Protecting Information Assets

- Unit# 5a -

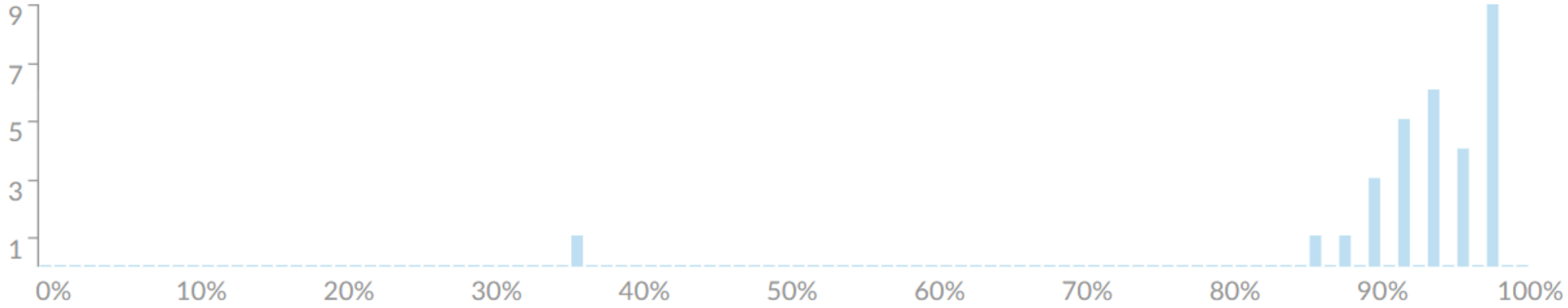
Business Continuity and Disaster Recovery Planning

Agenda

- Midterm Exam Review
- Business Continuity and Disaster Recovery Planning
- Test Taking Tip
- Quiz

Midterm Exam Summary

Average Score	High Score	Low Score	Standard Deviation
92%	98%	36%	10.97



An organization recently received a contract to conduct sponsored research as a European Union government contractor. What law now likely applies to the information systems involved in this contract?

GDPR	11 respondents	**37 %**
FISMA	19 respondents	63 %
PCI DSS		0 %
HIPAA		0 %

Who are responsible for ensuring that the information security policies and procedures have been adhered to?

Information systems auditors	13 respondents	**43 %**
Security officers		0 %
Information owners	17 respondents	57 %
Executive management		0 %

The risk of piggy backing is BEST mitigated by:

Use of plenum wiring in the data center	1 respondent	3 %
Use of traffic bollards		0 %
Use of a mantrap	20 respondents	**67 %**
Developing a physical security policy	9 respondents	30 %

Which of the following choices BEST helps information owners to determine the proper security categorization of data?

Understanding the security controls that protect data	1 respondent	3 %
Understanding which users need to access the data	6 respondents	20 %
Training on organizational policies and standards	22 respondents	**73 %** ✓
Use of an automated data leak prevention (DLP) tool	1 respondent	3 %

An IS auditor is reviewing an organization's security operation center (SOC). Which of the following choices is of greatest concern? The use of:

an uninterrupted power supply with 5 minutes of backup power.	1 respondent	3 %
a carbon dioxide-based fire suppression system.	23 respondents	**77 %** ✓
a rented rack space in the SOC.	1 respondent	3 %
a wet pipe-based fire suppression system.	5 respondents	17 %

The information security manager should treat regulatory compliance as:

A purely operational issue		0 %
Another risk to be managed	24 respondents	**80 %** ✓
An organizational mandate	5 respondents	17 %
A risk management priority	1 respondent	3 %

Business Continuity

Capability to continue service delivery at acceptable levels following" natural or human-induced disaster

Source: International Standards Organization 22300:2018

Security and resilience - Vocabulary

Resiliency

"Capacity to recover quickly from difficulties

...

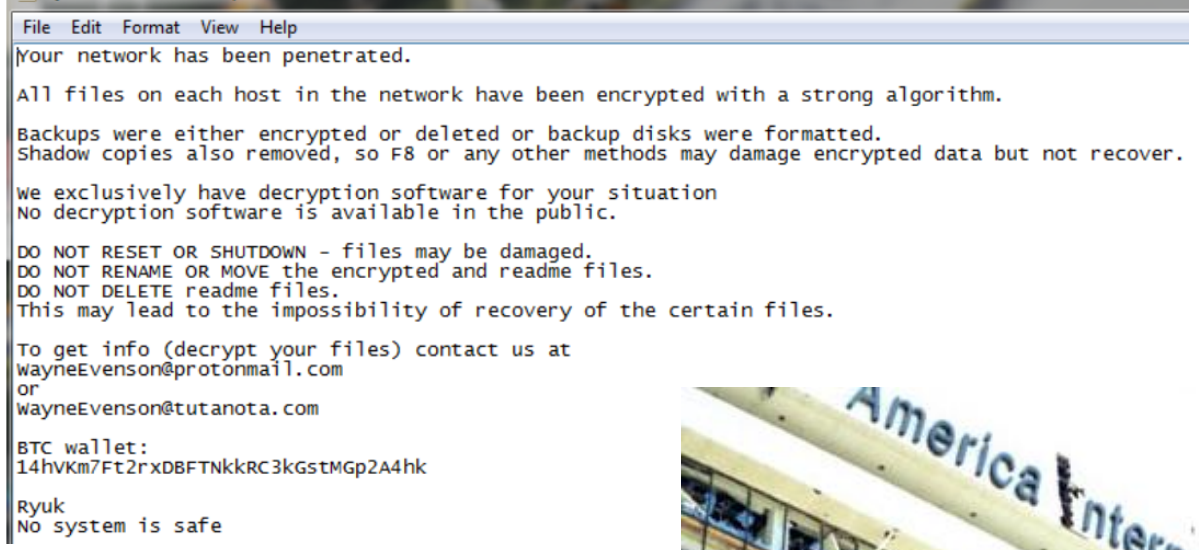
Antonyms:

- Vulnerability, weakness…"

Source: https://www.lexico.com/en/synonym/resilience

Disaster Context

- *Disruptions to operations can occur with or without warning*
- *Results may be predictable or unanticipated*



File Edit Format View Help

Your network has been penetrated.

All files on each host in the network have been encrypted with a strong algorithm.

Backups were either encrypted or deleted or backup disks were formatted.
Shadow copies also removed, so F8 or any other methods may damage encrypted data but not recover.

We exclusively have decryption software for your situation
No decryption software is available in the public.

DO NOT RESET OR SHUTDOWN - files may be damaged.
DO NOT RENAME OR MOVE the encrypted and readme files.
DO NOT DELETE readme files.
This may lead to the impossibility of recovery of the certain files.

To get info (decrypt your files) contact us at
WayneEvenson@protonmail.com
or
WayneEvenson@tutanota.com

BTC wallet:
14hVKm7Ft2rxDBFTNkkRC3kGstMGp2A4hk

Ryuk
No system is safe

The first priority is always the safety of the people:

- *Employees*
- *Service and Support Staff*
- *Visitors*

Business Continuity Management

The **Business Continuity Plan** (BCP) is developed to help assure the organization's ability to maintain, resume, and recover the business

- *It is not just about recovering information technology capabilities*

Planning focuses on the entire enterprise's mission critical infrastructure

- People
- Processes
- Technology

To assure resilient response, organizations need…

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 relocating critical information systems operations to an alternative site following significant disruption

Case study: MAERSK shipping

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)
- ***No contingency planning (no Disaster Recovery Plan)***

2017, March – Microsoft issues emergency patch to update systems and protect from NotPetya, Maersk's systems not upgraded or patched to protect from NotPetya virus/malware

2017, June – NotPetya encryption attack hits Maersk's offices in Ukraine (arrived as infected e-mail attachments)

- ***Rapidly spreads through Maersk's global wide area network resulting in complete IT availability loss***
  - Active directory domain controllers (network of 150) providing login information (i.e. usernames & passwords) and access control authorization information <u>all wiped out</u>
- 1 Active Directory domain controller in Ghana unaffected due to being off the internet due to electricity blackout

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

- Results: 10-days of lost business ($300,000,000 in expenses and lost earnings)

What impact level would you give this breach?

Availability is the focus of BCP & DRP

	POTENTIAL IMPACT		
Security Objective	**LOW**	**MODERATE**	**HIGH**
Confidentiality Preserving authorized restrictions on information access and disclosure, including means for pro pri inf [44	The unauthorized disclosure of information could be expected to have a **limited** adverse effect on organizational operations,	The unauthorized disclosure of information could be expected to have a **serious** adverse effect on organizational operations,	The unauthorized disclosure of information could be expected to have a **severe or catastrophic** adverse effect on

FIPS PUB 199

FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION

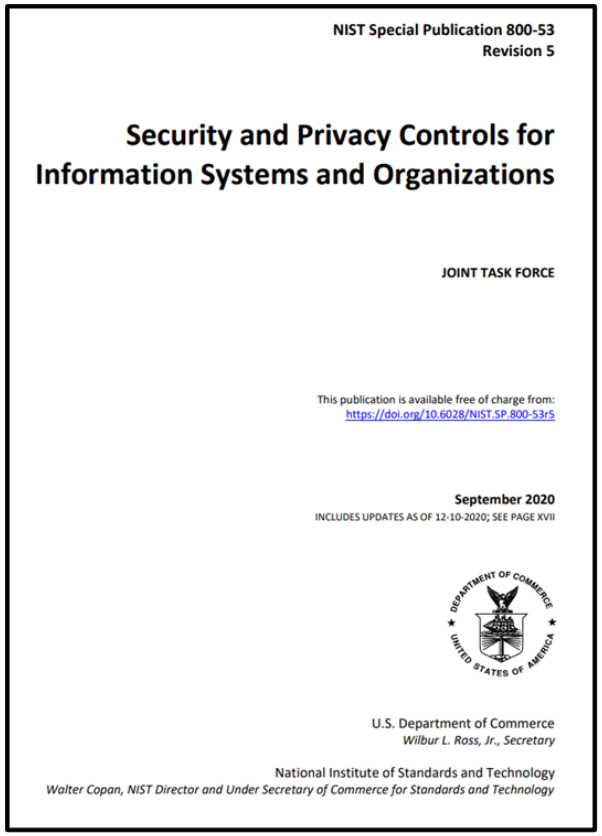
Standards for Security Categorization of Federal Information and Information Systems

	POTENTIAL IMPACT		
Security Objective	**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.

Business Continuity and Disaster Recovery planning focuses on Contingency Planning controls

…other controls play important roles in assuring effective contingency planning and disaster recovery!

CLASS	FAMILY
Management	Risk Assessment
Management	Planning
Management	System and Services Acquisition
Management	Certification, Accreditation, and Security Assessments
Operational	Personnel Security
Operational	Physical and Environmental Protection
Operational	Contingency Planning
Operational	Configuration Management
Operational	Maintenance
Operational	System and Information Integrity
Operational	Media Protection
Operational	Incident Response
Operational	Awareness and Training
Technical	Access Control
Technical	Audit and Accountability
Technical	System and Communications Protection


NIST Special Publication 800-53
Revision 5

Security and Privacy Controls for Information Systems and Organizations

JOINT TASK FORCE

This publication is available free of charge from:
https://doi.org/10.6028/NIST.SP.800-53r5

September 2020
INCLUDES UPDATES AS OF 12-10-2020; SEE PAGE XVII

U.S. Department of Commerce
Wilbur L. Ross, Jr., Secretary

National Institute of Standards and Technology
Walter Copan, NIST Director and Under Secretary of Commerce for Standards and Technology

Business Continuity Plan (BCP)

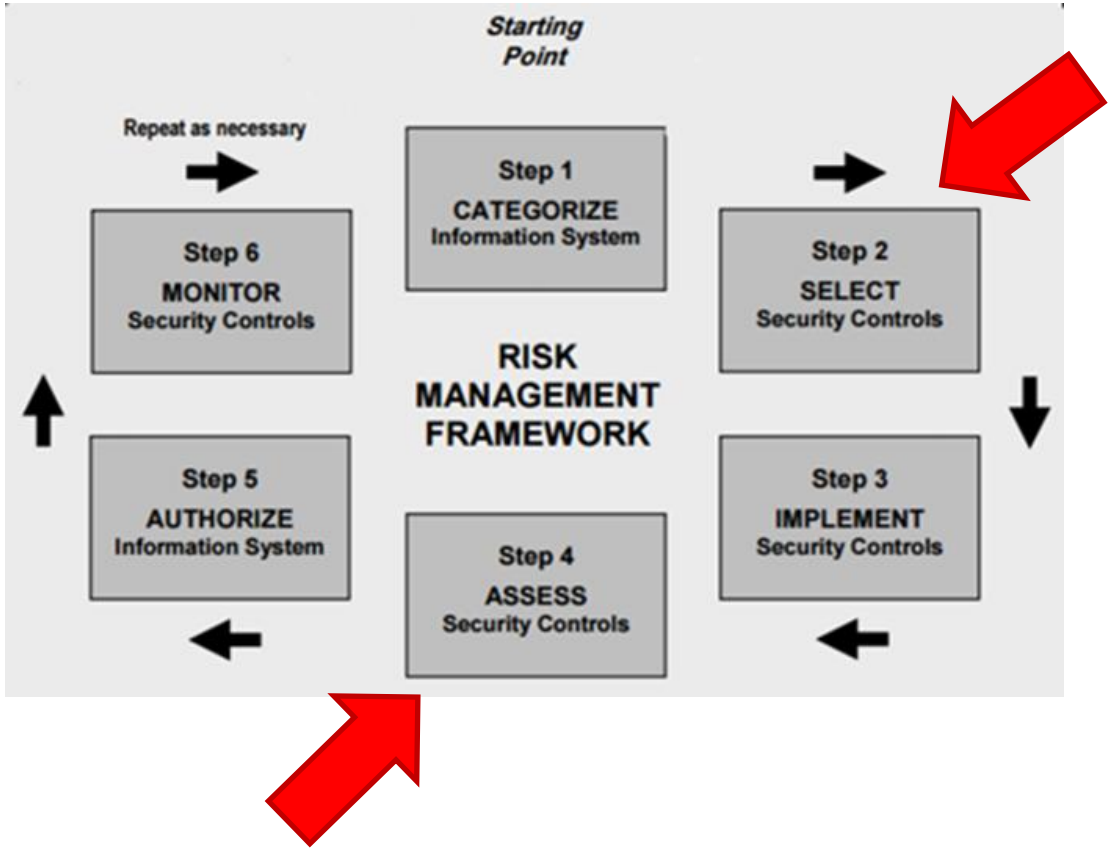
3 Phases of disaster contingency response :

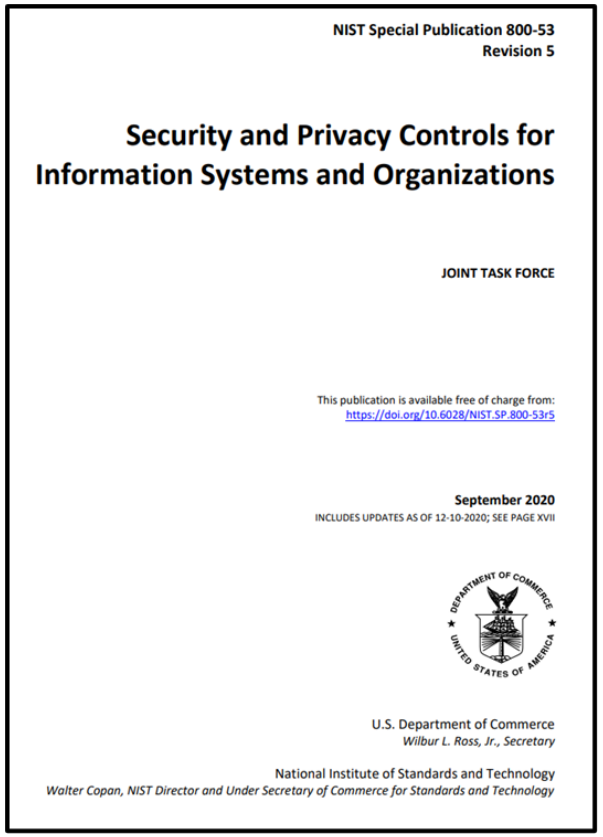
1. **Activation and Notification**
   i. **Activation criteria**
   ii. **Notification procedures**
   iii. **Outage assessment**

2. **Recovery - Disaster Recovery Plan (DRP)**
   i. **Sequence of recovery activities**
   ii. **Recovery procedures**

3. **Reconstitution**

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





NIST Special Publication 800-53
Revision 5

Security and Privacy Controls for Information Systems and Organizations

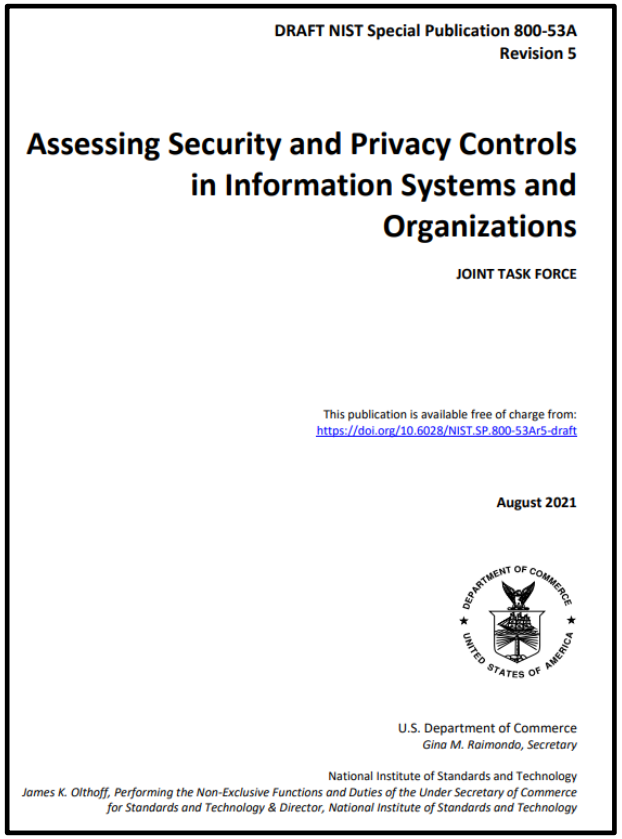
JOINT TASK FORCE

This publication is available free of charge from:
https://doi.org/10.6028/NIST.SP.800-53r5

September 2020
INCLUDES UPDATES AS OF 12-10-2020; SEE PAGE XVII

U.S. Department of Commerce
Wilbur L. Ross, Jr., Secretary

National Institute of Standards and Technology
Walter Copan, NIST Director and Under Secretary of Commerce for Standards and Technology



