MIS 5206
Protection of Information Assets
- Unit #3 -

Risk Evaluation

Agenda

- Categorizing Information for IT Risk Management
- Revisit Risk & Controls of Publicly Shared Geographic Information
- More on Confidentiality: Linked & Linkable PII
- Risk Evaluation
- Risk Management Techniques, a brief review
- Test taking tip
- Quiz

Agenda

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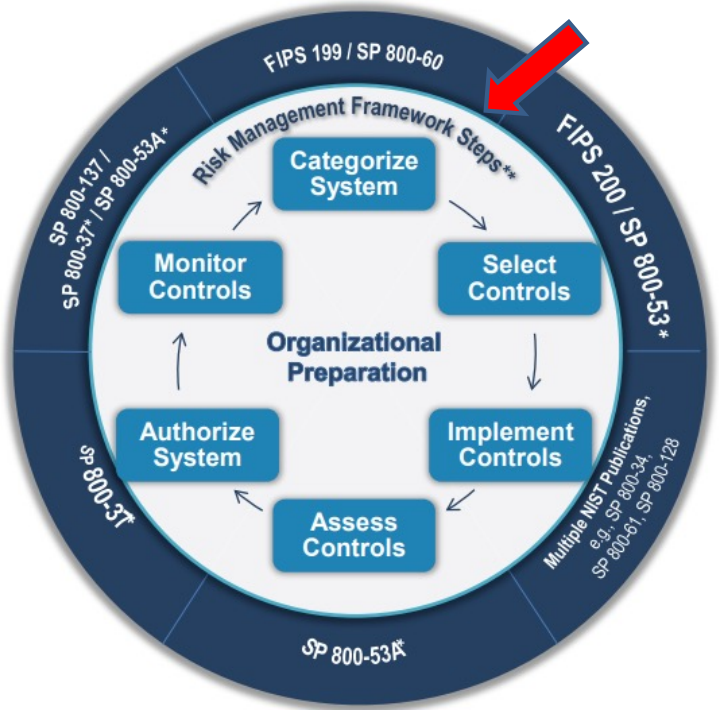
- Quiz

Information inventory, categorization and risk evaluation form the first step in information systems security…



- A holistic and comprehensive risk management process
- Provides a framework for managing risk throughout the information system development lifecycle

Supporting Publications

Federal Information Processing Standards (FIPS)

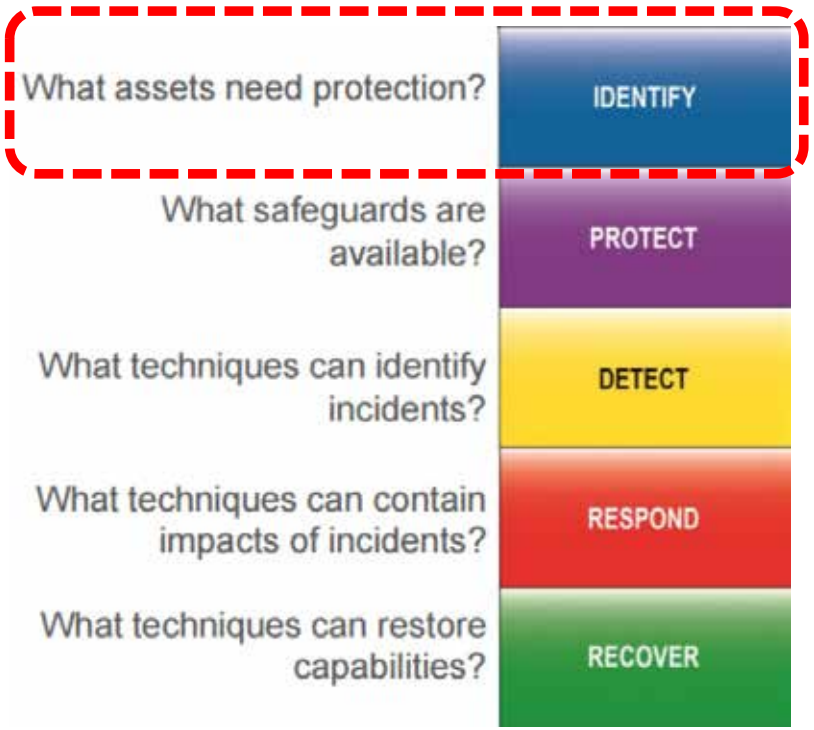
- FIPS 199 – Standards for Security Categorization
- FIPS 200 – Minimum Security Requirements

Special Publications (SPs)

- SP 800-18 – Guide for System Security Plan Development
- SP 800-30 – Guide for Conducting Risk Assessments
- SP 800-34 – Guide for Contingency Plan development
- SP 800-37 – Guide for Applying the Risk Management Framework
- SP 800-39 – Managing Information Security Risk
- SP 800-53/53A – Security Controls Catalog and Assessment Procedures
- SP 800-60 – Mapping Information Types to Security Categories
- SP 800-128 – Security-focused Configuration Management
- SP 800-137 – Information Security Continuous Monitoring
- Many others for operational and technical implementations

https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-37r1.pdf

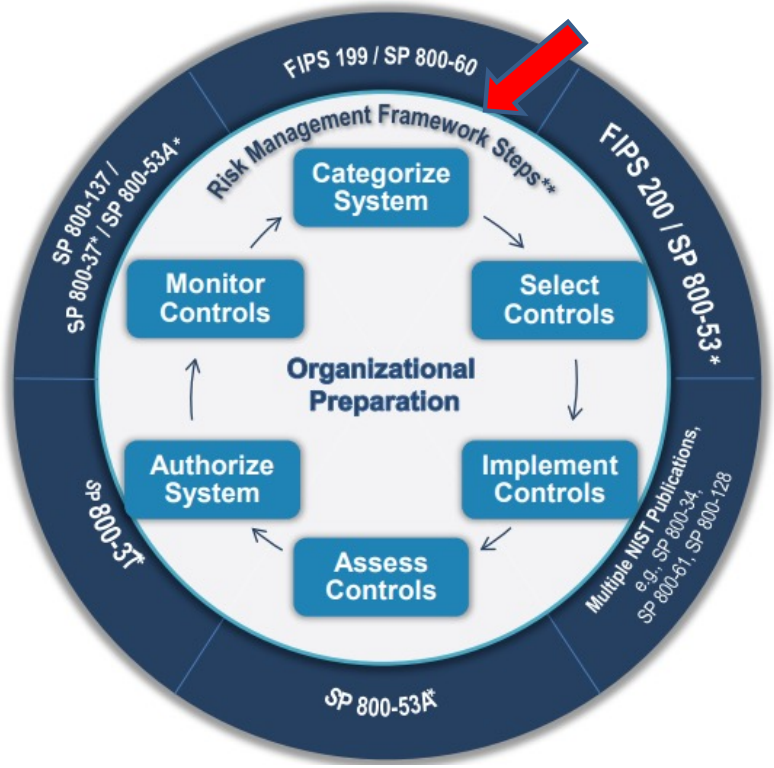
Information Categorization is part of Risk Evaluation



Why is data categorization important?

- It focuses attention on the identification and valuation of information assets
- It is the basis for access and other control policies and processes

Where information and IT asset inventory, categorization & risk evaluation fit in information systems security…

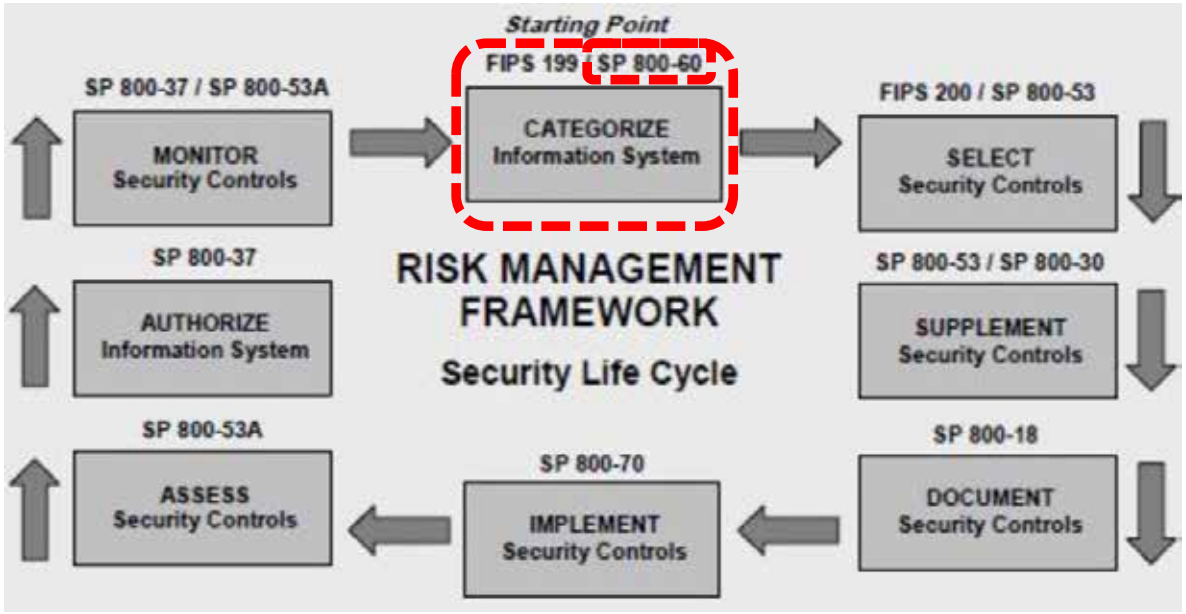


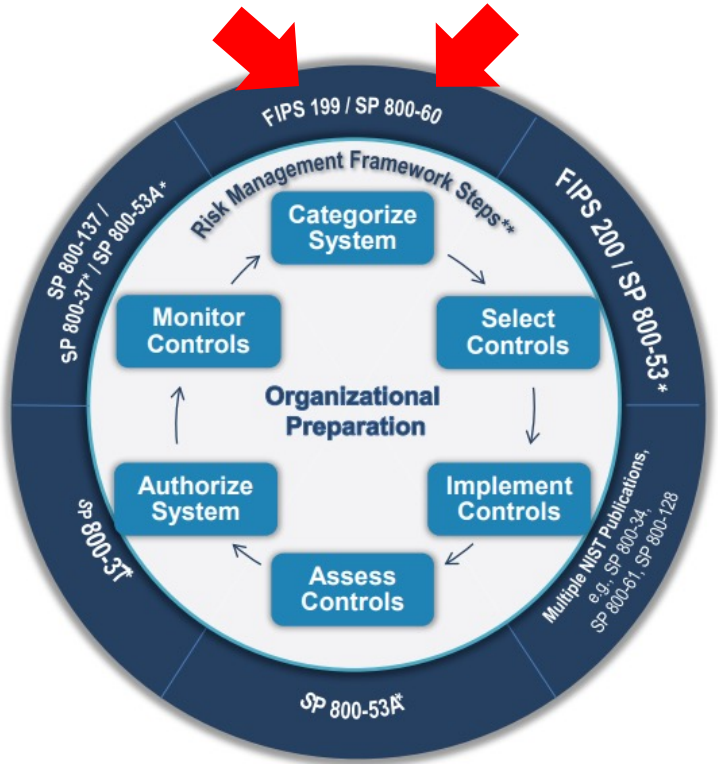
NIST Risk Management Framework

Function	Category Unique Identifier	Category
Identify	ID.AM	Asset Management
	ID.BE	Business Environment
	ID.GV	Governance
	ID.RA	Risk Assessment
	ID.RM	Risk Management Strategy
Protect	PR.AC	Access Control
	PR.AT	Awareness and Training
	PR.DS	Data Security
	PR.IP	Information Protection Processes and Procedures
	PR.MA	Maintenance
	PR.PT	Protective Technology
Detect	DE.AE	Anomalies and Events
	DE.CM	Security Continuous Monitoring
	DE.DP	Detection Processes
Respond	RS.RP	Response Planning
	RS.CO	Communications
	RS.AN	Analysis
	RS.MI	Mitigation
	RS.IM	Improvements
Recover	RC.RP	Recovery Planning
	RC.IM	Improvements
	RC.CO	Communications

