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Planning Considerations for Cyber Incidents

Guidance for Emergency Managers

NATIONAL ENGAGEMENT DRAFT

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Introduction and Overview

1. Purpose

Emergency management personnel play a central role in preparing for and responding to cyber incidents in their jurisdictions[1]. Although emergency managers are not expected to be technical experts on cyber incidents, they do need to understand and prepare for the potential impacts of an incident on their communities and operations. Knowing whom to engage when a cyber incident occurs and having plans in place to effectively address an incident's impacts is central to the role of emergency managers, regardless of hazard type.

This guide is intended to help state, local, tribal and territorial (SLTT) emergency management personnel collaboratively prepare for a cyber incident and support the development of a cyber incident response plan or annex.

2. Background

Nearly all aspects of society now rely heavily on technology and cyber connections. From phones and communications systems to home appliances and security systems, to transportation systems, medical systems and utility services, nearly everything in communities relies on cyber connections to communicate and operate. Although this increased interconnectedness provides better and more efficient services in many ways, this ever-expanding reliance on technology and cyber connections also means that cyber incidents may have far-reaching and devastating impacts. An interruption in one organization or system, whether from a natural hazard, human error, equipment failure or malicious attack, may have widespread impacts across the network. In the worst cases, this puts lives at risk and causes significant economic challenges. For this reason, it is increasingly important that organizations and jurisdictions have a cybersecurity program in place to protect against disruptions and a cyber incident response plan in place to enable quick, effective resolution when an incident occurs.

2.1. Cybersecurity and Cyber Incident Response

It is important to understand the difference and relationship between cybersecurity and cyber incident response. "Cybersecurity is the art of protecting networks, devices and data from unauthorized access or criminal use and the practice of ensuring confidentiality, integrity and availability of information."[2] The goal of cybersecurity is to stop or minimize disruptions. A cybersecurity program is designed to both understand and address cyber risks across an enterprise

[1] The Cybersecurity and Infrastructure Security Agency (CISA) leads the national effort to understand, manage, and reduce risk to the nation's cyber and physical infrastructure. CISA also coordinates the execution of national cyber defense, leads asset response for significant cyber incidents and ensures that timely and actionable information is shared across federal and non-federal and private sector partners. For more information, visit CISA.gov/about-cisa

[2] CISA, 2019, Security Tip (ST04-001), What is Cybersecurity?

and is composed of people and technologies that monitor, detect and, ideally, prevent incidents on an ongoing basis. However, even with the best cybersecurity program in place, cyber incidents are always a risk. Therefore, it is imperative to have a cyber incident response plan or annex that enables organizations to act quickly. An effective and efficient response helps mitigate impacts and return services as soon as possible. Much of cyber incident response planning occurs before an incident occurs and in conjunction with a cybersecurity program.

Although there is some overlap in concepts and activities between cyber incident response planning and creating a cybersecurity program, there are differences. This guide provides considerations for cyber incident response planning, in line with the six-step planning process outlined in Comprehensive Preparedness Guide (CPG) 101: Developing and Maintaining Emergency Operations Plans. This guide does not provide guidance for setting up a cybersecurity program or establishing general cybersecurity protocols. That said, there are many useful resources available to help organizations and jurisdictions set up and implement a cybersecurity program. Several key resources are highlighted in the resources box below.

Resources for Building or Strengthening a Cybersecurity Program

- National Institute of Standards and Technologies (NIST) Cybersecurity Framework: Provides strategic guidance to help build and execute a cybersecurity program. Helps organizations assess cyber risks and set plans for improving or maintaining their security posture.
- CISA Emergency Services Sector Cybersecurity Framework Implementation Guidance: Provides foundational guidance for how Emergency Services Sector organizations may enhance their cybersecurity using the NIST Cybersecurity Framework.
- CISA Emergency Services Sector Cybersecurity Initiative: Provides resources to help those in the Emergency Services Sector better understand and manage cyber risks.
- CISA Cyber Essentials Starter Kit: Provides guidance for leaders of small businesses and small and local government agencies to help them start implementing organizational cybersecurity practices.
- CISA Free Cybersecurity Services and Tools: Identifies free cybersecurity tools and services to help organizations further advance their security capabilities.
- State, Local, Tribal and Territorial Government Coordinating Council (SLTTGCC) Cyber Resource Compendium: Identifies some of the major references that may help build or strengthen an organization's cybersecurity program.
- Nationwide Cybersecurity Review (NCSR): Provides a no-cost, anonymous, annual self-assessment mechanism designed to measure gaps and capabilities of state, local, tribal and territorial governments’ cybersecurity programs.

2.2. Introduction to Cyber Incident Response Planning

Cyber incidents, like other disruptive events, may have unforeseen, cascading and far-reaching consequences. The impacts may cause immediate consequences to a service or system, or indirect and cascading effects in new areas. Further complicating this challenge is that cyber incidents may result from a variety of causes, such as a malicious attack, a natural disaster, human error or equipment failure, each potentially requiring distinct actions to resolve the situation. It may not be immediately known whether the root cause is cyber related. Emergency managers may be well into addressing the consequences of the event before realizing it is a cyber incident. For these reasons, cyber incident planning and response necessitate collaboration among emergency management, cyber professionals, law enforcement, private industry and other key stakeholders.

Although incident response plans vary from organization to organization, their purpose is consistent: to enable prompt, effective and efficient response to a cyber incident, mitigate its impacts and return services back to normal quickly. Having an effective cyber incident response plan in place before an incident occurs reduces the amount of time that organizations or jurisdictions spend determining who to contact, what to do and defining ownership and responsibilities during the incident.

Incident response plans identify response team members and their backups; how to contact team members when an event is reported; and the roles of each team member. The plan outlines the steps taken at each stage of the process and designates the team member(s) responsible for each step, as well as the team member charged with overall responsibility for the response. It is important that the planners recognize that a cyber incident will likely include significant ambiguity and ensure that the plan developed is flexible and adapts to changing circumstances over the course of the incident. More information on the planning process is provided in Appendix A and further detailed in Comprehensive Preparedness Guide (CPG) 101: Developing and Maintain Emergency Operations Plans.

Specific to cyber planning, there are different cyber incident response approaches that jurisdictions may leverage when developing a cyber incident response plan. The National Institute of Standards and Technologies (NIST)'s approach is one of the most respected. NIST's Computer Security Incident Handling Guide "assists organizations in establishing computer security incident response capabilities and handling incidents efficiently and effectively."

The Cyber Incident Response Process:

- Identifies, evaluates and correlates any potential anomalies or interruptions in normal cyber operations;
- Assesses the nature of the incident and scale of the effects;
- Isolates the cause of the disruption; and
- Restores the integrity of the organization/community's cyber operations.

The NIST incident response lifecycle involves four phases, shown in Figure 1 and listed below.[3]

1. **Preparation:** Preparation is essential to both preventing and responding to a disruptive cyber event. In preparing for a cybersecurity incident, NIST suggests implementing a series of tools ahead of time. This preparation provides the community with a framework to analyze, isolate and respond to an incident. Development of a clearly articulated cyber incident response plan with established points of contact, before an incident occurs, is important to this preparation phase.
2. **Detection and Analysis:** The second phase is determining an incident has occurred, its severity and its type.
3. **Containment, Eradication and Recovery:** The purpose of the containment phase is to halt the effects of an incident before it causes further damage.
4. **Post-Incident Activity:** Recovery's goal is to get the system operational if it went down or back to business as usual if it did not.

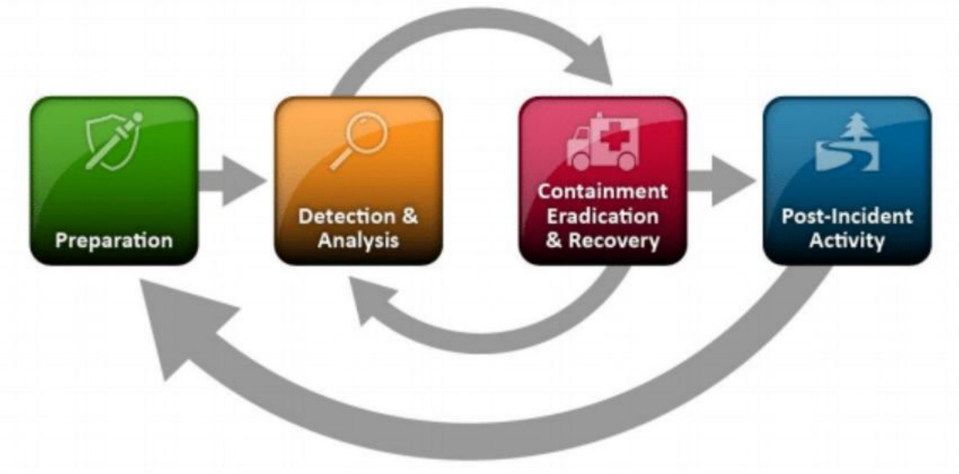


Figure 1: NIST Incident Response Lifecycle

Development of the incident response plan falls into the Preparation phase of the incident response lifecycle and will set the framework for executing the remaining phases when needed. Phases 2, 3 and 4 of the NIST incident response lifecycle are highly technical and require extensive cyber expertise. For this reason, it is essential that development of the cyber incident response plan is a collaborative effort among emergency management, cyber professionals, law enforcement, private industry and other key stakeholders.

[3] NIST, 2012, *Computer Security Incident Handling Guide*, https://nvlpubs.nist.gov/nistpubs/specialpublications/nist.sp.800-61r2.pdf.

Types of Cyber Incidents

A key step in planning for cyber incident response is identifying the types of cyber incidents that the jurisdiction may face. It is not necessary or even feasible to comprehensively identify all the cyber incidents that could impact the organization. Rather, it is important for emergency management personnel to have a general understanding of common types of cyber incidents. Partnerships with other key personnel and subject-matter experts help identify the types of incidents most likely to occur in the jurisdiction and examine their immediate and cascading impacts. This foundational understanding of common types of cyber incidents also helps with the development of incident scenarios that are useful to the planning process.

This section provides a general overview of key cyber concepts and incident types. It first describes the primary types of cyber assets and the role they may play in cyber incidents, then reviews the common causes of cyber disruptions. The content in this section is not intended to be all-encompassing. Please see the glossary for additional cyber terms and definitions.

Cyber Assets and Systems[4]

Assets are items of value to stakeholders. An asset may be tangible (e.g., a physical item such as hardware, firmware, computing platform, network device, or other technology component) or intangible (e.g., humans, data, information, software, capability, function, service, trademark, copyright, patent, intellectual property, image or reputation).

Systems are a combination of interacting elements organized to achieve one or more stated purposes. Interacting elements in the definition of system include hardware, software, data, humans, processes, facilities, materials and naturally occurring physical entities.

1. Overview of Cyber Assets and Incident Types

Cyber assets include hardware, software and networks. Hardware performs the physical functions, software directs and controls the hardware and a network is a connection of computers enabling them to communicate and share information. Cyber assets range from systems with local networks to assets with internet access including smart phones; security systems; building management systems; heating and air conditioning systems; land-line phone systems; Internet of Things (IoT)[5]

[4] NIST, 2021, *Developing Cyber-Resilient Systems: A Systems Security Engineering Approach,* https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-160v2r1.pdf.