DRAFT NIST Special Publication 800-53A
Revision 5

Assessing Security and Privacy Controls in Information Systems and Organizations

JOINT TASK FORCE

This publication is available free of charge from:
https://doi.org/10.6028/NIST.SP.800-53Ar5-draft

August 2021

U.S. Department of Commerce
Gina M. Raimondo, Secretary

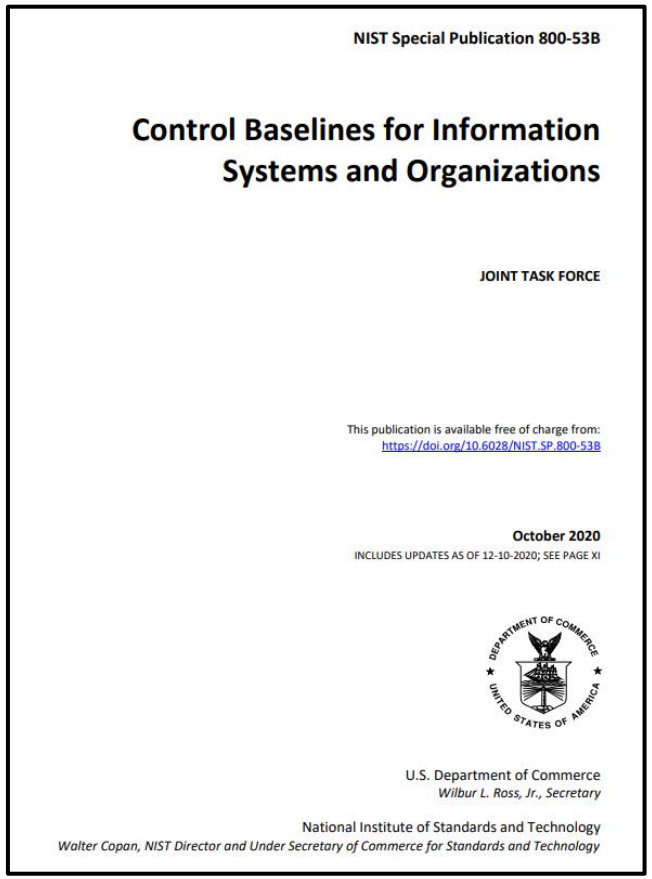
National Institute of Standards and Technology
James K. Olthoff, Performing the Non-Exclusive Functions and Duties of the Under Secretary of Commerce for Standards and Technology & Director, National Institute of Standards and Technology

Contingency Planning (CP)

CONTROL NUMBER	CONTROL NAME CONTROL ENHANCEMENT NAME	PRIVACY CONTROL BASELINE	SECURITY CONTROL BASELINES		
			LOW	MOD	HIGH
CP-1	**Policy and Procedures**		x	x	x
CP-2	**Contingency Plan**		x	x	x
CP-2(1)	COORDINATE WITH RELATED PLANS			x	x
CP-2(2)	CAPACITY PLANNING				x
CP-2(3)	RESUME MISSION AND BUSINESS FUNCTIONS			x	x
CP-2(4)	RESUME ALL MISSION AND BUSINESS FUNCTIONS	W: Incorporated into CP-2(3).			
CP-2(5)	CONTINUE MISSION AND BUSINESS FUNCTIONS				x
CP-2(6)	ALTERNATE PROCESSING AND STORAGE SITES				
CP-2(7)	COORDINATE WITH EXTERNAL SERVICE PROVIDERS				
CP-2(8)	IDENTIFY CRITICAL ASSETS				
CP-3	**Contingency Training**				
CP-3(1)	SIMULATED EVENTS				
CP-3(2)	MECHANISMS USED IN TRAINING ENVIRONMENTS				
CP-4	**Contingency Plan Testing**				
CP-4(1)	COORDINATE WITH RELATED PLANS				
CP-4(2)	ALTERNATE PROCESSING SITE				
CP-4(3)	AUTOMATED TESTING				
CP-4(4)	FULL RECOVERY AND RECONSTITUTION				
CP-4(5)	SELF-CHALLENGE				
CP-5	Contingency Plan Update				
CP-6	**Alternate Storage Site**				
CP-6(1)	SEPARATION FROM PRIMARY SITE				
CP-6(2)	RECOVERY TIME AND RECOVERY POINT OBJECTIVES				
CP-6(3)	ACCESSIBILITY				
CP-7	**Alternate Processing Site**				
CP-7(1)	SEPARATION FROM PRIMARY SITE				
CP-7(2)	ACCESSIBILITY				
CP-7(3)	PRIORITY OF SERVICE				
CP-7(4)	PREPARATION FOR USE				
CP-7(5)	EQUIVALENT INFORMATION SECURITY SAFEGUARDS				
CP-7(6)	INABILITY TO RETURN TO PRIMARY SITE				
CP-8	**Telecommunications Services**				
CP-8(1)	PRIORITY OF SERVICE PROVISIONS				

CONTROL NUMBER	CONTROL NAME CONTROL ENHANCEMENT NAME	PRIVACY CONTROL BASELINE	SECURITY CONTROL BASELINES		
			LOW	MOD	HIGH
CP-8(2)	SINGLE POINTS OF FAILURE			x	x
CP-8(3)	SEPARATION OF PRIMARY AND ALTERNATE PROVIDERS				x
CP-8(4)	PROVIDER CONTINGENCY PLAN				x
CP-8(5)	ALTERNATE TELECOMMUNICATION SERVICE TESTING				
CP-9	**System Backup**		x	x	x
CP-9(1)	TESTING FOR RELIABILITY AND INTEGRITY			x	x
CP-9(2)	TEST RESTORATION USING SAMPLING				x

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 Special Publication 800-53B

Control Baselines for Information Systems and Organizations

JOINT TASK FORCE

This publication is available free of charge from:
https://doi.org/10.6028/NIST.SP.800-53B

October 2020
INCLUDES UPDATES AS OF 12-10-2020; SEE PAGE XI

U.S. Department of Commerce
Wilbur L. Ross, Jr., Secretary

National Institute of Standards and Technology
Walter Copan, NIST Director and Under Secretary of Commerce for Standards and Technology

How would you audit this control?

DRAFT NIST Special Publication 800-53A
Revision 5

NIST Spec

Assessing Securit
Controls in Federa
Systems and (

Building Eff

CP-2	CONTINGENCY PLAN
	ASSESSMENT OBJECTIVE: *Determine if the organization:*

ASSESSMENT OBJECTIVE:

Determine if the organization:

CP-2(a)	*develops and documents a contingency plan for the information system that:*		
	CP-2(a)(1)	*identifies essential missions and business functions and associated contingency requirements;*	
	CP-2(a)(2)	**CP-2(a)(2)[1]**	*provides recovery objectives;*
		CP-2(a)(2)[2]	*provides restoration priorities;*
		CP-2(a)(2)[3]	*provides metrics;*
	CP-2(a)(3)	**CP-2(a)(3)[1]**	*addresses contingency roles;*
		CP-2(a)(3)[2]	*addresses contingency responsibilities;*
		CP-2(a)(3)[3]	*addresses assigned individuals with contact information;*
	CP-2(a)(4)	*addresses maintaining essential missions and business functions despite an information system disruption, compromise, or failure;*	
	CP-2(a)(5)	*addresses eventual, full information system restoration without deterioration of the security safeguards originally planned and implemented;*	
	CP-2(a)(6)	**CP-2(a)(6)[1]**	*defines personnel or roles to review and approve the contingency plan for the information system;*
		CP-2(a)(6)[2]	*is reviewed and approved by organization-defined*

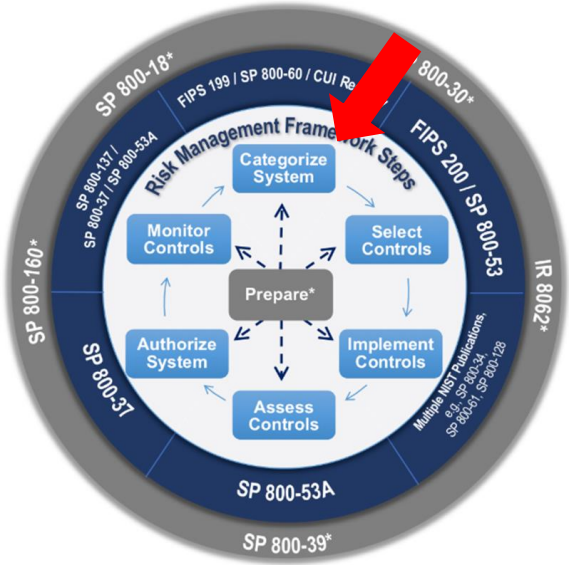
an for the information system that:
and business functions and associated
overy objectives;
oration priorities;
rics;
ntingency roles;
ntingency responsibilities;
signed individuals with contact
tial missions and business functions n disruption, compromise, or failure;
rmation system restoration without safeguards originally planned and
nnel or roles to review and approve ncy plan for the information system;
nd approved by organization-defined roles;
onnel (identified by name and/or by ments to whom copies of the istributed;
ingency plan to organization-defined nd organizational elements;
es with incident handling activities;
v the contingency plan for the
with the organization-defined
information system, or environment of

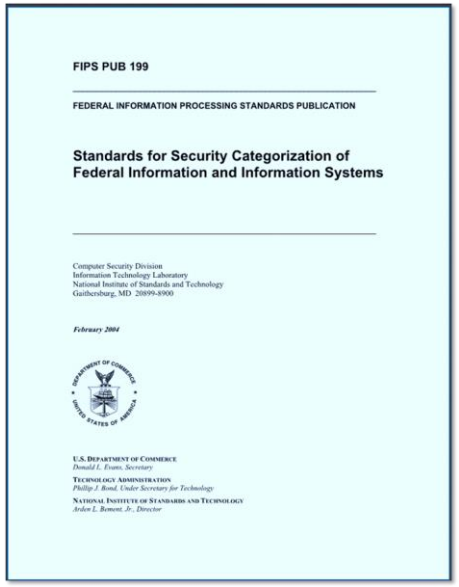
		CP-2(e)[2]	*problems encountered during plan implementation, execution, and testing;*
	CP-2(f)	**CP-2(f)[1]**	*defines key contingency personnel (identified by name and/or by role) and organizational elements to whom contingency plan changes are to be communicated;*

Identifying essential missions and business functions

An important and big topic:

- How to maintain the continued operation of the business' mission critical processes?
- Based on conducting a **Business Impact Analysis (BIA)**
  - Process of analyzing activities and the effect that a business disruption might have upon them





FIPS PUB 199

FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION

Standards for Security Categorization of Federal Information and Information Systems

Computer Security Division
Information Technology Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899-8900

February 2004

U.S. DEPARTMENT OF COMMERCE
Donald L. Evans, Secretary
TECHNOLOGY ADMINISTRATION
Phillip J. Bond, Under Secretary for Technology
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
Arden L. Bement, Jr., Director

	POTENTIAL IMPACT		
Security Objective	**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.

Business Impact Analysis (BIA) answers…

1. What are the work processes ?
2. How critical is each ?
   - *Assess impacts of not performing these activities over time;*
3. How quick do each need to be recovered?
   - *Prioritize the timeframe for resuming each activity at a specified minimum acceptable level, consider how long before the impacts of not resuming each would become unacceptable*
4. What data, applications, people, 3rd parties (e.g. suppliers, partners, …) are needed to run each critical process ?

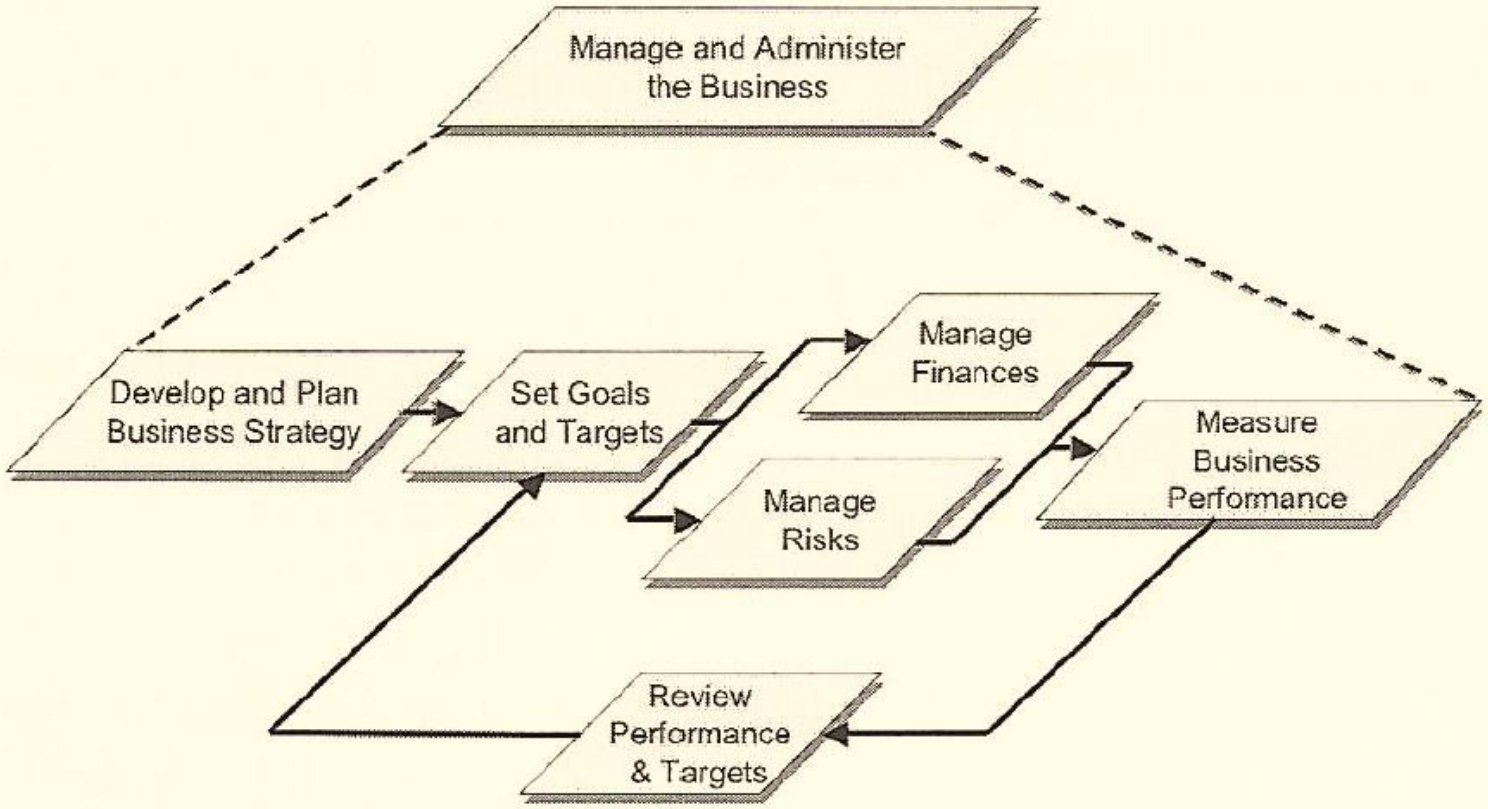
Meta-level view of information processing in large enterprises

There may be 5 or 10 high-level business processes ("meta-processes"), for example:

1. *Develop product offerings*
2. *Bring product offerings to market*
3. *Acquire customer orders*
4. *Fulfill customer orders*
5. *Manage the business*
   - ***For example has 6 sub-processes…***

Sherwood, J., Clark, A. and Lynas D. (2005)

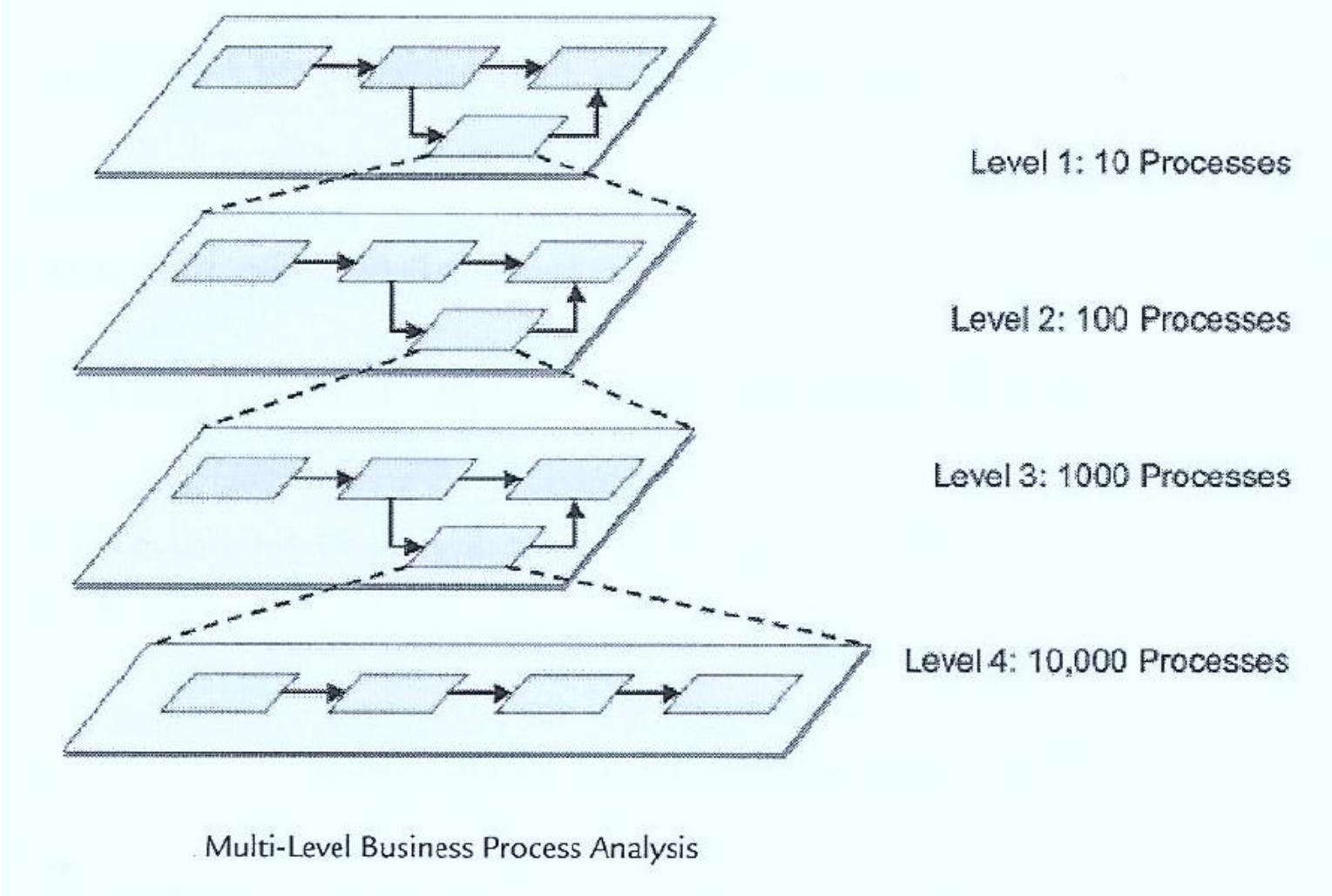
“Manage the business”