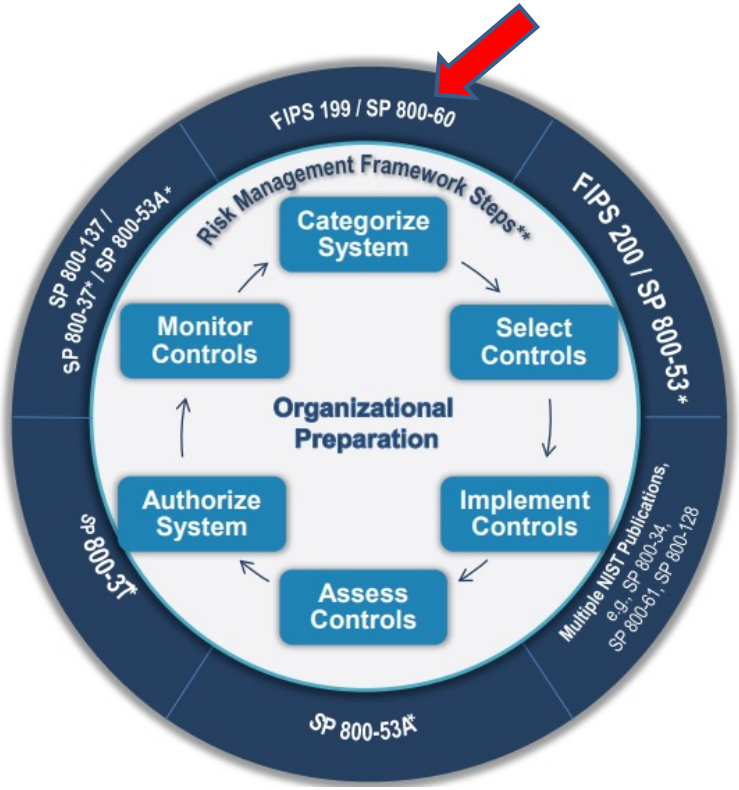
NIST Cybersecurity Framework

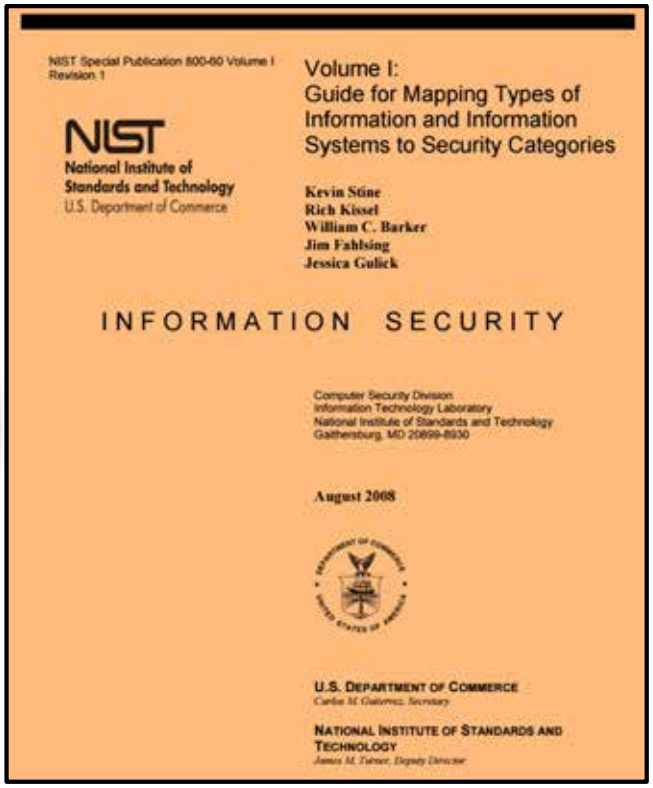
Different views of the NIST Risk Management Framework

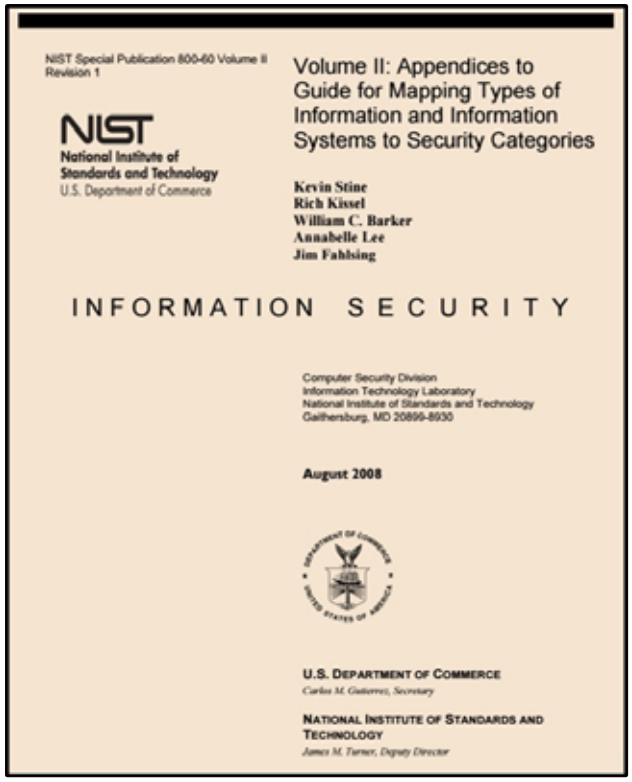




A systematic qualitative guide for categorizing information and information systems…







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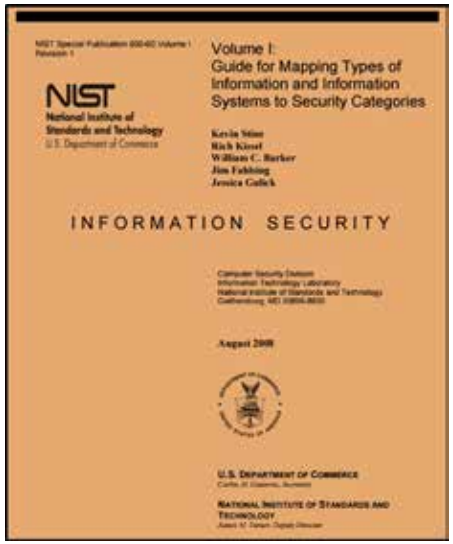

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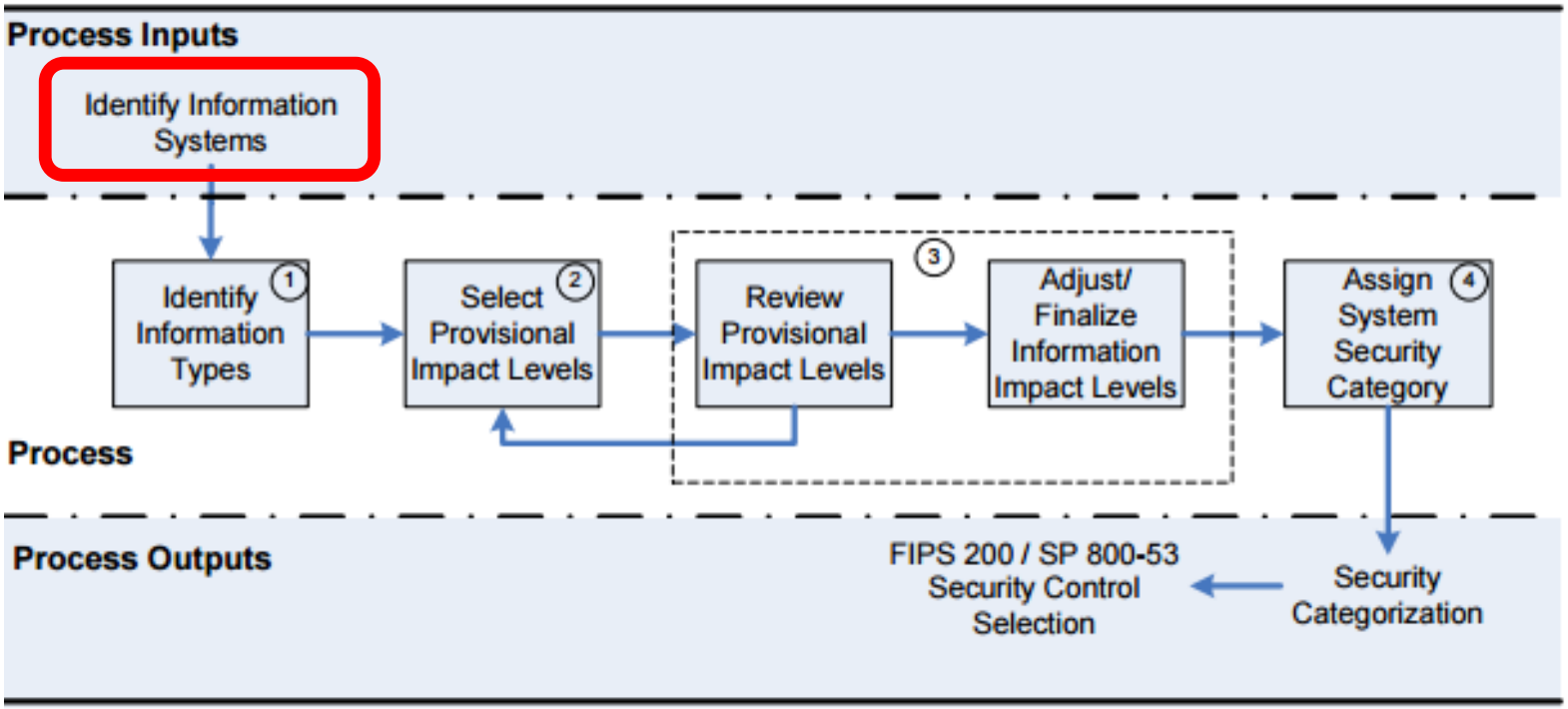
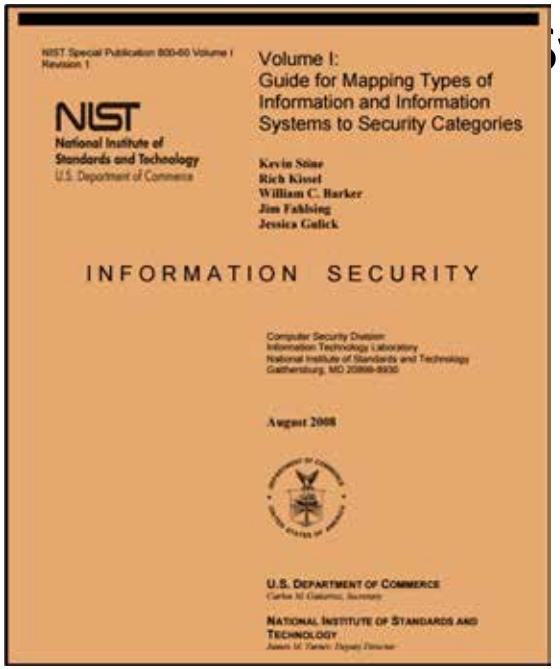


