Managing Enterprise Cybersecurity MIS 4596

Unit #23

Case Study 2 – Cyberattack: The Maersk Global Supply-Chain Meltdown

Agenda

- Breakout Groups
  - Why was Maersk attacked?
  - Why was NotPetya attack on Maersk successful?
  - What can companies do to mitigate impacts of ransomware & file encryption attacks?
- How would you rate Maersk's InfoSec maturity?
- Reading NIST documents for application to business

Breakout Groups

- Why was Maersk attacked?
- Why was NotPetya attack on Maersk successful?
- What can companies do to mitigate impacts of ransomware & file encryption attacks?

Why was Maersk attacked?

- Likely collateral damage from an attack by Russia on Ukraine
- NotPetya was likely a warning message sent to international firms not to do business in Ukraine, perhaps to deter foreign investment and/or delay European Union membership
- Hacker accessed and infected systems weeks or months prior to the attack, perhaps leaving evidence of espionage against Ukrainaian government and businesses. Ransomware attack not only disabled computers, but erased evidence of spying

Why was the NotPetya attack on Maersk successful?

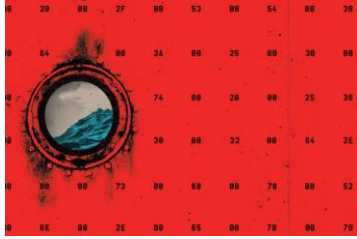
- Systems not upgraded nor patched to protect from NotPetya virus/malware
- All data, backups and systems accessible on the Internet (except Ghana Active Directory server)
- No contingency planning (Business Continuity Plan / Disaster Recovery Plan)

NotPetya

- Arrives as infected e-mail attachments
- Designed to spread automatically, rapidly, and indiscriminately
- Propelled by two powerful hacker exploits working in tandem:
  1. EternalBlue
     - Penetration tool stolen from US NSA that takes advantage of a Windows Server Message Block (SMB) protocol vulnerability (CVE-2017-0144) which allowed hackers free rein to remotely run their own code on any unpatched machine
  2. Mimikatz
     - Windows left users' passwords lingering in computers' memory
     - Once hackers gained initial access to a computer, Mimikatz would pull those passwords out of RAM and use them to hack into other machines accessible with the same credentials. On networks with multiuser computers, it could even allow an automated attack to hop from one machine to the next
  3. Encryption of disk drives (no decryption offered)

Note: Petya is a family of encrypting ransomware that was first discovered in 2016. The malware targets Microsoft Windows–based systems, infecting the master boot record to execute a payload that encrypts a hard drive's file system table and prevents Windows from booting.

Timeline



2016 – Maersk shipping company's senior system administrators warn company that its network of 80,000+ computers was vulnerable to attack

- Windows 2000 servers and Windows XP computers overdue for replacement
- Leadership approved upgrades, but systems administrators not motivated to implement the upgrades (due to bonuses based on "uptime" and not security)

2017, March – Microsoft issues emergency patch to update systems and protect from NotPetya

2017, June – NotPetya encryption attack

- IT availability loss
  - Active directory domain controllers (network of 150 of them) providing centralized store of usernames and passwords and access control authorization information all wiped out
  - Fall-back to manual business continuity activities
  - 1 domain controller in Ghana protected by power outage and served as a source for restoring domain control and access to restore systems
- 10-days of lost business ($300,000,000 in expenses and lost earnings)
  - **Note: 60% of small companies are unable to sustain their businesses over 6 months after a cyber attack!**

2017, July – System upgraded (4,000 new servers, 45,000 new PC's, with 2,500 applications) and computer-based business processes restored

What can companies do to mitigate impacts of cyberattacks?

What can companies do to mitigate impacts of cyberattacks?

- Regular operating system, anti-virus, and application updates and patches, training and incentives to keep security capabilities up-to-date
  - Greatest impact is on older unpatched software and systems
- 2-factor authentication to block hackers from infiltrating systems and networks
- Contingency planning
  - Data and system backups, training and practice in backing up and restoring systems

To assure resilient response

Business Continuity Plan (BCP)

Documented procedures for recovering and resuming critical operational functions following significant disruption

Source: ISO 22301:2012
Societal security – Business continuity management systems - Requirements

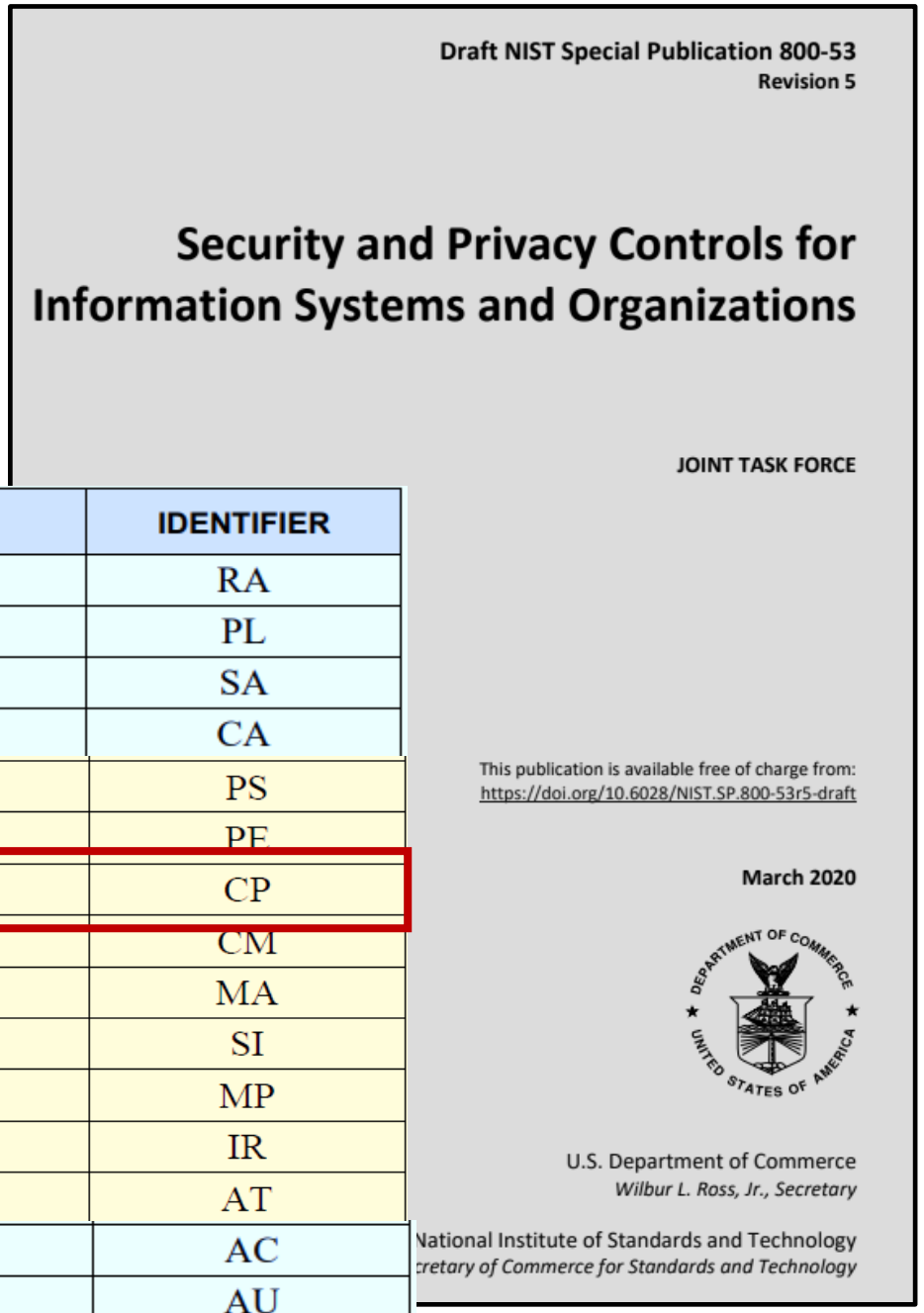
…includes a Disaster Recovery Plan (DRP)

Procedures for recovering critical information systems operations following significant disruption

Catalog of cyber-security controls

for Business Continuity and Resiliency planning focus on Contingency Planning controls

CLASS	FAMILY	IDENTIFIER
Management	Risk Assessment	RA
Management	Planning	PL
Management	System and Services Acquisition	SA
Management	Certification, Accreditation, and Security Assessments	CA
Operational	Personnel Security	PS
Operational	Physical and Environmental Protection	PE
Operational	Contingency Planning	CP
Operational	Configuration Management	CM
Operational	Maintenance	MA
Operational	System and Information Integrity	SI
Operational	Media Protection	MP
Operational	Incident Response	IR
Operational	Awareness and Training	AT
Technical	Access Control	AC
Technical	Audit and Accountability	AU
Technical	System and Communications Protection	SC



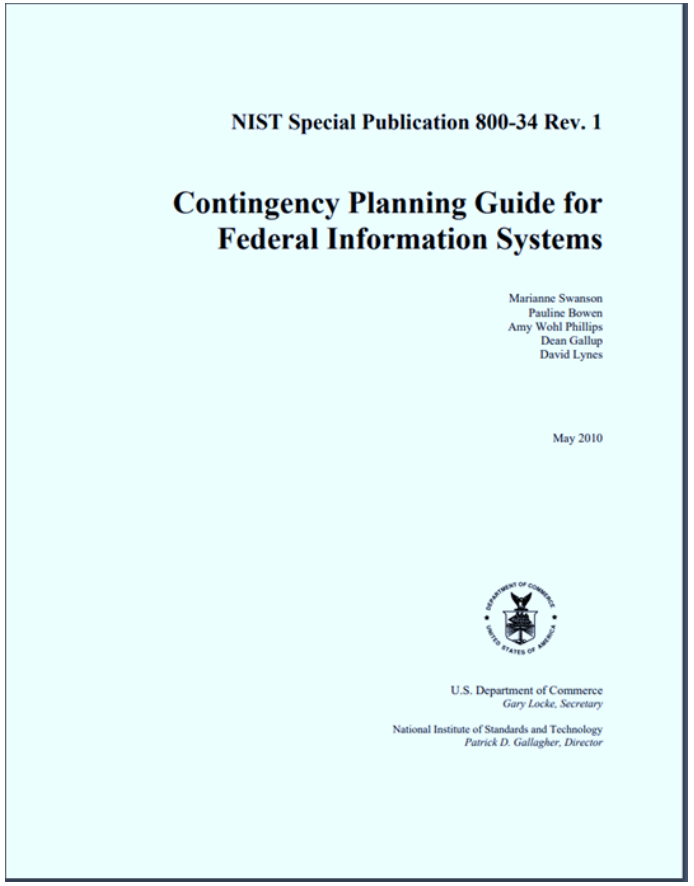
Contingency Planning Controls

CONTROL NAME	BASELINES		
	LOW	MOD	HIGH
Contingency Planning Policy and Procedures	X	X	X
Contingency Plan	X	X	X
Contingency Training	X	X	X
Contingency Plan Testing	X	X	X
Alternative Storage Site		X	X
Alternative Processing Site		X	X
Telecommunications Services		X	X
Information System Backup	X	X	X
Information System Recovery and Reconstitution	X	X	X