Example of Top-Down Business Process Analysis

Top-down business process analysis

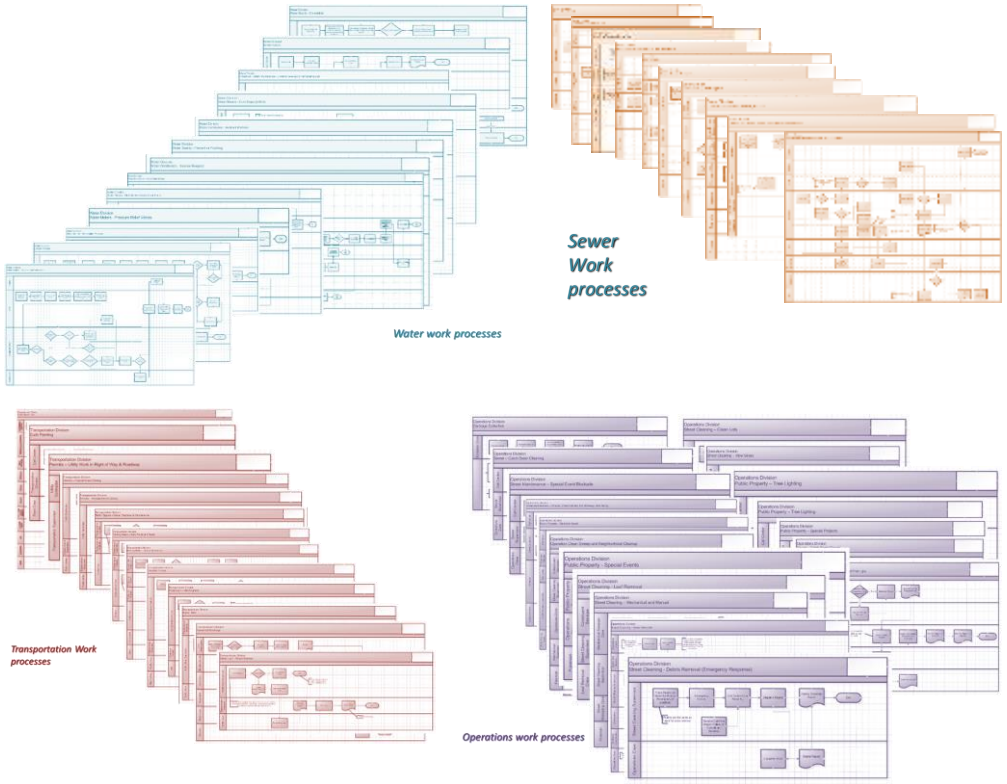
Also known as: Structured decomposition

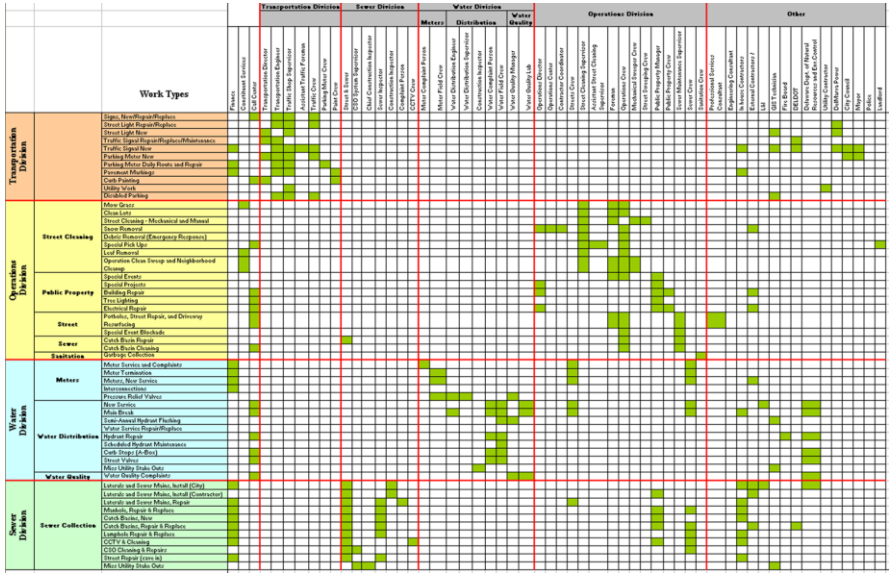


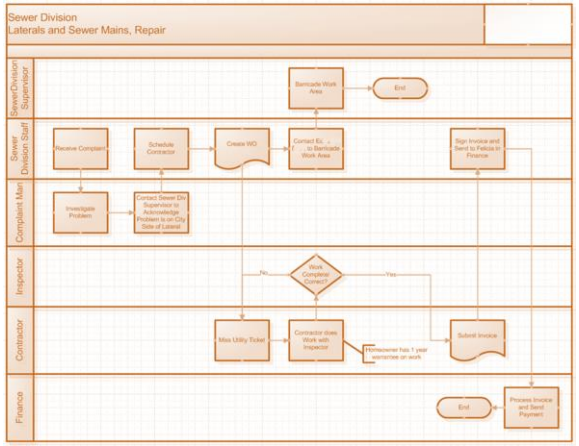
Organizations that achieve this level of detail have an excellent model for understanding their business and business continuity management

Prerequisite for Business Impact Analysis and Disaster Recovery Planning

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

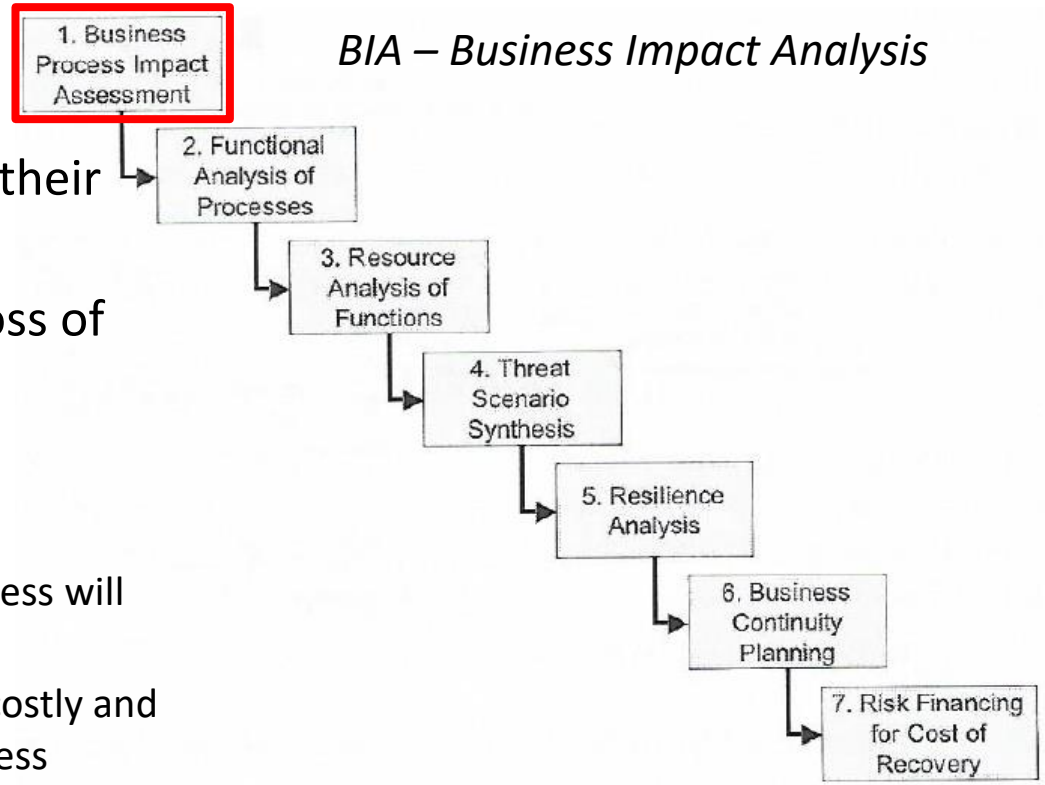






Auditing the Business Continuity Plan

BIA – Business Impact Analysis



Step 1

- Has the business identified and mapped their business processes?
- Have they assessed business impact of loss of each business process?
- Have they classified and ranked business processes into 3 or 4 prioritized groups?
  1. **High** (Catastrophic/Severe) – Loss of this process will result in deaths and/or destroy the business
  2. **Moderate** (Serious) – Loss will be extremely costly and cause persistent, severe damage to the business
  3. **Low** (limited) – Loss will impact the business
  4. **Other** – Damage caused by loss of this process can be absorbed

Sherwood, J., Clark, A. and Lynas D. (2005), Enterprise Security Architecture, CRC Press

Does the organization have an inventory of work processes supported by each information system ?

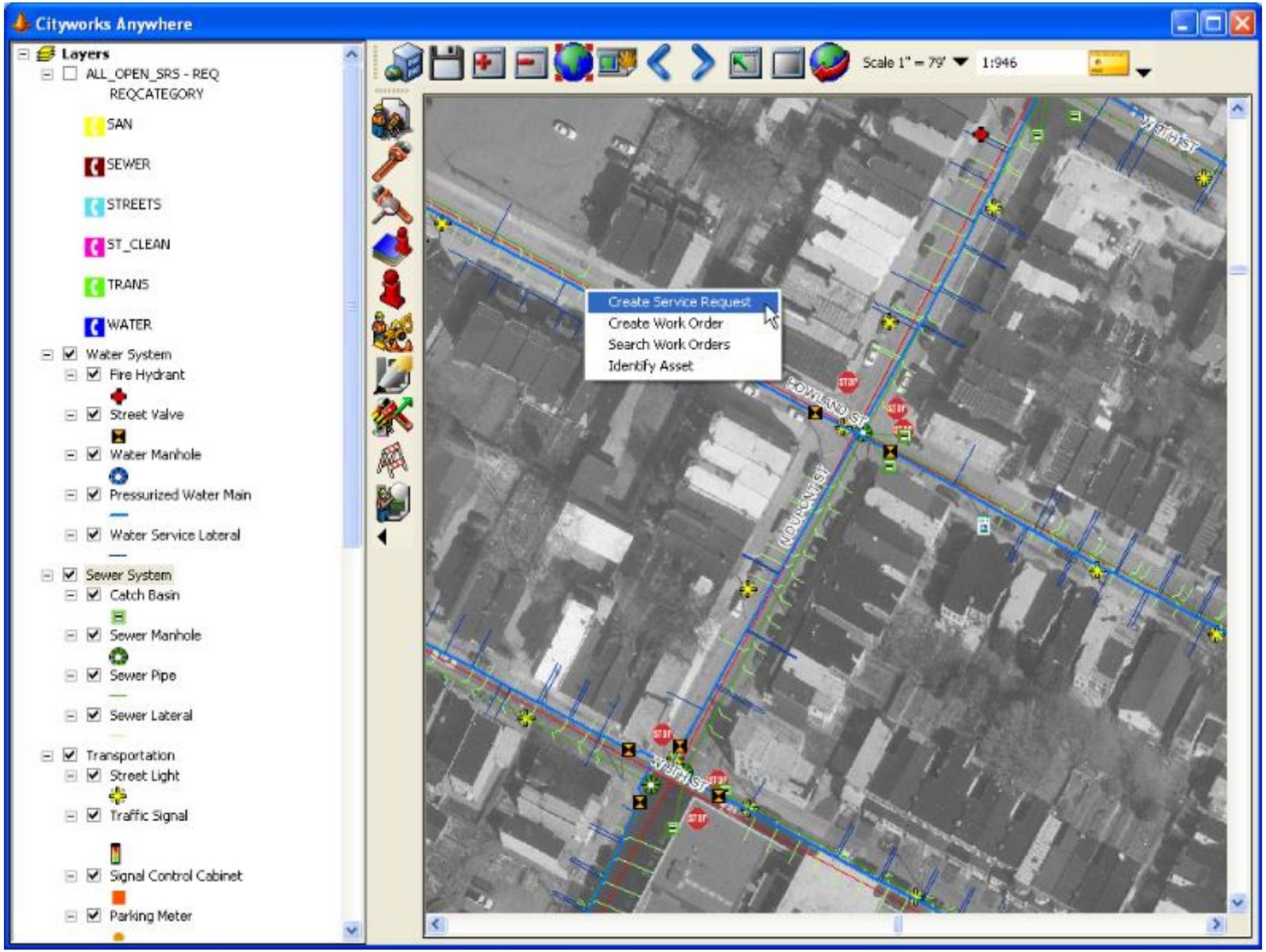
Example:

Service request and utility maintenance management work order information system

- City's Public Works Department
- 4 Divisions (230 employees)
    - Sewer
    - Water
    - Transportation
    - Operations

Service Request / Work Order System

“Computerized Maintenance Management System (CMMS)”



Service Request

Request | Recent | Search | Save | Close | New | Print | Tools | Labor

Search for Request ID

Recently Opened

Apply To All

Domain: DPW

Select a Problem from the Tree

- OPERATIONS
- SEWER/STORM
  - CATCH BASINS
  - GENERAL
  - MANHOLES/LAMPHOLES
    - LAMPHOLE_REPAIR/REPL
    - MANHOLE_REPAIR
    - MISSING_LAMPHOLE_COV
    - MISSING_MANHOLE_COV
- TRANSPORTATION
  - GENERAL
  - PARKING METERS
  - SIGNS
  - STREET LIGHTS
  - TRAFFIC SIGNALS
- WATER
  - GENERAL
  - HYDRANTS
  - METERS/BILLING
  - QUALITY
  - SERVICE LINES

Problem Details

Date/Time 4/14/2008 10:26: Account

Mr Ms

First Name Last

Address

City Zip

Phone

Email

Follow-up Call Required?

Follow-up Call Completed?

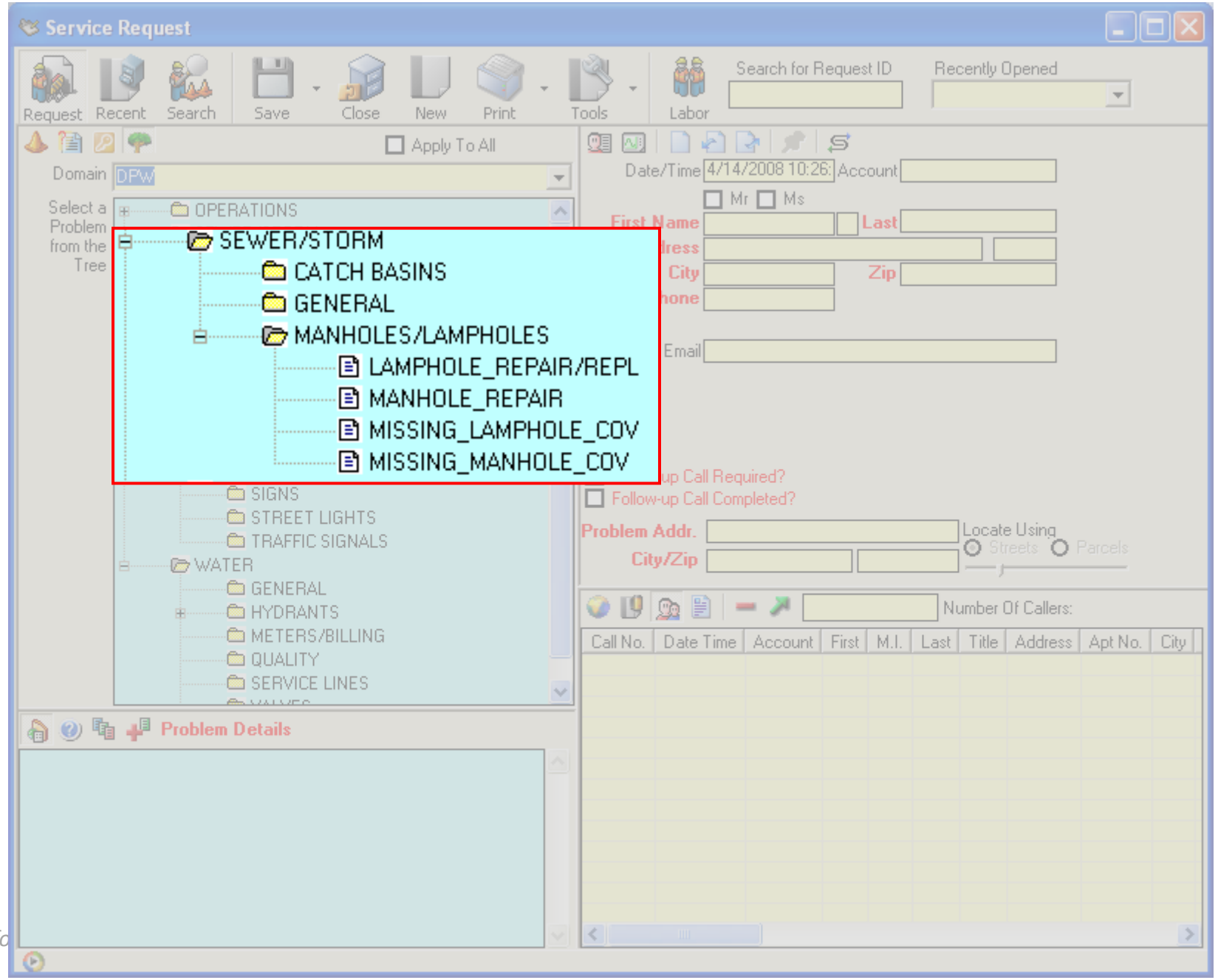
Problem Addr.