Figure 2: SP 800-60 Security Categorization Process Execution

2 Broad types of Information and Information Systems

1. **Mission-based Information & Information Systems**

2. Management and Support Information & Information Systems



Mission-based Information and Information Systems

1. Defense and National Security
2. Homeland Security
3. Intelligence Operations
4. Disaster Management
5. International Affairs and Commerce
6. Natural Resources
7. Energy
8. Environmental Management
9. Economic Development
10. Community and Social Services
11. Transportation
12. Education
13. Workforce Management
14. Health
15. Income Security
16. Law Enforcement
17. Litigation and Judicial Activities
18. Federal Correctional Activities
19. General Sciences and Innovation
20. Knowledge Creation and Management
21. Regulatory Compliance and Enforcement
22. Public Goods Creation and Management
23. Federal Financial Assistance
24. Credit and Insurance
25. Transfers to State/Local Governments
26. Direct Services for Citizens

Disaster Management Information Types

D.4 Disaster Management

Disaster Monitoring and Prediction

Disaster Preparedness and Planning

Disaster Repair and Restoration

Emergency Response

Table 4: Mission-Based Information

Mission Areas and Information

D.1 Defense & National Security
Strategic National & Theater Defense
Operational Defense
Tactical Defense

D.2 Homeland Security
Border and Transportation Security
Key Asset and Critical Infrastructure Protection
Catastrophic Defense
Executive Functions of the Executive Office of the President (EOP)

D.3 Intelligence Operations
Intelligence Planning
Intelligence Collection
Intelligence Analysis & Production
Intelligence Dissemination

D.4 Disaster Management
Disaster Monitoring and Prediction
Disaster Preparedness and Planning
Disaster Repair and Restoration
Emergency Response

D.5 International Affairs & Commerce
Foreign Affairs
International Development and Humanitarian Aid
Global Trade

D.6 Natural Resources
Water Resource Management
Conservation, Marine and Land Management
Recreational Resource Management and Tourism
Agricultural Innovation and Services

D.7 En
Energy Supply
Energy Conservation a
Energy Resource Man
Energy Production

D.8 Environmenta
Environmental Monito
Forecasting
Environmental Remed
Pollution Prevention a

D.9 Economic D
Business and Industry
Intellectual Property P
Financial Sector Overs
Industry Sector Income Stabilization

D.10 Community & Social Services
Homeownership Promotion
Community and Regional Development
Social Services
Postal Services

D.11 Transportation
Ground Transportation
Water Transportation
Air Transportation
Space Operations

D.12 Education
Elementary, Secondary, and Vocational Education
Higher Education
Cultural and Historic Preservation
Cultural and Historic Exhibition

D.13 Workforce Management
Training and Employment
Labor Rights Management
Worker Safety

D.16 Law Enforcement
Criminal Apprehension
Criminal Investigation and Surveillance
Citizen Protection
Leadership Protection
Property Protection
Substance Control
Crime Prevention
Trade Law Enforcement

D.17 Litigation & Judicial Activities
Judicial Hearings
Legal Defense
Legal Investigation
Legal Prosecution and Litigation
Resolution Facilitation

D.18 Federal Correctional Activities
Criminal Incarceration
Criminal Rehabilitation

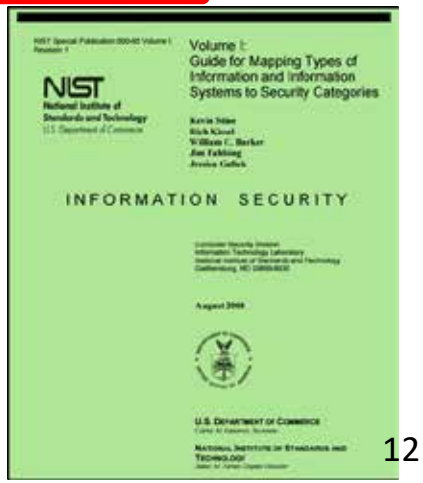
D.19 General Sciences & Innovation
Scientific and Technological Research and Innovation
Space Exploration and Innovation

Mode of Delivery]

D.24 Credit and Insurance
Direct Loans
Loan Guarantees
General Insurance

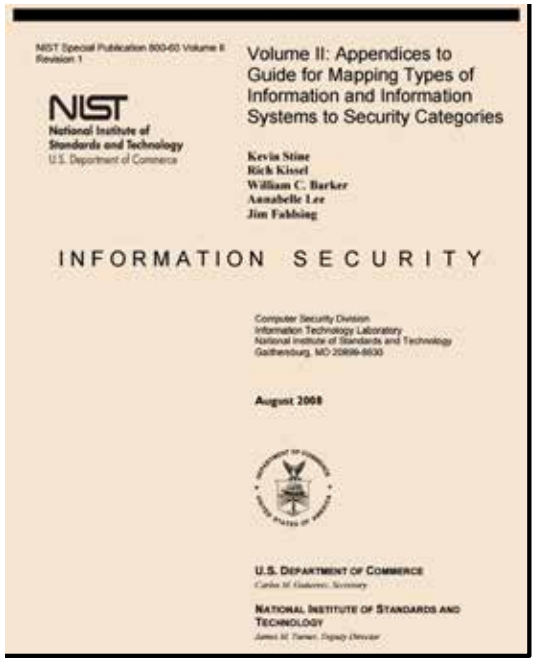
D.25 Transfers to State/ Local Governments
Formula Grants
Project/Competitive Grants
Earmarked Grants
State Loans

D.26 Direct Services for Citizens
Military Operations
Civilian Operations



Disaster Management Information System Example

[National Levee Database]



2. Select Provisional Impact Levels for the identified information system

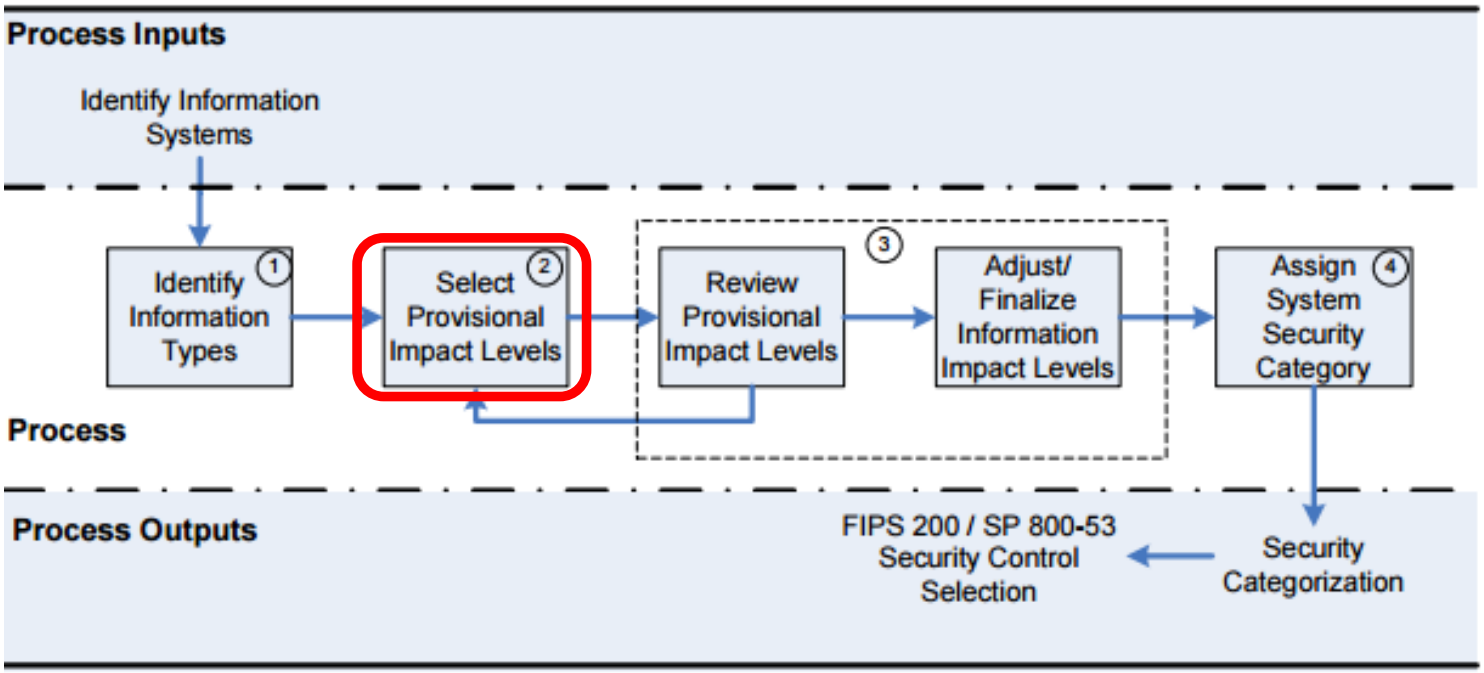
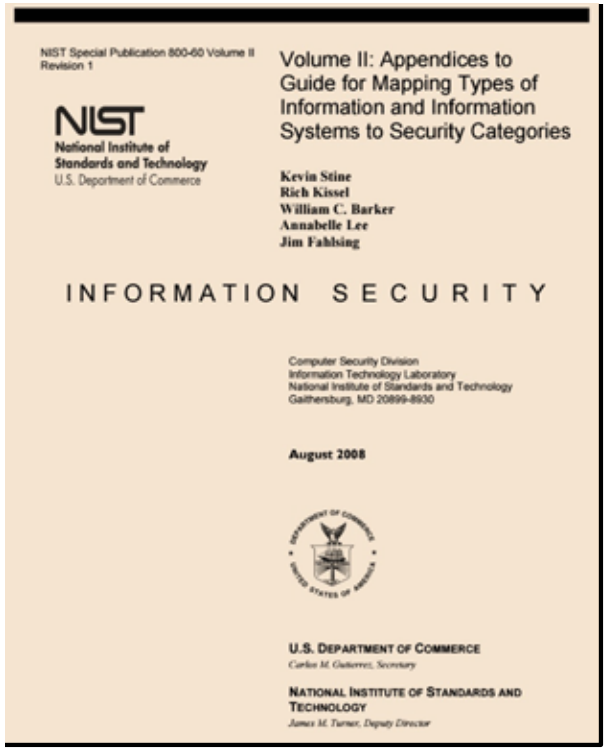


Figure 2: SP 800-60 Security Categorization Process Execution



Disaster Management Information Types

https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-60v2r1.pdf

Disaster Management Information Impact

D.4 Disaster Management

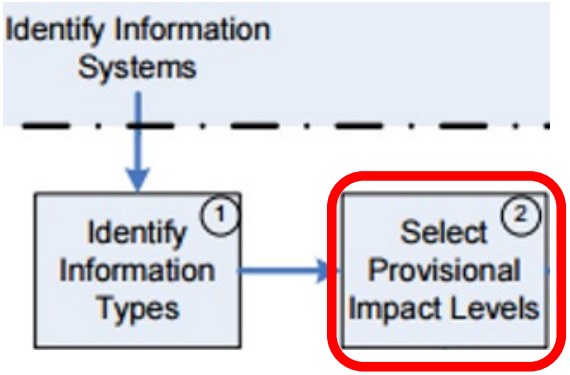
Disaster management involves the activities required to prepare for, mitigate, respond to, and repair the effects of all physical and humanitarian disasters whether natural or man-made. Compromise of much information associated with any of the missions within the disaster management mission area may seriously impact the security of a broad range of critical infrastructures and key national assets.