[5] Internet of Things (IoT) refers to devices connected to the internet and to networks within organizations that communicate with other devices wirelessly. Examples include home devices such as home security systems, smart appliances and smart lights, healthcare products such as smart pacemakers and industrial products such as infrastructure sensors, digital control systems and logistics tracking. Many IoT devices do not enforce rigorous cybersecurity controls which exposes them

devices; vehicle control systems; and more. By identifying critical services in the jurisdiction and understanding how those services depend upon different types of cyber assets, jurisdictions assess how different types of cyber incidents might affect them and their key functions. Impacts will often cascade, meaning that a particular impact on a specific system may be caused by an impact on an upstream system, or may cause further impact on a downstream system.

Below is an overview of three common cyber incident types. Although each is described independently, any of these incident types is likely to cause overlapping and cascading effects. The destruction or compromise of any hardware, software or network is likely to result in the loss or degradation of services and may expose confidential information or allow control access to a malicious attacker.

- **Hardware Destruction or Loss**: A jurisdiction's critical services often depend upon the hardware (e.g., computers, industrial control systems, storage devices, network infrastructure) that perform critical functions. This hardware may enable day-to-day community functions, such as controlling drinking water systems and water filtration, managing court processes, providing payment systems for municipal services and controlling traffic safety systems. It also may support critical emergency services, such as 911 services and radio transmitters used to communicate among emergency personnel. The infrastructure that provides these services may be overlapping. Hardware is vulnerable to damage by natural hazards including floods, fires and tornados, as well as electricity surges resulting from natural phenomenon such as lightning or geomagnetic disturbances/storms. Malicious actors may also cause physical damage to computer hardware. Hardware damage may result in the loss of computer and network communication services as well as loss of data.

- **Network Unavailability, Compromise, Degradation or Destruction**: Networks enable computers to communicate and share information. Most critical services rely on networks. Incidents affecting networks may occur because of both natural disasters and malicious attacks. Since many systems depend upon external organizations and are often provided by third parties, an incident affecting the jurisdiction may be the result of a third party's incident. The impact may vary from unreliable communication among computers to a complete loss of communication. Identifying how the jurisdiction uses networks helps the planning team understand how the jurisdiction depends upon these systems and evaluate the potential consequence of their loss.

- **Software Malfunction, Compromise or Exploitation**: Incidents affecting software may cause the loss or compromise of computers and networks. Most of these incidents are caused by software faults or accidental misconfigurations. However, incidents affecting software may also result from malicious attacks. Malicious actors may steal confidential information, modify and violate the integrity of information and deny access to information by encrypting it and demanding money (ransom) to decrypt it. Malicious attackers may also exploit software to

to unauthorized access. Some IoT devices provide only information, such as sensor readings, but many permit remote control of the device, which introduces vulnerabilities with substantial negative impact.

compromise the integrity of physical systems such as CCTV, water and wastewater treatment, dams, traffic signs and signals, streetlights, pipelines and facility management, which are often controlled (or monitored) by computerized industrial control systems.

2. Overview of Incident Cause

In most cases, determining the cause of a cyber disruption requires extensive cyber expertise. It is often unclear at the beginning of an incident whether the effects are caused by a malicious attacker or other source, and it may take days or months to determine. The information in this section is not intended to help identify the cause of a particular incident. Rather, it is intended to highlight the primary causes of incidents to help the planning team think through potential cyber incidents that may occur in their jurisdiction, whether the result of natural hazards, accident or intentional attack.

2.1. Non-Malicious Incidents

Non-malicious cyber incidents happen for numerous reasons. NIST includes the following non-malicious causes when categorizing threat sources: human errors; structural failures of organization-controlled resources (e.g., hardware, software, environmental controls); and natural and human-caused disasters, accidents and failures beyond the control of the organization.[6]

- **Human Error**: Cyber incidents may be caused by accidental errors made by individuals while performing their regular responsibilities. For example, mistakes happen while performing administrative tasks, such as installing or configuring hardware and software or conducting maintenance of computers and networks. These unintentional errors cause incidents that disable, disrupt or damage computers, networks and information.

- **Structural Failures**: These incidents happen when hardware, software or support systems, such as environmental controls (air conditioning), fail. Hardware and software often contain unknown faults that appear unexpectedly. These faults may cause incidents ranging from loss of services to the loss or corruption of important information. When computing or networking demands exceed the capacities of the cyber resources, the cyber services might stop operating, corrupt or lose important information, or create other problems.

- **Natural Disasters or Accidents**: All types of cyber assets depend upon physical systems ranging from hardware for computers and networks; to the infrastructure to support communication; to the infrastructure that manages their operational environment. Natural disasters and accidents may damage or disrupt the operation of the physical systems. Fires, floods, windstorms and electrical disturbances often cause non-malicious cyber incidents. Loss of electrical power is another common cause. Uninterruptible power supplies handle short-

[6] NIST, 2012, *Guide for Conducting Risk Assessments*, https://nvlpubs.nist.gov/nistpubs/legacy/sp/nistspecialpublication800-30r1.pdf.

term power problems, and alternative power generation systems such as diesel generators handle long-term losses provided fuel is available.

2.2. Malicious Attacks

Malicious attacks attempt to compromise the availability, integrity or confidentiality of computers, networks or information. As noted above, rarely will the specific cause of an incident be known while the event takes place. More often, it is discovered days or months later following a forensic examination of the impacted equipment or software.

- **Denial of Service (DoS)**: DOS attacks flood computers and networks with traffic that overloads networks and disrupts legitimate requests. Attackers often originate from multiple locations to complicate attempts to block them, and multiple locations will often serve to amplify the malicious traffic directed at the targeted computers. These are described as distributed denial-of-service (DDoS) attacks. By limiting access to websites used for business operations, attackers may cause a variety of effects, including financial losses or damage to the reputation of businesses. Similarly, adversaries have denied access to government websites.

- **Malware**: Malware is a broad term for any type of malicious software designed to harm or exploit any programmable device, service or network. Malware appears in various forms and may perform a wide variety of malicious actions:

    - Ransomware uses encryption to deny access to information. Ransomware attacks demand ransom to decrypt the information and attackers may threaten to publish the information unless the ransom is paid.

    - Spyware infects computers and collects information about user activity, such as usernames and passwords, payment information, information in emails and other sensitive information that may enable attackers to perform other malicious activity.

    - A Trojan provides a backdoor gateway for malicious programs or malevolent users to enter a system and steal valuable data without the user’s knowledge and permission.

    - A Worm replicates and spreads across devices within a network. As it spreads, it consumes bandwidth, overloading infected systems and making them unreliable or unavailable.

- **Phishing**: Adversaries use phishing to steal sensitive information and potentially enable malicious access to a computer or system. Phishing typically uses email or text messages (smishing) to trick people into clicking a link, downloading malicious software (malware) or revealing login credentials. If successful, phishing attacks may infect the email recipient’s computer. Spear phishing is a tactic that targets specific organizations or individuals with personalized messages that encourages the receiver to trust the message.

- **Third-Party Compromises and Supply Chain Attacks**: Adversaries attack third-party vendors of software and services because other organizations rely upon and trust vendors and install their software to manage complex systems. Adversaries gain access to third-party vendor software to exploit the modified software once installed by the vendor's customers.

Assessing Cyber Risks to Inform Prioritization and Planning

Effective preparedness for cyber incidents requires jurisdictions to understand how essential services and infrastructure in the community rely on cyber systems and the potential cascading impacts of a disruption. This knowledge helps the jurisdiction's planning team determine response actions and resources that are needed in a cyber incident, as well as how to prioritize restoration efforts.

1. Engaging Service Owners and Operators

Owners and operators of critical services and cyber systems play an important role in preparing for cyber incidents, including assessing cyber risks. They provide the most detailed and accurate information regarding system dependencies and vulnerabilities and valuable guidance on assessing whether the service remains operational during and following an incident. Engaging owners and operators in assessing cyber risks and planning for cyber incidents also helps establish relationships with cyber staff and service providers. Such relationships foster shared understanding of vulnerabilities and impacts related to specific incident types and aid development of effective plans, policies, procedures and protocols.

Engagement with owners and operators of critical services and cyber systems is essential to successful cyber incident response planning. However, some organizations may be reluctant to collaborate due to concerns such as sharing proprietary information, the risk of data leakage and the potential for brand and financial damages in the event of an incident. Establishing a confidentiality agreement, non-disclosure agreement (NDA), private-public partnership (P3) or other legal agreement may reduce these concerns. The Federal Emergency Management Agency's (FEMA) Building Private-Public Partnerships Guide[7] provides best practices for jurisdictions to establish and maintain a private-public partnership.

[7] FEMA, 2021, *Building Private-Public Partnerships*, https://www.fema.gov/sites/default/files/documents/fema_building-private-public-partnerships.pdf.

Cyber Asset Owners and Operators[8]

Asset owners are people or organizational entities, internally or externally, that have primary responsibility for the viability, productivity and resilience of the asset.

Asset operators are people or organizational entities, internally or externally, who are responsible for satisfying the protection and sustainment requirements for the asset established by the asset owner. Example asset operators include: System/database administrators; industrial control system engineers; facility managers; IT support organizations; and contractors who host and manage data (e.g., cloud service provider).

2. Assessing Cyber Risks

Assessing cyber risks enables the jurisdiction to identify the most likely cyber disruptions with the most severe impact for their community. This aids the jurisdiction in identifying the response actions and resources needed in a cyber incident, as well as how to prioritize restoration efforts. Assessing cyber risks requires the following actions:

- Identifying the critical services for the community that rely on information technology, such as emergency services, water and wastewater systems and communications.
- Identifying the interdependencies of critical infrastructure, particularly those related to critical services, cyber assets and services.
- Identifying the consequences of service loss or disruption, with special attention to the problems caused by cyber incidents.

Developing a critical services and dependencies inventory is a good way to identify, examine and document this information. The inventory captures the critical services, infrastructure, assets, associated owners and operators, other key personnel and the dependencies among systems. In addition to helping with this assessment and prioritization process, this inventory may also be included within the cyber incident response plan or annex for reference during an incident.

2.1. Identifying Critical Services

Identifying the jurisdiction's critical services that rely on cyber systems is the first step in the assessment process. The planning team begins by identifying the known critical services and their owners/operators, then expands to identify other related services. This helps build the critical services and dependencies inventory. It also provides an opportunity to identify additional key

[8] NIST, 2021, *Developing Cyber-Resilient Systems*, https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-160v2r1.pdf.

stakeholders to include in the planning team (See Appendix A for information on the six-step planning process and more guidance on forming the core and collaborative planning teams).

When identifying critical services, it may be beneficial to use community lifelines[9] as a starting point. Community lifelines are services that enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security. They are the most fundamental services within a community that, when stabilized, enable all other aspects of society to function.

Continuity of Operations Planning

Continuity is the ability to provide uninterrupted critical services, essential functions and support, while maintaining organizational viability, before, during and after an event that disrupts normal operations.

It may be helpful to consider continuity planning best practices when establishing and updating cyber incident response plans. Cyber incidents may result in degraded communications, compromised systems or inoperable facilities. It is crucial that jurisdictions' continuity assessments and plans include cyber considerations.