City/Zip

Locate Using Streets Parcels

Number Of Callers:

Call No.	Date Time	Account	First	M.I.	Last	Title	Address	Apt No.	City


Service Request
Request
Recent
Search
Save
Close
New
Print
Tools
Labor
Search for Request ID
Recently Opened
Apply To All
Domain
DPW
Select a Problem from the Tree
OPERATIONS
SEWER/STORM
CATCH BASINS
GENERAL
MANHOLES/LAMPHOLES
LAMPHOLE_REPAIR/REPL
MANHOLE_REPAIR
MISSING_LAMPHOLE_COV
MISSING_MANHOLE_COV
SIGNS
STREET LIGHTS
TRAFFIC SIGNALS
WATER
GENERAL
HYDRANTS
METERS/BILLING
QUALITY
SERVICE LINES
Problem Details
Date/Time
4/14/2008 10:26:
Account
Mr
Ms
First Name
Last
City
Zip
Email
Follow-up Call Required?
Follow-up Call Completed?
Problem Addr.
City/Zip
Locate Using
Streets
Parcels
Number Of Callers:
Call No.
Date Time
Account
First
M.I.
Last
Title
Address
Apt No.
City

Service Request # 29438 MANHOLE_REPAIR / Manhole Needs Repair

Request | Recent | Search | Save | Close | New | Print | Tools | Labor

Search for Request ID

Recently Opened

Apply To All

Problem Type **MANHOLE_REPAIR**

Description Manhole Needs Repair

ID/Status 29438 OPEN

Priority/Division 1 High SEWER

Initiated By ADMIN, CITYWORKS 4/14/2008 11:03:01 AM

Submit To 4/14/2008 11:03:01 AM

Opened By

Dispatch To 4/14/2008 11:02:52 AM

Opened By

Prj Comp. Date MM/DD/YYYY

Closed By

- [ ] Is the Investigation Complete?
- [x] Is This Incident an Emergency?
- [ ] Is a Work Order Needed?
- [ ] Cancel

Work Order

Open WO | Attach To | Create WO

Work Order Description

Project

Open | Attach To

Problem Details

Date/Time 4/14/2008 11:03: Account

Mr Ms

First Name Last

Address

City Zip

Phone

Email

Follow-up Call Required?

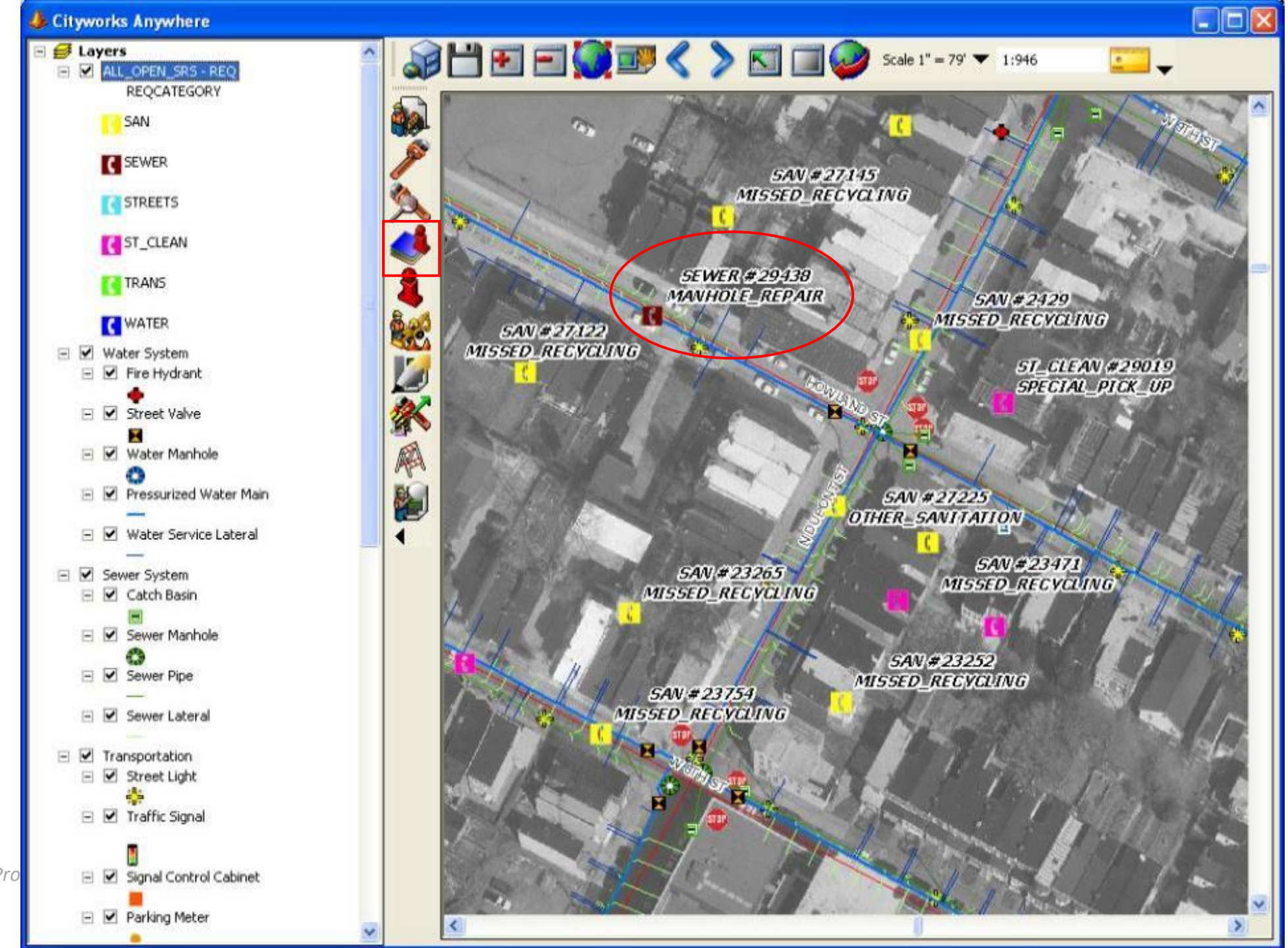
Follow-up Call Completed?

Problem Addr. Locate Using Streets Parcels

City/Zip 19 01-2134

Number of Callers: 1

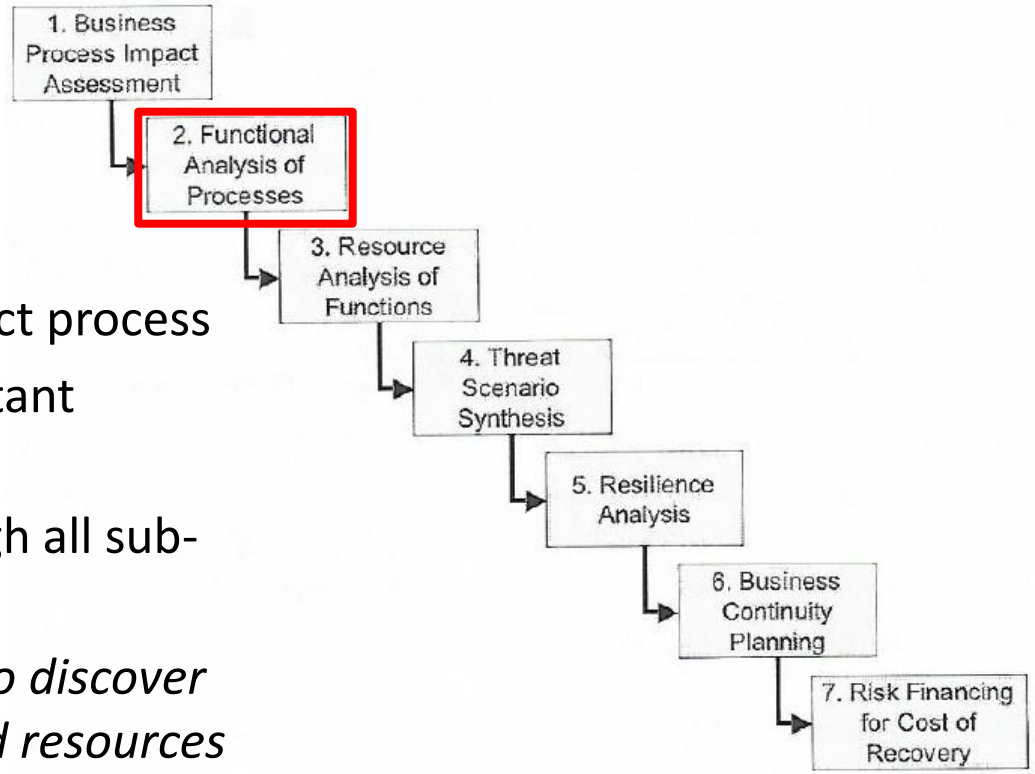
Call No.	Date Time	Account	First	M.I.	Last	Title	Address
29423	4/14/2008 11:03:01 AM	014624	BEN		SMITH		514 N WA


Cityworks Anywhere
Layers
ALL_OPEN_SRS - REQ
REQCATEGORY
SAN
SEWER
STREETS
ST_CLEAN
TRANS
WATER
Water System
Fire Hydrant
Street Valve
Water Manhole
Pressurized Water Main
Water Service Lateral
Sewer System
Catch Basin
Sewer Manhole
Sewer Pipe
Sewer Lateral
Transportation
Street Light
Traffic Signal
Signal Control Cabinet
Parking Meter
Scale 1" = 79'
1:946
SAN #27145
MISSED_RECYCLING
SEWER #29438
MANHOLE_REPAIR
SAN #2429
MISSED_RECYCLING
SAN #27122
MISSED_RECYCLING
ST_CLEAN #29019
SPECIAL_PICK_UP
LOWLAND ST
SAN #27225
OTHER_SANITATION
SAN #23265
MISSED_RECYCLING
SAN #23471
MISSED_RECYCLING
SAN #23252
MISSED_RECYCLING
SAN #23754
MISSED_RECYCLING
W 8TH ST

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
	Street	Potholes, Street Repair, and Resurfacing
		Special Event Blockade
	Sanitation	Catch Basin Repair
		Catch Basin Cleaning
		Garbage Collection

Auditing the Business Continuity Plan



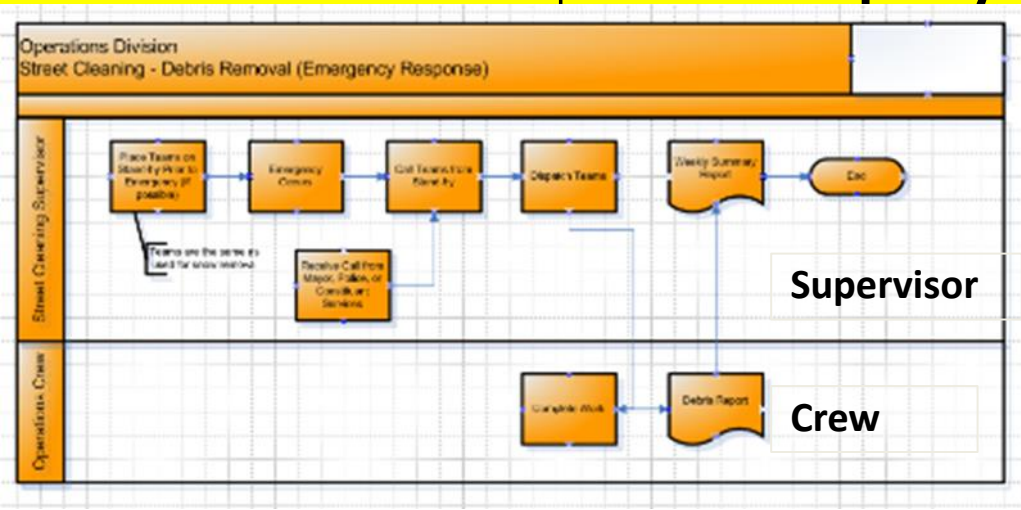
Step 2

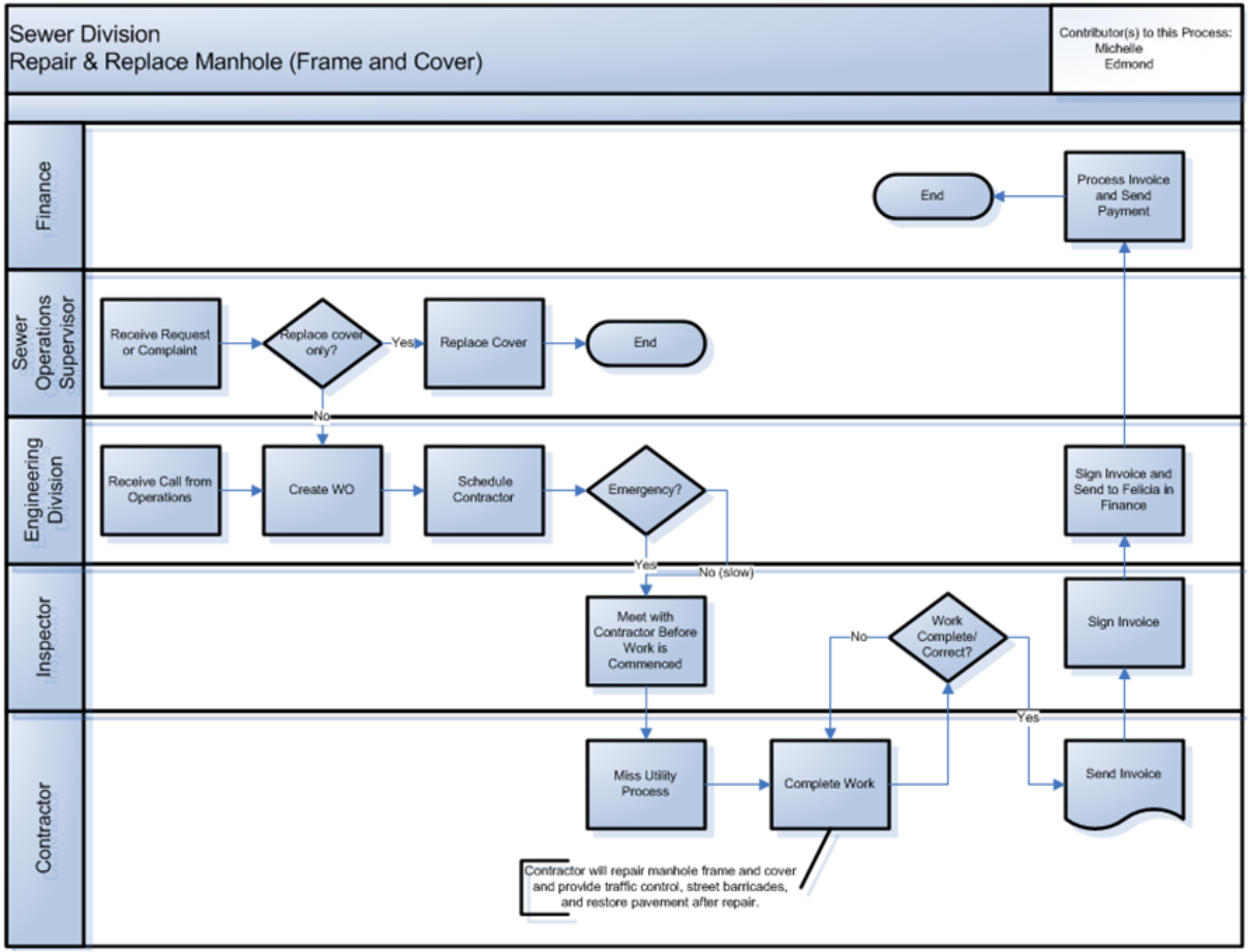
- Select each high and moderate impact process
- Does documentation of these important business processes exist?
- Can your analysis follow trace through all sub-processes?
  - *Down to single functional steps to discover all information systems, data and resources needed to keep this high-impact or moderate-impact process in continuous operation?*

Sherwood, J., Clark, A. and Lynas D. (2005), Enterprise Security Architecture, CRC Press

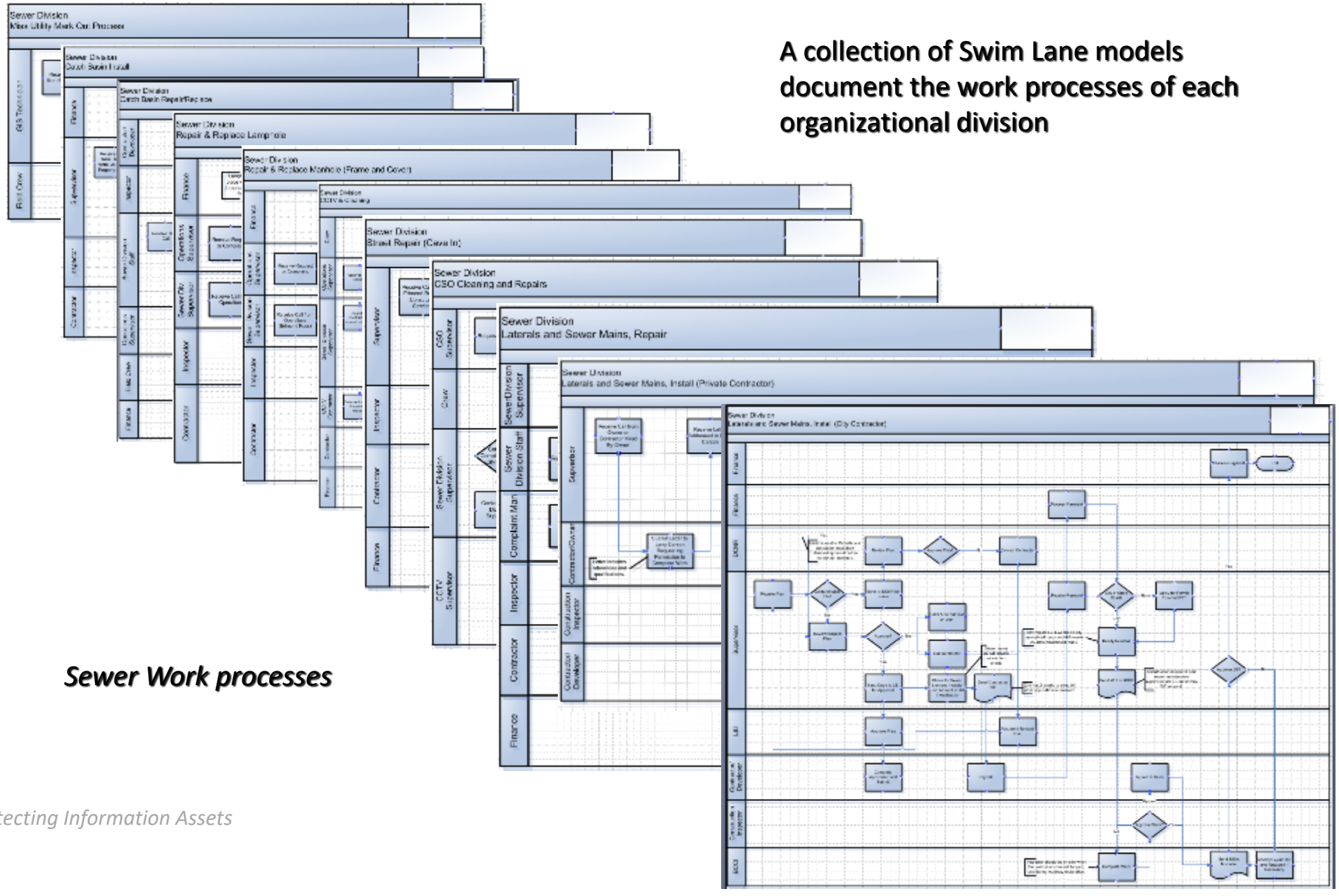
Priorities for recovery example

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
		Potholes, Street Repair, and Resurfacing
		Special Event Blockade
		Catch Basin Repair
		Catch Basin Cleaning
		Garbage Collection




Sewer Division
Repair & Replace Manhole (Frame and Cover)
Contributor(s) to this Process:
Michelle
Edmond
Finance
Sewer Operations Supervisor
Engineering Division
Inspector
Contractor
End
Process Invoice and Send Payment
Receive Request or Complaint
Replace cover only?
Yes
Replace Cover
End
No
Receive Call from Operations
Create WO
Schedule Contractor
Emergency?
Sign Invoice and Send to Felicia in Finance
Yes
No (slow)
Meet with Contractor Before Work is Commenced
No
Work Complete/ Correct?
Sign Invoice
Yes
Miss Utility Process
Complete Work
Send Invoice
Contractor will repair manhole frame and cover and provide traffic control, street barricades, and restore pavement after repair.