A spreadsheet is a useful way to organize datasets to categorize an information system

Information Types	Confidentiality	Integrity	Availability
Disaster Monitoring and Prediction			
Disaster Preparedness and Planning			
Disaster Repair and Restoration			
Emergency Response Information Type			

- *NIST SP 800-60 V.2 R1 is helpful for determining a preliminary impact level categorization of Disaster Information Types*

Disaster Management Information Types



D.4.1 Disaster Monitoring and Prediction Information Type

Disaster monitoring and prediction involves the actions taken to predict when and where a disaster may take place and communicate that information to affected parties. [Some disaster management information occurs in humanitarian aid systems under the International Affairs and Commerce line of business (e.g., State Department disaster preparedness and planning).] The recommended provisional categorization of the disaster monitoring and protection information type follows:

Security Category = {(confidentiality, Low), (integrity, High), (availability, High)}

D.4.2 Disaster Preparedness and Planning Information Type

Disaster preparedness and planning involves the development of response programs to be used in case of a disaster. This involves the development of emergency management programs and activities as well as staffing and equipping regional response centers. The recommended provisional categorization of the disaster preparedness and planning information type follows:

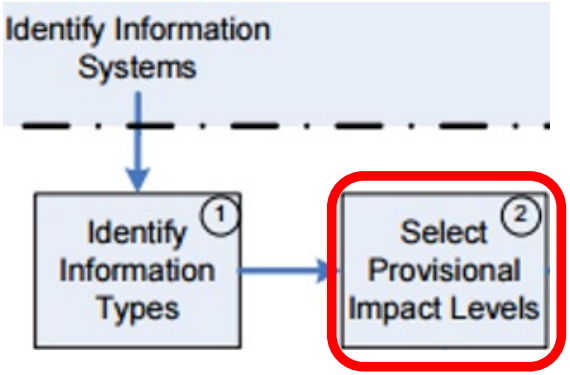
Security Category = {(confidentiality, Low), (integrity, Low), (availability, Low)}

D.4.3 Disaster Repair and Restoration Information Type

Disaster repair and restoration involves the cleanup and restoration activities that take place after a disaster. This involves the cleanup and rebuilding of any homes, buildings, roads, environmental resources, or infrastructure that may be damaged due to a disaster. The recommended provisional categorization of the disaster repair and restoration information type follows:

Security Category = {(confidentiality, Low), (integrity, Low), (availability, Low)}

Disaster Management Information Types



D.4.4 Emergency Response Information Type

Emergency Response involves the immediate actions taken to respond to a disaster (e.g., wildfire management). These actions include providing mobile telecommunications, operational support, power generation, search and rescue, and medical life saving actions. Impacts to emergency response information and the information systems that process and store emergency response information could result in negative impacts on cross-jurisdictional coordination within the critical emergency services infrastructure and the general effectiveness of organizations tasked with emergency response missions. The recommended provisional categorization of the emergency response information type follows:

Security Category = {(confidentiality, Low), (integrity, High), (availability, High)}

Can you recall…

- *How to determine the Summary Impact Levels for the Disaster Information Types*

Disaster Management Information Systems

Information Types	Confidentiality	Integrity	Availability	Summary Impact Level
Disaster Monitoring and Prediction	Low	High	High	?
Disaster Preparedness and Planning	Low	Low	Low	?
Disaster Repair and Restoration	Low	Low	Low	?
Emergency Response Information Type	Low	High	High	?

Can you determine the impact level categorization of an information system based on categorizations of the types of information it contains?

Disaster Management Information Systems

Information Types	Confidentiality	Integrity	Availability	Summary Impact Level
Disaster Monitoring and Prediction	Low	High	High	***High***
Disaster Preparedness and Planning	Low	Low	Low	***Low***
Disaster Repair and Restoration	Low	Low	Low	***Low***
Emergency Response Information Type	Low	High	High	***High***
Information System Impact Ratings:	?	?	?	

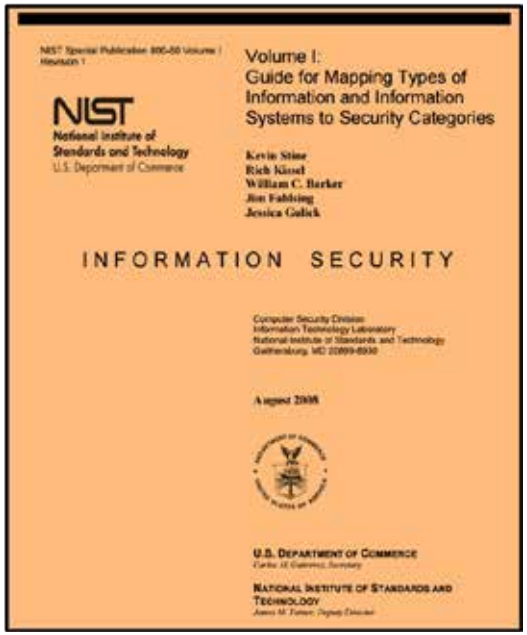
Can you determine the overall security categorization of a Disaster Information System?

Disaster Management Information Systems

Information Types	Confidentiality	Integrity	Availability	Summary Impact Level
Disaster Monitoring and Prediction	Low	High	High	***High***
Disaster Preparedness and Planning	Low	Low	Low	***Low***
Disaster Repair and Restoration	Low	Low	Low	***Low***
Emergency Response Information Type	Low	High	High	***High***
Information System Impact Ratings:	Low	High	High	**?**

Overall security categorization of a Disaster Information System

Disaster Management Information Systems				
Information Types	Confidentiality	Integrity	Availability	Summary Impact Level
Disaster Monitoring and Prediction	Low	High	High	***High***
Disaster Preparedness and Planning	Low	Low	Low	***Low***
Disaster Repair and Restoration	Low	Low	Low	***Low***
Emergency Response Information Type	Low	High	High	***High***
Information System Impact Ratings:	Low	High	High	***High***



Once categorized, select security control baseline for the information system

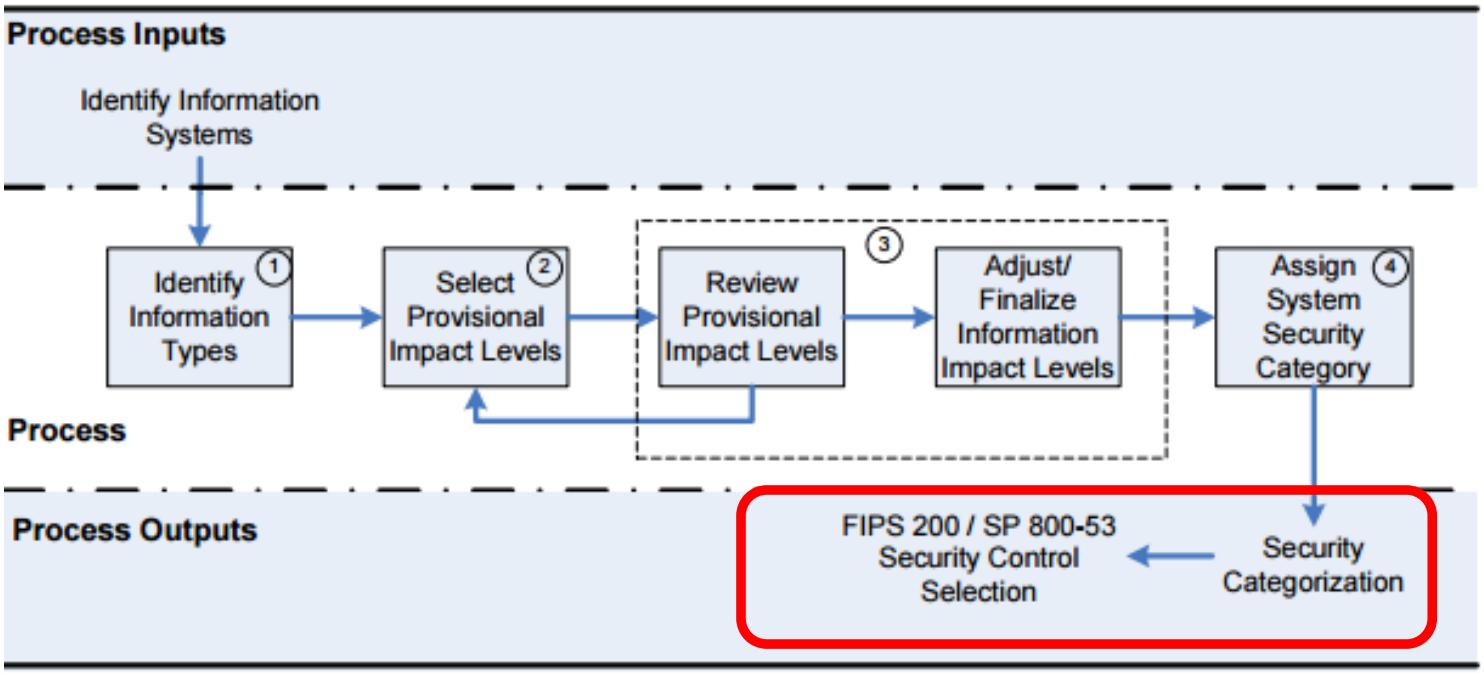
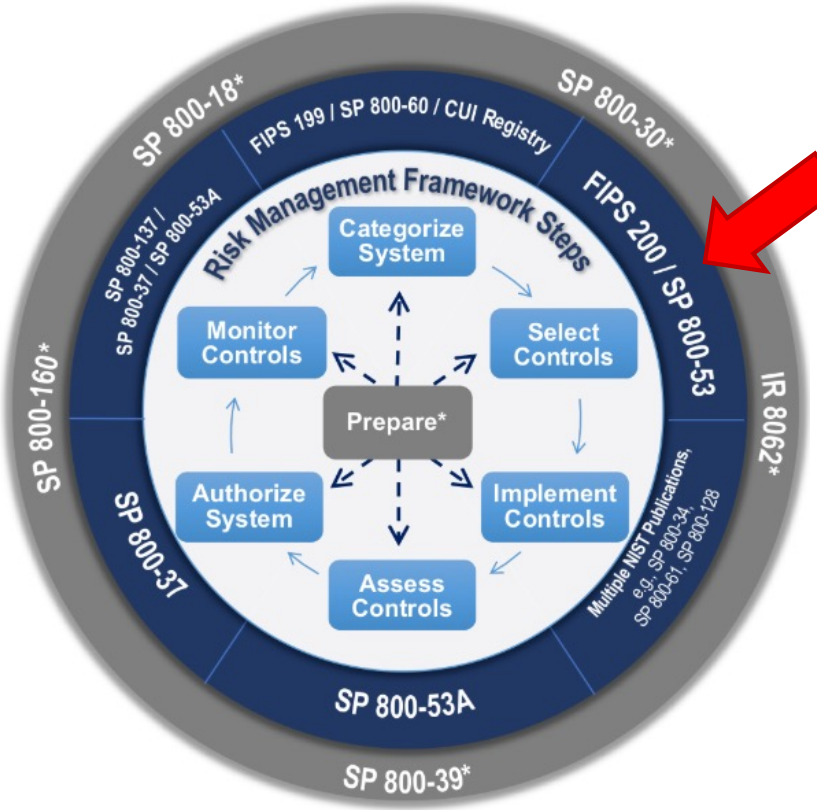
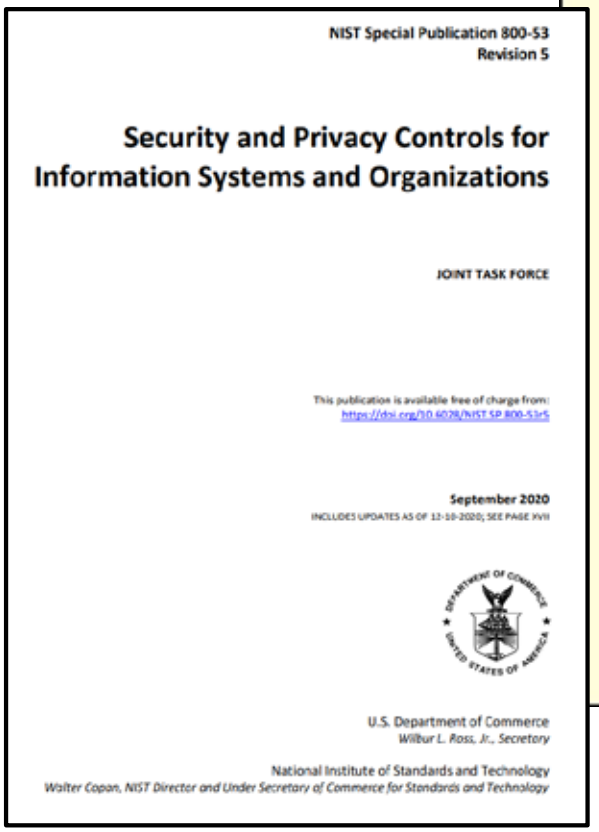