For more information on continuity planning, assessment tools and resources, visit: Continuity Resources and Technical Assistance | FEMA.gov

2.2. Identifying Service Dependencies

Identifying and understanding dependencies among systems and assets helps the planning team, and ultimately the incident response team, consider what may disrupt key services or other assets on which those services depend. It also helps to identify upstream or downstream implications. This process helps the planning team anticipate possible impacts to community lifelines, which may influence the prioritization of incident response decisions and actions.

Using the list of critical services and their owners/operators as a starting point, the planning team identifies services dependencies by:

- **Engaging with Service Owners and Operators:** The service owners and operators provide key information about the system to assist with building an understanding of the jurisdiction's dependencies and interdependencies.
- **Identifying and Engaging Other Stakeholders of Each Service:** Some services have other stakeholders beyond the system owner such as security professionals, third-party service

[9] For more information on community lifelines, visit: https://www.fema.gov/emergency-managers/practitioners/lifelines.

providers, or a cyber incident response team (CIRT). Understanding all the stakeholders and their roles aids in identifying who is contacted when an incident occurs.

- **Identifying Support Contacts for All Vendors and Contracted Service Providers:** Not all services and systems are owned, serviced or maintained by in-house staff. As a result, third-party or support contacts may need to be part of the planning effort. The planning team works with service owners to identify any support contracts and determine what these contracts may provide during an incident. For example, the internet service provider (ISP) may help identify the type of attack and potentially block the attacker if requested.

During this engagement, the planning team identifies and documents the dependencies and interdependencies in the critical services and dependency inventory. When identifying dependencies, the planning team considers:

- **Upstream dependencies:** These are products or services provided to a jurisdiction by an external organization that are necessary to support its operations and functions. Examples of upstream dependencies include:
    - Supply of electricity from an electric utility distribution substation;
    - Telephone communication services;
    - Access to the internet; and
    - External organizations, such as a vendor that maintains essential software systems.
- **Internal dependencies:** These are the interactions among internal services, operations, functions and information of the jurisdiction. Examples of internal dependencies include:
    - Information services, such as websites, depend upon database servers;
    - Operational control systems depend upon process measurement systems; and
    - Computer systems depend upon computer network equipment.
- **Downstream dependencies:** These are services provided by a jurisdiction to its residents or other jurisdictions. Examples of downstream dependencies include: drinking water; wastewater treatment; electricity; traffic control; requests for emergency response; information, scheduling, registration services and customer billing.

Questions to Assist in Identifying Dependencies

1. What are the service's external dependencies?

An external dependency exists when an outside entity (e.g., contractor, customer, service provider) has access to, control of, ownership in, possession of, responsibility for or other defined obligations related to the critical service or its associated assets.

Examples of services provided to an organization from external entities may include: outsourced activities that support operation or maintenance of the critical service; security operations; IT service delivery and operations management or services that directly affect resilience processes; backup and recovery of data, provision of backup facilities for operations and processing and provision of support technology or similar resilience-specific services infrastructure providers such as power and dark fiber; telecommunications (e.g., telephony and data); technology and information assets (e.g., application software, databases); and education and training resources.

2. Which external dependencies are most important?

The intent of prioritization is to ensure that the jurisdiction properly directs its resources to the external dependencies that most directly impact the critical service.

Prioritization criteria may include dependencies that: directly affect the operation and delivery of the critical service; support, maintain or have custodial care of critical service assets; support the continuity of operations of the critical service; save access to highly sensitive or classified information; support more than one critical service; supply assets that support the operation of a critical service; or impact the recovery time objective of the critical service.

3. On which infrastructure providers does the critical service depend?

Critical services may be dependent on infrastructure providers to remain viable. The organization may need to address the loss of these providers, which may affect the resilience of the critical service. The jurisdiction may need to consider the resilience of the providers when developing service continuity plans.

These infrastructure services may include telecommunications and telephone services; data and network service providers; electricity, natural gas and other energy sources; and water and sewer services.

2.2.1. CONSIDERING CYBER DEPENDENCIES

When identifying dependencies for critical services, it is important to consider the interconnected nature of the service and its components. Cyber dependencies exist both internally and externally to an organization and may be direct or indirect relationships. For example, websites depend upon servers, data and access to the internet. Jurisdictions might provide and maintain their own software, computers and networks to operate their websites, which form an internal dependency, or contract with external website providers to manage their websites, forming an external dependency.

External dependencies often exist when jurisdictions contract with external organizations to provide services such as computer support and security. A direct dependency would exist between a utility control computer and a computerized sensor, while a logical but indirect dependency exists between natural gas delivery systems and their customer billing systems.

Questions to Consider when Identifying the Owner of a Cyber System

- What part(s) of the jurisdiction is responsible for the delivery of the critical service?
- Who are the owners of the assets required for delivery of the critical service?
- Are both owners and operators of assets documented?

2.3. Identifying the Consequences of Service Losses or Disruptions

With an understanding of key dependencies, the planning team may identify the likely consequences of service interruptions caused by the loss or disruption of another service or cyber asset. As part of this process, it is important to determine whether the consequence would occur immediately after an incident or later. For example, a service might fail immediately if its industrial control computer failed because of an attack or system fault. Or, a service might fail after the depletion of a resource, such as a backup battery providing power during a power outage. Awareness of these consequences, and associated impacts to community lifelines, helps to establish incident response priorities and identify resources and capabilities that improve incident response and reduce the consequences of cyber incidents.

During this process, the planning team works with service owners and operators to understand the criticality of their dependencies on other services and cyber assets. This helps to identify the impact of the loss or disruption of these support services and cyber assets. In a cyber incident, cascading impacts are likely.

Sample Questions to Consider – Consequences of Service Loss or Disruption

- What happens to the community water supply if the pumps lose electricity?
- What happens to the availability or quality of water if the industrial control systems or their communication networks are disrupted?
- What happens if the water treatment process is compromised by a malicious cyberattack and the monitoring system is unable to show trustworthy, accurate testing results to human workers?
- What public health impacts may occur from the cyber incident? Are local healthcare facilities able to respond on a community-wide scale?
- What is the consequence if web-based services, such as scheduling and bill-payment, are unavailable because of a cyber incident that affects the computers or the network?
- What happens if financial information, such as customer credit card information, is stolen by a malicious attacker?

As part of this process, the planning team may also determine how to gain situational awareness of the status and operational readiness of critical services during an incident so that information may be factored into plan development. Gaining this situational awareness will often depend on the managers of those services and cyber assets. While some services, such as water and electricity supply, are directly observable and customers will likely report losses, other services and cyber assets require the use of instruments that monitor and report on status. Additionally, service assessments might require personnel to check and report on operational readiness and whether services are affected by the cyber incident. The planning team engages with the owners and operators of critical services and assets to understand how status is monitored and communicated. This information is essential to the incident response, as it enables the emergency management team to understand what and how services are affected, what services are not affected and what services might be affected later.

Obtaining information necessary to quickly mount a response to cascading impacts may include:

- Establishing a partnership with a neutral, third-party intelligence organization (e.g., state/local fusion center, Multi-State Information Sharing and Analysis Center [MS-ISAC]);
- Establishing legal agreements among critical service providers to promote information-sharing; and
- Creating anonymous reporting tools that scrub sensitive information while promoting shared visibility of the event or its impacts.

3. Prioritizing and Planning

Using information gained in the assessment process and documented in the critical services and dependencies inventory the planning team appraises each cyber asset to determine how critical or sensitive it is to the operation of critical services in the jurisdiction. The planning team, in close collaboration with the system owners and operators, discuss what redundancies or backups are available for those services if internet or web service connectivity is lost for a significant period of time. For example, some IT services may be able to be run manually or may be relocated to a non-impacted location. Once these contingencies have been established, the planning team has a clearer understanding of what systems are essential, what is required to operate those systems and what alternative methods are available for operating those services. The planning team uses this information to establish priorities for services, how to apply limited resources and the order of response efforts in advance of an incident.

The ordering of response efforts considers time-dependent aspects such as how long a service may remain unavailable or disrupted before causing a negative impact. During a response, the priorities may change rapidly as services become available or unavailable. These changes may indicate destabilization of community lifelines and be tracked and included in incident reporting products that support the reevaluation and determination of incident response priorities.

Cyber Risk Assessments Resources

- CISA Cyber Resilience Review Asset Management: Provides guidance on how to identify, document and manage assets to evaluate and improve cyber resilience and response.
- FEMA Threat and Hazard Identification and Risk Assessment (THIRA): Provides guidance for assessing the risk of all threats and hazards.
- NIST Guide for Conducting Risk Assessments: Provides guidance for assessing cybersecurity risks of federal information systems and organizations.

Emergency Management Roles and Responsibilities

Emergency managers' roles and responsibilities in preparing for and responding to a cyber incident may differ from those associated with other incident types. Roles and responsibilities may also differ across jurisdictions based on existing authorities and plans. Some jurisdictions place the emergency management organization in the lead coordinating role for cybers incident, while others identify information technology or law enforcement entities as the primary coordinator. In those instances, emergency managers take on a supporting role focusing on consequence management impacts from the incident.

In many jurisdictions, the emergency manager is responsible for coordinating the development of a plan or annex focused on cyber incident response and factoring cyber considerations into other plans. This includes oversight and leadership of the planning team and ensuring the needed representatives are engaged in the effort. See Appendix A for guidance on forming the core and collaborative planning teams, including cyber-specific considerations.

Emergency managers should understand the stages of a cyber incident (described in the Introduction to Cyber Incident Response Planning section of this guide and NIST's Computer Security Incident Handling Guide) as well as the roles and responsibilities that are listed in the jurisdiction's cyber plan or annex, if available. Beginning with detection of a cyber incident, emergency managers have important responsibilities in the management of direct and indirect impacts. Similar to other technical hazards, emergency managers may not be expected to directly work on containing and eradicating cyber threats; however, response actions taken by emergency managers help to prevent further damage, assess impacts and support procedures for threat investigation and removal. Emergency managers may also assist with communication procedures and ensure the appropriate people are notified. They may also be able to help manage questions throughout an incident to ensure that timely remediation occurs for the affected organization. As the focus of the incident transitions to recovery[10], emergency managers coordinate with the cyber response team to verify that the threat is contained and with stakeholders to ensure that affected operations are restored.

During an incident, emergency managers prioritize resources, such as personnel, to address the needs of response. Depending on incident impacts, emergency managers may activate other plans (e.g., power outage, distribution management) Activation of other plans may require incorporation of additional partners into incident support and consequence management. Additionally, the

[10] For more information visit the NIST Guide for Cybersecurity Event Recovery at https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-184.pdf.

Presidential Policy Directive on United States Cyber Incident Coordination (PPD-41, July 2016)[11] calls on federal agencies to support three lines of effort for any cyber incident: threat response (law enforcement and national security investigations and activities); asset response (technical assistance to assess and mitigate vulnerabilities and impacts), and intelligence support (situational threat awareness and information sharing). While not required of SLTT agencies managing cyber incidents within their own jurisdiction and capabilities, supporting these lines of effort helps ensure a robust response. Balancing these potentially competing operational demands and the potential for cascading effects on stakeholders may require establishment of a unified command structure.