NIST SP 800-53r4 "Security and Privacy Controls for Federal Information Systems and Organizations"

CNTL NO.	CONTROL NAME *Control Enhancement Name*	WITHDRAWN	ASSURANCE	CONTROL BASELINES		
				LOW	MOD	HIGH
CP-1	**Contingency Planning Policy and Procedures**		x	x	x	x
CP-2	**Contingency Plan**			x	x	x
CP-2(1)	*CONTINGENCY PLAN | COORDINATE WITH RELATED PLANS*				x	x
CP-2(2)	*CONTINGENCY PLAN | CAPACITY PLANNING*					x
CP-2(3)	*CONTINGENCY PLAN | RESUME ESSENTIAL MISSIONS / BUSINESS FUNCTIONS*				x	x
CP-2(4)	*CONTINGENCY PLAN | RESUME ALL MISSIONS / BUSINESS FUNCTIONS*					x
CP-2(5)	*CONTINGENCY PLAN | CONTINUE ESSENTIAL MISSIONS / BUSINESS FUNCTIONS*					x
CP-2(8)	*CONTINGENCY PLAN | IDENTIFY CRITICAL ASSETS*				x	x
CP-3	**Contingency Training**		x	x	x	x
CP-3(1)	*CONTINGENCY TRAINING | SIMULATED EVENTS*		x			x
CP-4	**Contingency Plan Testing**		x	x	x	x
CP-4(1)	*CONTINGENCY PLAN TESTING | COORDINATE WITH RELATED PLANS*		x		x	x
CP-4(2)	*CONTINGENCY PLAN TESTING | ALTERNATE PROCESSING SITE*		x			x
CP-5	**Contingency Plan Update**	x	Incorporated into CP-2.			
CP-6	**Alternate Storage Site**				x	x
CP-6(1)	*ALTERNATE STORAGE SITE | SEPARATION FROM PRIMARY SITE*				x	x
CP-6(2)	*ALTERNATE STORAGE SITE | RECOVERY TIME / POINT OBJECTIVES*					x
CP-6(3)	*ALTERNATE STORAGE SITE | ACCESSIBILITY*				x	x
CP-7	**Alternate Processing Site**				x	x
CP-7(1)	*ALTERNATE PROCESSING SITE | SEPARATION FROM PRIMARY SITE*				x	x
CP-7(2)	*ALTERNATE PROCESSING SITE | ACCESSIBILITY*				x	x
CP-7(3)	*ALTERNATE PROCESSING SITE | PRIORITY OF SERVICE*				x	x
CP-7(4)	*ALTERNATE PROCESSING SITE | PREPARATION FOR USE*					x
CP-7(5)	*ALTERNATE PROCESSING SITE | EQUIVALENT INFORMATION SECURITY SAFEGUARDS*	x	Incorporated into CP-7.			
CP-8	**Telecommunications Services**				x	x
CP-8(1)	*TELECOMMUNICATIONS SERVICES | PRIORITY OF SERVICE PROVISIONS*				x	x
CP-8(2)	*TELECOMMUNICATIONS SERVICES | SINGLE POINTS OF FAILURE*				x	x
CP-8(3)	*TELECOMMUNICATIONS SERVICES | SEPARATION OF PRIMARY / ALTERNATE PROVIDERS*					x
CP-8(4)	*TELECOMMUNICATIONS SERVICES | PROVIDER CONTINGENCY PLAN*					x
CP-9	**Information System Backup**			x	x	x
CP-9(1)	*INFORMATION SYSTEM BACKUP | TESTING FOR RELIABILITY / INTEGRITY*				x	x
CP-9(2)	*INFORMATION SYSTEM BACKUP | TEST RESTORATION USING SAMPLING*					x
CP-9(3)	*INFORMATION SYSTEM BACKUP | SEPARATE STORAGE FOR CRITICAL INFORMATION*					x
CP-9(4)	*INFORMATION SYSTEM BACKUP | PROTECTION FROM UNAUTHORIZED MODIFICATION*	x	Incorporated into CP-9.			
CP-9(5)	*INFORMATION SYSTEM BACKUP | TRANSFER TO ALTERNATE STORAGE SITE*					x
CP-10	**Information System Recovery and Reconstitution**			x	x	x
CP-10(1)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | CONTINGENCY PLAN TESTING*	x	Incorporated into CP-4.			
CP-10(2)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | TRANSACTION RECOVERY*				x	x
CP-10(3)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | COMPENSATING SECURITY CONTROLS*	x	Addressed by tailoring procedures.			
CP-10(4)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | RESTORE WITHIN TIME PERIOD*					x
CP-10(5)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | FAILOVER CAPABILITY*	x	Incorporated into SI-13.			

Contingency Plan



NIST Special Publication 800-34 Rev. 1

Contingency Planning Guide for Federal Information Systems

Marianne Swanson
Pauline Bowen
Amy Wohl Phillips
Dean Gallup
David Lynes

May 2010

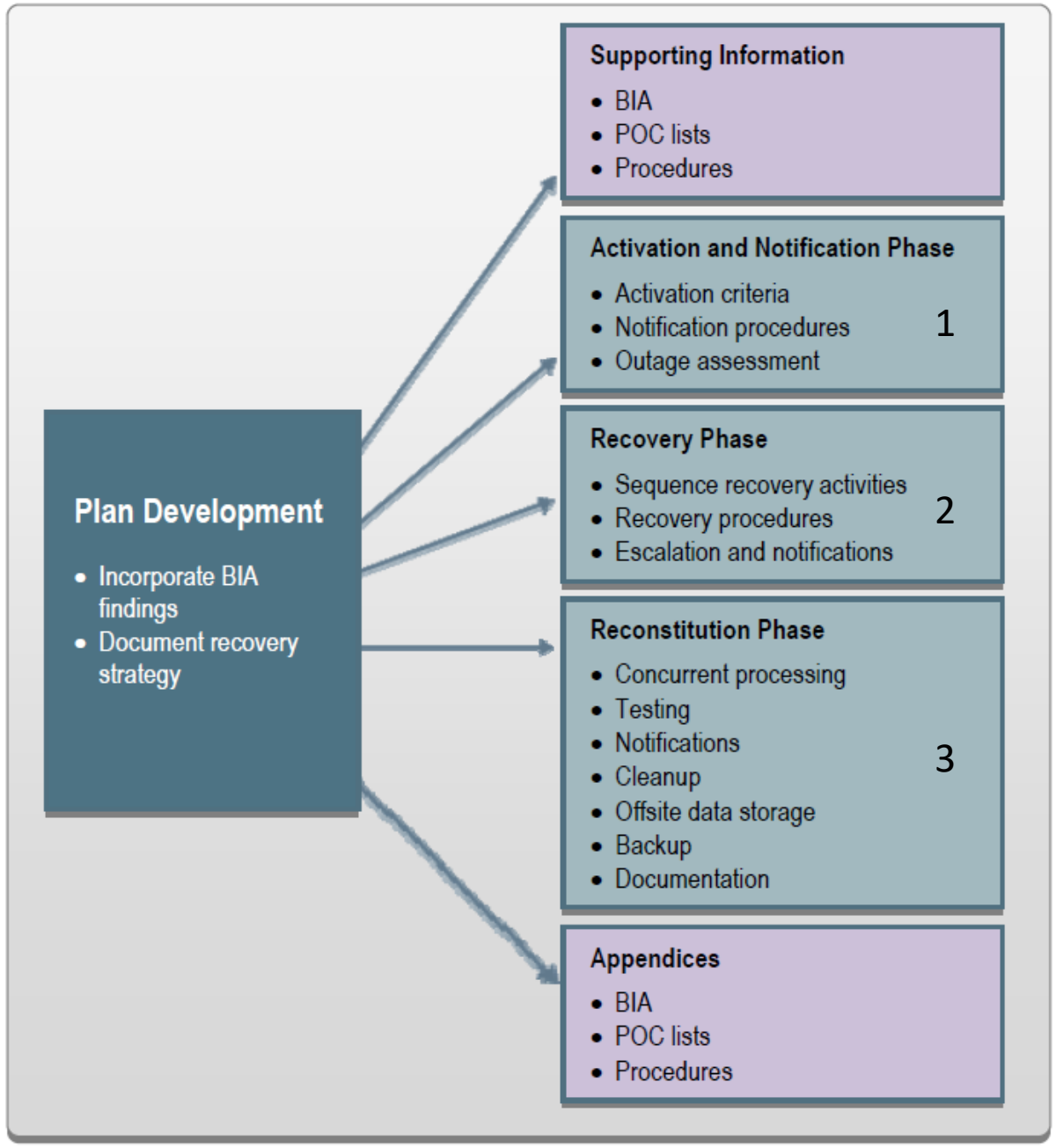
U.S. Department of Commerce
Gary Locke, Secretary

National Institute of Standards and Technology
Patrick D. Gallagher, Director

TABLE OF CONTENTS

3-Phases in a Contingency Plan

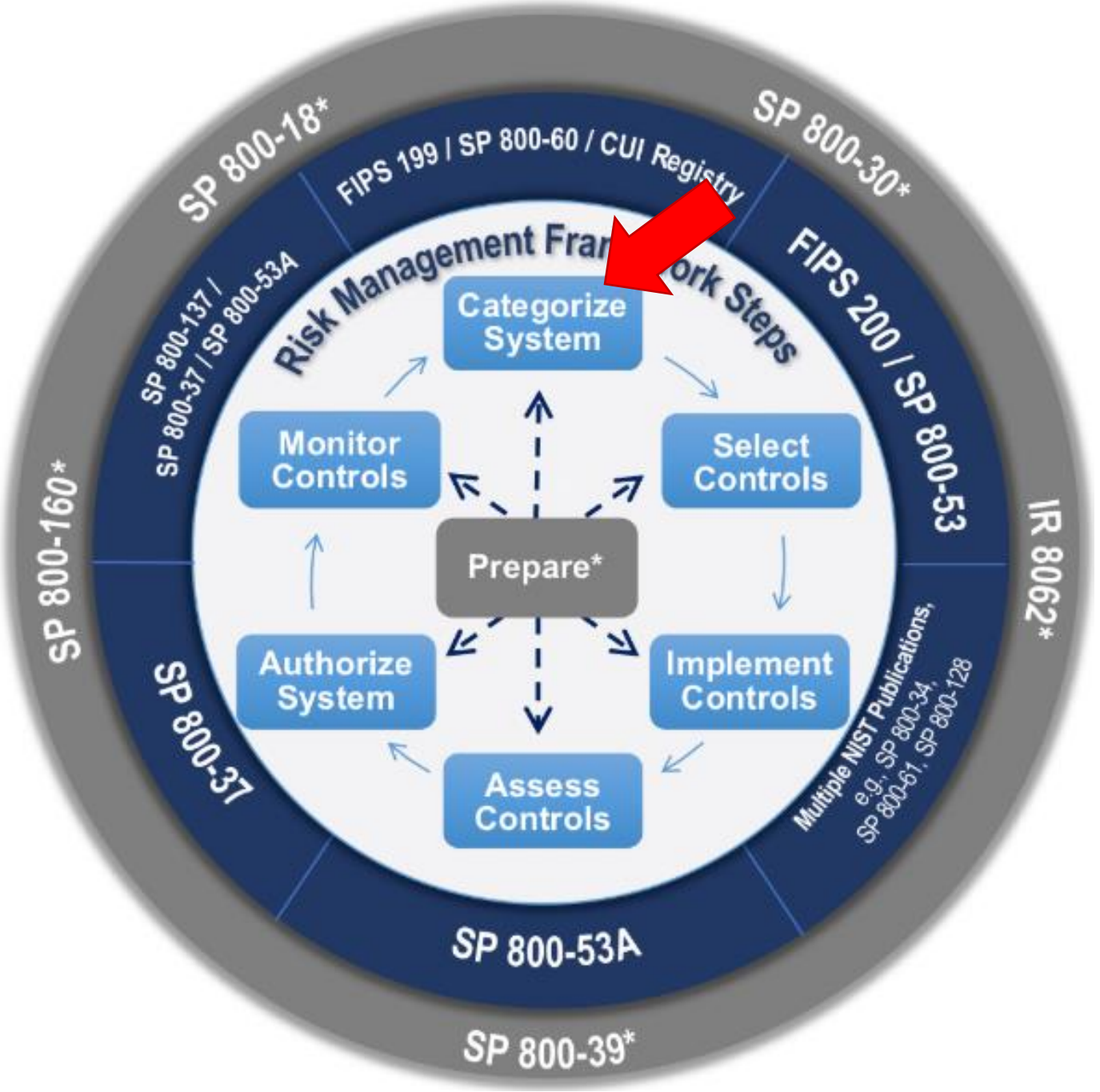
All dependent on a BIA “Business Impact Analysis”