Figure 2: SP 800-60 Security Categorization Process Execution

Selecting cybersecurity risk controls





NIST Special Publication 800-53
Revision 5

Security and Privacy Controls for Information Systems and Organizations

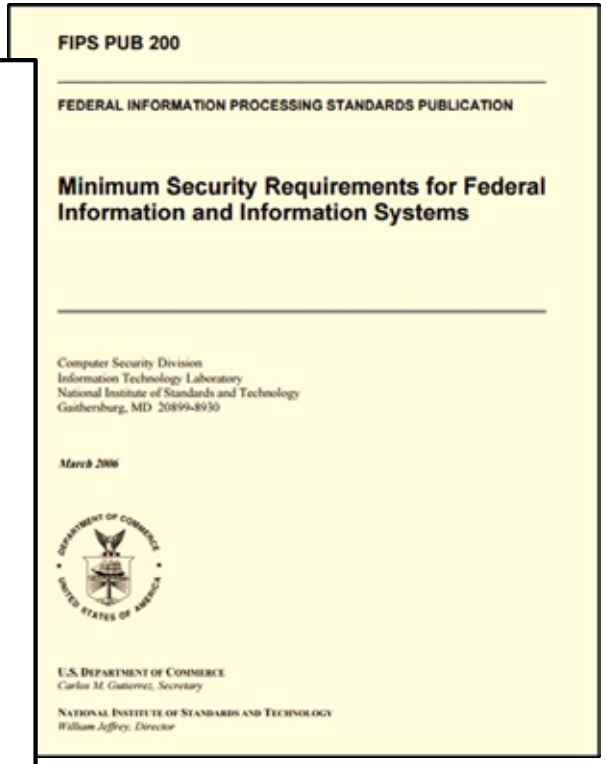
JOINT TASK FORCE

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



FIPS PUB 200

FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION

Minimum Security Requirements for Federal Information and Information Systems

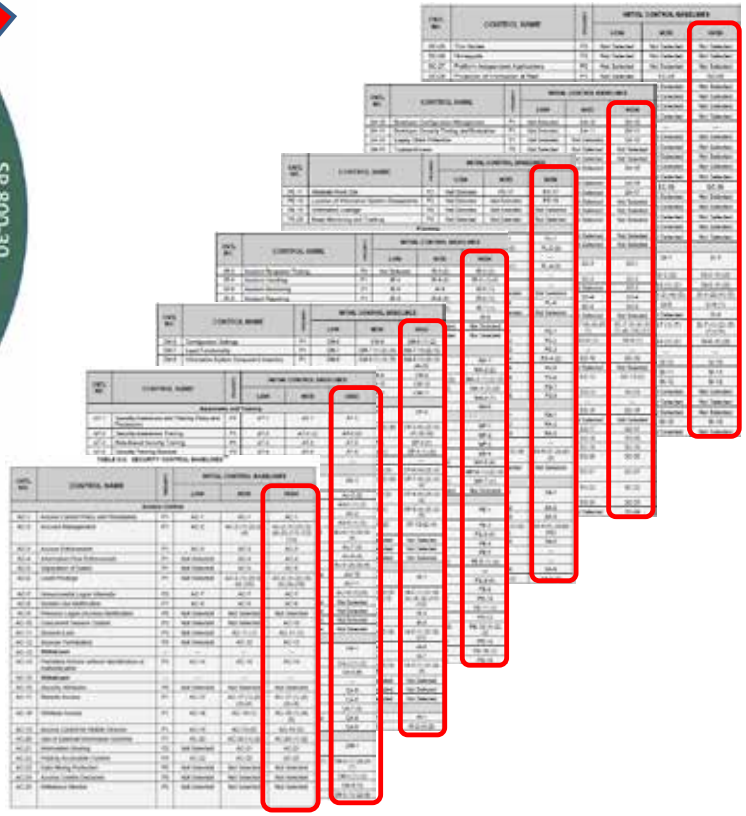
Computer Security Division
Information Technology Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899-8930

March 2006

U.S. DEPARTMENT OF COMMERCE
Carlos M. Gutierrez, Secretary

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
William Jeffrey, Director

FIPS 199 categorization is used to select among 3 security control baselines of security controls



CNTL NO.	CONTROL NAME	PRIORITY	INITIAL CONTROL BASELINES		
			LOW	MOD	HIGH
	Awareness and Training				
AT-1	Security Awareness and Training Policy and Procedures	P1	AT-1	AT-1	AT-1
AT-2	Security Awareness Training	P1	AT-2	AT-2 (2)	AT-2 (2)
AT-3	Role-Based Security Training	P1	AT-3	AT-3	AT-3
AT-4	Security Training Records	P3	AT-4	AT-4	AT-4
AT-5	**Withdrawn**	---	---	---	---
	Audit and Accountability				
AU-1	Audit and Accountability Policy and Procedures	P1	AU-1	AU-1	AU-1
AU-2	Audit Events	P1	AU-2	AU-2 (3)	AU-2 (3)
AU-3	Content of Audit Records	P1	AU-3	AU-3 (1)	AU-3 (1) (2)
AU-4	Audit Storage Capacity	P1	AU-4	AU-4	AU-4
AU-5	Response to Audit Processing Failures	P1	AU-5	AU-5	AU-5 (1) (2)
AU-6	Audit Review, Analysis, and Reporting	P1	AU-6	AU-6 (1) (3)	AU-6 (1) (3) (5) (6)
AU-7	Audit Reduction and Report Generation	P2	Not Selected	AU-7 (1)	AU-7 (1)
AU-8	Time Stamps	P1	AU-8	AU-8 (1)	AU-8 (1)
AU-9	Protection of Audit Information	P1	AU-9	AU-9 (4)	AU-9 (2) (3) (4)
AU-10	Non-repudiation	P2	Not Selected	Not Selected	AU-10
AU-11	Audit Record Retention	P3	AU-11	AU-11	AU-11
AU-12	Audit Generation	P1	AU-12	AU-12	AU-12 (1) (3)
AU-13	Monitoring for Information Disclosure	P0	Not Selected	Not Selected	Not Selected
AU-14	Session Audit	P0	Not Selected	Not Selected	Not Selected
AU-15	Alternate Audit Capability	P0	Not Selected	Not Selected	Not Selected
AU-16	Cross-Organizational Auditing	P0	Not Selected	Not Selected	Not Selected
	Security Assessment and Authorization				
CA-1	Security Assessment and Authorization Policies and Procedures	P1	CA-1	CA-1	CA-1
CA-2	Security Assessments	P2	CA-2	CA-2 (1)	CA-2 (1) (2)
CA-3	System Interconnections	P1	CA-3	CA-3 (5)	CA-3 (5)
CA-4	**Withdrawn**	---	---	---	---
CA-5	Plan of Action and Milestones	P3	CA-5	CA-5	CA-5
CA-6	Security Authorization	P2	CA-6	CA-6	CA-6
CA-7	Continuous Monitoring	P2	CA-7	CA-7 (1)	CA-7 (1)
CA-8	Penetration Testing	P2	Not Selected	Not Selected	CA-8
CA-9	Internal System Connections	P2	CA-9	CA-9	CA-9
	Configuration Management				
CM-1	Configuration Management Policy and Procedures	P1	CM-1	CM-1	CM-1
CM-2	Baseline Configuration	P1	CM-2	CM-2 (1) (3) (7)	CM-2 (1) (2) (3) (7)
CM-3	Configuration Change Control	P1	Not Selected	CM-3 (2)	CM-3 (1) (2)
CM-4	Security Impact Analysis	P2	CM-4	CM-4	CM-4 (1)
CM-5	Access Restrictions for Change	P1	Not Selected	CM-5	CM-5 (1) (2) (3)

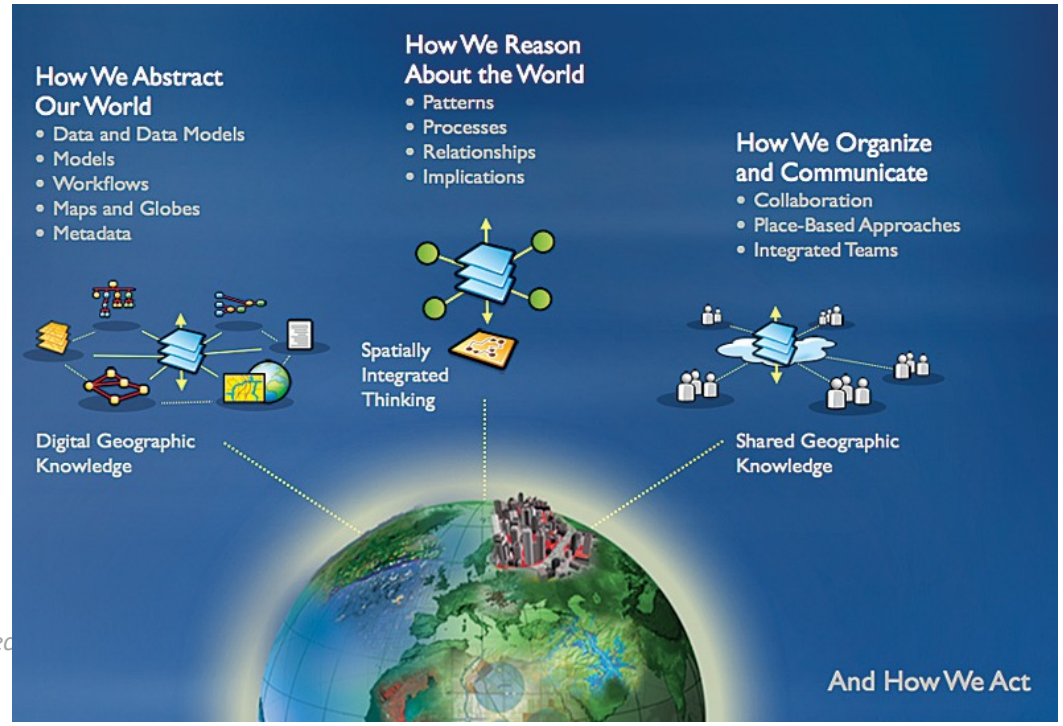
Agenda

- ✓ Categorizing Information for IT Risk Management
- Revisit Risk & Controls of Publicly Shared Geographic Information
- More on Confidentiality: Linked & Linkable PII
- Risk Evaluation
- Risk Management Techniques, a brief review
- Test taking tip
- Quiz