Unified Coordination Group (UCG)

A Unified Coordination Group (UCG) is the primary organizational structure for managing and supporting complex disaster response operations. Depending on the needs of the incident, a UCG is comprised of senior leaders representing jurisdictional interests and may include federal, state, local, tribal or territorial governments; the private sector; or nongovernmental organizations. In coordination with applicable government and private entities, Emergency Support Functions assess the situation and identify requirements. Federal agencies may provide resources under mission assignments or their own authorities. The UCG applies unified command principles to coordinating assistance provided to support the jurisdiction's response.

In 2016, PPD-41 established lead Federal agencies and an architecture for coordinating the broader Federal Government response to cyber incidents. PPD-41 created the Cyber UCG to serve as the primary coordinating structure among Federal agencies in response to a significant cyber incident, as well as the integration of private sector partners into incident response efforts, as appropriate. The Lead Federal Agencies for this UCG are the Department of Justice (acting through the FBI), the Department of Homeland Security (acting through CISA) and the Office of the Director of National Intelligence. When cyber incidents threaten or result in physical consequences leading to a Stafford Act declaration, FEMA may serve in a combined Cyber/Physical UCG.

Considering the complex nature of cyber incidents and the high potential for cascading impacts, jurisdictions of all sizes may consider using the UCG structure to better organize response and recovery efforts to ensure that the priorities of various officials, subject matter experts and asset owners are consistent and best meet the needs of the incident.

Emergency managers rehearse their roles and responsibilities for cyber incident response through customized scenarios and exercises. Such activities help the planning team explore contingencies, identify gaps, validate existing plans, and determine appropriate courses of action. Activities are iterative and build on prior incidents and exercises to strengthen jurisdictional capabilities. The

[11] Presidential Policy Directive on United States Cyber Incident Coordination, 2016, https://obamawhitehouse.archives.gov/the-press-office/2016/07/26/presidential-policy-directive-united-states-cyber-incident.

incident examples below may be used to identify potential lead and supporting roles for emergency managers.

Example Scenario #1: Compromised Water Systems

Date: November 5, 2020
Location: Central City

Early on the morning of November 5, 2020, a water treatment facility within Central City received a call from a customer complaining about the smell and taste of their water: “I went to get some water from my kitchen sink, and it immediately smelled like bleach was coming out of the faucet. It tasted wrong, even after I tried boiling it for my morning coffee. Is it safe to drink the water?”

An inspector performs a manual measurement of the chlorine levels in the water system and verifies that the water contains too much chlorine. The investigation includes an examination of the control system that operates and monitors the water treatment process. The control system displays and settings that regulate the release of chlorine and monitor the levels of chlorine appear normal. All physical controls (e.g., gates, locks) are operating as expected.

The water treatment department issues a "Do Not Drink Water Advisory" to inform their customers that the water is contaminated with potentially harmful amounts of chlorine and boiling the water does not make it safe to drink.

Example Emergency Manager Lead Roles:

- ☐ Coordinating communication to identify the scope of the incident (e.g., what jurisdictions are impacted)
- ☐ Activating the emergency operations center
- ☐ Developing Incident Action Plans
- ☐ Maintaining coordination with cyber authorities to sustain situational awareness and reporting
- ☐ Managing coordination of resource and support requests from responding agencies
- ☐ Organizing Hazardous materials support to identify and secure contaminated areas, as necessary
- ☐ Identifying the potential for any cascading impacts or additional hazards following the water contamination incident
- ☐ Tracking capability gaps and strengths for improvement planning following the incident

Example Emergency Manager Supporting Roles:

□ Communicating information related to the cyber incident to law enforcement and nearby jurisdictions

□ Developing and distributing notifications to the public regarding impacts, status and resolution

□ Coordination of safety and security for impacted property, as necessary

□ Engaging private sector partners to provide resources and technical support

□ Coordinating the distribution of emergency supplies of potable water

□ Reaching out to chemical facilities for things to counteract the abundance of chlorine

□ Identifying the root cause of the incident

□ Mitigating impacts from the water system compromise

Example Scenario #2: Tornado

Date: November 5, 2020
Location: Central City

Late in the evening of November 5, 2020, Central City experienced an intense thunderstorm that quickly intensified. Meteorologists issued a "Tornado Watch", and shortly after a "Tornado Warning" circulated throughout Central City. Within minutes, an EF-4 tornado touched down and caused widespread, severe damage to property and infrastructure. The tornado caused widespread electricity outages, debris damage to electrical lines and tornado strikes on transformers. Additionally, heavy rainfall caused widespread flooding.

Preliminary damage assessments indicate that several buildings that provide critical services for Central City were damaged by the tornado and their contents appear to have been exposed to the rain. These buildings house computer and communications systems that serve the jurisdiction. These cyber systems — computers, networks and communications gear — may have suffered physical damage from the tornado, water damage from the rain or electronic damage from lightning. Incident response teams are struggling to establish communications and coordination due to power outages and disruptions to communications systems in the area.

Example Emergency Manager Lead Roles:

□ Activating pertinent emergency operations plans and/or annexes

□ Advising senior elected/appointed officials regarding the situation and emergency/disaster declarations

□ Identifying incident objectives and priorities in coordination with jurisdictional leadership

□ Activating the emergency operations center

□ Developing Incident Action Plans

□ Assessing the storm's impact on the jurisdiction’s critical services

□ Communicating with elected officials about the status of critical services

□ Communicating with the public about the status of key critical services and safety risks

□ Coordinating response to the loss of critical services

□ Identifying the potential for cascading impacts or additional threats and hazards following the storm

□ Serving as a coordination point for response partners, supporting communication, incident command and the development of a common operating picture

□ Coordinating recovery from the loss of critical services

□ Tracking capability gaps and strengths for improvement planning following the incident

Example Emergency Manager Supporting Roles:

□ Assessing the storm’s effect on cyber services and systems

□ Supporting communications related to the loss of critical computer and network services

□ Providing situational awareness reporting

□ Coordinating safety and security for impacted property, as necessary

□ Coordinating temporary emergency power at critical facilities

□ Coordinating with third-party vendors or suppliers with impacted property

□ Coordinating resource requirements

Communication Considerations

Communications during cyber incident response need to be carefully planned, and similarly to communication considerations for other incidents, include both information sharing among emergency management and incident response personnel, as well as messaging out to broader stakeholder groups and the general public. This section presents key considerations for communicating before, during and after a cyber incident.

1. Integrated Communications

It is important to identify who will serve as the lead for communications in a cyber incident and how the communications will occur. As described in the National Incident Management System (NIMS), integrated communications is a foundational characteristic of incident command and coordination. "Integrated communications provide and maintain contact among and between incident resources, enable connectivity between various levels of government, achieve situational awareness and facilitate information sharing. Planning, both in advance of and during an incident, addresses equipment, systems and protocols necessary to achieve integrated voice and data communications."[12] Impacts from cyber incidents may adversely affect voice and data communication channels, either taking them down entirely or comprising the security of the system, necessitating alternative communication channels. Planning efforts consider and address reporting mechanisms for cyber incidents, the possibility of degraded communications, notification procedures for key stakeholders and handling procedures for sensitive information.

- **Reporting:** The planning team identifies who is contacted in the event of a cyber disruption, what details are reported and how that information is reported. Consideration is given to if and when law enforcement is notified, and any legal requirements related to notification. For cyber incidents that may be malicious, it is best to ensure the reporting channel is outside the affected systems. For example, an organization that believes their systems are compromised would not use email. Instead, they might utilize a telephone from outside the organization to ensure that their communications are not intercepted by the malicious attacker.

- **Alternative Communications Systems**: Cyber incidents, regardless of cause, may render common voice and data communications channels unusable. It is important for the planning team to understand how their communication channels rely on cyber systems and how they may be impacted. The planning team identifies alternative communication mechanisms to use when needed and ensure all appropriate parties have the knowledge and access to effectively use those channels. For cyber incidents that may be malicious, communication channels are identified that are not within the impacted platform since sensitive information could be intercepted by attackers.

[12] National Incident Management System, Third Edition, October 2017.

- **Notification of Key Entities**: The planning team establishes procedures for identifying which stakeholders are notified in the event of a cyber incident (or how to determine which stakeholders are notified) and what information is communicated. It is best to pre-identify points of contact for communications, both internally and with key external partners. Key information to include in communications may include:
  - Date of the incident;
  - Description of the incident;
  - Processes or services affected by the incident;
  - Actions taken so far to deal with the incident;
  - Any actions that the stakeholder may need to take; and
  - Contact information for further information.
- **Information Sharing**: As discussed in Engaging Service Owners and Operators section of this guide, communications before and during a cyber incident may require the sharing of sensitive information, necessitating the establishment of a confidentiality agreement, non-disclosure agreement or other legal agreement such as a private-public partnership. Ideally, such an agreement is established before an incident occurs, though in some instances they may need to be developed during incident response. The planning team considers such requirements when developing their plan or annex and includes a procedure for quickly establishing such agreements when an incident occurs.

2. Public Messaging

Some cyber incidents require notification of the general public. Given the sensitive nature of cyber incidents, it is important to establish clear procedures for public messaging before an incident occurs. Communication with the public requires awareness of what constitutes sensitive information and includes measures to ensure that sensitive information is protected. If available, a jurisdiction’s Public Information Officers (PIO) may provide assistance developing and delivering important messages to their communities.

Sensitive Information[13]

Information that is restricted in some manner based on formal or administrative determination. Examples of such information includes contract-sensitive information, classified information related to special access programs or compartments, privileged information, proprietary information, and personally identifiable information.

Security and privacy risk assessments as well as applicable laws, regulations, and policies can provide useful inputs to these determinations. Access restrictions may include non-disclosure agreements (NDA). Information flow techniques and security attributes may be used to provide automated assistance to users making sharing and collaboration decisions.

Not all cyber incidents are publicly reportable. Some may be deemed too sensitive for broader awareness. As such, public messaging protocols for cyber incidents should include steps to determine whether the incident may be publicly reported.

For those incidents that may be publicly reported, procedures should ensure that only necessary and appropriate information is included in messaging. Measures to ensure appropriate messaging to the public include:

- Determining whether law enforcement entities are more appropriate to develop and deliver messaging;
- Using clear and concise language;
- Identifying any direct or indirect impacts to the safety and security of individuals;
- Focusing on impacts to service availability;
- Emphasizing actions that may be taken by the individual to lessen direct impacts;
- Emphasizing actions that may be taken by the individual immediately to lessen cascading impacts from the initial incident;
- Encouraging preparedness behaviors that build resilience for future incidents; and
- Distributing communications to those within the scope of service disruption.

Information that should not be incorporated into communications related to a cyber incident includes:

[13] NIST, 2020, *Security and Privacy Controls for Information Systems and Organizations*, https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r5.pdf.

- Attributions of the incident to any actors before the root cause has definitively been determined;
- Specifics related to the location of facilities and assets that are impacted;
- Specifics related to the nature and extent of damage to infrastructure assets;
- Identification of any ongoing vulnerabilities that may be exploited by opportunistic attackers;
- References to any specific data that have been breached before proper notifications have been made; and
- Any Personally Identifiable Information (PII) or proprietary information.

Once a cyber incident has been communicated to the public, it is beneficial to ensure that notification regarding resolution of the incident is also distributed.