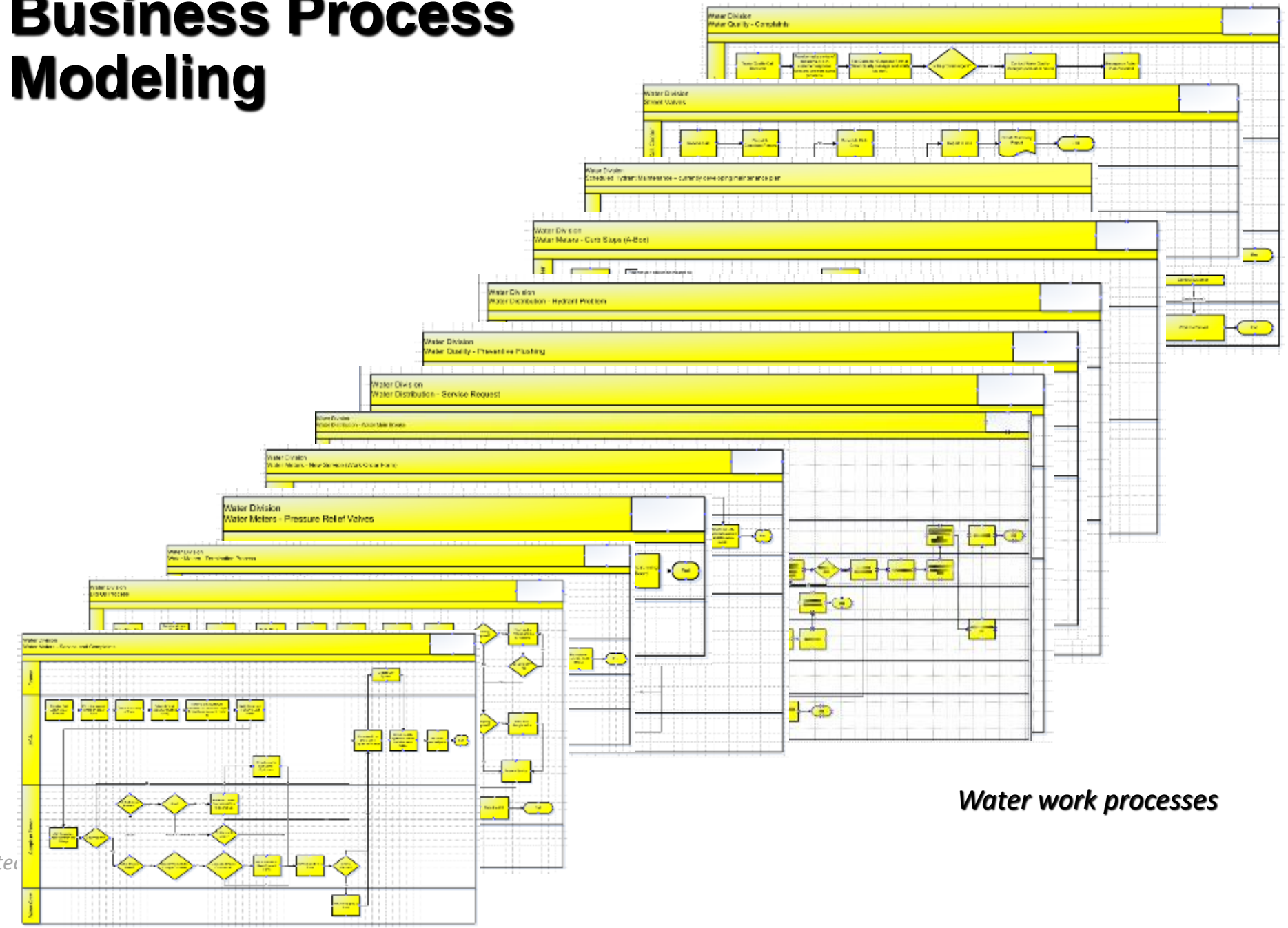
Business Process Modeling



A collection of Swim Lane models document the work processes of each organizational division

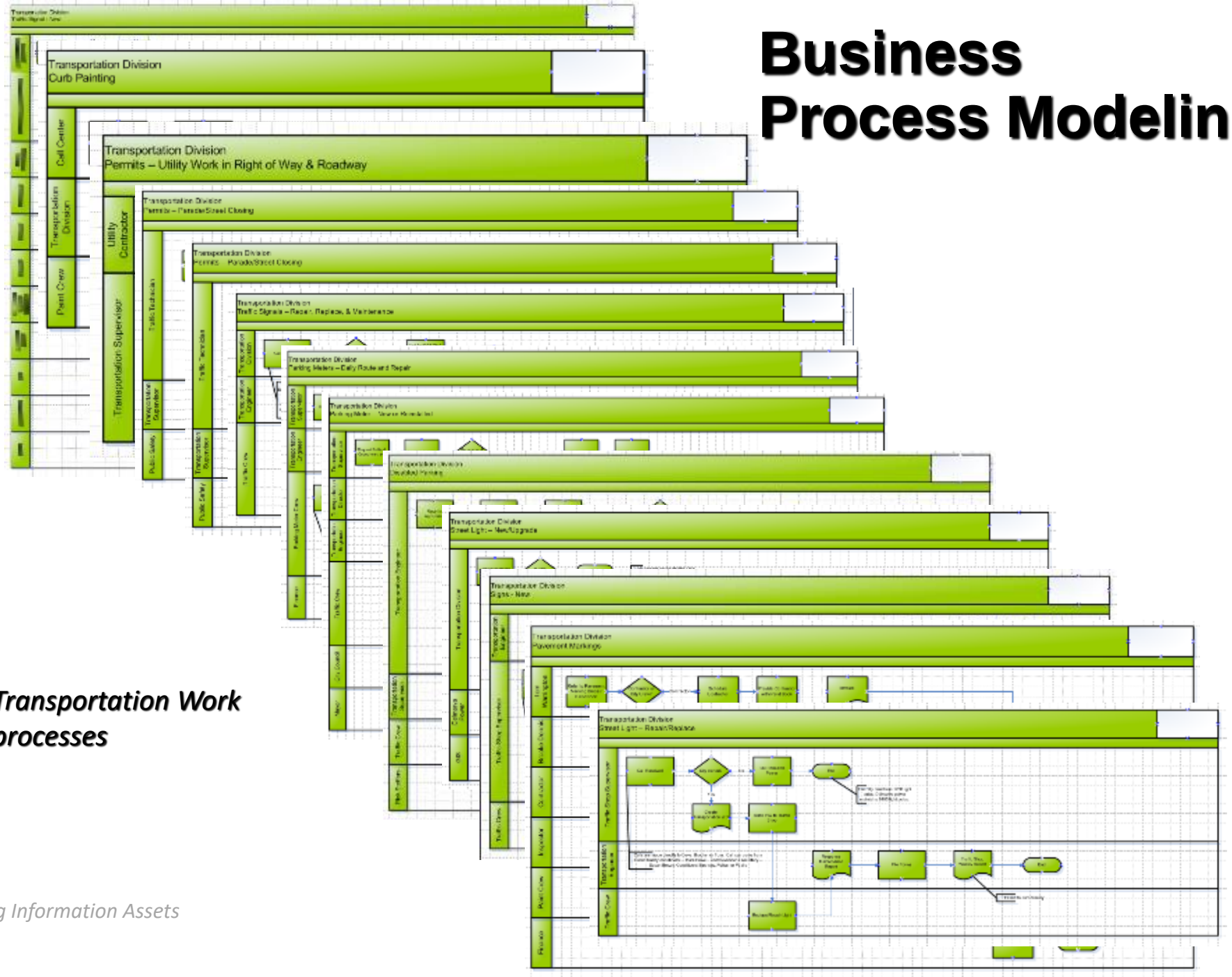
Sewer Work processes

Business Process Modeling

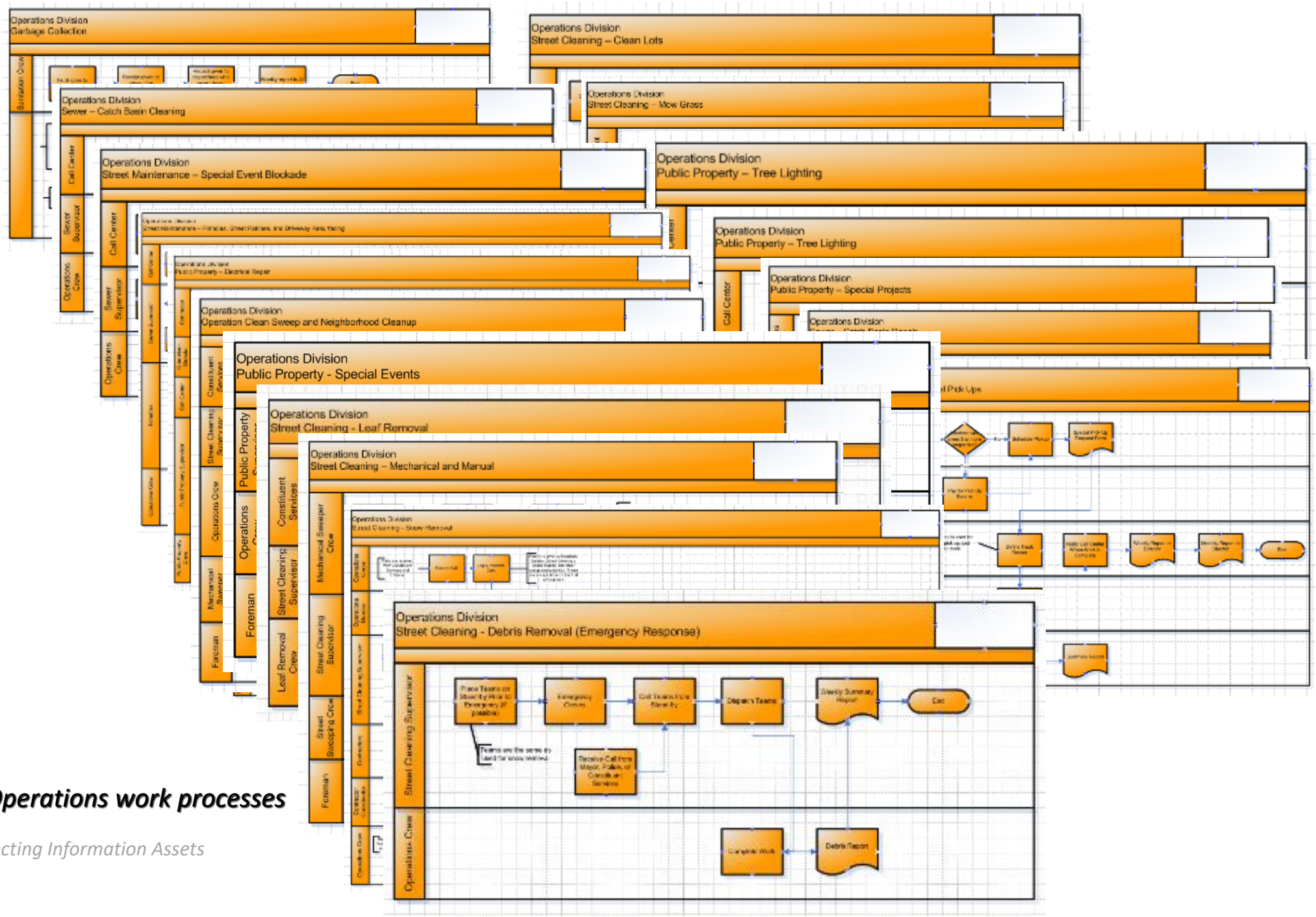


Water work processes

Business Process Modeling



Transportation Work processes

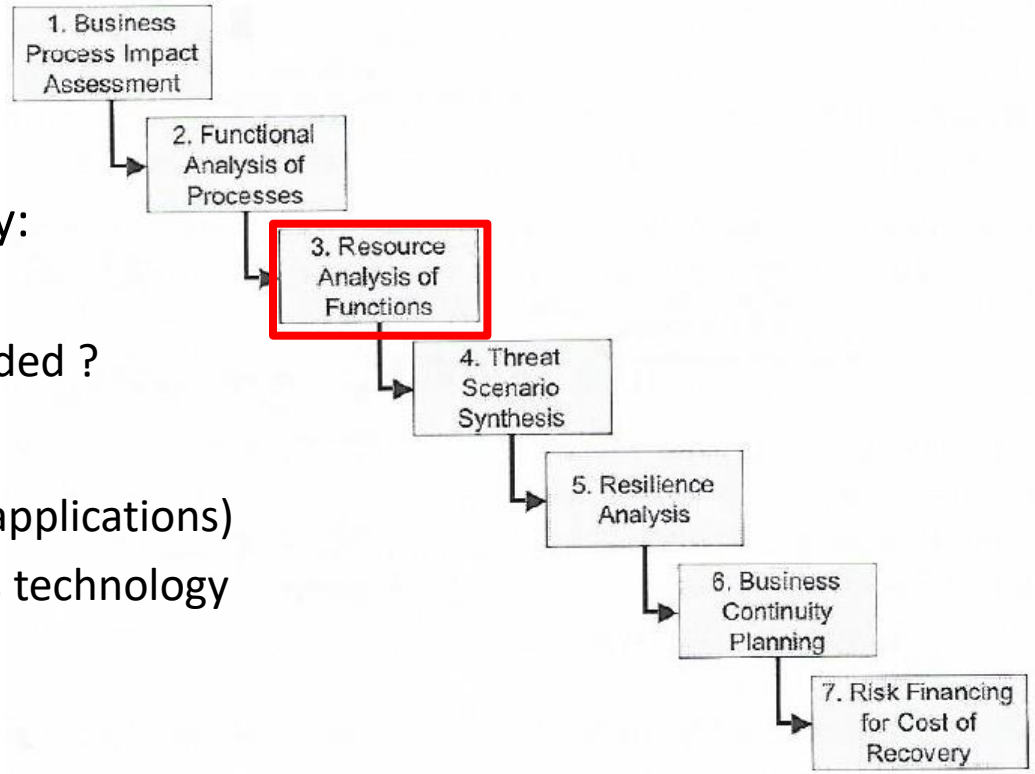


Operations work processes

Auditing the Business Continuity Plan

Step 3

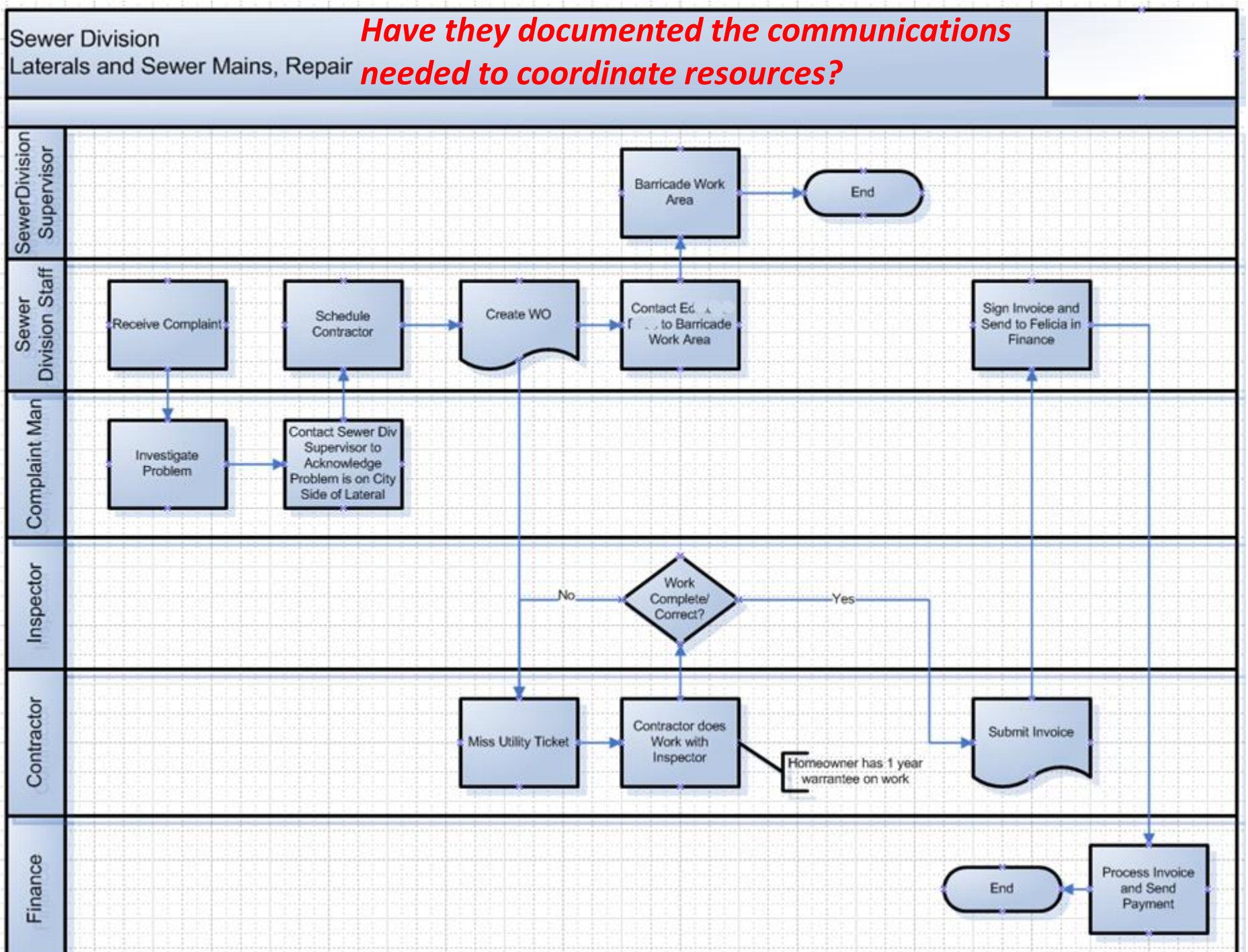
- For each sub-process or function identified in Step 2, can you identify:
  - What resources are needed ?
  - How much of each resource is needed ?
    - People
    - Information systems (i.e. applications)
    - Data and communications technology
    - Other Equipment
    - …



Sherwood, J., Clark, A. and Lynas D. (2005), Enterprise Security Architecture, CRC Press

Have they mapped out the work processes and staff resources needed from each department?