Geographic information, for example, is important

Free flow of geographic information between government and public is recognized as essential to the Nation

- ***Informs public for participation in democratic decision making***
- ***Private businesses reuse the public's investment in government information***



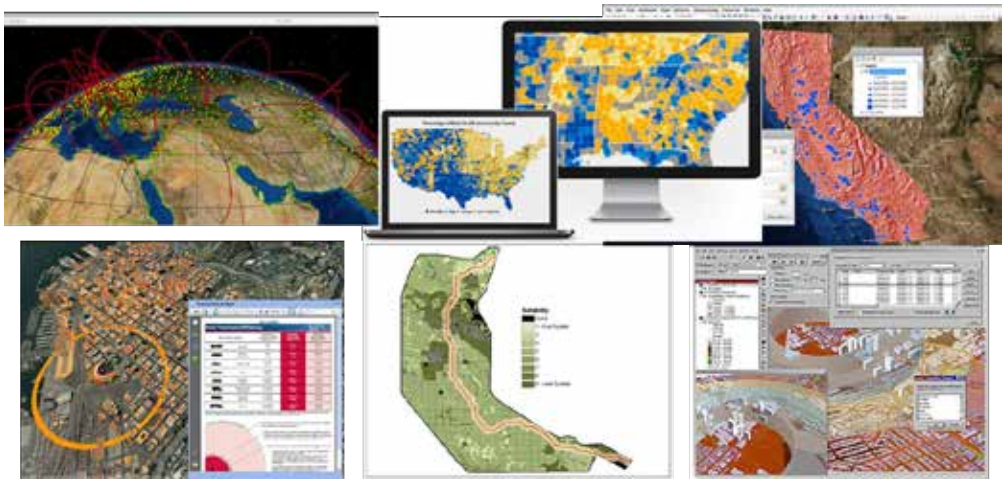
Disseminating public geospatial data is central to the missions of many public, private and non-profit organizations

From ESRI Marketing material

Geographic data's role in government

Geographic location is a key element of 80-90% of all governmental data

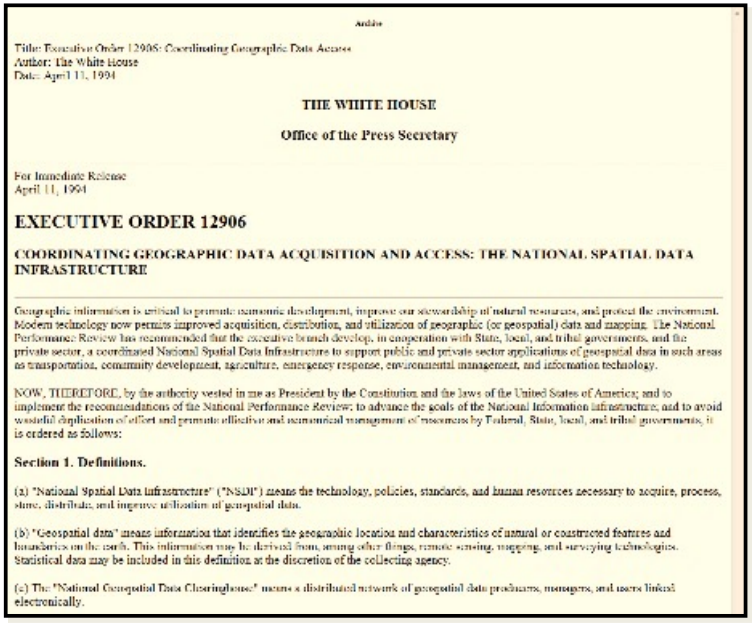
Data produced with Geographic Information Systems (GIS) are essential to >50% of U.S. domestic economic activities



National Spatial Data Infrastructure

1994 Executive Order instructed Federal Geographic Data Committee (FGDC) to create National Spatial Data Infrastructure (NSDI), and…

- Address $ billions wasted
  - Redundant collection of undocumented hard to find geospatial data stored in incompatible formats
- Encourage Agencies to stand-up NSDI Clearing House nodes (i.e. websites on Internet)
  - Populated with geospatial data and their descriptive metadata



Archive

Title: Executive Order 12906: Coordinating Geographic Data Access
Author: The White House
Date: April 11, 1994

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release
April 11, 1994

EXECUTIVE ORDER 12906

COORDINATING GEOGRAPHIC DATA ACQUISITION AND ACCESS: THE NATIONAL SPATIAL DATA INFRASTRUCTURE

Geographic information is critical to promote economic development, improve our stewardship of natural resources, and protect the environment. Modern technology now permits improved acquisition, distribution, and utilization of geographic (or geospatial) data and mapping. The National Performance Review has recommended that the executive branch develop, in cooperation with State, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data in such areas as transportation, community development, agriculture, emergency response, environmental management, and information technology.

NOW, THEREFORE, by the authority vested in me as President by the Constitution and the laws of the United States of America, and to implement the recommendations of the National Performance Review, to advance the goals of the National Information Infrastructure, and to avoid wasteful duplication of effort and promote effective and economical management of resources by Federal, State, local, and tribal governments, it is ordered as follows:

Section 1. Definitions.

(a) "National Spatial Data Infrastructure" ("NSDI") means the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data.

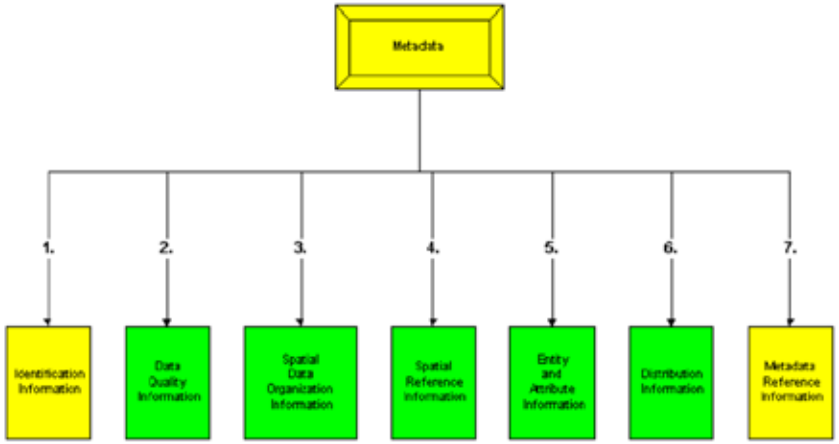
(b) "Geospatial data" means information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies. Statistical data may be included in this definition at the discretion of the collecting agency.

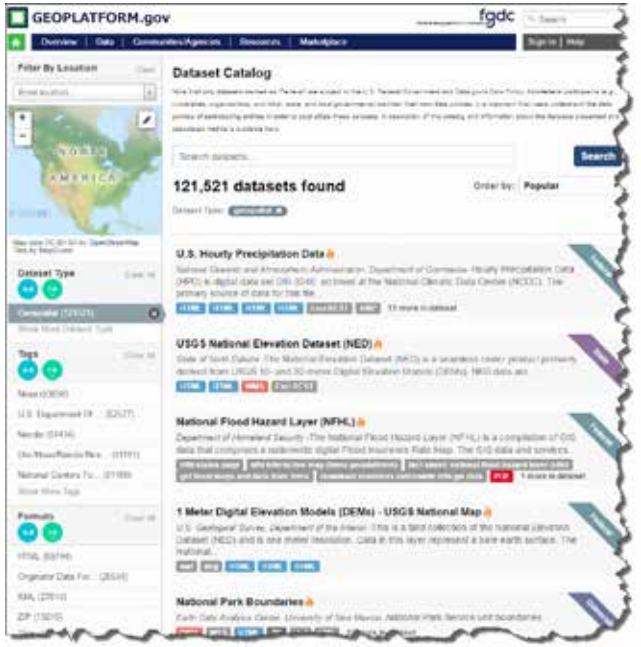
(c) The "National Geospatial Data Clearinghouse" means a distributed network of geospatial data producers, managers, and users linked electronically.

Public GIS data are shared and distributed via the Internet-based National Spatial Data Infrastructure

National Spatial Data Infrastructure

Provides a searchable metadata-enabled online clearinghouse for finding, downloading and resusing GIS datasets





NSDI: A data source for terrorists?

After attacks on USS Cole in 2000 and the 9/11/2001 attacks, attention focused again on protecting critical infrastructure U.S. advisories might seek to attack

*…**GIS data** made available through NSDI websites became **recognized as at risk** of being exploited by those seeking to attack U.S. major cities and critical infrastructure*

RAND Corporation…

1946

The First Satellite Design

More than 12 years before *Sputnik*, RAND released its first report while still at Douglas Aircraft, *Preliminary Design of an Experimental World-Circling Spaceship*. At the time, it was the most comprehensive engineering study of the nuts-and-bolts realities of a satellite spacecraft.

1948

The JOHNNIAC

When the need for solutions to complex analytic studies outstripped the computing power of the time, RAND decided to build its own computer. Named after mathematician John von Neumann, the JOHNNIAC was one of the first mainframe computers with stored memory.

1954

Selection and Use of Strategic Air Bases

The report by a team led by Albert Wohlstetter struck the foundation of nuclear deterrence policy by shifting the United States from a first-strike to a second-strike posture. It suggested placing air bases closer to the United States and relying on long-range bombers and aerial refueling aircraft, eventually saving the Air Force billions of dollars.

1967

Artificial Intelligence

The first successful Artificial Intelligence program that used Information Processing Languages (IPLs) was developed in RAND's Systems Research Laboratory. IPLs were the precursors of popular contemporary languages such as LISP.

1961

The RAND Tablet

The tablet was one of the first devices permitting the input of handwritten text and freehand drawings into a computer. While limited in its capabilities and far too expensive for commercial use, the RAND Tablet nonetheless showed the way for PalmPilots, Tablet PCs, and iPads.

1962

Packet Switching: Seed of the Internet

Paul Baran developed a plan for a communication network that would withstand a nuclear attack. This notion of distributed communications, or packet switching, eventually became the foundation of the Internet.