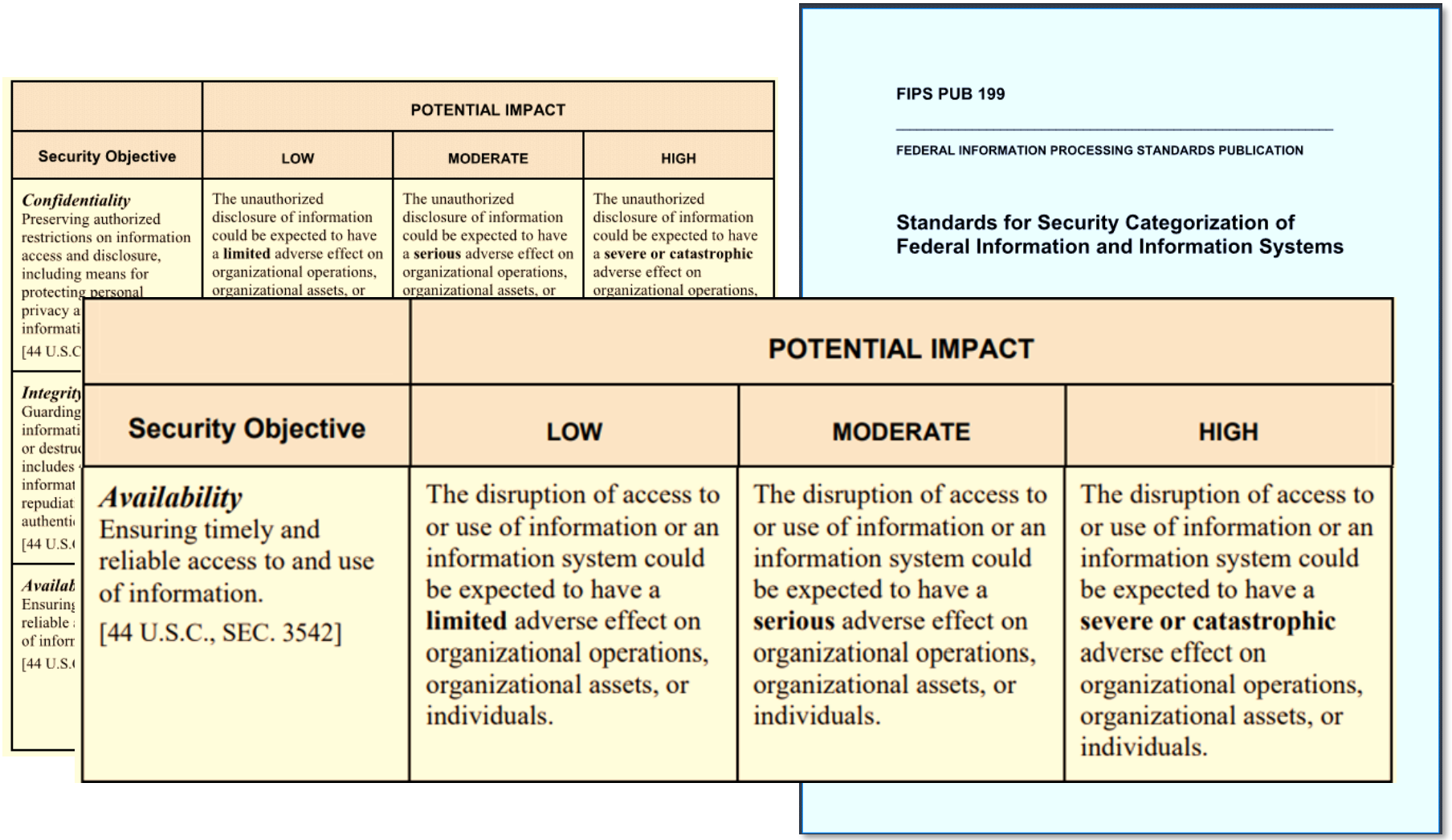
NIST SP 800-34 R1 Contingency Planning Guide for Federal Information Systems

National Institute of Standards and Technology
U.S. Department of Commerce

Categorizing information systems enables us to understand the priority for recovery…



Impact on which security objective determines priorities for recovery?



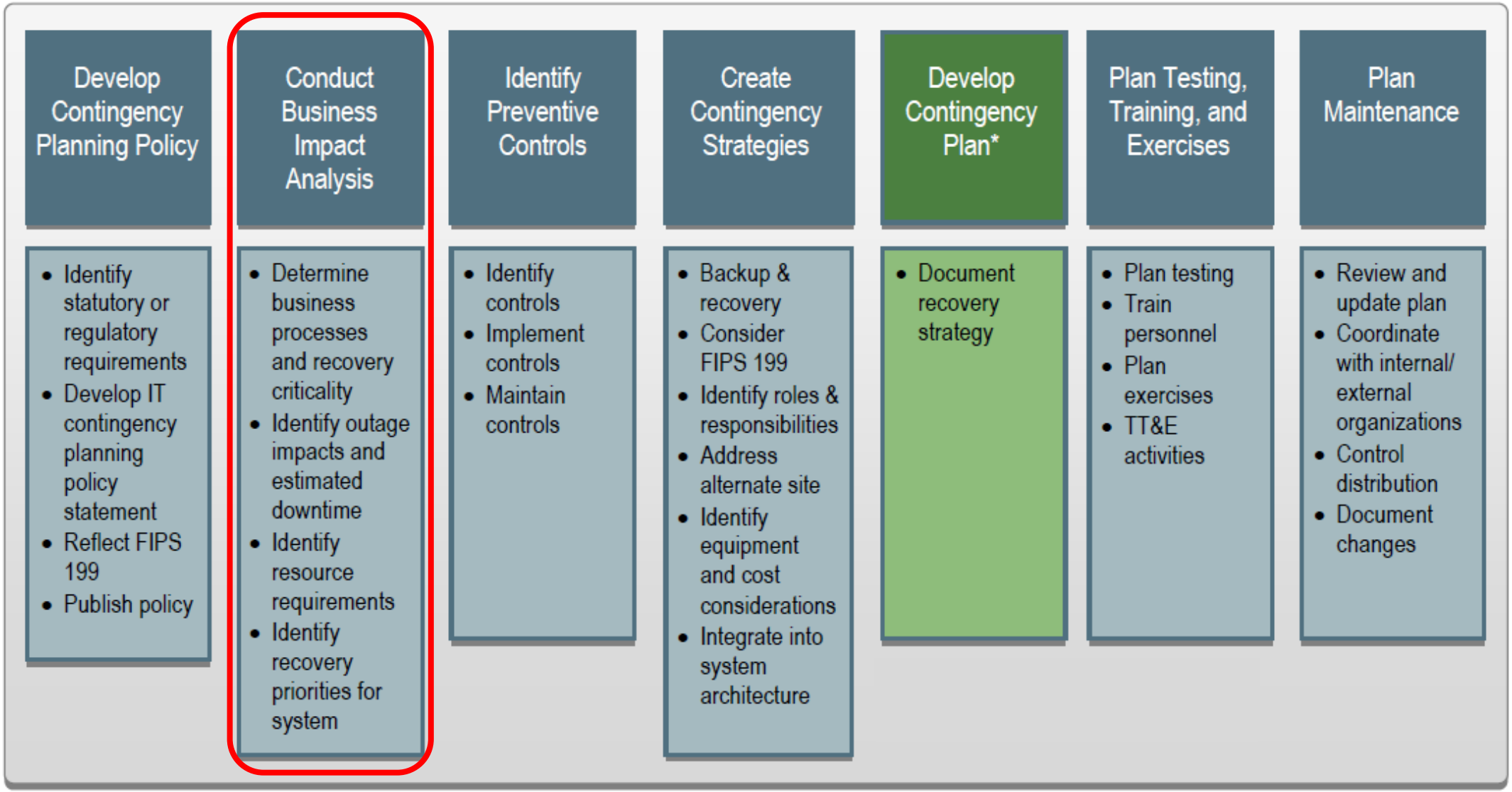
FIPS PUB 199

FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION

Standards for Security Categorization of Federal Information and Information Systems

Security Objective	POTENTIAL IMPACT		
	LOW	MODERATE	HIGH
Availability Ensuring timely and reliable access to and use of information. [44 U.S.C., SEC. 3542]	The disruption of access to or use of information or an information system could be expected to have a **limited** adverse effect on organizational operations, organizational assets, or individuals.	The disruption of access to or use of information or an information system could be expected to have a **serious** adverse effect on organizational operations, organizational assets, or individuals.	The disruption of access to or use of information or an information system could be expected to have a **severe or catastrophic** adverse effect on organizational operations, organizational assets, or individuals.

Plan is based on “recovery priorities”



NIST SP 800-34 R1 – Contingency Planning Guide for Federal Information Systems

Business Impact Analysis (BIA) Answers

1. What are the work processes ?
2. How critical is each ?
3. What data, applications, and people are needed to run each critical process ?
4. What are the priorities for recovering information systems after disruption ?