Conclusion

Emergency managers play a central role in preparing jurisdictions for cyber incidents. By coordinating the efforts of planning team members, engaging with stakeholders and ensuring effective communication, emergency managers develop an understanding of the cyber risks experienced by their jurisdictions and potential impacts. This understanding and coordination allows for the development and ongoing validation of cyber incident plans, increasing the community's preparedness and overall resilience.

Key aspects of cyber incident preparedness include:

- Understanding the types of cyber incidents likely to occur;
- Engaging service owners and operators;
- Identifying critical services and related dependencies;
- Prioritizing and planning for service and system disruptions;
- Clearly identifying roles and responsibilities; and
- Providing integrated communication and public messaging.

This guide aids state, local, tribal and territorial emergency management personnel to collaboratively prepare for a cyber incident and support the development of a cyber incident response plan or annex. Appendix A provides details for developing a jurisdiction's cyber plan or supporting annex for an existing emergency operations plan. Appendix C shares additional resources on cyber policy, training, exercise and funding options. Taken together, the information and resources in this guide empower emergency managers to address a persistent and complex hazard to ensure safe and resilient communities.

Appendix A: Developing a Plan

When preparing for cyber incidents, careful planning and collaboration are necessary to ensure a holistic and effective response. Using the six-step planning process detailed in Comprehensive Preparedness Guide (CPG) 101: Developing and Maintaining Emergency Operations Plans and shown in Figure 2, the planning team may develop a comprehensive and realistic plan or annex with purposeful involvement from all key stakeholders.

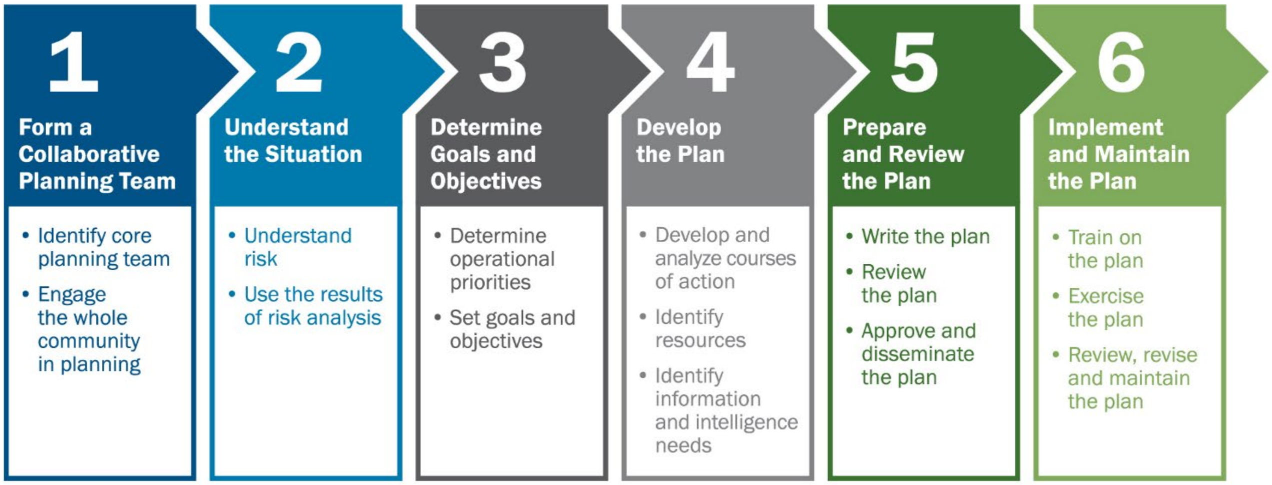

1
Form a Collaborative Planning Team
• Identify core planning team
• Engage the whole community in planning
2
Understand the Situation
• Understand risk
• Use the results of risk analysis
3
Determine Goals and Objectives
• Determine operational priorities
• Set goals and objectives
4
Develop the Plan
• Develop and analyze courses of action
• Identify resources
• Identify information and intelligence needs
5
Prepare and Review the Plan
• Write the plan
• Review the plan
• Approve and disseminate the plan
6
Implement and Maintain the Plan
• Train on the plan
• Exercise the plan
• Review, revise and maintain the plan

Figure 2. CPG 101 Emergency Operations Six-Step Planning Process

Step 1: Form a Collaborative Planning Team

The most realistic and complete plans result from a diverse planning team that includes representatives from across the whole community. Prior to identifying members of the broader collaborative planning team, it is necessary to identify the core planning team that will be responsible for leading coordination efforts. As CPG 101 suggests, the core planning team is composed of any key partners that are "likely to be involved in most, if not all, responses." Given the highly technical nature of cyber incident response, it is also important to include key cyber stakeholders on the core planning team.

The wide-reaching threat and impacts of a cyber incident necessitate collaboration among many stakeholders in the planning process, to include emergency management, cyber professionals, law enforcement, private industry and others. However, due to the technical challenges and elements posed by any cyber incident, an essential person to include on the core planning team is the senior information security officer. This could be the senior IT director, chief information officer (CIO), chief information security officer (CISO), chief technology officer (CTO) or designee. If an organization does not have someone with one of these titles, they may seek engagement from the applicable information security officer at the next highest jurisdictional level (e.g., county level, state level).

Once the appropriate information security officer is identified, the emergency manager may work with this individual to identify other members of the core planning team. It is beneficial to include members of the community that have a current understanding of the jurisdiction’s cyber infrastructure and cyber security capabilities, as well as any critical nodes, roles or features that otherwise would have been unknown. Table 1 below provides a list of individuals/organizations that may be beneficial to include on the core planning team.

Table 1. Potential Stakeholders for the Core Planning Team - Cyber

Individuals/Organizations	Expertise brought to Core Planning Team - Cyber
Emergency Manager or designee	▪ Experience coordinating multiple organizations with varying capabilities and areas of specialized knowledge ▪ Knowledge about all-hazards planning techniques ▪ Knowledge about existing mitigation, emergency, continuity and recovery plans ▪ Knowledge of emergency communication systems that may require cyber systems ▪ Incident management experience and capabilities
Senior IT Director, Chief Information Officer (CIO), Chief Information Security Officer (CISO), Chief Technology Officer (CTO) or designee[14]	▪ Knowledge of cyber incident response ▪ Specialized personnel and support ▪ Knowledge of key cyber systems within jurisdiction (e.g., water treatment, traffic systems, energy connections, hospital systems, backups)
Senior Official (elected or appointed) or designee	▪ Government intent by identifying planning goals and essential tasks ▪ Authority to commit the jurisdiction’s resources ▪ Knowledge of government resources that require cyber systems (e.g., jurisdiction records, emergency plans, key resources, call lists)
Police Chief or designee	▪ Knowledge about local laws and ordinances and specialized response requirements ▪ Knowledge about fusion centers and intelligence and security strategies for the jurisdiction ▪ Knowledge of key law enforcement requiring cyber systems (e.g., dispatch, records, emergency notifications)

[14] This is an essential member of the core planning team. If the organization does not have someone with one of these titles, the emergency manager or senior official would seek engagement from the applicable information security officer at the next highest jurisdictional level (e.g., county level, state level).

Individuals/Organizations	Expertise brought to Core Planning Team - Cyber
Emergency Medical Services Director or designee	▪ Knowledge about emergency medical treatment requirements for a variety of situations ▪ Knowledge of key medical resources that require cyber systems (e.g., dispatch, dispensing)
Fire Chief or designee	▪ Knowledge about the jurisdiction's fire-related risks ▪ Knowledge of key fire resources that require cyber systems (e.g., dispatch)
Public Works Director or designee	▪ Knowledge about the jurisdiction's road and utility infrastructure and the cyber-based systems in use (e.g., traffic systems, road signage)
Public Health Officer or designee	▪ Understanding of the unique medical needs of the community
General counsel or legal advisor	▪ Knowledge of applicable data privacy laws and other legal requirements

Given the potential reach and scope of a disruptive cyber incident, it is important to include additional community stakeholders in the planning process through the broader collaborative planning team, including those associated with community lifelines and other critical services that rely on cyber systems. Examples of key stakeholders that may be beneficial to include on the broader collaborative planning team are presented in Table 2.

Table 2. Potential Stakeholders for the Collaborative Planning Team - Cyber

Individuals/Organizations	Expertise brought to Collaborative Planning Team - Cyber
Utility representatives or designee	▪ Knowledge about utility infrastructure and possible cyber interdependencies (e.g., connections to and from gas, electric and water interconnections)
Hazardous Materials Coordinator or designee	▪ Knowledge about hazardous materials that are produced, stored, or transported in or through the community, and the cyber-based systems in use (e.g., facility controls, machinery)
Transportation Director or designee	▪ Knowledge about the jurisdiction's road infrastructure and transportation resources and the cyber-based systems in use (e.g., traffic systems, camera operations)
School Superintendent or designee	▪ Knowledge about the hazards that directly affect schools and the cyber-based systems in use (e.g., administrative systems, communication software, enrollment information)

Individuals/Organizations	Expertise brought to Collaborative Planning Team - Cyber
Local Federal Response Partners or designee, to include Protective Security Advisors/Cyber Security Advisors and others[15]	▪ Knowledge about specialized personnel and equipment resources that could be used in an emergency (e.g., CIRT teams) ▪ Knowledge about potential threats to or hazards at Federal facilities ▪ Knowledge of regional interconnections and partnerships that may be able to assist with a cyber incident ▪ Understanding of broader level threat landscape that may be required for overall containment of cyber threat
NGOs and other private, not-for-profit, faith-based and community organizations or designee	▪ Knowledge about community resources and needs (e.g., Red Cross, United Way) ▪ Understanding of community and its communication needs (e.g., case management systems)
Local business and industry senior IT representatives or designee	▪ Knowledge of their IT infrastructure and their dependencies (e.g., cash system, security system, communications)

Step 2: Understand the Situation

In this step, the planning team develops an understanding of how potential incidents may occur in and impact their community. Information in the Types of Cyber Incidents section of this guide provides a starting point for understanding the common types of cyber incidents and how they could impact the community. The Assessing Cyber Risks to Inform Prioritization and Planning section provides guidance and considerations for identifying potential consequences and impacts from cyber incidents and restoration priorities.

The planning team may benefit from developing a few scenarios to drive their planning efforts. Developing and exploring different scenarios helps the planning team understand potential risks to be addressed in the response plan or annex and examine the dependencies of assets and services. Exercises may also be used after the plan is developed to identify potential gaps and highlight where additional training and coordination is needed.

Prior to developing a cyber incident plan or annex, or integrating cyber incidents into a jurisdiction's EOP, the planning team should fully understand their EOP and any existing supporting plans and

[15] PSAs are trained critical infrastructure protection and vulnerability mitigation subject matter experts who facilitate local field activities in coordination with other Department of Homeland Security offices. They also advise and assist state, local and private sector officials and critical infrastructure facility owners and operators. For more information visit: https://www.cisa.gov/protective-security-advisors.

annexes, such as communications and energy. Annexes supplement and are consistent with the EOP and do not duplicate or conflict with it. A jurisdiction's EOP base plan or supporting plans will address many responsibilities and actions taken when implementing cyber incident response, as these actions are frequently required regardless of the specific threat or hazard. A cyber annex therefore addresses the unique characteristics and requirements not already covered in the EOP base plan or other annexes.