1974

Improving Computer Security

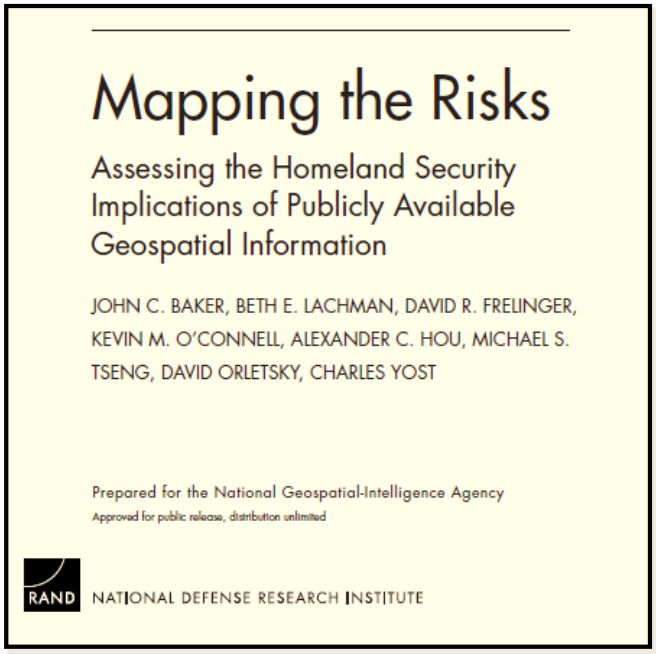
RAND's expertise in defense-related computer security issues was extended to the private sector during the 1970s. Willis Ware chaired a government committee that studied the problems arising from the application of computer technology to record keeping about people. This work guided the DoD computer configurations and eventually became the foundation of the Federal Privacy Act of 1974.

http://www.rand.org/about/history.html

Risks from public geospatial information

In 2003, Director of U.S. National Imagery and Mapping Agency asked RAND Corporation for a:

Framework to "guide public and private decision makers in weighing homeland security implications related to release of geospatial information"



Today the National Imagery and Mapping Agency is called the National Geospatial-Intelligence Agency

Risks from public geospatial information

RAND's 2004 deliverable included a survey and analysis of

- 465 programs/offices/initiatives at 30 agencies and departments identified as providing geospatial information to the public
  - 628 public datasets sampled from NSDI Clearinghouse websites
  - 37 (~6%) found to be useful in helping an attacker select a target or plan an attack against a site
    - None were considered so critical that an "attacker could not perform the attack without" them
- Conclusions
  - Publically available geospatial "information needed for identifying and locating potential targets is widely accessible"
  - "…detailed and up-to-date information required for attack planning against a particular target is much less readily available"

RAND's assessment of risks posed by GIS data shared publically over the Internet is focused by 3 "filters"

Framework for Analyzing the Homeland Security Sensitivity of Geospatial Data and Information Sources

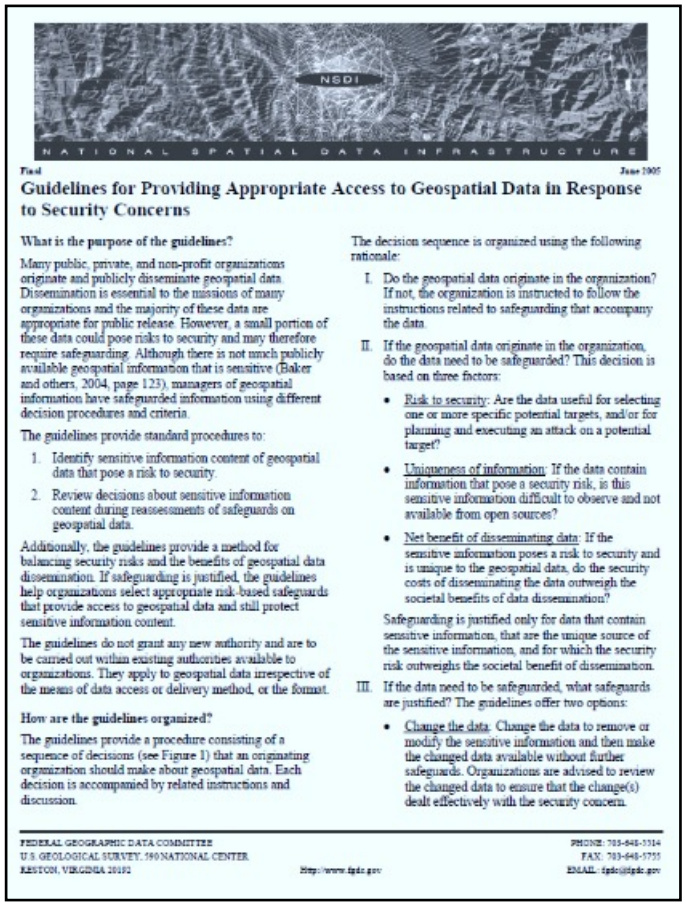
Filter	Key Questions for Decisionmakers
Usefulness	• Is the information useful for target selection or location purposes? • Is the information useful for attack planning purposes?
Uniqueness	• Is the information readily available from other geospatial information sources? • Is the information available from direct observation or other nongeospatial information types?
Societal benefits and costs	• What are the expected security benefits of restricting public access to the source? • What are the expected societal costs of restricting public access to the source?

Federal Geographic Data Committee's risk assessment and control guidelines for…

- **Identifying sensitive information contents of geospatial data that pose a risk to security**
- **Making information security decisions and applying safeguards to sensitive geospatial data contents**

"Does knowledge of the location and purpose of a feature as described in the data, have the potential to significantly compromise the security of persons, property, or systems?"

FGDC 2005, based on RAND's 2004 study



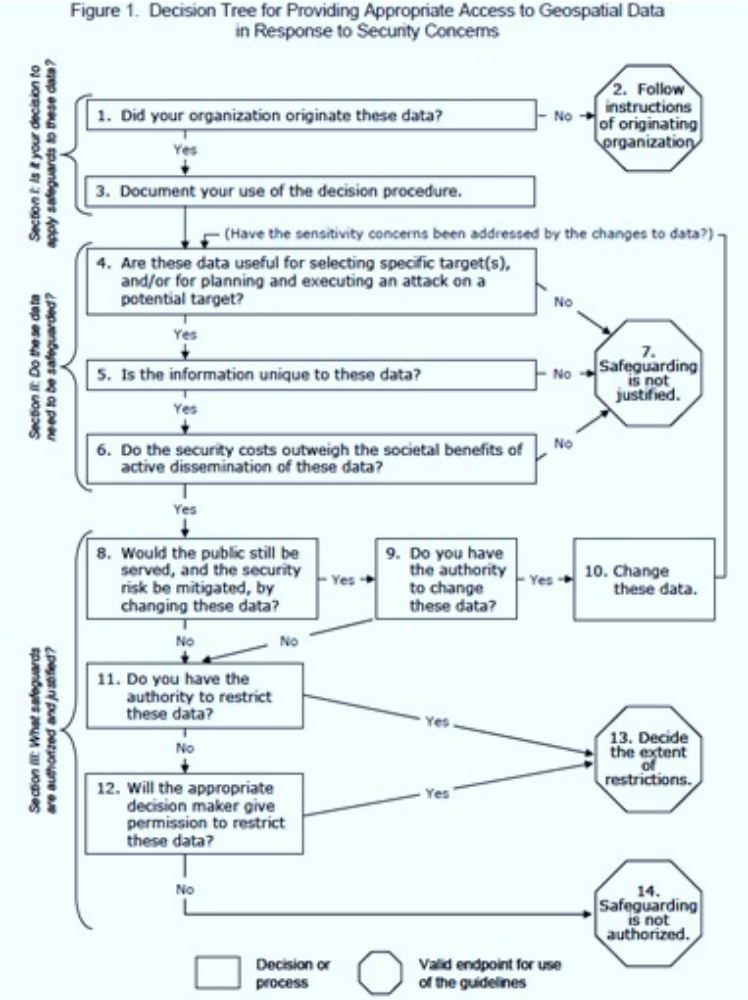
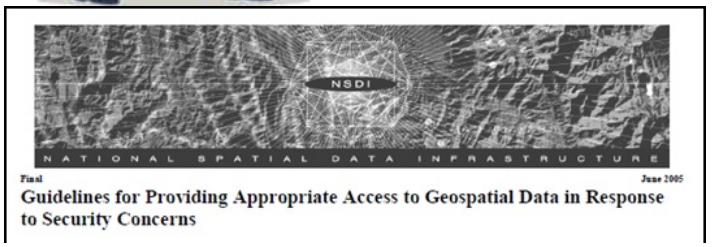
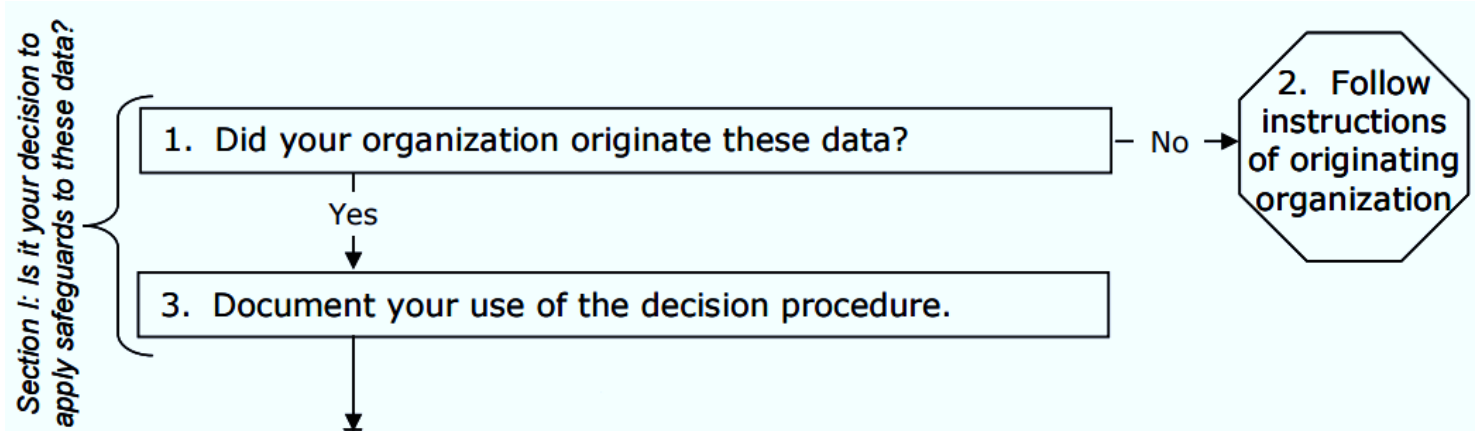


Figure 1. Decision Tree for Providing Appropriate Access to Geospatial Data in Response to Security Concerns
Section I: Is it your decision to apply safeguards to these data?
Section II: Do these data need to be safeguarded?
Section III: What safeguards are authorized and justified?
1. Did your organization originate these data?
No
2. Follow instructions of originating organization.
Yes
3. Document your use of the decision procedure.
(Have the sensitivity concerns been addressed by the changes to data?)
4. Are these data useful for selecting specific target(s), and/or for planning and executing an attack on a potential target?
No
Yes
5. Is the information unique to these data?
No
Yes
6. Do the security costs outweigh the societal benefits of active dissemination of these data?
No
7. Safeguarding is not justified.
Yes
8. Would the public still be served, and the security risk be mitigated, by changing these data?
Yes
9. Do you have the authority to change these data?
Yes
10. Change these data.
No
No
11. Do you have the authority to restrict these data?
Yes
No
12. Will the appropriate decision maker give permission to restrict these data?
Yes
13. Decide the extent of restrictions.
No
14. Safeguarding is not authorized.
Decision or process
Valid endpoint for use of the guidelines