5. For each critical IT resource, what are:
   - **Recover time objective** (RTO):

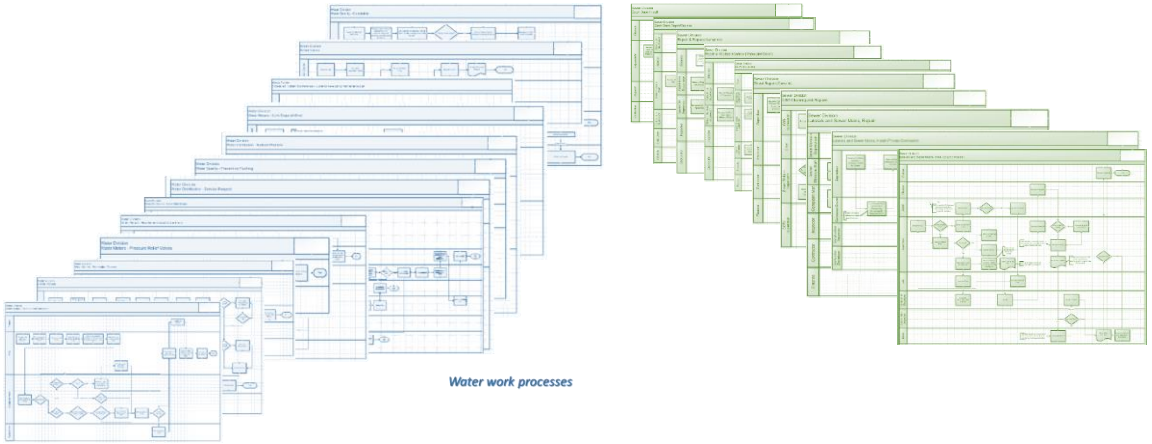
     Maximum acceptable downtime

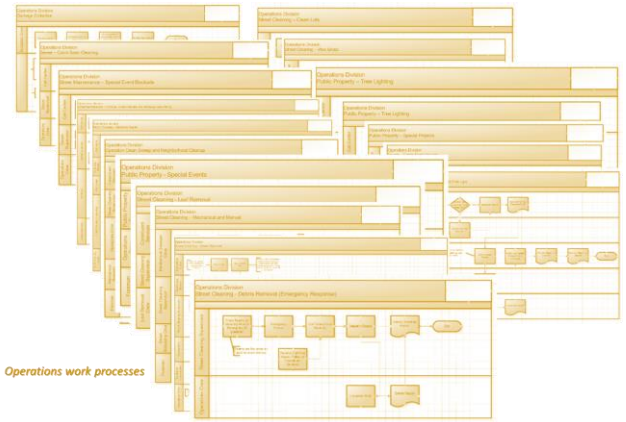
   - **Recovery point objective** (RPO):

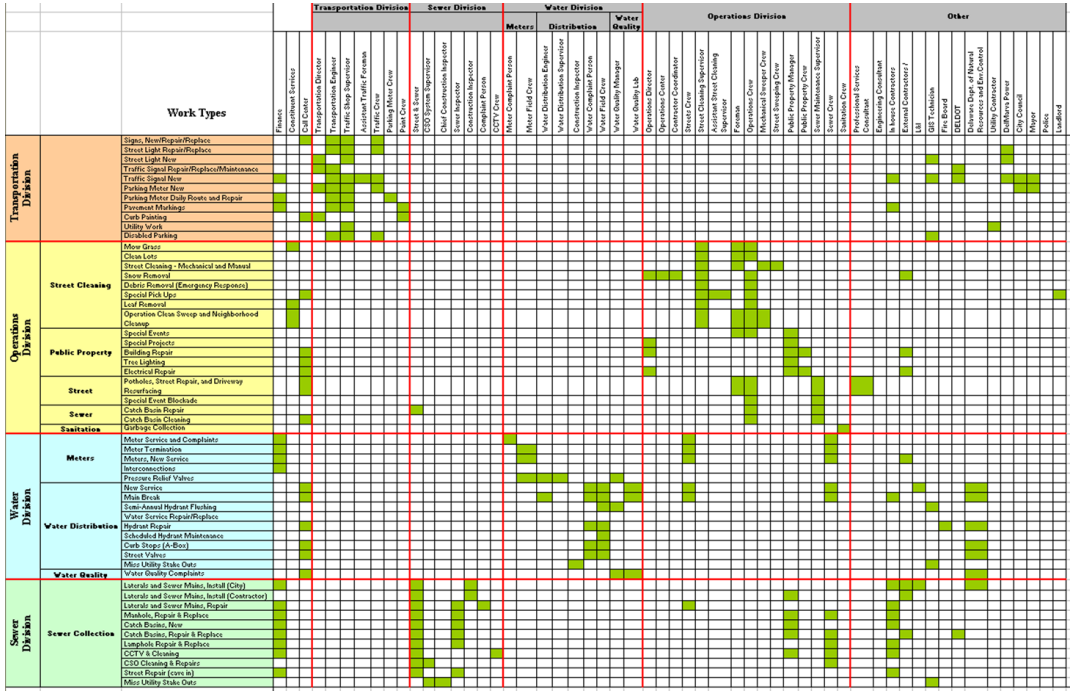
     Maximum acceptable data loss (measured in time, but implies # of data records)

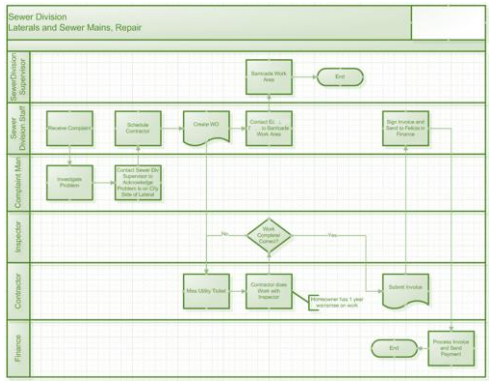
Prerequisite for BIA and contingency planning…

Good work process documentation identifies all people, data, applications, communications and information technologies needed to restore operations



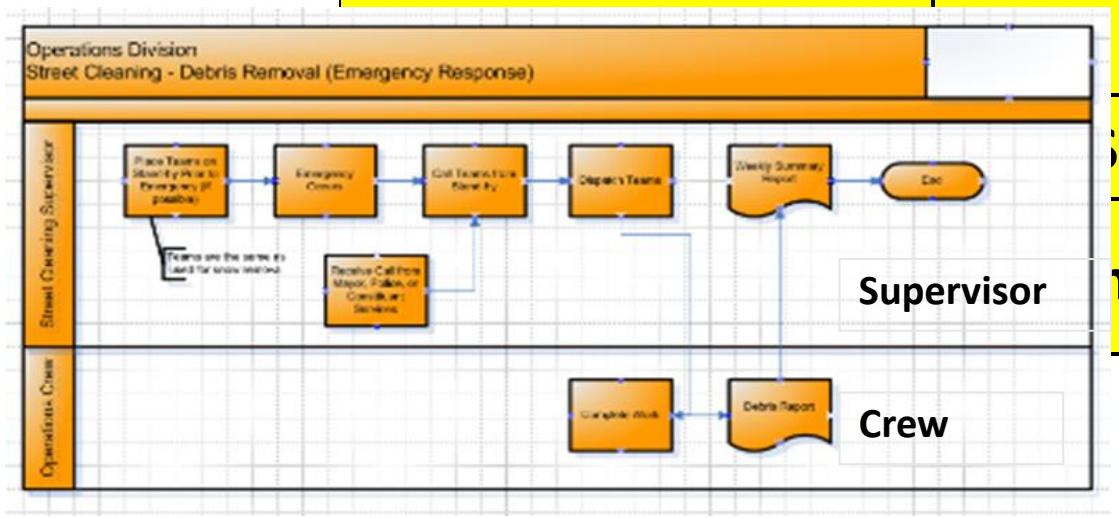






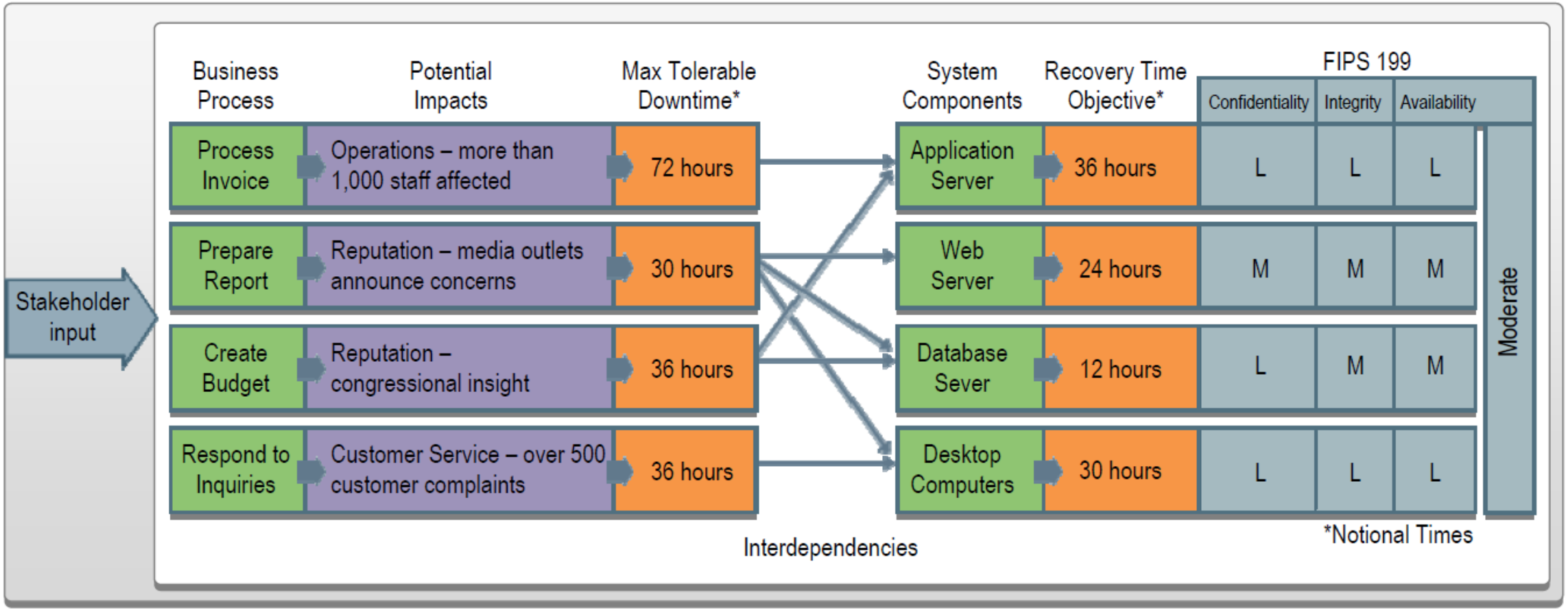
Priorities for recovery example

Public Works Dept Operations Division	**Street Cleaning**	**Mow Grass**
		Clean Lots
		Street Cleaning - Mechanical and Manual
		Snow Removal
		Debris Removal (Emergency Response)
		Special Pick Ups
		Leaf Removal
		Neighborhood Cleanup
	Public Property	**Special Events**
		Special Projects
		Building Repair
		Tree Lighting
		Electrical Repair
	treet	**Potholes, Street Repair, and Resurfacing**
		Special Event Blockade
	itation	**Catch Basin Repair**
		Catch Basin Cleaning
		Garbage Collection



Business Impact Analysis (BIA) example…

- Determine Business Processes and Recovery Criticality
- Identify Information and IT Resource Requirements
- Identify Information System Resource Recovery Priorities



