 2 - 5 Questions [per Domain]

Process Institutionalization Elements

What to Do + Making it Stick
EDM Assessment – Sample Questions

Has a plan for selecting and forming relationships with suppliers been established?

Is the ability of suppliers to meet resilience requirements of the critical service considered in the selection process?

Are dependencies on external relationships that are critical to the service(s) identified?

Are vulnerabilities in the organization’s external entities that affect the critical service actively discovered?

Are the risks of relying on an external entity to support the critical service identified and managed?

Are service continuity plans tested with external entities?
Maturity indicator levels – sustaining capability

MIL2 – Planned:
Have stakeholders been identified and made aware of their roles?
Is there a documented policy for the domain?

MIL3 – Managed:
Is there management oversight?
Are risks to the process controlled?

MIL4 – Measured
Is the process reviewed for effectiveness?

MIL5 - Defined
Is there a standard process enterprise wide?
Is there a lessons-learned process?

...
EDM Assessment Heat Map

Overview of EDM Results

Summary of Results

Maturity Indicator Level by Domain
External Dependency Analysis Method (EDA Method) Overview

A method to identify and make decisions about the suppliers that support a specific acquirer service or set of services. **Whom do we manage and how much?**

Purpose:

- To identify and provide organizational leadership with an *accurate, useful representation* of the organization’s critical few suppliers;

- To assess and display the controls and practices applied to a supplier set, so that organizational leadership can make better decisions about their management
Identifying dependencies: HAVEX attack

“A newer approach used by the attackers involves compromising the update site for several industrial control system (ICS) software producers.”
Lifecycle and relationship management

Procurement → Deployment → Operation

Periodic software downloads from manufacturer website
Requirement: Integrity of downloaded software installers

Who is managing this relationship?
External entities are identified based on services and relationships with key assets.

Entities/suppliers are ranked according to standard impact definitions and aggravating factors.

The organization answers fifteen questions per supplier about current practices.

The toolset provides a chart of the supplier set comparing supplier criticality to current practices.
Standard service impact levels and factors

**High service impact:**

Disruption to the external entity would result in the critical service failing to meet its requirements and customers or stakeholders experiencing substantial harm.

**Medium service impact:**

1. A tolerable degradation of the critical service. The service continues to function at its minimum requirements. The disruption may be noticeable to stakeholders but it is an inconvenience. The organization may experience extra costs during the disruption but they are manageable or planned for, or

2. The external entity disruption represents a clear source of risk to the requirements for the critical services or to the assets that support the critical service.

**Aggravating factors:** Reputational, financial, compliance-related
## Management practice implementation

<table>
<thead>
<tr>
<th>NIST CSF Function</th>
<th>Internal practice</th>
<th>External practice</th>
<th>Cooperative practice</th>
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</thead>
<tbody>
<tr>
<td>Identify</td>
<td>Does the organization manage the risk of the external entity being a single point of failure?</td>
<td>Does the external entity have a risk management program that is consistent with and supportive of the critical service(s)?</td>
<td>Does the organization periodically review risks and threats with the external entity to maintain both organizations' situational awareness?</td>
</tr>
<tr>
<td>Protect</td>
<td>Does the organization document and maintain resilience requirements and control objectives that pertain to the external entity?</td>
<td>Are resilience requirements for the external entity adequately documented in formal agreements with the external entity?</td>
<td>Are the controls at the external entity periodically validated, audited or tested to ensure that they meet organizational requirements?</td>
</tr>
<tr>
<td>...</td>
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<td>...</td>
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</table>
Importance of cooperation and managing the supplier set

Figure 6: Who identifies data breaches

- UNRELATED PARTY: 28%
- FRAUD DETECTION: 24%
- USER: 10%
- CUSTOMER: 9%
- LAW ENFORCEMENT: 8%
- PERPETRATOR: 7%
- FINANCIAL AUDIT: 3%
- INTRUSION DETECTION: 2%
- LOG REVIEW: 1%
- FRAUD DETECTION: 1%
- INCIDENT RESPONSE: 1%
- IT AUDIT: 1%

Many organizations devote a disproportionate amount of time and money to detection methods that fall below the 1% mark.
Output

External Dependency Risk Profile

Supplier Criticality

Implemented supplier management practices

Higher Risk

Lower Risk

Optimal Profile

- Five Nines Networks
- Credit Checker
- Energy Infrastructure
- Cloudy Computing
- Local Emergency Mgmt.
- Payment Right
Conclusion: What Is Cyber Resilience?

“... 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 – PPD 21
  February 12, 2013
Conclusion: Why resilience?

Resilience management provides support to *simplify* the management of complex cybersecurity challenges.

**Efficiency:** not too much and not too little; resilience equilibrium
- balancing risk and cost
- getting the most bang for your buck
- achieving compliance as a by-product of resilience management

**Roadmap:** what to do to manage cybersecurity; flexibility and scalability
- using an overarching approach - which standard is best
- deciding what versus how to manage cybersecurity risk

**Cybersecurity ecosystem:** addressing the interconnectedness challenge
- managing dependencies
- addressing internal and external organizational challenges and silos
Questions?
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