		Work Types	Sewer Division						
			Street & Sewer	CSO System Supervisor	Chief Construction Inspector	Sewer Inspector	Construction Inspector	Complaint Person	CCTV Crew
Sewer Division	Sewer Collection	Laterals and Sewer Mains, Install (City)	■				■		
		Laterals and Sewer Mains, Install (Contractor)	■				■		
		Laterals and Sewer Mains, Repair	■			■		■	
		Manhole, Repair & Replace	■			■			
		Catch Basins, New	■			■			
		Catch Basins, Repair & Replace	■			■			
		Lamphole Repair & Replace	■			■			
		CCTV & Cleaning	■						■
		CSO Cleaning & Repairs	■	■					
		Street Repair (cave in)	■			■			
		Miss Utility Stake Outs		■	■				


Sewer Division
Laterals and Sewer Mains, Repair
Have they documented the communications needed to coordinate resources?
SewerDivision Supervisor
Sewer Division Staff
Complaint Man
Inspector
Contractor
Finance
Barricade Work Area
End
Receive Complaint
Schedule Contractor
Create WO
Contact Ed
to Barricade Work Area
Sign Invoice and Send to Felicia in Finance
Investigate Problem
Contact Sewer Div Supervisor to Acknowledge Problem is on City Side of Lateral
No
Work Complete/ Correct?
Yes
Miss Utility Ticket
Contractor does Work with Inspector
Homeowner has 1 year warrantee on work
Submit Invoice
End
Process Invoice and Send Payment

Does the documentation enable you to understand the cross organizational business process workflows…

				Operations Division															Other													
		Work Types	Finance	Operations Director	Operations Center	Contractor Coordinator	Streets Crew	Street Cleaning Supervisor	Assistant Street Cleaning Supervisor	Foreman	Operations Crew	Mechanical Sweeper Crew	Street Sweeping Crew	Public Property Manager	Public Property Crew	Sewer Maintenance Supervisor	Sewer Crew	Sanitation Crew	Professional Services Consultant	Engineering Consultant	In house Contractors	Developer	L&I	GIS Technician	Fire Board	DELDOT	Delaware Dept. of Natural Resources and Env.Control	Utility Contractor	DelMarva Power	City Council	Mayor	Police	Landlord
Sewer Division	Sewer Collection	Laterals and Sewer Mains, Install (City)	■																		■	■	■				■						
		Laterals and Sewer Mains, Install (Contractor)												■								■											
		Laterals and Sewer Mains, Repair	■				■														■												
		Manhole, Repair & Replace	■											■			■				■												
		Catch Basins, New	■											■							■												
		Catch Basins, Repair & Replace	■											■			■					■				■							
		Lamphole Repair & Replace	■														■				■												
		CCTV & Cleaning	■											■			■				■												
		CSO Cleaning & Repairs															■																
		Street Repair (cave in)	■																		■												
		Miss Utility Stake Outs																						■									

…identifying dependencies on critical paths for completing prioritized work processes

Who needs availability and access to the information?

				Operations Division															Other													
		Work Types	Finance	Operations Director	Operations Center	Contractor Coordinator	Streets Crew	Street Cleaning Supervisor	Assistant Street Cleaning Supervisor	Foreman	Operations Crew	Mechanical Sweeper Crew	Street Sweeping Crew	Public Property Manager	Public Property Crew	Sewer Maintenance Supervisor	Sewer Crew	Sanitation Crew	Professional Services Consultant	Engineering Consultant	In house Contractors	Developer	L&I	GIS Technician	Fire Board	DELDOT	Delaware Dept. of Natural Resources and Env.Control	Utility Contractor	DelMarva Power	City Council	Mayor	Police	Landlord
Sewer Division	Sewer Collection	Laterals and Sewer Mains, Install (City)	■																		■	■	■				■						
		Laterals and Sewer Mains, Install (Contractor)												■								■											
		Laterals and Sewer Mains, Repair	■				■														■												
		Manhole, Repair & Replace	■											■			■				■												
		Catch Basins, New	■											■							■												
		Catch Basins, Repair & Replace	■											■			■					■				■							
		Lamphole Repair & Replace	■														■				■												
		CCTV & Cleaning	■											■			■				■												
		CSO Cleaning & Repairs															■																
		Street Repair (cave in)	■																		■												
		Miss Utility Stake Outs																						■									

…identifying dependencies on critical paths for completing prioritized work processes

Does the business understand resources needed to support mission critical work?

						Transportation Division							Sewer Division							Water Division									Operations Division													Other													
																				Meters		Distribution				Water Quality																															
		Work Types	Finance	Constituent Services	Call Center	Transportation Director	Transportation Engineer	Traffic Shop Supervisor	Assistant Traffic Foreman	Traffic Crew	Parking Meter Crew	Paint Crew	Street & Sewer	CSO System Supervisor	Chief Construction Inspector	Sewer Inspector	Construction Inspector	Complaint Person	CCTV Crew	Meter Complaint Person	Meter Field Crew	Water Distribution Engineer	Water Distribution Supervisor	Construction Inspector	Water Complaint Person	Water Field Crew	Water Quality Manager	Water Quality Lab	Operations Director	Operations Center	Contractor Coordinator	Streets Crew	Street Cleaning Supervisor	Assistant Street Cleaning Supervisor	Foreman	Operations Crew	Mechanical Sweeper Crew	Street Sweeping Crew	Public Property Manager	Public Property Crew	Sewer Maintenance Supervisor	Sewer Crew	Sanitation Crew	Professional Services Consultant	Engineering Consultant	In house Contractors	External Contractors / Developer	L&I	GIS Technician	Fire Board	DELDOT	Delaware Dept. of Natural Resources and Env.Control	Utility Contractor	DelMarva Power	City Council	Mayor	Police	Landlord
Water Division	Meters	Meter Service and Complaints	■																	■																																					
		Meter Termination	■																		■											■										■															
		Meters, New Service	■																		■											■										■					■											
		Interconnections	■																																																						
		Pressure Relief Valves																			■	■	■			■																															
	Water Distribution	New Service			■																			■	■		■					■										■					■					■						
		Main Break			■																	■		■	■		■					■										■				■					■							
		Semi-Annual Hydrant Flushing																							■	■																						■									
		Water Service Repair/Replace																																																								
		Hydrant Repair			■																			■	■																							■			■							
		Scheduled Hydrant Maintenance																							■																																	
		Curb Stops (A-Box)			■																			■	■																																	
		Street Valves			■																			■	■																																	
		Miss Utility Stake Outs																						■																							■											
	Water Quality	Water Quality Complaints			■																					■	■																															
Sewer Division	Sewer Collection	Laterals and Sewer Mains, Install (City)	■										■				■																													■	■					■					
		Laterals and Sewer Mains, Install (Contractor)											■				■																					■								■											
		Laterals and Sewer Mains, Repair	■										■			■		■														■														■												
		Manhole, Repair & Replace	■										■			■																						■			■					■												
		Catch Basins, New	■										■			■																						■								■												
		Catch Basins, Repair & Replace	■										■			■																						■			■					■	■				■							
		Lamphole Repair & Replace	■										■			■																									■					■												
		CCTV & Cleaning	■										■						■																				■			■					■												
		CSO Cleaning & Repairs	■										■	■																											■																	
		Street Repair (cave in)	■										■			■																													■													
		Miss Utility Stake Outs												■	■																																	■										

Note: Public Works tasks are often supported by staff from a number of Divisions, other City offices, and outside agencies

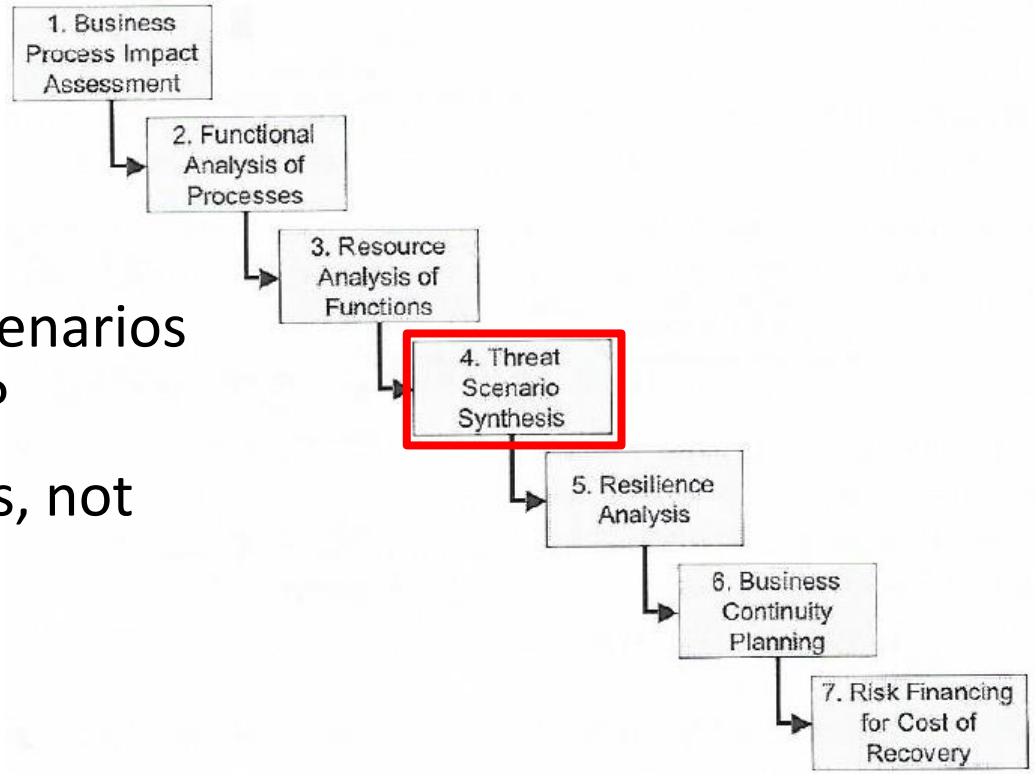
Does the business understand resources needed to support mission critical work?

		Work Types	Finance	Constituent Services	Call Center	Transportation Director	Transportation Engineer	Traffic Shop Supervisor	Assistant Traffic Foreman	Traffic Crew	Parking Meter Crew	Paint Crew	Street & Sewer	CSO System Supervisor	Chief Construction Inspector	Sewer Inspector	Construction Inspector	Complaint Person	CCTV Crew	Meter Complaint Person	Meter Field Crew	Water Distribution Engineer	Water Distribution Supervisor	Construction Inspector	Water Complaint Person	Water Field Crew	Water Quality Manager	Water Quality Lab	Operations Director	Operations Center	Contractor Coordinator	Streets Crew	Street Cleaning Supervisor	Assistant Street Cleaning Supervisor	Foreman	Operations Crew	Mechanical Sweeper Crew	Street Sweeping Crew	Public Property Manager	Public Property Crew	Sewer Maintenance Supervisor	Sewer Crew	Sanitation Crew	Professional Services Consultant	Engineering Consultant	In house Contractors	External Contractors ?	L&I	GIS Technician	Fire Board	DELDOT	Delaware Dept. of Natural Resources and Env.Control	Utility Contractor	DelMarva Power	City Council	Mayor	Police	Landlord
						Transportation Division							Sewer Division							Water Division																																							
																				Meters		Distribution					Water Quality																																	
Transportation Division		Signs, New/Repair/Replace																																																										
		Street Light Repair/Replace																																																										
		Street Light New																																																										
		Traffic Signal Repair/Replace/Maintenance																																																									
		Traffic Signal New																																																										
		Parking Meter New																																																										
		Parking Meter Daily Route and Repair																																																										
		Pavement Markings																																																										
		Curb Painting																																																										
		Utility Work																																																										
		Disabled Parking																																																										
Operations Division	Street Cleaning	Mow Grass																																																										
		Clean Lots																																																										
		Street Cleaning - Mechanical and Manual																																																										
		Snow Removal																																																										
		Debris Removal (Emergency Response)																																																										
		Special Pick Ups																																																										
		Leaf Removal																																																										
		Operation Clean Sweep and Neighborhood Cleanup																																																										
	Public Property	Special Events																																																										
		Special Projects																																																										
		Building Repair																																																										
		Tree Lighting																																																										
		Electrical Repair																																																										
	Street	Potholes, Street Repair, and Driveway Resurfacing																																																										
		Special Event Blockade																																																										
	Sewer	Catch Basin Repair																																																										
		Catch Basin Cleaning																																																										
	Sanitation	Garbage Collection																																																										
Water Division	Meters	Meter Service and Complaints																																																										
		Meter Termination																																																										
		Meters, New Service																																																										
		Interconnections																																																										
		Pressure Relief Valves																																																										
	Water Distribution	New Service																																																										
		Main Break																																																										
		Semi-Annual Hydrant Flushing																																																										
		Water Service Repair/Replace																																																										
		Hydrant Repair																																																										
		Scheduled Hydrant Maintenance																																																										
		Curb Stops (A-Box)																																																										
		Street Valves																																																										
		Miss Utility Stake Outs																																																										
	Water Quality	Water Quality Complaints																																																										
Sewer Division	Sewer Collection	Laterals and Sewer Mains, Install (City)																																																										
		Laterals and Sewer Mains, Install (Contractor)																																																										
		Laterals and Sewer Mains, Repair																																																										
		Manhole, Repair & Replace																																																										
		Catch Basins, New																																																										
		Catch Basins, Repair & Replace																																																										
		Lamphole Repair & Replace																																																										
		CCTV & Cleaning																																																										
		CSO Cleaning & Repairs																																																										
		Street Repair (cave in)																																																										
		Miss Utility Stake Outs																																																										

Auditing the Business Continuity Plan

Step 4

- For each resource have they identified high-level threat scenarios that put that resource at risk?
- Have they focused on impacts, not causes?

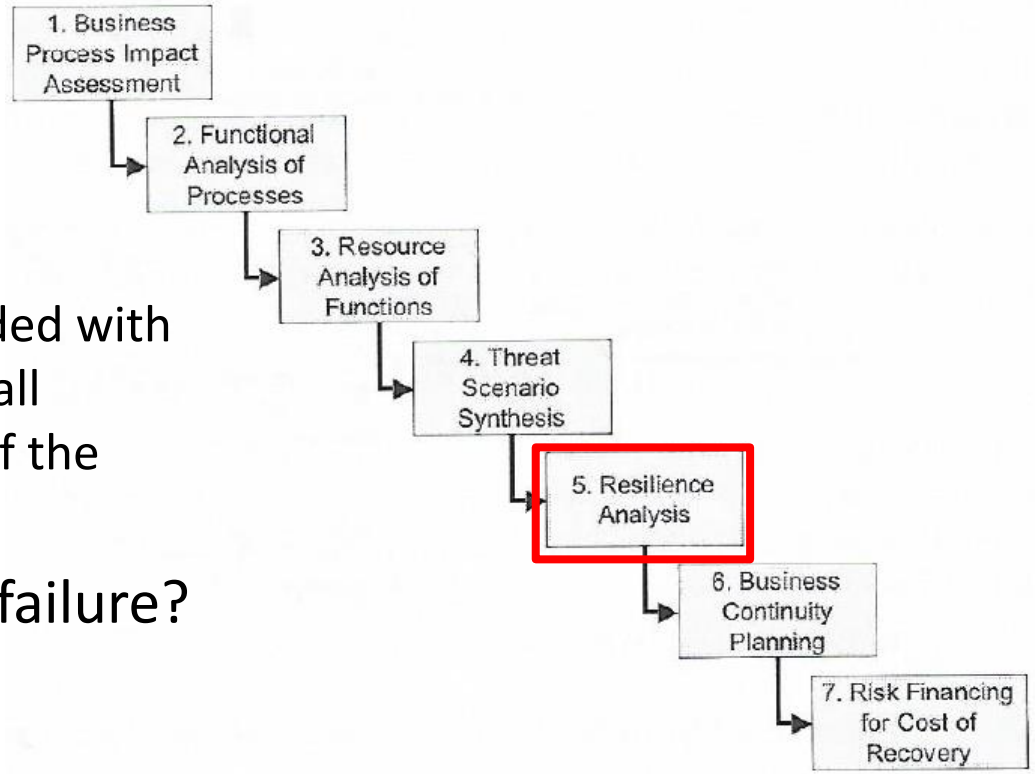


Sherwood, J., Clark, A. and Lynas D. (2005), Enterprise Security Architecture, CRC Press

Auditing the Business Continuity Plan

Step 5

- For each resource/scenario combination
  - Are the current resources provided with sufficient resilience for the overall business to withstand impacts of the scenario?
- Are there any single points of failure?