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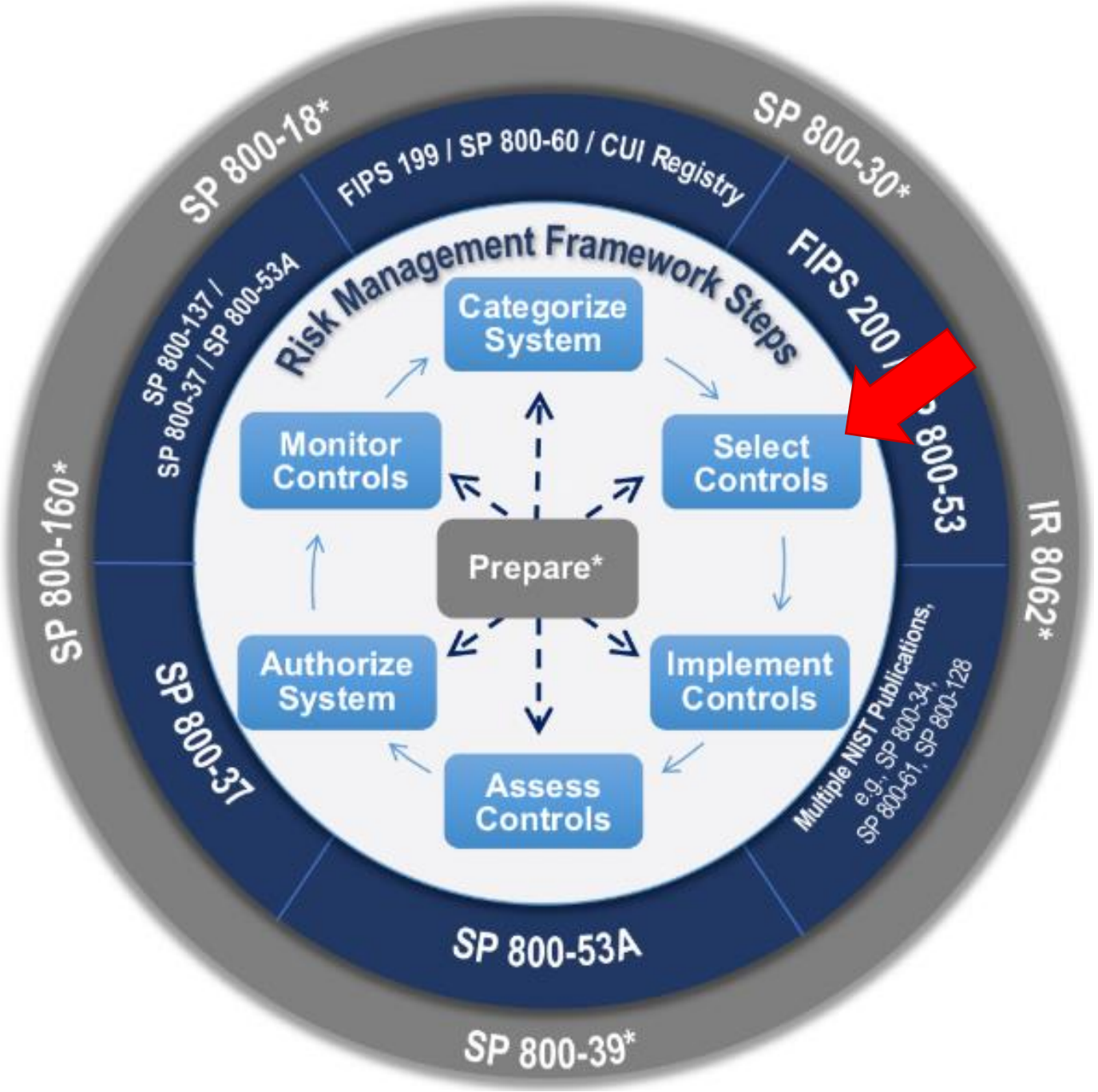

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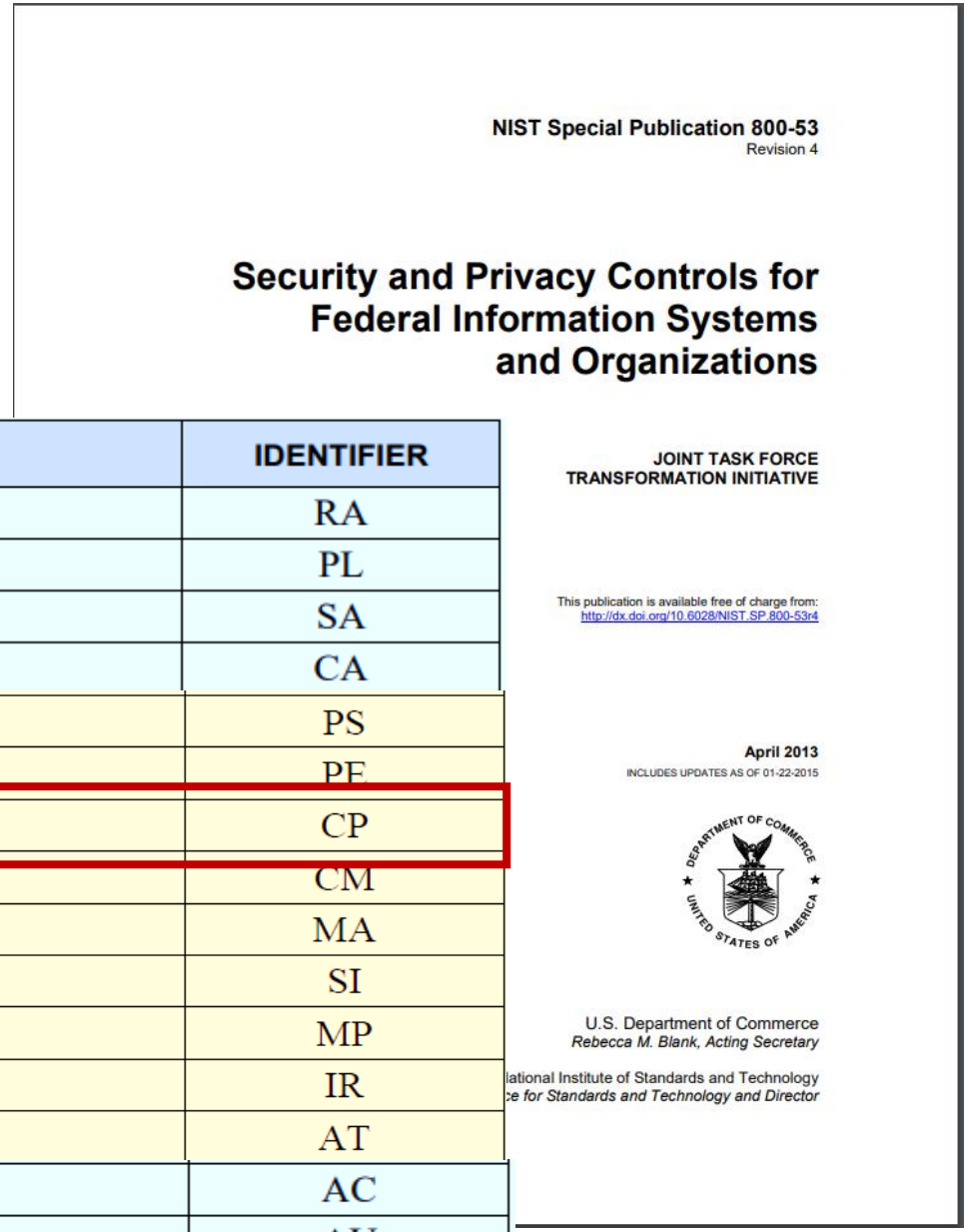

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Revision 4

Security and Privacy Controls for Federal Information Systems and Organizations

JOINT TASK FORCE TRANSFORMATION INITIATIVE

This publication is available free of charge from: http://dx.doi.org/10.6028/NIST.SP.800-53r4

April 2013

INCLUDES UPDATES AS OF 01-22-2015

U.S. Department of Commerce
Rebecca M. Blank, Acting Secretary

ational Institute of Standards and Technology
ce for Standards and Technology and Director

Contingency Planning Controls

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Contingency Plan Testing	X	X	X
Alternative Storage Site		X	X
Alternative Processing Site		X	X
Telecommunications Services		X	X
Information System Backup	X	X	X
Information System Recovery and Reconstitution	X	X	X

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CP-2(8)	*CONTINGENCY PLAN | IDENTIFY CRITICAL ASSETS*				x	x
CP-3	**Contingency Training**		x	x	x	x
CP-3(1)	*CONTINGENCY TRAINING | SIMULATED EVENTS*		x			x
CP-4	**Contingency Plan Testing**		x	x	x	x
CP-4(1)	*CONTINGENCY PLAN TESTING | COORDINATE WITH RELATED PLANS*		x		x	x
CP-4(2)	*CONTINGENCY PLAN TESTING | ALTERNATE PROCESSING SITE*		x			x
CP-5	**Contingency Plan Update**	x	Incorporated into CP-2.			
CP-6	**Alternate Storage Site**				x	x
CP-6(1)	*ALTERNATE STORAGE SITE | SEPARATION FROM PRIMARY SITE*				x	x
CP-6(2)	*ALTERNATE STORAGE SITE | RECOVERY TIME / POINT OBJECTIVES*					x
CP-6(3)	*ALTERNATE STORAGE SITE | ACCESSIBILITY*				x	x
CP-7	**Alternate Processing Site**				x	x
CP-7(1)	*ALTERNATE PROCESSING SITE | SEPARATION FROM PRIMARY SITE*				x	x
CP-7(2)	*ALTERNATE PROCESSING SITE | ACCESSIBILITY*				x	x
CP-7(3)	*ALTERNATE PROCESSING SITE | PRIORITY OF SERVICE*				x	x
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CP-8(4)	*TELECOMMUNICATIONS SERVICES | PROVIDER CONTINGENCY PLAN*					x
CP-9	**Information System Backup**			x	x	x
CP-9(1)	*INFORMATION SYSTEM BACKUP | TESTING FOR RELIABILITY / INTEGRITY*				x	x
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CP-10	**Information System Recovery and Reconstitution**			x	x	x
CP-10(1)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | CONTINGENCY PLAN TESTING*	x	Incorporated into CP-4.			
CP-10(2)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | TRANSACTION RECOVERY*				x	x
CP-10(3)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | COMPENSATING SECURITY CONTROLS*	x	Addressed by tailoring procedures.			
CP-10(4)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | RESTORE WITHIN TIME PERIOD*					x
CP-10(5)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | FAILOVER CAPABILITY*	x	Incorporated into SI-13.			