Step 3: Determine Goals and Objectives

In this step, the planning team works together to determine operational priorities and then set goals and objectives for cyber incident response. Operational priorities specify what the responding organizations are to accomplish to achieve the desired end-state for the cyber incident response. Using the scenarios and risk analysis results from Step 2, the planning team engages the senior official (e.g., tribal leader[s], mayor, county judge, commissioner[s]) to explore how the incident and impacts may evolve within the jurisdiction and what defines a successful outcome. The resulting discussion explores the requirements necessary to achieve the desired end-state, which will help determine actions and resources for the incident response. Senior officials may identify the desired end-state and operational priorities for cyber incident response operations or affirm those proposed by the planning team.

The actual situation when an incident occurs will determine the incident objectives. The goals and objectives established in the EOP are based on planning assumptions and provide a starting place for incident response planning.

Once operational priorities for the EOP or annex are set, the planning team collectively determines goals and objectives for cyber incident response. The goals and objectives should be realistic and based on the current state of cyber maturity in the jurisdiction. When crafting goals and objectives, the planning team considers the minimum capabilities needed to provide essential services and understands that priorities may change during the course of the incident.

Possible Goals for a Cyber Incident Response Plan May Include:

- Ensure continuity of community lifelines and critical services.
- Disseminate timely information to the community regarding impacted services, restoration expectations and available support.
- Efficiently exchange information with service owners/operators to enable rapid response and recovery efforts.
- Mitigate additional cascading impacts by isolating the impacted system(s), if possible.
- Identify how the system was compromised and make the immediate changes to ensure vulnerabilities cannot continue to be exploited while containment and recovery efforts are ongoing.

Step 4: Develop the Plan

Based on the results of Steps 2 and 3, the planning team may begin developing their plan, to include generating, comparing and selecting possible courses of action to achieve the identified goals and objectives and identifying resources. Planners may refer to CPG 101 for writing and reviewing checklists, as well as format considerations.

The cyber experts on the planning team play an essential role in developing and evaluating courses of action, as they may provide insight into the likely actions, impacts and decision points in a cyber incident. When developing courses of action, the planning team may follow the process described in CPG 101. During this decision process, the planning team considers:

- The roles and responsibilities each party may play throughout a cyber incident. For example, an emergency manager may *support* in an emergency caused by a cyber incident or may be responsible for leading the response if the cyber incident resulted in physical damages to water treatment or fuel supply facilities;
- A timeline of when expected response parties would be available;
- Specific types of cyber incidents that would require special notifications or cause concern that may require notification to legal authorities, neighboring jurisdictions, state, or federal governments; and
- When to ask for additional specialized assistance and what options are available.

When developing courses of action, the planning team considers any applicable legal requirements or procedures. Cyber incidents such as data breaches may necessitate compliance with legal reporting requirements. Laws might specify when and how to disclose privacy or identify risks, such as the breach of private personal information. If a data breach affects financial information such as payment (credit/debit) cards, the organization may need to notify consumer reporting agencies and the payment card issuers and processing companies. Other examples of legal requirements that may apply to disclosure of compromise to other types of service include drinking or wastewater.

After selecting courses of action, the planning team determines what resources are necessary to carry out the associated activities and identify resource gaps so that they may work with partners to preemptively address those gaps. The planning team may use capability estimates to describe the jurisdiction’s ability to perform a course of action. When developing capability estimates for cyber incident response planning, the planning team may want to consider:

- Cyber Incident Response Teams;
- State/federal partners;
- Mutual assistance;

- Third-party cyber advisors, which may be private sector partners;
- Computer equipment (e.g., laptops, monitors, networking);
- Industrial control system hardware (e.g., human machine interfaces, programmable logic controllers, etc.);
- Communications (e.g., telephone, network); and
- Computer storage (e.g., hard drives).

Depending on incident impacts, emergency managers may need to activate other plans or annexes (e.g., power outage, distribution management)). Activation of other plans may require incorporation of additional partners into incident support and consequence management. Establishing a unified command structure may effectively integrate partners with leadership roles in a complex cyber incident that includes extensive consequence management requirements.

During this step, the planning team also determines how to assess the status and operational readiness of the previously identified essential services and cyber assets and factor that information into plan development. This will help when responding to cyber incidents by providing emergency managers with information about what and how services are affected, what services are not affected and what services might be affected later (and when) because of delayed effects or because of future actions required to mitigate or recover from the incident.

Step 5: Prepare and Review the Plan

This step involves translating the findings of Steps 3 and 4 into a cyber incident response plan or annex, reviewing it to ensure that it meets applicable regulatory requirements and jurisdictional standards and to verify that it is useful in practice and obtaining approval on the plan by the appropriate elected official. During this step, jurisdictions may update key stakeholders and ensure buy-in from partners. Planners may follow the best practices for plan development outlined in CPG 101 to ensure the plan is readily understood by all audiences regardless of their technical expertise.

To ensure the plan meets regulatory requirements and standards, the planning team may engage external partners (e.g., the next level of government, regional or national cyber experts) to perform a review of the document. To evaluate the effectiveness of the plan, the planning team may consider the five criteria outlined in CPG 101: adequacy, feasibility, acceptability, completeness and compliance.

Questions to Consider When Reviewing a Cyber Incident Plan or Annex

- Did the planning team include representation from the jurisdiction's technology teams?
- Does the plan outline the roles and responsibilities of the key stakeholders?
- Does the plan map interdependencies between critical cyber systems or services?
- Does the plan include an emergency contact list for each of the critical cyber services?
- Does the plan identify potential consequences of service disruptions?
- Does the plan outline minimal service levels needed to have continuity of operations?
- Does the plan clearly identify available cyber response resources (e.g., personnel, administration and finance, operational organizations, logistics, communications, equipment and facilities)?
- Does the plan specify how to notify emergency management of an event with potentially cascading impacts to other areas?
- Does the plan identify when to escalate emergency response and who is responsible for making that decision?
- Does the plan clearly define the beginning and end of cyber incident response operations?
- Does the plan clearly define who is the lead, those with support roles and how to divide and address necessary tasks during cyber incident response?
- Does the plan include provisions for engaging private sector organizations in management of cyber incident response either as resources or as members of the unified command?
- Does the plan account for updates in technology since the last revision?

Prior to distributing the approved cyber incident response plan or annex, the planning team would confirm that the document does not contain any sensitive information that could be leveraged to carry out a cyberattack. Sensitive information may need to be redacted, or the plan's distribution limited to a smaller, specific audience as described earlier in the Communications Considerations section.

Step 6: Implement and Maintain the Plan

This step focuses on ensuring key stakeholders are familiar with the roles and processes described in the plan or annex, through training and exercises and that the plan or annex is regularly updated to reflect lessons learned and best practices.

Training on the cyber incident response plan or annex is crucial to ensuring that timely communication and coordination become engrained in the response team. Routine training also helps ensure new staff are aware of their roles and responsibilities. It may be beneficial for trainings to address:

- Foundational cyber topics (e.g., common causes of cyber incidents, key terms);
- Basic topics in emergency management (e.g., planning, situational awareness, Incident Command System) for other key personnel (e.g., IT staff, CISO);
- Use of specific, essential response tools (e.g., decision support matrices, escalation criteria);
- Complex or nuanced aspects of response (e.g., notification, escalation, legal reporting requirements); and
- Plan specific training (e.g., communication relay, role/function assignments).

Like other emergency plans and annexes, cyber incident response plans are exercised regularly. Use of Homeland Security Exercise and Evaluation Program (HSEEP) guidance can maximize the effectiveness of exercise development. Once exercise scope, objectives, and capabilities are identified, exercise planners may develop scenarios for their exercise. It is important for the exercise planning team to include cyber experts in both the exercise planning and after-action processes. These cyber experts help to ensure the cyber aspects of the exercise are realistic while understanding and interpreting the more nuanced aspects of a cyber incident so that improvement actions are documented accurately. Jurisdictions may select to integrate cyber considerations into their broader exercise program, to include the Integrated Preparedness Planning Workshop (IPPW) and resultant multi-year Integrated Preparedness Plan recommended in the Homeland Security Exercise and Evaluation Program.

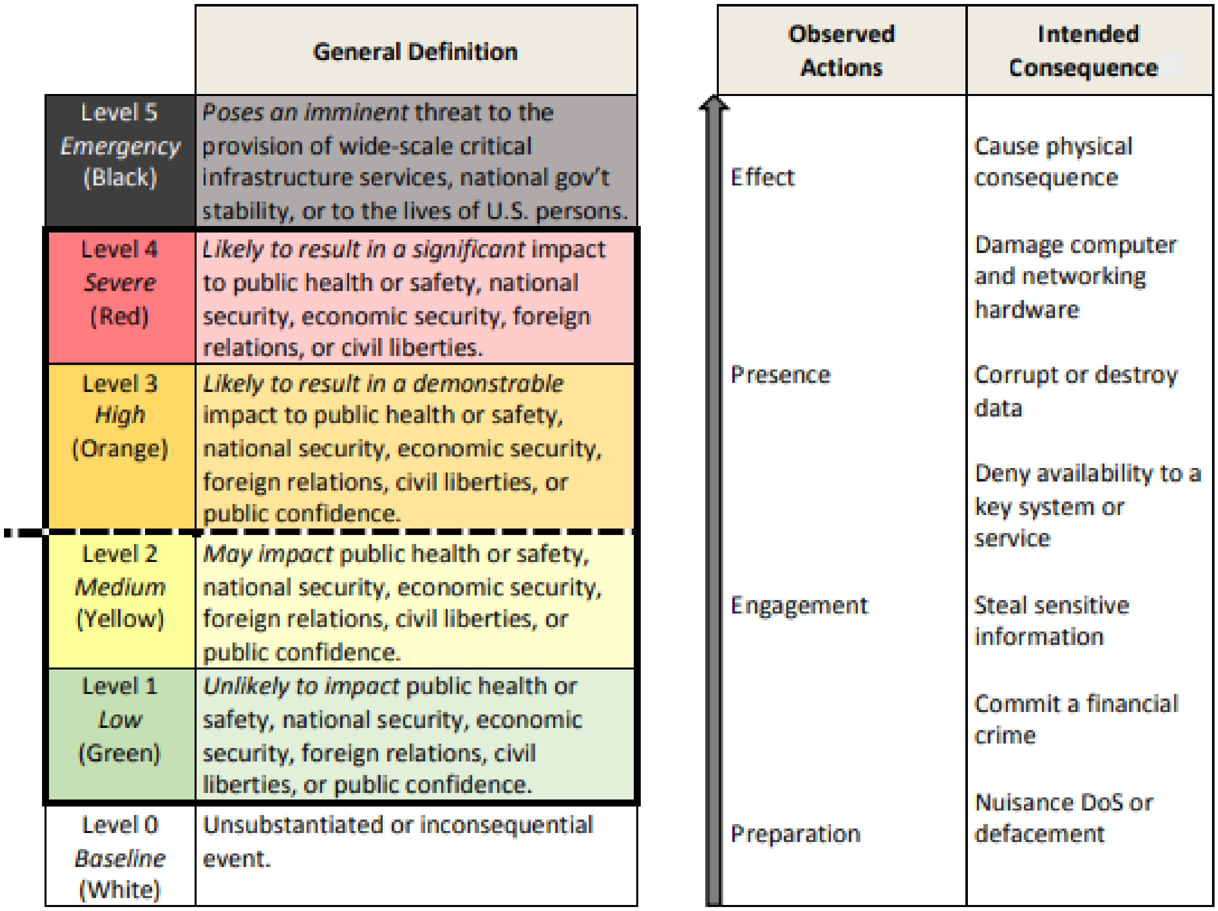
Plans are regularly reviewed and updated to address changes in jurisdictional capabilities, resources and requirements, as well as to address findings and lessons learned from exercises and real-world events. CPG 101 recommends establishing a process to review and revise the plan on a recurring basis. Asset owners, cyber stakeholders and other emergency response personnel may coordinate in the after-action process to ensure that lessons learned are identified and shared collaboratively.