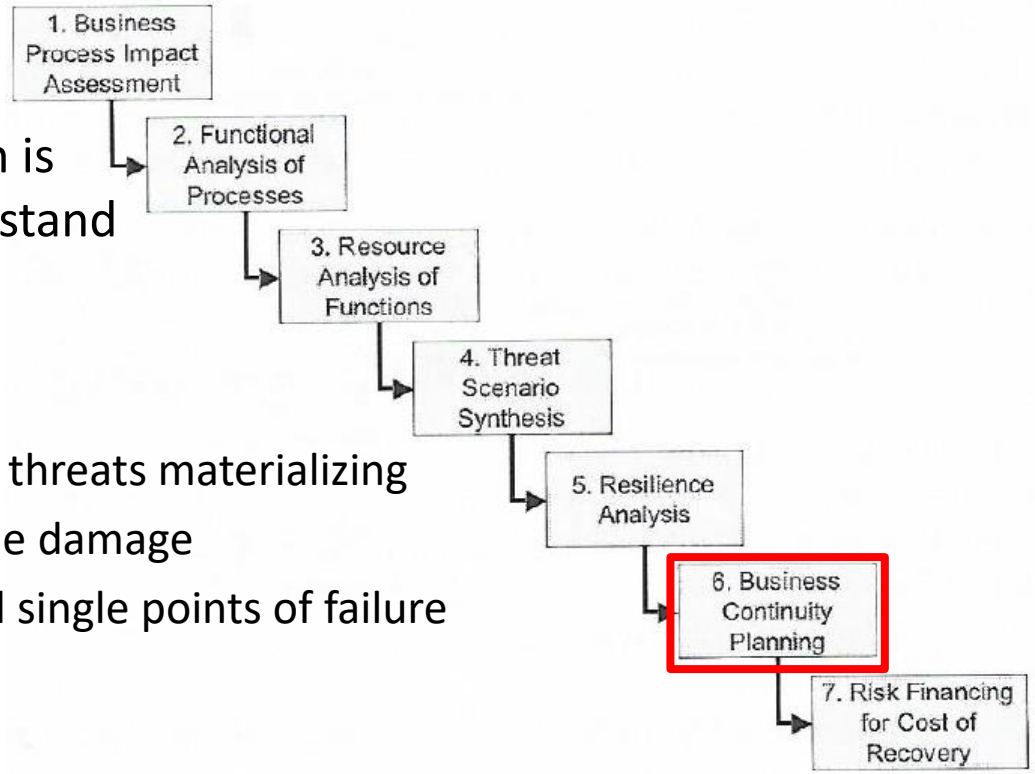


Sherwood, J., Clark, A. and Lynas D. (2005), Enterprise Security Architecture, CRC Press

Auditing the Business Continuity Plan

Step 6

- What additional resource protection is needed so overall business can withstand the threat scenarios?
- For example:
  - Preventive measures to avoid the threats materializing
  - Containment measures to limit the damage
  - Redundancy of resources to avoid single points of failure and to provide fallback capacity
  - Incident management plans
  - Recovery plans to resume business following an incident
  - Training and awareness



Sherwood, J., Clark, A. and Lynas D. (2005), Enterprise Security Architecture, CRC Press

CP-2	CONTINGENCY PLAN
	ASSESSMENT OBJECTIVE: *Determine if the organization:*

ASSESSMENT OBJECTIVE:

Determine if the organization:

CP-2(a)	*develops and documents a contingency plan for the information system that:*		
	CP-2(a)(1)	*identifies essential missions and business functions and associated contingency requirements;*	
	CP-2(a)(2)	**CP-2(a)(2)[1]**	*provides recovery objectives;*
		CP-2(a)(2)[2]	*provides restoration priorities;*
		CP-2(a)(2)[3]	*provides metrics;*
	CP-2(a)(3)	**CP-2(a)(3)[1]**	*addresses contingency roles;*
		CP-2(a)(3)[2]	*addresses contingency responsibilities;*
		CP-2(a)(3)[3]	*addresses assigned individuals with contact information;*
	CP-2(a)(4)	*addresses maintaining essential missions and business functions despite an information system disruption, compromise, or failure;*	
	CP-2(a)(5)	*addresses eventual, full information system restoration without deterioration of the security safeguards originally planned and implemented;*	
	CP-2(a)(6)	**CP-2(a)(6)[1]**	*defines personnel or roles to review and approve the contingency plan for the information system;*
		CP-2(a)(6)[2]	*is reviewed and approved by organization-defined*

an for the information system that:
and business functions and associated
overy objectives;
oration priorities;
rics;
ntingency roles;
ntingency responsibilities;
signed individuals with contact
tial missions and business functions n disruption, compromise, or failure;
rmation system restoration without safeguards originally planned and
nnel or roles to review and approve ncy plan for the information system;
nd approved by organization-defined roles;
onnel (identified by name and/or by nents to whom copies of the istributed;
ingency plan to organization-defined nd organizational elements;
es with incident handling activities;
v the contingency plan for the
with the organization-defined
information system, or environment of

		CP-2(e)[2]	*problems encountered during plan implementation, execution, and testing;*
	CP-2(f)	**CP-2(f)[1]**	*defines key contingency personnel (identified by name and/or by role) and organizational elements to whom contingency plan changes are to be communicated;*

Business Impact Analysis (BIA) also 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 is the :
   - **Recover time objective** (RTO):

     Maximum acceptable downtime
   - **Recovery point objective** (RPO):

     Maximum acceptable data loss (measured in time, but implies # of data records)
   - **Service delivery objective (SDO):**

     Level of services to be reached during the alternative process mode until the normal situation is restored
   - **Maximum tolerable outage (MTO):**

     Maximum time the organization can support processing in alternative mode

Auditing Recovery Plans

Have they documented:

1. Strategies, resources, timelines and dependencies?
2. Approaches to “re-initiate” crucial business functions and resume on-going operations?

Have the plans been reviewed and confirmed by function owners in the business as well as executives?

Contingency Planning (CP)

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

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
	AL MISSIONS / BUSINESS					x
	SSETS				x	x
			x	x	x	x
	NTS		x			x
			x	x	x	x
	E WITH RELATED PLANS		x		x	x
	PROCESSING SITE		x			x
		x	Incorporated into CP-2.			
					x	x
	ROM PRIMARY SITE				x	x
	ME / POINT OBJECTIVES					x
					x	x
					x	x
	ON FROM PRIMARY SITE				x	x
	LITY				x	x
	OF SERVICE				x	x
	ION FOR USE					x
	NT INFORMATION	x	Incorporated into CP-7.			
					x	x
	TY OF SERVICE				x	x
	POINTS OF FAILURE				x	x
	ATION OF PRIMARY /					x
	ER CONTINGENCY PLAN					x
				x	x	x
	OR RELIABILITY /				x	x
	TORATION USING					x
	E STORAGE FOR CRITICAL					x
	ION FROM UNAUTHORIZED	x	Incorporated into CP-9.			
	R TO ALTERNATE					x
	constitution			x	x	x
	CONSTITUTION |	x	Incorporated into CP-4.			
	CONSTITUTION |				x	x
	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.			

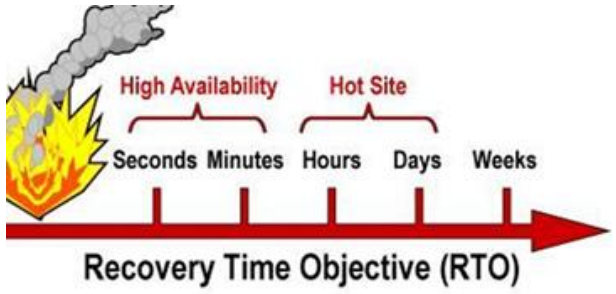
What kind of offsite alternative recovery facility do they have ?

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



What kind of offsite alternative recovery facility do they have ? (continued)

Mobile site: A packaged modular processing facility mounted on transportable vehicles and kept ready to be delivered and set up at a location specified on activation

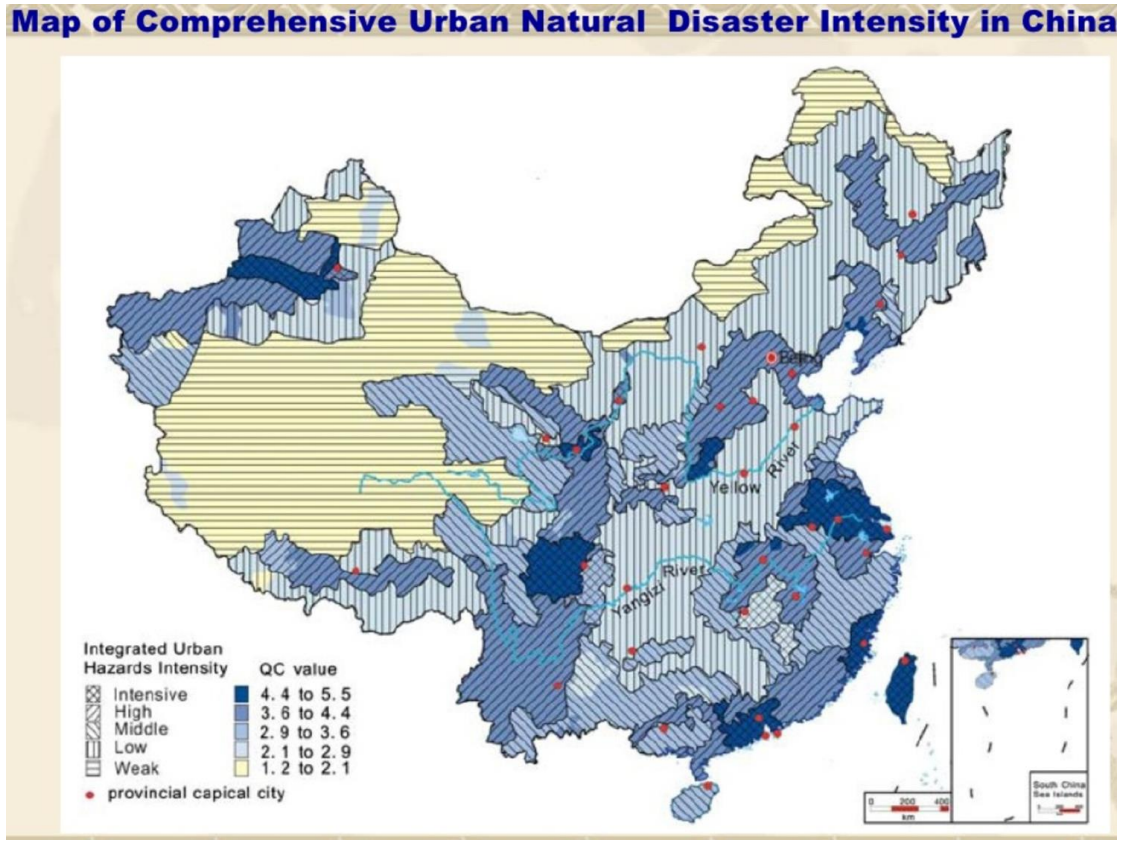
Shared site: Least expensive arrangement ("reciprocal agreements") with compatible companies who agree to host each other's employees and business functions in the event of a disaster

- *Most risky alterative - few companies maintain extra capacity and equipment suitable to host another company's business processes*
- *Better than having no plan at all*

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…



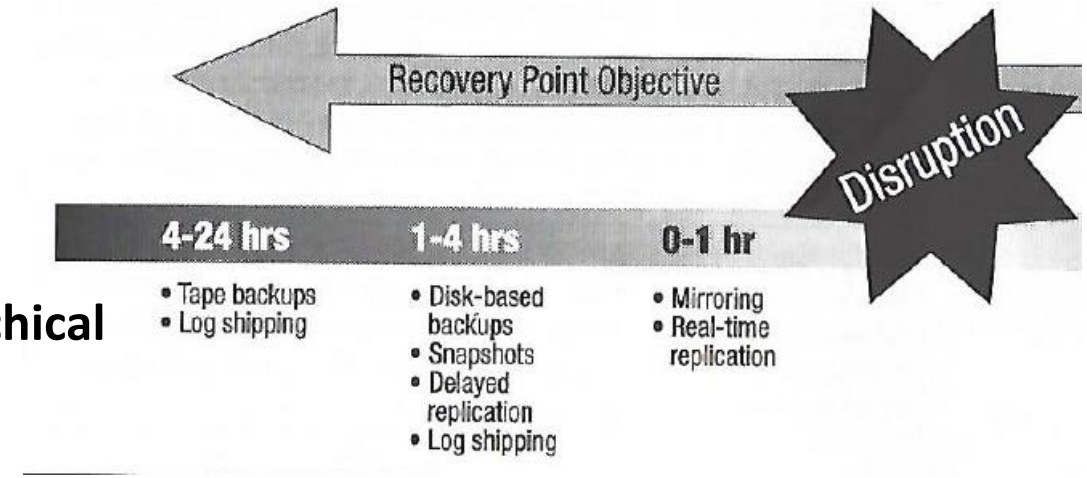
With multiple providers of:

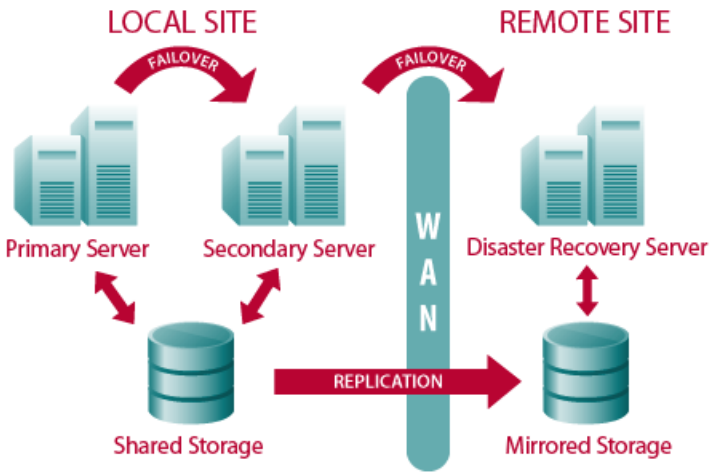
中国教育和科研计算机网
China Education and Research Network

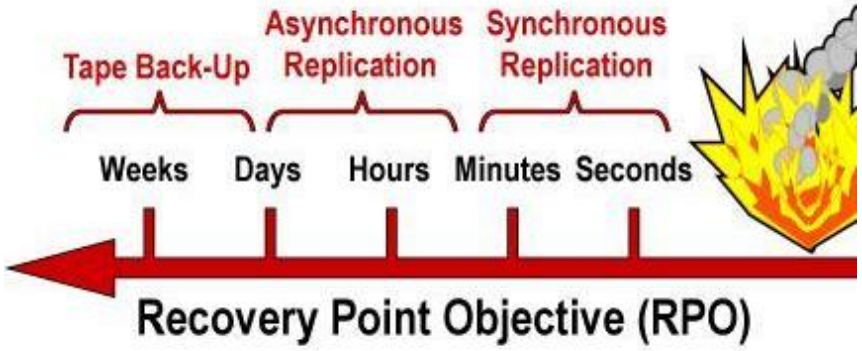
- Telecommunications
- Stable power supply
- Redundant utilities

Data backup systems and redundancies

- **Database shadowing**
- **Electronic vaulting**
- **Remote journaling**
- **Storage area network and hierarchical storage management**
- **Shared storage**
- **RAID** (Redundant Array of Independent Disks)
- **Failover clustering**

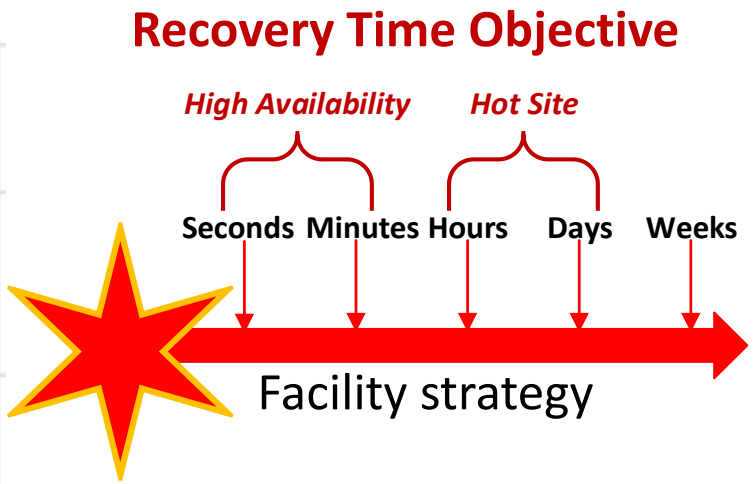


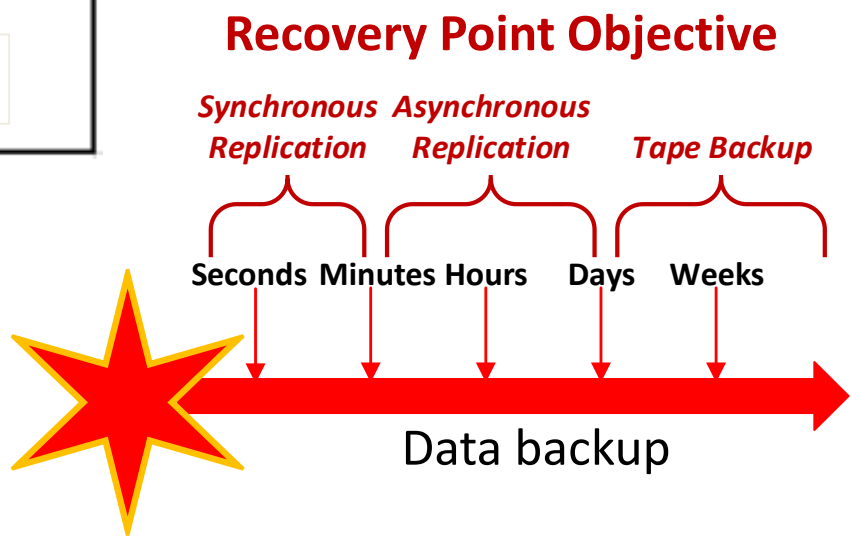




Recovery Options: Location & Backup

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 ¥



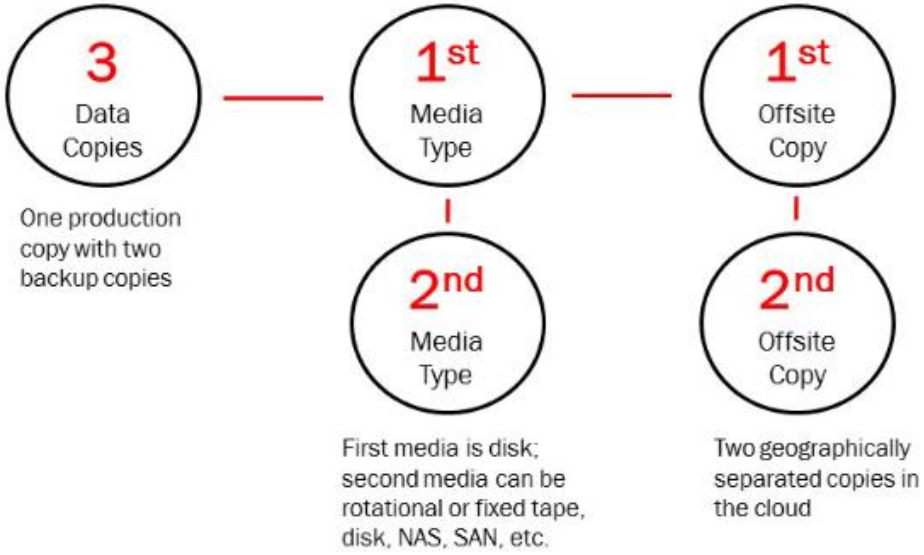


[NIST SP 800-34 R1]
[Contingency Planning Guide for Federal Information Systems]