Options for alternate Data Processing Site

Hot site: A geographically remote facility, fully equipped and ready to power up at a moments notice

Warm site: Includes communications components but computers are not installed – will need to be delivered and setup

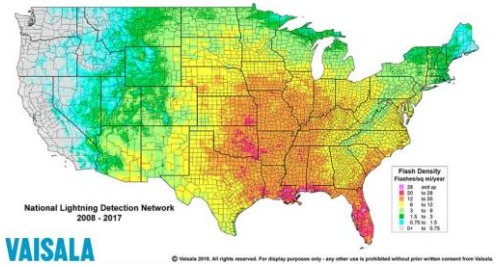
Cold site: Provides only the basic environment that can be outfitted with communication, utilities and computers

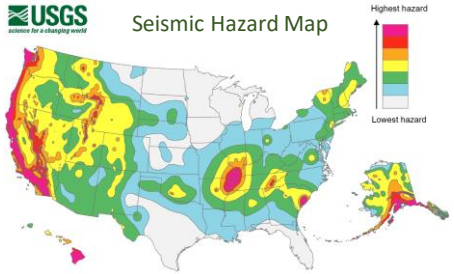
Site	Cost	Hardware Equipment	Telecommunications	Setup Time
Hot Site	High	Full	Full	Short
Warm Site	Medium	Partial	Full / Partial	Medium
Cold Site	Low	None	None	Long

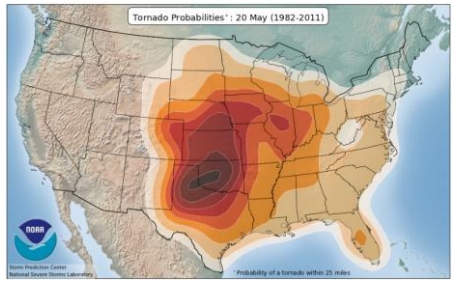
Location of Alternate site

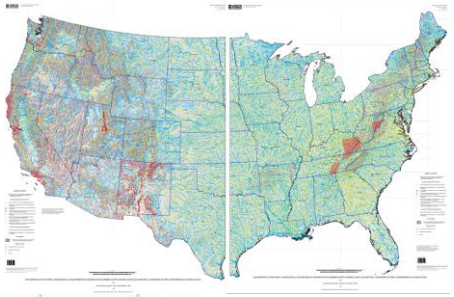
Disaster recovery site should be in a different geophysical area not susceptible to same disaster as the primary operations facility

Note: even the cloud is located somewhere…

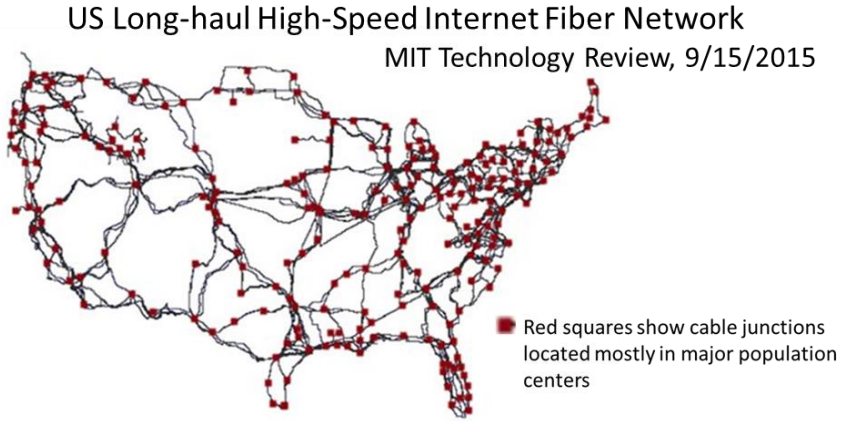








With multiple providers of:



- Telecommunications
- Stable power supply
- Redundant utilities

Multi-hazard mapping

Primer on Natural Hazard Management in Integrated Regional Development Planning

Department of Regional Development and Environment Executive Secretariat for Economic and Social Affairs Organization of American States

With support from the Office of Foreign Disaster Assistance United States Agency for International Development

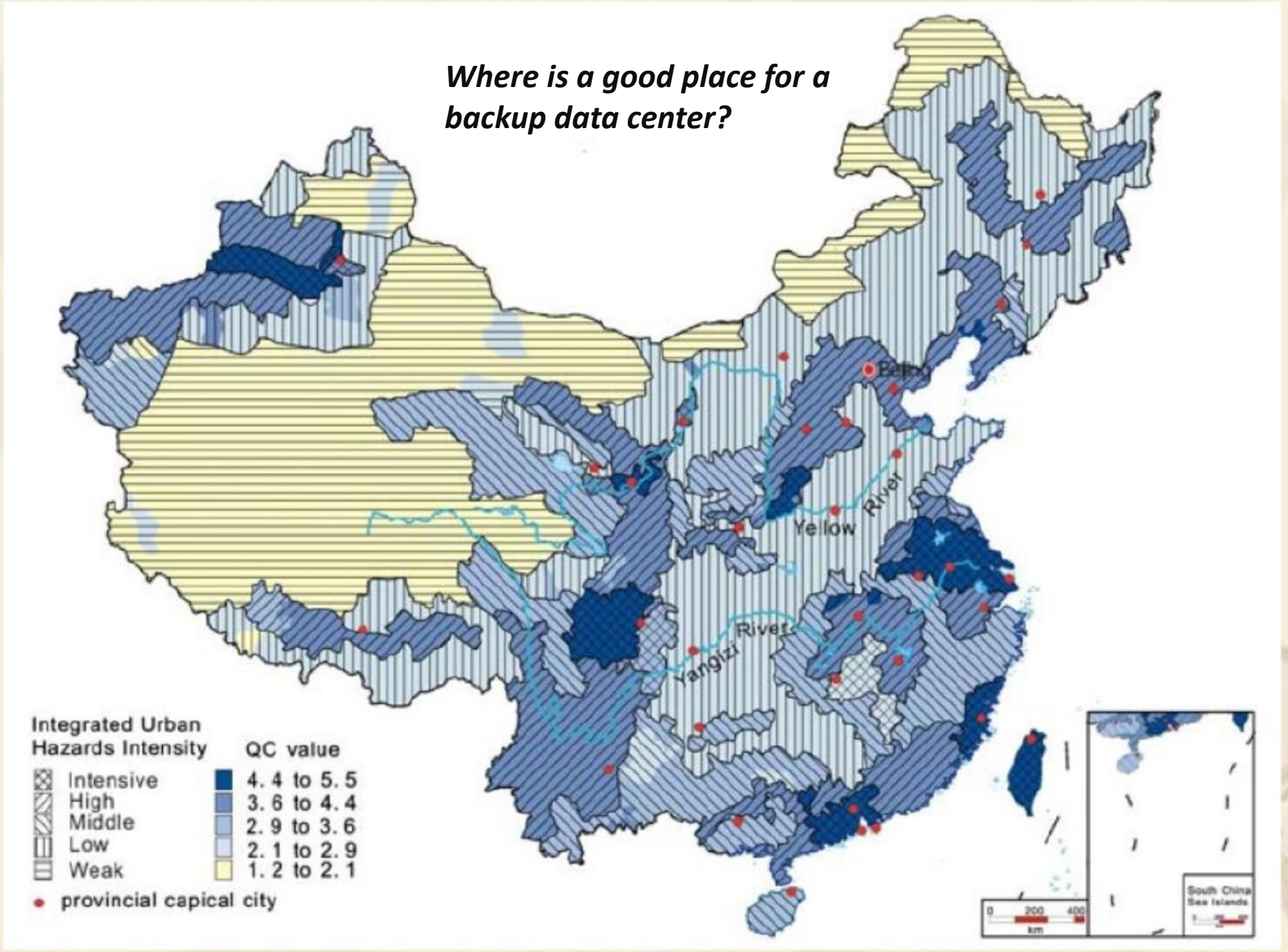
Washington, D.C. 1991

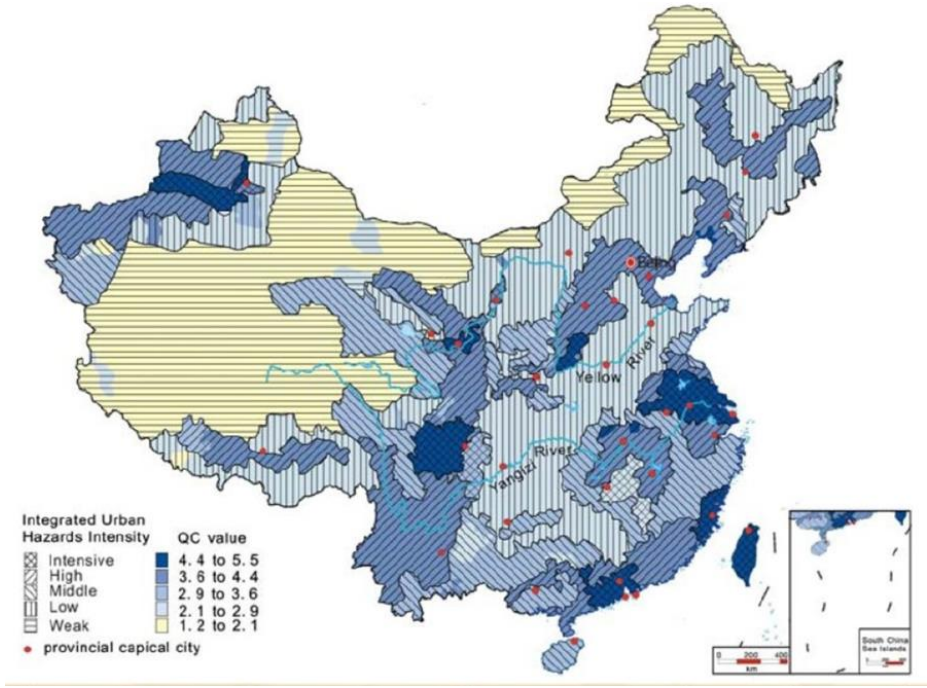
Figure 6-1 EXAMPLES OF NATURAL PHENOMENA WHICH MAY BE HAZARDOUS

Atmospheric	Volcanic	Hydrologic	Other Geologic	Seismic	Wildfire
Hailstorms	Ashfalls	Coastal flooding	Debris avalanches	Fault ruptures	Brush
Hurricanes	Gases	Desertification	Expansive soils	Ground shaking	Forest
Lightning	Lava flows	Drought	Rockfalls	Lateral spreading	Savannah
Thunderstorms	Projectiles and lateral blasts	Erosion	Submarine slides	Liquefaction	Urban conflagration
Tornadoes	Pyroclastic flows	River floods	Subsidence	Seiches	
Tropical storms	Tephra (ashes, cinders, lapilli)	Storm surges		Tsunamis	

CHAPTER 6 - MULTIPLE HAZARD MAPPING

Map of Comprehensive Urban Natural Disaster Intensity in China





中国教育和科研计算机网
China Education and Research Network

Example is an outdated internet infrastructure map intended to illustrate what is needed to plan data center disaster recovery site

Contingency Planning Controls

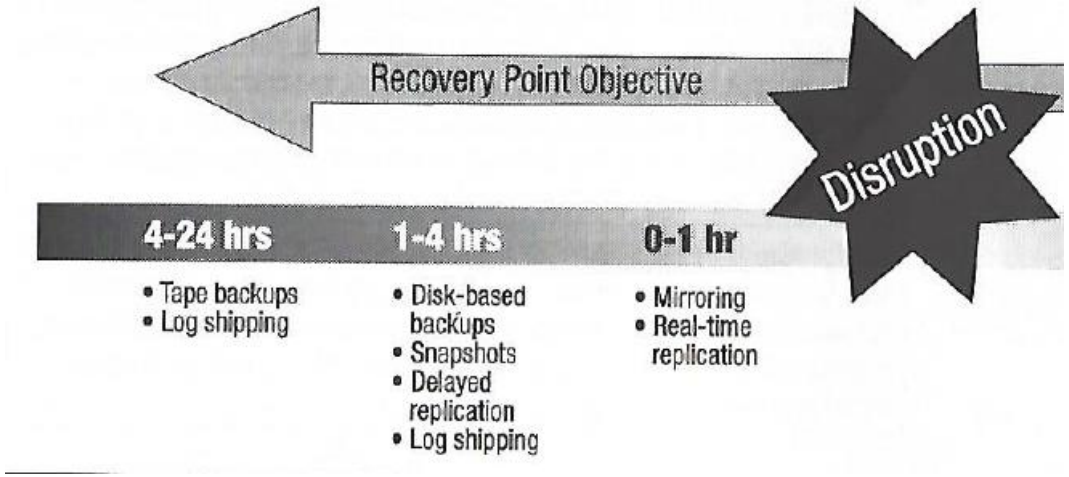
CONTROL NAME	BASELINES		
	LOW	MOD	HIGH
Contingency Planning Policy and Procedures	X	X	X
Contingency Plan	X	X	X
Contingency Training	X	X	X
Contingency Plan Testing	X	X	X
Alternative Storage Site		X	X
Alternative Processing Site		X	X
Telecommunications Services		X	X
Information System Backup	X	X	X
Information System Recovery and Reconstitution	X	X	X