Exercise Resources

- The Homeland Security Exercise and Evaluation Program (HSEEP): Provides a set of guiding principles for exercise and evaluation programs, including a common approach to exercise program management, design and development, conduct, evaluation and improvement planning. Utilizing HSEEP helps to ensure a coordinated and comprehensive approach to planning, training and strengthening capabilities ahead of a cyber incident.
- The National Exercise Program (NEP) is a two-year cycle of exercises across the nation that examines and validates capabilities in all preparedness mission areas. SLTT jurisdictions are eligible to submit requests for exercise support and participate in the NEP.
- HSEEP After-Action Report Template: Provides a flexible template for after action report development.
- CISA Tabletop Exercise Packages (CTEPs): A comprehensive set of resources designed to assist stakeholders in conducting their own exercises. Includes cybersecurity Situation Manuals (SITMANs) covering topics such as industrial control systems (ICS), ransomware, insider threats, phishing and elections-related cyber threat vectors.

Appendix B: Cyber Incident Identification and Closing Processes

The planning team works together to establish a process for monitoring, identifying and declaring a cyber incident. The planning team identifies benchmarks or triggers that clearly indicate when the cyber incident plan or annex is activated. As a starting point for this effort, it may be helpful for the planning team to review the Cyber Incident Severity Schema in the National Cyber Incident Response Plan (NCIRP), which serves as a way to describe the severity or impact of a cyber incident. The figure below depicts several key elements of the schema outlined in the NCRIP. (See Figure 3).



	General Definition
Level 5 *Emergency* (Black)	*Poses an imminent* threat to the provision of wide-scale critical infrastructure services, national gov't stability, or to the lives of U.S. persons.
Level 4 *Severe* (Red)	*Likely to result in a significant* impact to public health or safety, national security, economic security, foreign relations, or civil liberties.
Level 3 *High* (Orange)	*Likely to result in a demonstrable* impact to public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.
Level 2 *Medium* (Yellow)	*May impact* public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.
Level 1 *Low* (Green)	*Unlikely to impact* public health or safety, national security, economic security, foreign relations, civil liberties, or public confidence.
Level 0 *Baseline* (White)	Unsubstantiated or inconsequential event.

Observed Actions	Intended Consequence
Effect	Cause physical consequence
	Damage computer and networking hardware
Presence	Corrupt or destroy data
	Deny availability to a key system or service
Engagement	Steal sensitive information
	Commit a financial crime
Preparation	Nuisance DoS or defacement

Figure 3: Elements of Cyber Incident Severity Schema

For cyber-driven events, the first partners to be notified often vary based on the incident and jurisdiction. This means that building strong relationships and understandings of cascading impacts from cyber incidents may enhance the capacity to make a joint and informed decisions. Establishing relationships and reviewing cyber incident response protocols with these types of partners helps emergency managers gain an understanding of the types of situations in which they would be asked to assist or lead with a cyber-driven event.

The planning team may also choose to establish benchmarks or triggers that signal the end of cyber incident response operations and a return to regular activities. For instance, a cyber incident response may end once the root cause of the incident has been identified and remediated or the situation stabilized. Cyber incidents often escalate and de-escalate differently than natural hazards. For example, while hurricanes often come with significant pre-warning and progress in severity, cyber incidents may have unexpected and immediate severe impacts. Similarly, other disasters may include a long-term recovery process that lasts months or years. Although cyber professionals may consider a cyber incident fully recovered once the compromised system is restored to functionality, the physical and cascading impacts of a cyber incident may require a longer recovery process. Open and regular communication among staff is key to understanding how similar terms are used in different organizations and for establishing clear expectations.

Officially closing an incident makes it apparent when cyber response resources may be demobilized and when potential threats to public safety have been stabilized enough that people may continue with regular activities. In practice, the end of a cyber incident may be difficult to identify or define, as it may blend into traditional recovery activities.

Cybersecurity Incident & Vulnerability Response Playbooks

CISA developed two playbooks to strengthen cybersecurity response practices and operational procedures for the federal government, public and private sector entities. Building on insights from previous incidents and incorporating industry best practices, the playbooks contain checklists for incident response, incident response preparation and vulnerability response that any organization can adapt to track necessary activities to completion.

- The Incident Response Playbook applies to incidents that involve confirmed malicious cyber activity and for which a major incident has been declared or not yet been reasonably ruled out.
- The Vulnerability Response Playbook applies to any vulnerability used by adversaries to gain unauthorized entry into computing resources. This playbook builds on CISA's Binding Operational Directive 22-01 and standardizes the high-level process that is followed when responding to vulnerabilities that pose significant risk across the federal government, private and public sectors.

To view the playbooks visit: Federal Government Cybersecurity Incident and Vulnerability Response Playbooks (cisa.gov)

Appendix C. Additional Resources

1. Cyber Incident Management Guidance, References and Training

1.1. Cybersecurity and Infrastructure Security Agency

- Binding Operational Directive 22-01: Establishes a CISA-managed catalog of known exploited vulnerabilities that carry significant risk to the federal enterprise and establishes requirements for agencies to remediate any such vulnerabilities.

- Cyber Essential Element – Your Crisis Response: Provides tips focused on limiting damage and quickening restoration of normal operations

- Cyber Essentials Starter Kit: Provides guidance for leaders of small businesses and small and local government agencies to help them start implementing organizational cybersecurity practices.

- Cybersecurity Glossary: A glossary of common cybersecurity words and phrases.

- Cyber Resilience Review (CRR): A no-cost, voluntary, non-technical assessment to evaluate an organization's operational resilience and cybersecurity practices. The CRR may be conducted as a self-assessment or as an on-site assessment facilitated by the Department of Homeland Security (DHS) cybersecurity professionals. The assessment is designed to measure existing organizational resilience as well as provide a gap analysis for improvement based on recognized best practices.

- Cyber Incident Resource Guide for Governors: Information for governors and their staff on how to request federal support during or following a cyber incident.

- Cyber Incident Response Resources: Provides an overview of CISA's role in cyber incident response and includes supporting resources.

- Cyber Incident Response Training: No-cost cybersecurity incident response training for government employees and contractors across Federal and SLTT government and educational and critical infrastructure partners.

- Emergency Services Sector Cybersecurity Framework Implementation Guidance: Provides foundational guidance for how Emergency Services Sector organizations may enhance their cybersecurity using the NIST Cybersecurity Framework.

- Emergency Services Sector Cybersecurity Initiative: Provides resources to help those in the Emergency Services Sector better understand and manage cyber risks.

- Federal Government Cybersecurity Incident and Vulnerability Response Playbooks: Two playbooks developed by CISA to strengthen cybersecurity practices and operational procedures for the federal government, public and private sector entities. The playbooks contain checklists for incident response, incident response preparation and vulnerability response.

- Free Cybersecurity Services and Tools: Identifies free cybersecurity tools and services to help organizations further advance their security capabilities.

- Resources for State, Local, Tribal and Territorial (SLTT) Governments: Presents key resources for SLTT Governments pertaining to cybersecurity, to include best practices / case studies and an SLTT Toolkit.

- State, Local, Tribal and Territorial Government Coordinating Council (SLTTGCC) Cyber Resource Compendium: Identifies some of the major references that may help build or strengthen an organization's cybersecurity program.

- Tabletop Exercise Packages (CTEPs): A comprehensive set of resources designed to assist stakeholders in conducting their own exercises. Includes cybersecurity Situation Manuals covering topics such as industrial control systems, ransomware, insider threats, phishing and elections-related cyber threats.

1.2. Federal Emergency Management Agency

- Building Private-Public Partnership Guide: Provides best practices for jurisdictions to establish and maintain a private-public partnership, which is essential to successful cyber incident response.

- Continuity Resources and Technical Assistance: Information and tools on continuity assessments and resources.

- Developing and Maintaining Emergency Operations Plans Comprehensive Preparedness Guide (CPG 101): Details the six-step planning process for developing emergency operations plans and hazard specific annexes.

- Homeland Security Exercise and Evaluation Program (HSEEP): Provides a set of guiding principles for exercise and evaluation programs, including a common approach to exercise program management, design and development, conduct, evaluation and improvement planning.

- HSEEP After-Action Report Template: Provides a flexible template for after action report development.

- National Exercise Program (NEP) is a two-year cycle of exercises across the nation that examines and validates capabilities in all preparedness mission areas. SLTT jurisdictions are eligible to submit requests for exercise support and participate in the NEP.

- National Incident Management System: guides all levels of government, nongovernmental organizations and the private sector to work together to prevent, protect against, mitigate, respond to and recover from incidents.

- Preparedness Grants Manual: Describes regulations, policies and procedures for managing preparedness grants with guidance specific to each grant. Includes information on the Homeland Security Grant Program.

- Threat and Hazard Identification and Risk Assessment (THIRA): Provides guidance for assessing the risk of all threats and hazards.

1.3. National Institute of Science and Technology

- Computer Security Incident Handling Guide: Assists organizations in establishing computer security incident response capabilities and handling incidents efficiently and effectively.

- Cybersecurity Framework: Provides strategic guidance to help build and execute a cybersecurity program. Helps organizations assess cyber risks and set plans for improving or maintaining their security posture.

- Guide for Conducting Risk Assessments: Provides guidance for conducting risk assessments of federal information systems and organizations.

- Guide for Cybersecurity Event Recovery: Provides guidance to help organizations plan and prepare recovery from a cyber event and integrate the processes and procedures into their enterprise risk management plans.

- Security and Privacy Controls for Information Systems and Organizations: provides a catalog of security and privacy controls for information systems and organizations to protect organizational operations and assets, individuals and other organizations from a diverse set of threats and risks.

1.4. Other Resources

- Cyber Incident Reporting: A Unified Message for Reporting to the Federal Government: Explains when, what and how to report a cyber incident to the federal government.

- Data Breach Response Guide: Provided by the Federal Trade Commission and provides general guidance for an organization on how to manage a data breach.

- National Cyber Incident Response Plan (NCIRP): Maintained by the Department of Homeland Security, the NCIRP a national approach to dealing with cyber incidents; addresses the important role that the private sector, state and local governments and multiple federal agencies play in responding to incidents and how the actions of all fit together for an integrated response.

2. Direct Resources and Collaboration Partnerships

2.1. Multi-State Information Sharing & Analysis Center (MS-ISAC)

The mission of the MS-ISAC is to improve the overall cybersecurity posture of the nation's state, local, tribal and territorial governments through focused cyber threat prevention, protection, response and recovery. The MS-ISAC 24x7 cybersecurity operations center provides real-time network monitoring, early cyber threat warnings and advisories, vulnerability identification and mitigation and incident response. SLTT government representatives who believe they are experiencing a cybersecurity event may report it to: http://msisac.cisecurity.org/about/incidents.