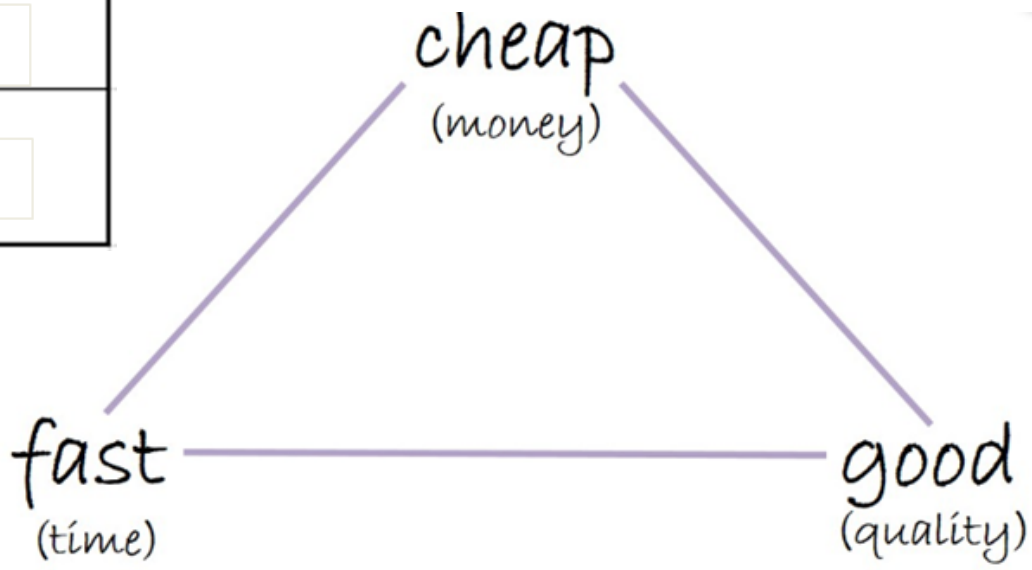
Backup Mitigation – Best Practice

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



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 $



The Quality Triangle:

Pick Two

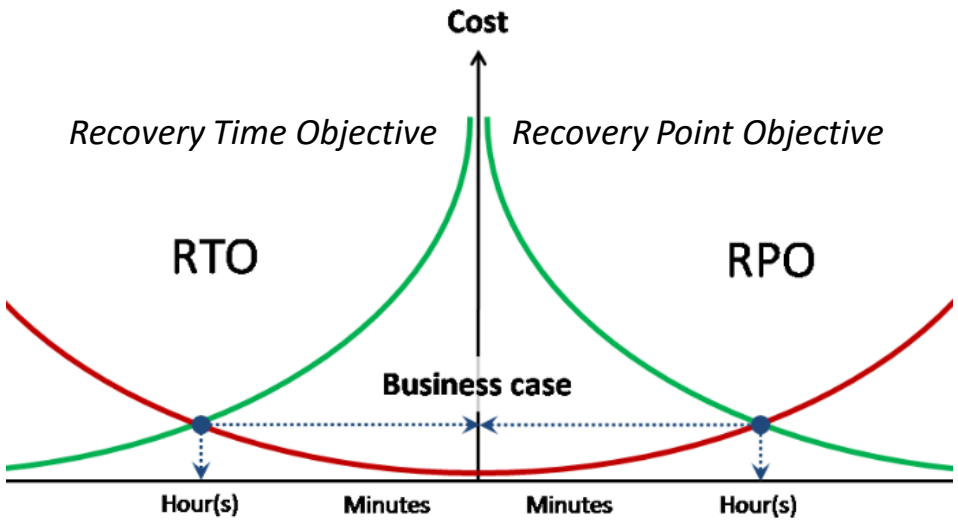
Disaster recovery time targets

Disaster recovery must be achieved within critical deadlines

- Need for careful analysis
  - Of business needs for recovery of services
  - Time-criticality of various information services

Speed of recovery must be traded off against cost

- If needed, non-stop 365 day by 24-hour service can be maintained, but it pushes the cost up very high
- Business needs and justifications must be detailed to plan disaster recovery
  - Remember: *The only goal is to create effective business continuity, whatever that needs to be*



Have they classified their application systems and scheduled their restoration?

Example Classification of Applications*

Classification		Description
1	Mission Critical	Mission Critical to accomplishing the mission of the organization Can be performed only by computers No alternative manual processing capability exists Must be restored within 36 hours
2	Critical	Critical in accomplishing the work of the organization Primarily performed by computers Can be performed manually for a limited time period Must be restored starting at 36 hours and within 5 days
3	Essential	Essential in completing the work of the organization Performed by computers Can be performed manually for an extended time period Can be restored as early as 5 days, however it can take longer

* From SANS

Have they properly planned the availability of replacement software?

- In addition to data…
  - Operating systems, programs and utilities used during regular business must also be backed up regularly to the offsite facility
- An application built for a one version of an operating system, will not run if different (wrong) version of the operating system is installed at the offsite facility
  - Data is often formatted to work in a particular version of a program,
    - If that version is not available at the backup facility, it is possible that the data will not be available for use in the time of need

CP-2	CONTINGENCY PLAN
	ASSESSMENT OBJECTIVE: *Determine if the organization:*

ASSESSMENT OBJECTIVE:

Determine if the organization:

CP-2(a)	*develops and documents a contingency plan for the information system that:*		
	CP-2(a)(1)	*identifies essential missions and business functions and associated contingency requirements;*	
	CP-2(a)(2)	**CP-2(a)(2)[1]**	*provides recovery objectives;*
		CP-2(a)(2)[2]	*provides restoration priorities;*
		CP-2(a)(2)[3]	*provides metrics;*
	CP-2(a)(3)	**CP-2(a)(3)[1]**	*addresses contingency roles;*
		CP-2(a)(3)[2]	*addresses contingency responsibilities;*
		CP-2(a)(3)[3]	*addresses assigned individuals with contact information;*
	CP-2(a)(4)	*addresses maintaining essential missions and business functions despite an information system disruption, compromise, or failure;*	
	CP-2(a)(5)	*addresses eventual, full information system restoration without deterioration of the security safeguards originally planned and implemented;*	
	CP-2(a)(6)	**CP-2(a)(6)[1]**	*defines personnel or roles to review and approve the contingency plan for the information system;*
		CP-2(a)(6)[2]	*is reviewed and approved by organization-defined*

an for the information system that:

and business functions and associated

overy objectives;

oration priorities;

rics;

ntingency roles;

ntingency responsibilities;

signed individuals with contact

tial missions and business functions n disruption, compromise, or failure;

rmation system restoration without safeguards originally planned and

nnel or roles to review and approve ncy plan for the information system;

nd approved by organization-defined roles;

onnel (identified by name and/or by ments to whom copies of the istributed;

ingency plan to organization-defined nd organizational elements;

es with incident handling activities;

v the contingency plan for the

with the organization-defined

information system, or environment of

		CP-2(e)[2]	*problems encountered during plan implementation, execution, and testing;*
	CP-2(f)	**CP-2(f)[1]**	*defines key contingency personnel (identified by name and/or by role) and organizational elements to whom contingency plan changes are to be communicated;*

Have they planned for the availability of people after disaster?

- Attention focused on backing up and restoring data and technology, often overlooks people and necessary skillsets for continuing the operation of the enterprise
- Who is responsible for calling it a “disaster” to begin DRP implementation?
- Employees may not be available after a disaster:
  - Due to death, injury, or family responsibilities
  - Business continuity committee
    - Must identify the necessary skill set for each critical task
    - Need back-up solutions (e.g. using temp agencies or cross training individuals)

Do they have Recovery Teams?

After a disaster two teams may be assembled:

1. ***Recovery team***
   - Coordinates bringing up the alternative site
   - To be sure everyone knows what to do, tests are conducted
     - Range from troubleshooting the plan by simply walking through documents detailing the sequence of events, rehearsing the plan up to the point of actual data or resource recovery at the main site
2. ***Salvage team***
   - Assesses damage and works to bring the businesses' primary facility back on-line

Templates are Available

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

Question

Is it practical to conduct a thorough test of a Business Continuity Plan (BCP)?

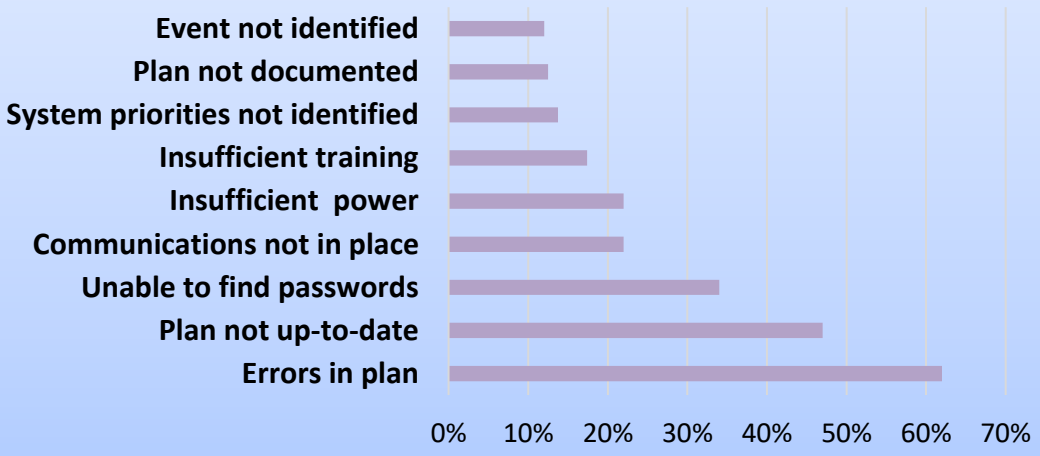
- *Why might it not be practical?*
- *If it is not practical, what alternative ways can you recommend for testing a BCP?*

Disaster Recovery and Business Continuity Plans must be practiced and tested

…to be sure the plan is good, everyone is prepared, and knows what to do

Can range from:

- *Checklist review*
- *Tabletop exercise*
- *Structured walk-through*
- *Dry-Run tests*



Janco Associates, Inc. (2012)
https://www.e-janco.com/PR20110304.html

What DRP Tests have been conducted?

- **Checklist review**
  - Simplest, least labor-intensive form of testing
  - Each person has a checklist of responsibilities under the DRP
  - During testing: each person reviews his/her checklist
  - Can be done individually or as a group

- **Tabletop exercise**
  - Test facilitator descries a specific disaster scenario
  - DRP team members verbally walk through their responses to the scenario
  - Scenarios can be disseminated at the test or in advance

What DRP Tests have been conducted?

- **Structured walk-through**
  - More formal troubleshooting of the plan by simply walking through the documents detailing the sequence of events

- **Dry-Run tests**
  - Can be conducted on a function by function basis
  - Do not have test all functions for each cycle
  - Tests should involve actual interruptions and recoveries
  - Rehearsing the plan up to the point of actual data or resource recovery at the main site

Audit Focus

Areas for

IT Audit

evaluation:

Figure 3—Possible Tests/Procedures for Backup and Recovery	
Data	• Review or observe backup procedures. • Review documentation of a successful restore (within the last year). • Verify restoration personally (when risk is high or restoration is an audit objective).
Site/computers/ OS	• Review the provisions of the BCP/DRP. • Review a contract (hot site, cold site, mutual aid, etc.). • Verify the ability to restore these aspects.
Applications	• Review the plan's provisions. • Review the critical applications list, including ranking. • Verify the ability to restore (personally, when risk is high or restoration is an audit objective). • Observe or inquire about the backups of application software and location.
Supplies/ documentation	• Review the plan's provisions. • Observe or inquire about the provisions and location.
Recovery team	• Review the plan's provisions. • Interview one or more members of the team, and ask about roles and responsibilities. • Gain assurance that there is provision for adequate personnel for a successful restoration.

Test Taking Tip

Don’t Revise Your Answer

(without a very strong reason)

- Your first answer is probably the right one
- On an exam where there is no penalty for wrong answers, you are just using time that might have gone to getting another correct answer
- If you are having second thoughts, plan to come back to that question after you have completed the entire test

1. The BEST method for assessing the effectiveness of a business continuity plan is to review the:
   a) Plans and compare them to appropriate standards
   b) Results from previous tests
   c) Emergency procedures and employee training
   d) Offsite storage and environmental controls

1. The BEST method for assessing the effectiveness of a business continuity plan is to review the:
   a) Plans and compare them to appropriate standards
   b) Results from previous tests
   c) Emergency procedures and employee training
   d) Offsite storage and environmental controls

2. With respect to business continuity strategies, an information system (IS) auditor interviews key stakeholders in an organization to determine whether they understand their roles and responsibilities. The IS auditor is attempting to evaluate the:

a) Clarity and simplicity of the business continuity plans
b) Adequacy of the business continuity plans
c) Effectiveness of the business continuity plans
d) Ability of IT and end-user personnel to respond effectively in emergencies

2. With respect to business continuity strategies, an information system (IS) auditor interviews key stakeholders in an organization to determine whether they understand their roles and responsibilities. The IS auditor is attempting to evaluate the:

a) Clarity and simplicity of the business continuity plans
b) Adequacy of the business continuity plans
c) Effectiveness of the business continuity plans
d) Ability of IT and end-user personnel to respond effectively in emergencies

3. During the design of a business continuity plan, the business impact analysis (BIA) identifies critical processes and supporting applications. This will PRIMARILY influence the:

a) Responsibility for maintaining the business continuity plan
b) Criteria for selecting a recovery site provider
c) Recovery strategy
d) Responsibilities of key personnel

3. During the design of a business continuity plan, the business impact analysis (BIA) identifies critical processes and supporting applications. This will PRIMARILY influence the:

a) Responsibility for maintaining the business continuity plan
b) Criteria for selecting a recovery site provider
c) Recovery strategy
d) Responsibilities of key personnel

4. During a review of a business continuity plan, an IS auditor noticed that the point at which a situation is declared to be a crisis has not been defined. The MAJOR risk associated with this is that:
   a) Assessment of the situation may be delayed
   b) Execution of the disaster recovery plan could be impacted
   c) Notification of the media might not occur
   d) Potential crisis recognition might be ineffective

4. During a review of a business continuity plan, an IS auditor noticed that the point at which a situation is declared to be a crisis has not been defined. The MAJOR risk associated with this is that:
   a) Assessment of the situation may be delayed
   b) Execution of the disaster recovery plan could be impacted
   c) Notification of the media might not occur
   d) Potential crisis recognition might be ineffective

5. An organization has just completed their annual risk assessment. Regarding the business continuity plan, what should an IS auditor recommend as the next step for the organization?
   a) Review and evaluate the business continuity plan for adequacy
   b) Perform a full simulation of the business continuity plan
   c) Train and educate employees regarding the business continuity plan
   d) Notify critical contacts in the business continuity plan

5. An organization has just completed their annual risk assessment. Regarding the business continuity plan, what should an IS auditor recommend as the next step for the organization?
   a) Review and evaluate the business continuity plan for adequacy
   b) Perform a full simulation of the business continuity plan
   c) Train and educate employees regarding the business continuity plan
   d) Notify critical contacts in the business continuity plan

6. Integrating business continuity planning (BCP) into an IS project aids in:
   a) The retrofitting of the business continuity requirements
   b) The development of a more comprehensive set of requirements
   c) The development of a transaction flowchart
   d) Ensuring the application meets the user's needs

6. Integrating business continuity planning (BCP) into an IS project aids in:
   a) The retrofitting of the business continuity requirements
   b) The development of a more comprehensive set of requirements
   c) The development of a transaction flowchart
   d) Ensuring the application meets the user's needs

7. While observing a full simulation of the business continuity plan, an IS auditor notices that the notification systems within the organizational facilities could be severely impacted by infrastructural damage. The BEST recommendation the IS auditor can provide to the organization is to ensure:
   a) The salvage team is trained to use the notification system
   b) The notification system provides for the recovery of the backup
   c) Redundancies are built into the notification system
   d) The notification systems are stored in a vault

7. While observing a full simulation of the business continuity plan, an IS auditor notices that the notification systems within the organizational facilities could be severely impacted by infrastructural damage. The BEST recommendation the IS auditor can provide to the organization is to ensure:
   a) The salvage team is trained to use the notification system
   b) The notification system provides for the recovery of the backup
   c) Redundancies are built into the notification system
   d) The notification systems are stored in a vault

8. The activation of an enterprise's business continuity plan should be based on predetermined criteria that address the:
   a) Duration of the outage
   b) Type of outage
   c) Probability of the outage
   d) Cause of the outage

8. The activation of an enterprise's business continuity plan should be based on predetermined criteria that address the:
   a) Duration of the outage
   b) Type of outage
   c) Probability of the outage
   d) Cause of the outage

9. An organization has outsourced its wide area network (WAN) to a third-party service provider. Under these circumstances, which of the following is the PRIMARY task the IS auditor should perform during an audit of business continuity (BCP) and disaster recovery planning (DRP)?

a) Review whether the service provider's BCP process is aligned with the organization's BCP and contractual obligations
b) Review whether the service level agreement (SLA) contains a penalty clause in case of failure to meet the level of service in case of a disaster
c) Review the methodology adopted by the organization in choosing the service provider
d) Review the accreditation of the third-party service provider's staff

9. An organization has outsourced its wide area network (WAN) to a third-party service provider. Under these circumstances, which of the following is the PRIMARY task the IS auditor should perform during an audit of business continuity (BCP) and disaster recovery planning (DRP)?

a) Review whether the service provider's BCP process is aligned with the organization's BCP and contractual obligations
b) Review whether the service level agreement (SLA) contains a penalty clause in case of failure to meet the level of service in case of a disaster
c) Review the methodology adopted by the organization in choosing the service provider
d) Review the accreditation of the third-party service provider's staff

10. An IS auditor can verify that an organization's business continuity plan (BCP) is effective by reviewing the:
    a) Alignment of the BCP with industry best practices
    b) Results of business continuity tests performed by IT and end-user personnel
    c) Off-site facility, its contents, security and environmental controls.
    d) Annual financial cost of the BCP activities versus the expected benefit of implementation of the plan

10. An IS auditor can verify that an organization's business continuity plan (BCP) is effective by reviewing the:
    a) Alignment of the BCP with industry best practices
    b) Results of business continuity tests performed by IT and end-user personnel
    c) Off-site facility, its contents, security and environmental controls.
    d) Annual financial cost of the BCP activities versus the expected benefit of implementation of the plan

Agenda

- ✓ Midterm Exam Review
- ✓ Business Continuity and Disaster Recovery Planning
- ✓ Test Taking Tip
- ✓ Quiz