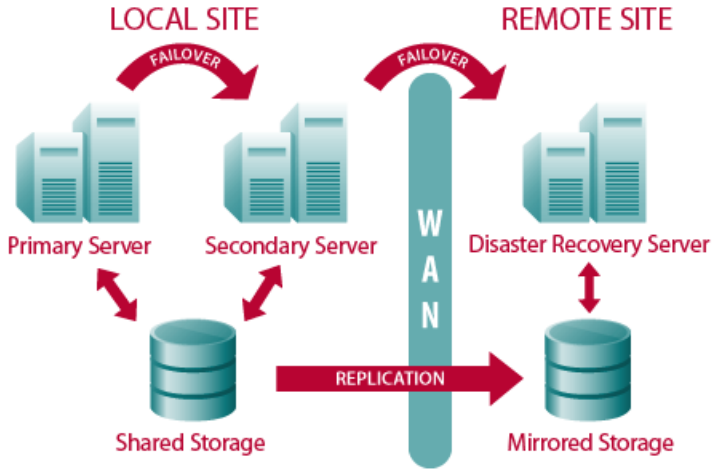
NIST SP 800-53r4 "Security and Privacy Controls for Federal Information Systems and Organizations"

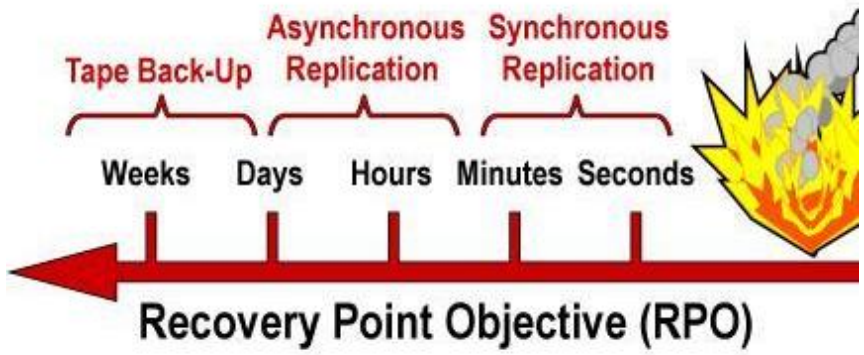
CNTL NO.	CONTROL NAME *Control Enhancement Name*	WITHDRAWN	ASSURANCE	CONTROL BASELINES		
				LOW	MOD	HIGH
CP-1	**Contingency Planning Policy and Procedures**		x	x	x	x
CP-2	**Contingency Plan**			x	x	x
CP-2(1)	*CONTINGENCY PLAN | COORDINATE WITH RELATED PLANS*				x	x
CP-2(2)	*CONTINGENCY PLAN | CAPACITY PLANNING*					x
CP-2(3)	*CONTINGENCY PLAN | RESUME ESSENTIAL MISSIONS / BUSINESS FUNCTIONS*				x	x
CP-2(4)	*CONTINGENCY PLAN | RESUME ALL MISSIONS / BUSINESS FUNCTIONS*					x
CP-2(5)	*CONTINGENCY PLAN | CONTINUE ESSENTIAL MISSIONS / BUSINESS FUNCTIONS*					x
CP-2(8)	*CONTINGENCY PLAN | IDENTIFY CRITICAL ASSETS*				x	x
CP-3	**Contingency Training**		x	x	x	x
CP-3(1)	*CONTINGENCY TRAINING | SIMULATED EVENTS*		x			x
CP-4	**Contingency Plan Testing**		x	x	x	x
CP-4(1)	*CONTINGENCY PLAN TESTING | COORDINATE WITH RELATED PLANS*		x		x	x
CP-4(2)	*CONTINGENCY PLAN TESTING | ALTERNATE PROCESSING SITE*		x			x
CP-5	**Contingency Plan Update**	x	Incorporated into CP-2.			
CP-6	**Alternate Storage Site**				x	x
CP-6(1)	*ALTERNATE STORAGE SITE | SEPARATION FROM PRIMARY SITE*				x	x
CP-6(2)	*ALTERNATE STORAGE SITE | RECOVERY TIME / POINT OBJECTIVES*					x
CP-6(3)	*ALTERNATE STORAGE SITE | ACCESSIBILITY*				x	x
CP-7	**Alternate Processing Site**				x	x
CP-7(1)	*ALTERNATE PROCESSING SITE | SEPARATION FROM PRIMARY SITE*				x	x
CP-7(2)	*ALTERNATE PROCESSING SITE | ACCESSIBILITY*				x	x
CP-7(3)	*ALTERNATE PROCESSING SITE | PRIORITY OF SERVICE*				x	x
CP-7(4)	*ALTERNATE PROCESSING SITE | PREPARATION FOR USE*					x
CP-7(5)	*ALTERNATE PROCESSING SITE | EQUIVALENT INFORMATION SECURITY SAFEGUARDS*	x	Incorporated into CP-7.			
CP-8	**Telecommunications Services**				x	x
CP-8(1)	*TELECOMMUNICATIONS SERVICES | PRIORITY OF SERVICE PROVISIONS*				x	x
CP-8(2)	*TELECOMMUNICATIONS SERVICES | SINGLE POINTS OF FAILURE*				x	x
CP-8(3)	*TELECOMMUNICATIONS SERVICES | SEPARATION OF PRIMARY / ALTERNATE PROVIDERS*					x
CP-8(4)	*TELECOMMUNICATIONS SERVICES | PROVIDER CONTINGENCY PLAN*					x
CP-9	**Information System Backup**			x	x	x
CP-9(1)	*INFORMATION SYSTEM BACKUP | TESTING FOR RELIABILITY / INTEGRITY*				x	x
CP-9(2)	*INFORMATION SYSTEM BACKUP | TEST RESTORATION USING SAMPLING*					x
CP-9(3)	*INFORMATION SYSTEM BACKUP | SEPARATE STORAGE FOR CRITICAL INFORMATION*					x
CP-9(4)	*INFORMATION SYSTEM BACKUP | PROTECTION FROM UNAUTHORIZED MODIFICATION*	x	Incorporated into CP-9.			
CP-9(5)	*INFORMATION SYSTEM BACKUP | TRANSFER TO ALTERNATE STORAGE SITE*					x
CP-10	**Information System Recovery and Reconstitution**			x	x	x
CP-10(1)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | CONTINGENCY PLAN TESTING*	x	Incorporated into CP-4.			
CP-10(2)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | TRANSACTION RECOVERY*				x	x
CP-10(3)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | COMPENSATING SECURITY CONTROLS*	x	Addressed by tailoring procedures.			
CP-10(4)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | RESTORE WITHIN TIME PERIOD*					x
CP-10(5)	*INFORMATION SYSTEM RECOVERY AND RECONSTITUTION | FAILOVER CAPABILITY*	x	Incorporated into SI-13.			

Data backup systems and redundancies

- **Database shadowing**
- **Electronic vaulting**
- **Remote journaling**
- **Storage area network and hierarchical storage management**
- **Shared storage**
- **RAID**
- **Failover clustering**



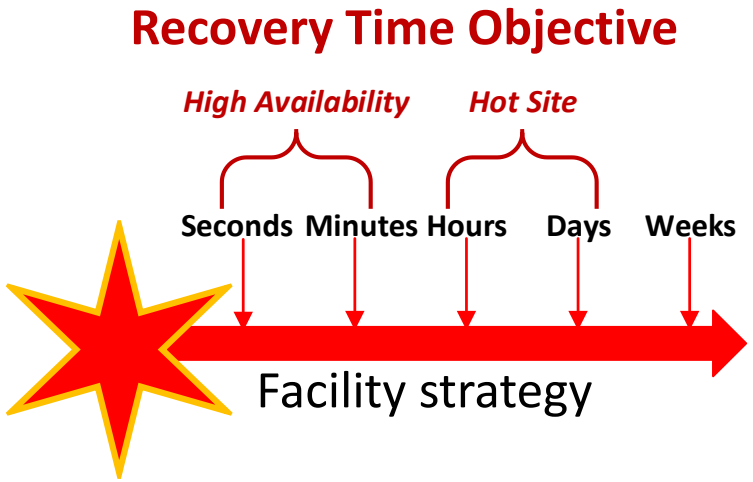


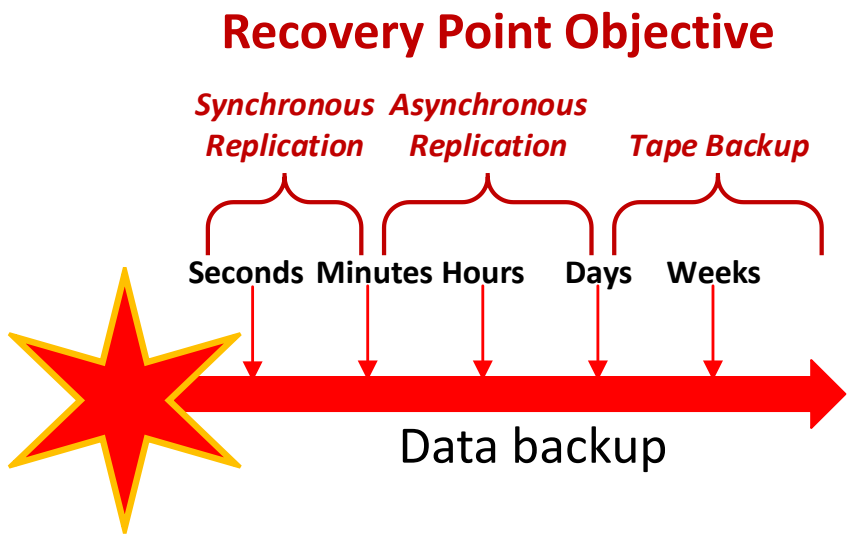


Recovery Options: Location & Backup

Information System Recovery Priority	Backup / Recovery Strategy
High priority	**Backup:** Mirrored systems and disc replication **Strategy:** Hot site $$$
Moderate priority	**Backup:** Optical backup and WAN/VLAN replication **Strategy:** Warm or Cold site $$
Low priority	**Backup:** Tape backup **Strategy:** Cold site $

[NIST SP 800-34 R1](#)
[Planning Guide for Federal Information Systems](#)