The MS-ISAC Cyber Incident Response Team (CIRT) provides SLTT governments with malware analysis, computer and network forensics, code analysis/mitigation and incident response. External vulnerability assessments are also available post a cyber incident. This service helps victims of cyber incidents to check if their remediation efforts have been effective. For more information, visit: MS-ISAC (cisecurity.org)

2.1. Cyber Security Advisors (CSAs)

CSAs are regionally located DHS personnel who direct coordination, outreach and regional support to protect cyber components essential to the sustainability, preparedness and protection of the Nation's critical infrastructure and SLTT governments. CSAs offer immediate and sustained assistance to prepare and protect SLTT and private entities. CSAs bolster the cybersecurity preparedness, risk mitigation and incident response capabilities of these entities and bring them into closer coordination with the Federal government. CSAs represent a front-line approach and promote resilience of key cyber infrastructures throughout the U.S. and its territories. For more information about CSAs, please email cyberadvisor@hq.dhs.gov

2.2. Protective Security Advisors (PSAs)

PSAs are trained critical infrastructure protection and vulnerability mitigation subject matter experts. Operating under CISA's Integrated Operations Division, PSAs facilitate local field activities in coordination with other DHS offices while assisting state, local, private sector and critical infrastructure officials, owners and operators. The PSA program focuses on physical site security and resiliency assessments, planning and engagement, incident management assistance and vulnerability and consequence information sharing. For more information about PSAs, visit: http://dhs.gov/protective-security-advisors.

2.3. Public Infrastructure Security Cyber Education System (PISCES)

PISCES is a non-profit organization that, in partnership with DHS CISA and the Pacific Northwest National Laboratory, partners with the private sector, colleges and universities and local governments to provide no-cost cybersecurity event monitoring to small public sector organizations. Students leverage data collected from customer networks to build their skills as cybersecurity analysts, and report confirmed or potential compromises to the customer jurisdiction when identified. For more information, visit: PISCES (pisces-intl.org).

3. Funding Considerations

3.1. Robert T. Stafford Disaster Relief and Emergency Assistance Act

The Robert T. Stafford Disaster Relief and Emergency Assistance Act[16] (Stafford Act) authorizes the President to declare a major disaster or emergency and provide federal assistance to states, local governments, tribal nations, individuals and households and nonprofit organizations to respond and recover from a major disaster. All requests for a declaration by the President are made by the Governor or tribal leader of the affected state, territory or tribal nation. These requests are based on findings that "the disaster is of such severity and magnitude that effective response is beyond the capabilities of the State and the affected local governments, and that Federal assistance is necessary."

Cyber incidents may or may not meet the criteria for declaring a major disaster or emergency. During a cyber incident response, jurisdictions may need additional resources including computer hardware, software, cyber security vendors and other support services or personnel. Planning for a potential widespread cyber incident, including the identification of various resource and funding sources, is critical for jurisdictions.

3.2. Homeland Security Preparedness Grants

The Homeland Security Grant Program includes a suite of risk-based grants to assist state, local, tribal and territorial efforts in preventing, protecting against, mitigating, responding to and recovering from acts of terrorism and other threats. These grants provide grantees with the resources required for implementation of the National Preparedness System and working toward the National Preparedness Goal of a secure and resilient nation.

In addition to other items allowed under the grants, certain cybersecurity planning, risk reduction activities, hardware and operating system software designated for use in an integrated system may be allowable under specific grant programs. Such systems include detection, communication, cybersecurity, logistical support and geospatial information systems. This may include networking hardware routers, wireless access points, servers, workstations, notebook computers and peripherals.

For more information on Homeland Security Grants, visit: Homeland Security Grant Program | FEMA.gov[17]

[16] Pub. L. No. 93-288, as amended, 42 U.S.C. 5121 et seq.

[17] https://www.fema.gov/grants/preparedness/homeland-security#programs

3.3. Cybersecurity Grant Programs

The passage of the Infrastructure Investment and Jobs Act of 2021 established the State and Local Cybersecurity Grant Program (SLCGP) and Tribal Security Grants Program (TCGP). Implemented by CISA and FEMA, CISA serves as subject matter experts for the programs, while FEMA provides grant administration and oversight for appropriated funds. State, territorial and tribal governments are responsible for distributing awarded funds to local governments to address cybersecurity risks and threats to information systems owned or operated by or on behalf of state, local, tribal and territorial governments.

The overarching goal of the programs is to assist state, local, tribal and territorial governments in managing and reducing systemic cyber risks. To accomplish this, CISA established four separate, but interrelated objectives:

- Governance and Planning: Develop and establish appropriate governance structures, as well as plans, to improve capabilities to respond to cybersecurity incidents and ensure continuity of operations.
- Assessment and Evaluation: Identify areas for improvement in SLTT cybersecurity posture based on continuous testing, evaluation, and structured assessments.
- Mitigation: Implement security protections commensurate with risk through best practices
- Workforce Development: Ensure organization personnel are appropriately trained in cybersecurity, commensurate with their responsibilities as suggested in the National Initiative for Cybersecurity Education[18]

For more information on the State and Local Cybersecurity Grant Program and the Tribal Security Grants Program, visit: CyberGrants | CISA[19]

[18] https://www.nist.gov/itl/applied-cybersecurity/nice

[19] https://www.cisa.gov/cybergrants

Appendix D: Glossary

- **Asset**: Items of value to stakeholders. An asset may be tangible (e.g., a physical item such as hardware, firmware, computing platform, network device, or other technology component) or intangible (e.g., humans, data, information, software, capability, function, service, trademark, copyright, patent, intellectual property, image, or reputation). Source: NIST SP 800-160 Vol. 2 Rev. 1

- **Attack**: An attempt to gain unauthorized access to system services, resources or information, or an attempt to compromise system integrity.

- **Confidentiality**: A property that information is not disclosed to users, processes or devices unless they have been authorized to access the information.

- **Cyber incident**: An event occurring on or conducted through a computer network that actually or imminently jeopardizes the confidentiality, integrity, or availability of computers, information or communications systems or networks, physical or virtual infrastructure controlled by computers or information systems, or information resident thereon.

- **Cyber infrastructure**: Electronic information and communications systems and services and the information contained therein.

- **Cybersecurity:** The activity or process, ability or capability or state whereby information and communications systems and the information contained therein are protected from and/or defended against damage, unauthorized use or modification or exploitation.

- **Data breach**: The unauthorized movement or disclosure of sensitive information to a party, usually outside the organization, that is not authorized to have or see the information.

- **Denial-of-Service (DoS):** An attack that prevents or impairs the authorized use of information system resources or services.

- **Disruption**: An event which causes unplanned interruption in operations or functions.

- **Distributed Denial-of-Service (DDoS)**: A denial of service technique that uses numerous systems to perform the attack simultaneously.

- **Exploit**: A technique to breach the security of a network or information system in violation of security policy.

- **Incident Command System (ICS)**: The Incident Command System is a standardized approach to the command, control and coordination of on-scene incident management, providing a common hierarchy within which personnel from multiple organizations may be effective. ICS is the combination of procedures, personnel, facilities, equipment and communications operating within a common organizational structure, designed to aid in the management of on-scene resources during incidents. It is used for all kinds of incidents and is applicable to small, as well as large and complex, incidents, including planned events.

- **Industrial Control System (ICS)**: An information system used to control industrial processes such as manufacturing, product handling, production and distribution or to control infrastructure assets. Also known as operational technology.

- **Information Technology (IT)**: Any equipment or interconnected system or subsystem of equipment that processes, transmits, receives or interchanges data or information.

- **Insider Threat**: A person or group of persons within an organization who pose a potential risk through violating security policies. One or more individuals with the access and/or inside knowledge of a company, organization or enterprise that would allow them to exploit the vulnerabilities of that entity's security, systems, services, products or facilities with the intent to cause harm.

- **Integrity**: The property whereby information, an information system or a component of a system has not been modified or destroyed in an unauthorized manner. A state in which information has remained unaltered from the point it was produced by a source, during transmission, storage and eventual receipt by the destination.

- **Malware**: Software that compromises the operation of a system by performing an unauthorized function or process. Hardware, firmware or software that is intentionally included or inserted in a system to perform an unauthorized function or process that has adverse impacts on the confidentiality, integrity or availability of an information system.

- **Mitigation**: The application of one or more measures to reduce the likelihood of an unwanted occurrence and/or lessen its consequences.

- **Network Services**: firewalls, including hardware (e.g., hubs, bridges, switches, multiplexers, routers, cables, proxy servers and protective distributor systems) and software that permit the sharing and transmission of all spectrum transmissions of information to support the security of information and information systems.

- **Operational Technology (OT)**: The hardware and software systems used to operate industrial control devices.

- **Phishing**: A digital form of social engineering to deceive individuals into providing sensitive information, including usernames and passwords.

- **Privacy**: The assurance that the confidentiality of, and access to, certain information about an entity is protected.

- **Recovery**: The activities after an incident or event to restore essential services and operations in the short and medium term and fully restore all capabilities in the longer term.
- **Resilience**: The ability to adapt to changing conditions and prepare for, withstand and rapidly recover from disruption.
- **Service**: A service is a resource or capability provided by an asset that may be used for operational or information functions.
- **Spyware**: Software that is secretly or surreptitiously installed into an information system without the knowledge of the system user or owner.
- **System**: are a combination of interacting elements organized to achieve one or more stated purposes. Interacting elements in the definition of system include hardware, software, data, humans, processes, facilities, materials and naturally occurring physical entities. Source: NIST SP 800-160 Vol. 2 Rev. 1
- **Trojan:** A computer program that appears to have a useful function, but also has a hidden and potentially malicious function that evades security mechanisms, sometimes by exploiting legitimate authorizations of a system entity that invokes the program.
- **Unauthorized Access**: Any access that violates the stated security policy.
- **Worm**: A self-replicating, self-propagating, self-contained program that uses networking mechanisms to spread itself.

Appendix E: Acronyms

CCTV	Closed-Circuit Television
CIO	Chief Information Officer
CIRT	Cyber Incident Response Team
CISA	Cyber Infrastructure and Cybersecurity Agency
CISO	Chief Information Security Officer
CPG	Comprehensive Preparedness Guide
CRR	Cyber Resilience Review
CTO	Chief Technology Officer
DHS	Department of Homeland Security
DOS	Denial of Service
EOP	Emergency Operations Plan
FEMA	Federal Emergency Management Agency
HSEEP	Homeland Security Exercise and Evaluation Program
ICS	Industrial Control Systems OR Incident Command System
IPPW	Integrated Preparedness Planning Workshop
ISAC	Information Sharing & Analysis Center
ISP	Internet Service Provider
NCIRP	National Cyber Incident Response Plan
NCSR	Nationwide Cybersecurity Review
NDA	Non-Disclosure Agreement
NIMS	National Incident Management System
NIST	National Institute of Science and Technology

PII	Personally Identifiable Information
PISCES	Public Infrastructure Security Cyber Education System
PSA	Protective Security Advisor
SLTT	State, Local, Tribal and Territorial
THIRA	Threat and Hazard Identification and Risk Assessment
UCG	Unified Coordination Group