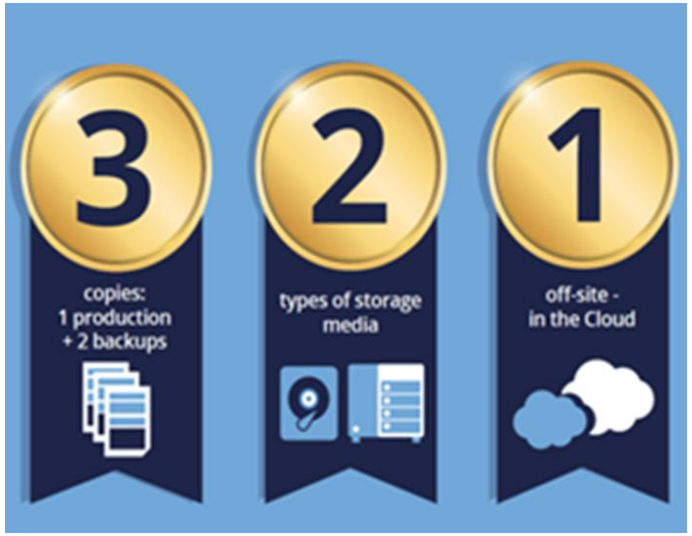


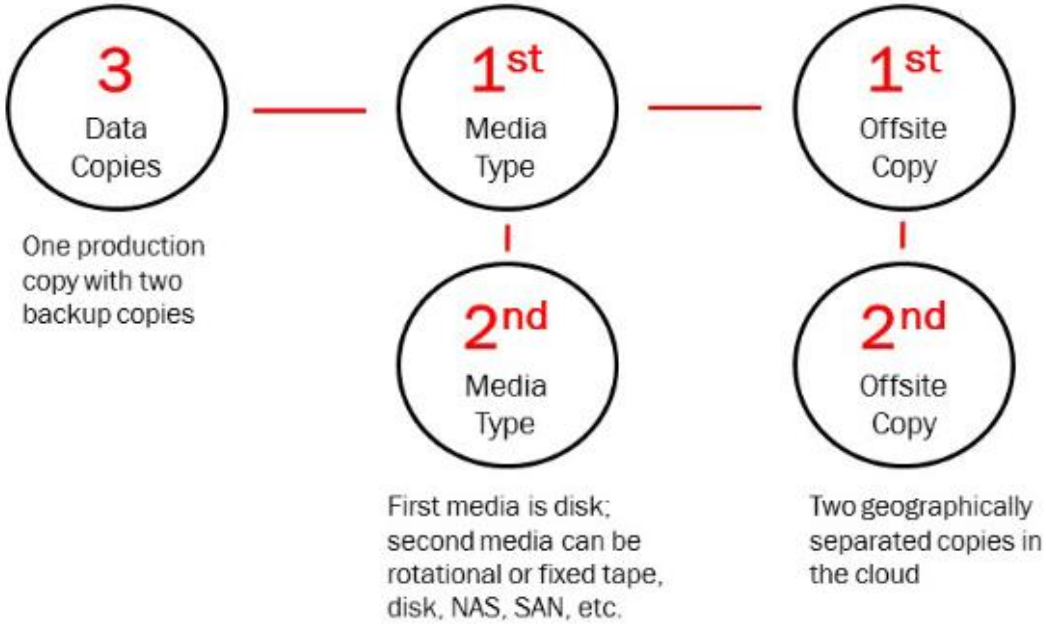
Mitigation – Best Practice

Three-Two-One rule

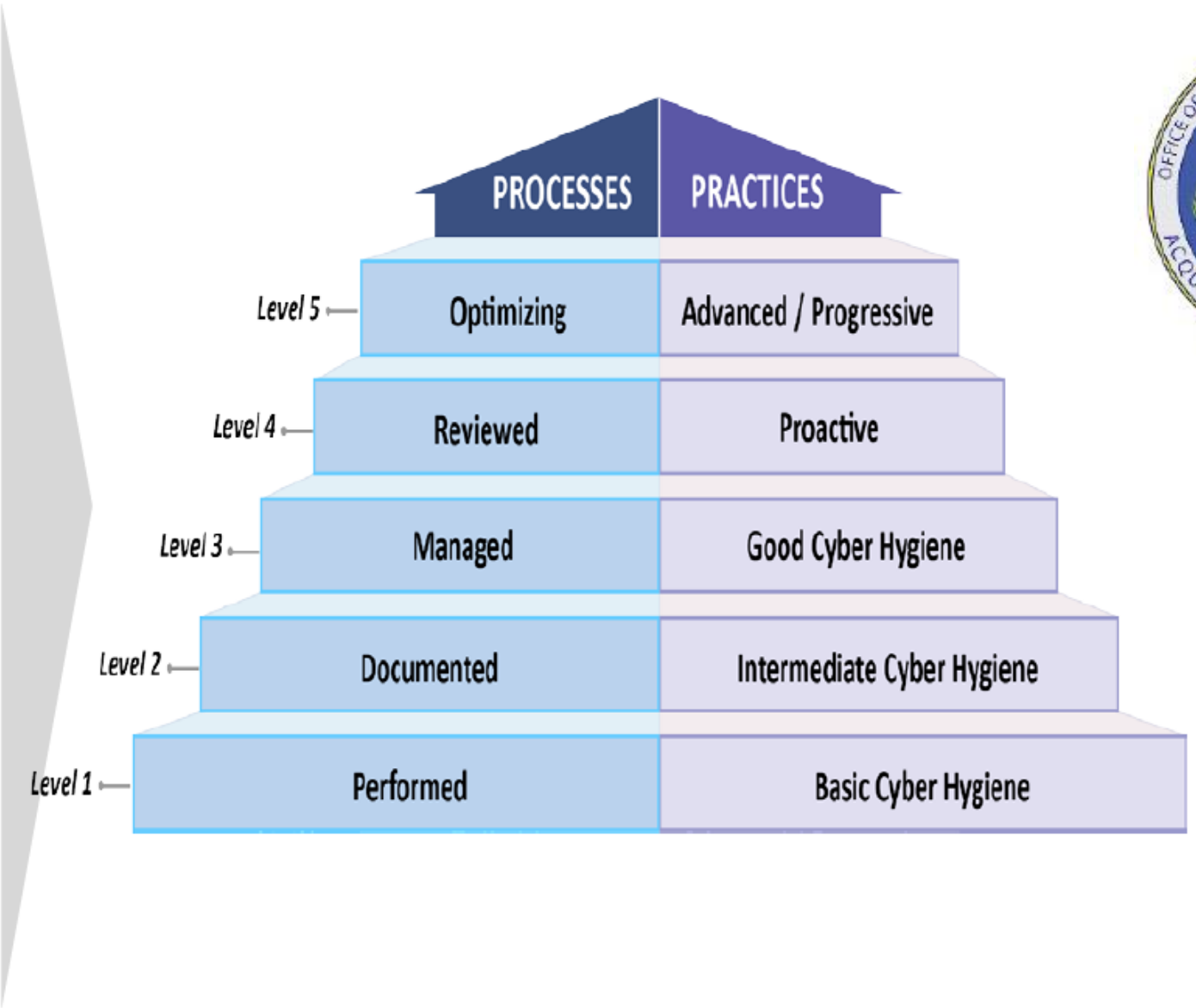
- Make 3 copies of all mission critical software and corresponding data in 2 different formats (to run on Linux and Windows machines), with 1 copy stored off-site not connected to any network

Maersk had 50 copies of their mission critical software and corresponding data – all in the same format, all on the network





How would you rate Maersk's InfoSec maturity?



Enterprise Strategy Group's Cybersecurity Maturity Model

Category	Basic Organizations	Progressing Organizations	Advanced Organizations
Philosophy	Cybersecurity is a "necessary evil."	Cybersecurity must be more integrated into the business.	Cybersecurity is part of the culture.
People	The CISO reports to IT. Small security team with minimal skills. High burnout rate and turnover.	The CISO reports to the COO or to another non-IT manager. Larger security team with some autonomy from IT. Remain overworked, understaffed, and under-skilled.	The CISO reports to the CEO and is active with the board. The CISO considered to be a business executive. Large, well-organized staff with good work environment. Skills and staff problems persist due to the global cybersecurity skills shortage.
Process	Informal and as necessary. Subservient to IT.	Better coordination with IT but processes remain informal, manual, and dependent on individual contributors.	Documented and formal with an eye toward more scale and automation.
Technology	Elementary security technologies with simple configurations. Decentralized security organization with limited coordination across functions. Focus on prevention and regulatory compliance.	More advanced use of security technologies and adoption of new tools for incident detection and security analytics.	Building an enterprise security technology architecture. Focus on incident prevention, detection, and response. Adding elements of identity management and data security to deal with security for cloud computing and mobile computing.

ISACA and CMMI Institute's Cybersecurity Maturity Model

	LEVEL 1 PERFORMED	LEVEL 2 MANAGED	LEVEL 3 DEFINED	LEVEL 4 QUANTITATIVELY MANAGED	LEVEL 5 OPTIMIZED
PEOPLE	General personnel capabilities may be performed by an individual, but are not well defined	Personnel capabilities achieved consistently within subsets of the organization, but inconsistent across the entire organization	Roles and responsibilities are identified, assigned, and trained across the organization	Achievement and performance of personnel practices are predicted, measured, and evaluated	Proactive performance improvement and resourcing based on organizational changes and lessons learned (internal & external)
PROCESS	General process capabilities may be performed by an individual, but are not well defined	Adequate procedures documented within a subset of the organization	Organizational policies and procedures are defined and standardized. Policies and procedures support the organizational strategy	Policy compliance is measured and enforced Procedures are monitored for effectiveness	Policies and procedures are updated based on organizational changes and lessons learned (internal & external) are captured.
TECHNOLOGY	General technical mechanisms are in place and may be used by an individual	Technical mechanisms are formally identified and defined by a subset of the organization; technical requirements in place	Purpose and intent is defined (right technology, adequately deployed); Proper technology is implemented in each subset of the organization	Effectiveness of technical mechanisms are predicted, measured, and evaluated	Technical mechanisms are proactively improved based on organizational changes and lessons learned (internal & external)

ISACA | CMMI Institute

Milestone 4 – Student question

Student's question:

I'm working on the impact table for Milestone 4. During the inspection of NIST 800-53 controls, I see that the document mentions "Federal" control requirements in discussions of a number of controls.

I'm kind of confused about the usage of the word "Federal" in the document. How does it affect our selection of controls?

Instructor's answer:

NIST (National Institute of Standards and Technology) is part of the US Federal government. As such its cybersecurity standards, guidelines, procedures and other documents were created for mandatory use by US Federal government agencies and optional use by businesses, as well as state, county and local government agencies.

To improve your understanding when reading NIST documents for applicability to the business context of your Milestone 4 report replace the word "Federal" with "business".

Student's reply:

That's really helpful. Thank you so much.

Replacing the federal with business does put everything in perspective for me.

Agenda

- ✓Breakout Groups
  - ✓Why was Maersk attacked?
  - ✓Why was NotPetya attack on Maersk successful?
  - ✓What can companies do to mitigate impacts of ransomware & file encryption attacks?
- ✓How would you rate Maersk's InfoSec maturity?
- ✓Reading NIST documents for application to business