NSDI
NATIONAL SPATIAL DATA INFRASTRUCTURE
Final
June 2005
Guidelines for Providing Appropriate Access to Geospatial Data in Response to Security Concerns

Decision Tree for Providing Appropriate Access to Geospatial Data in Response to Security Concerns

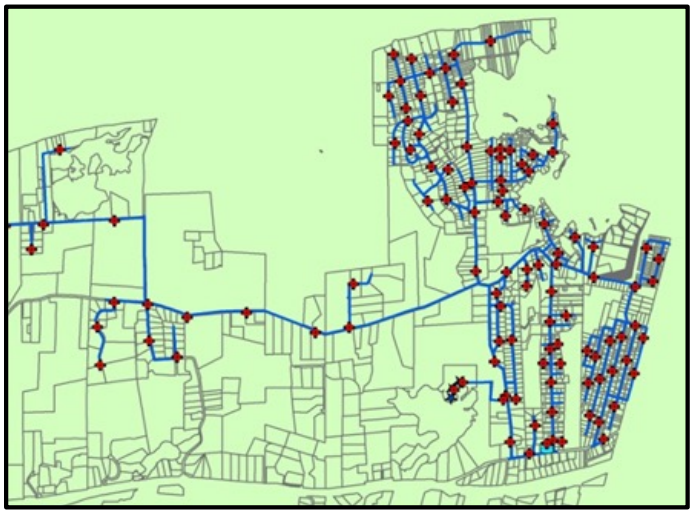


…risk assessment…

4. Are these data useful for selecting specific target(s), and/or for planning and executing an attack on a potential target?

"Sensitivity" of geospatial data is based on usefulness to terrorists

Do the data show "choke points to increase effectiveness of an attack ?"

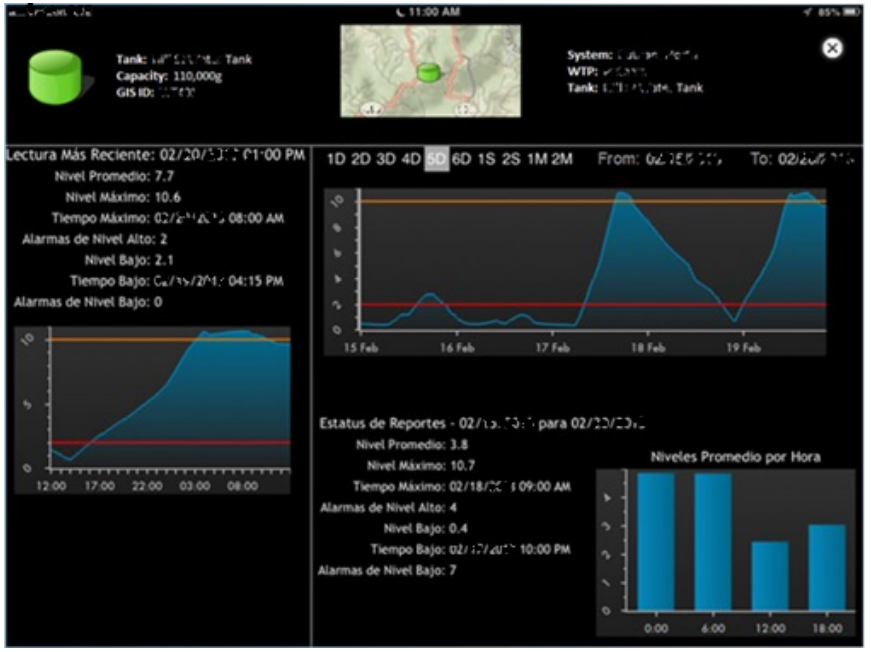


…risk assessment…

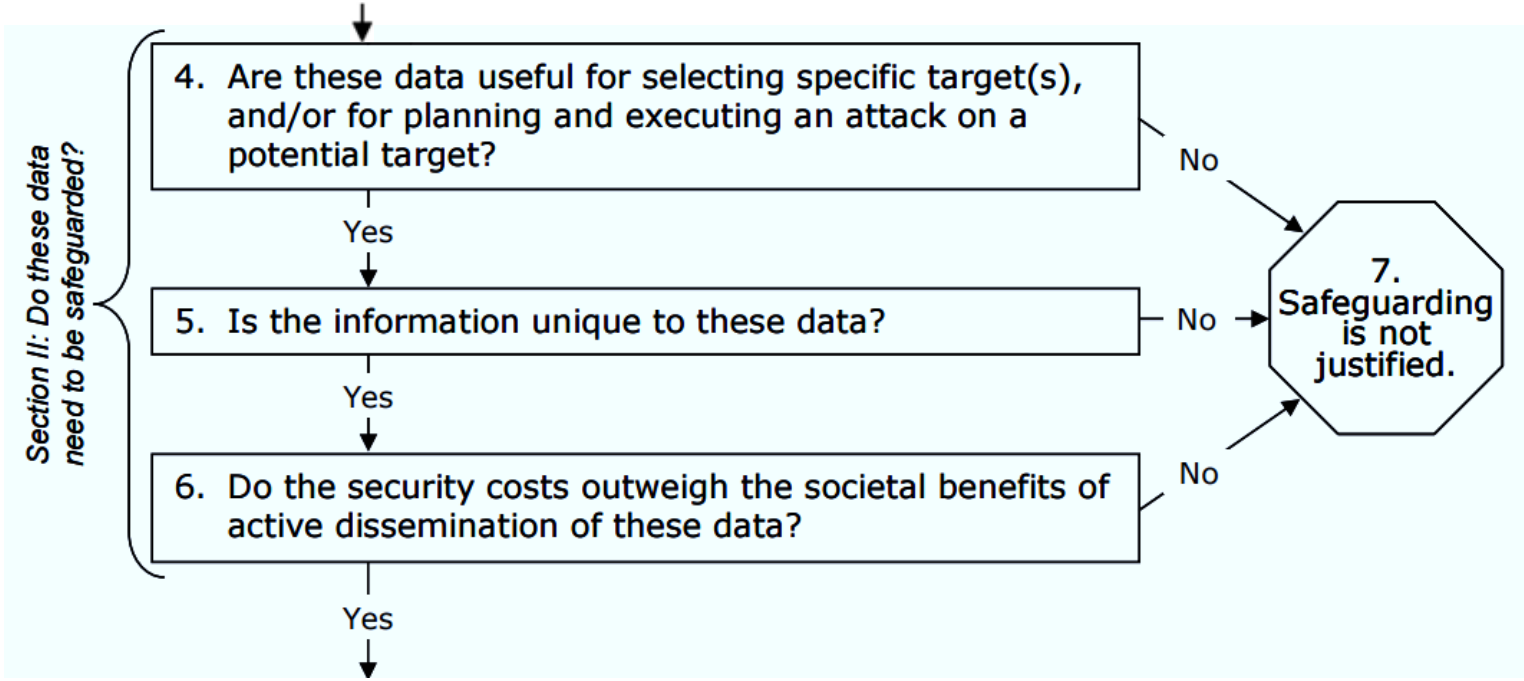
4. Are these data useful for selecting specific target(s), and/or for planning and executing an attack on a potential target?

"Sensitivity" of geospatial data is based on usefulness to terrorists

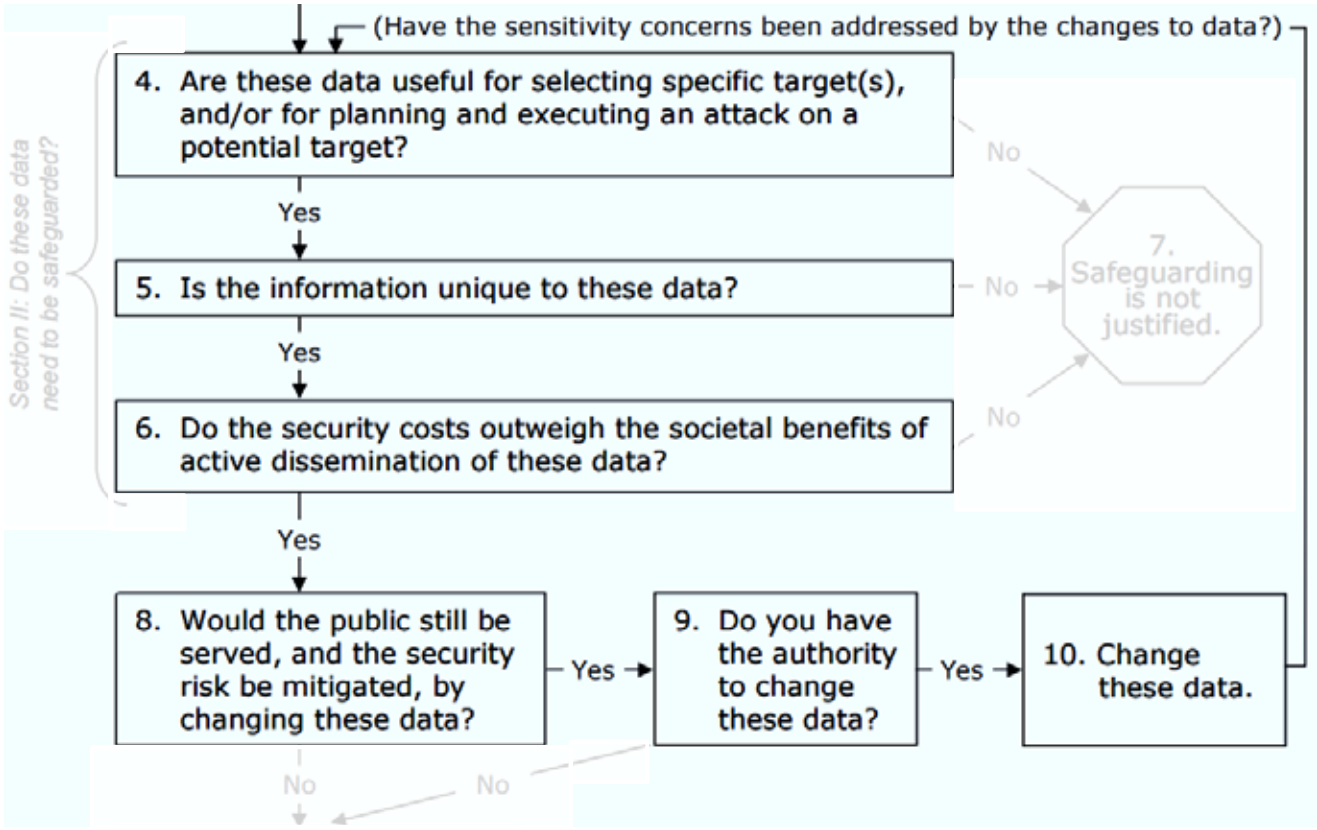
Do the data "provide relevant current (real-time, near real-time, or very recent) security-related data" that can help an attacker "find the best way to cause catastrophic failure ?"



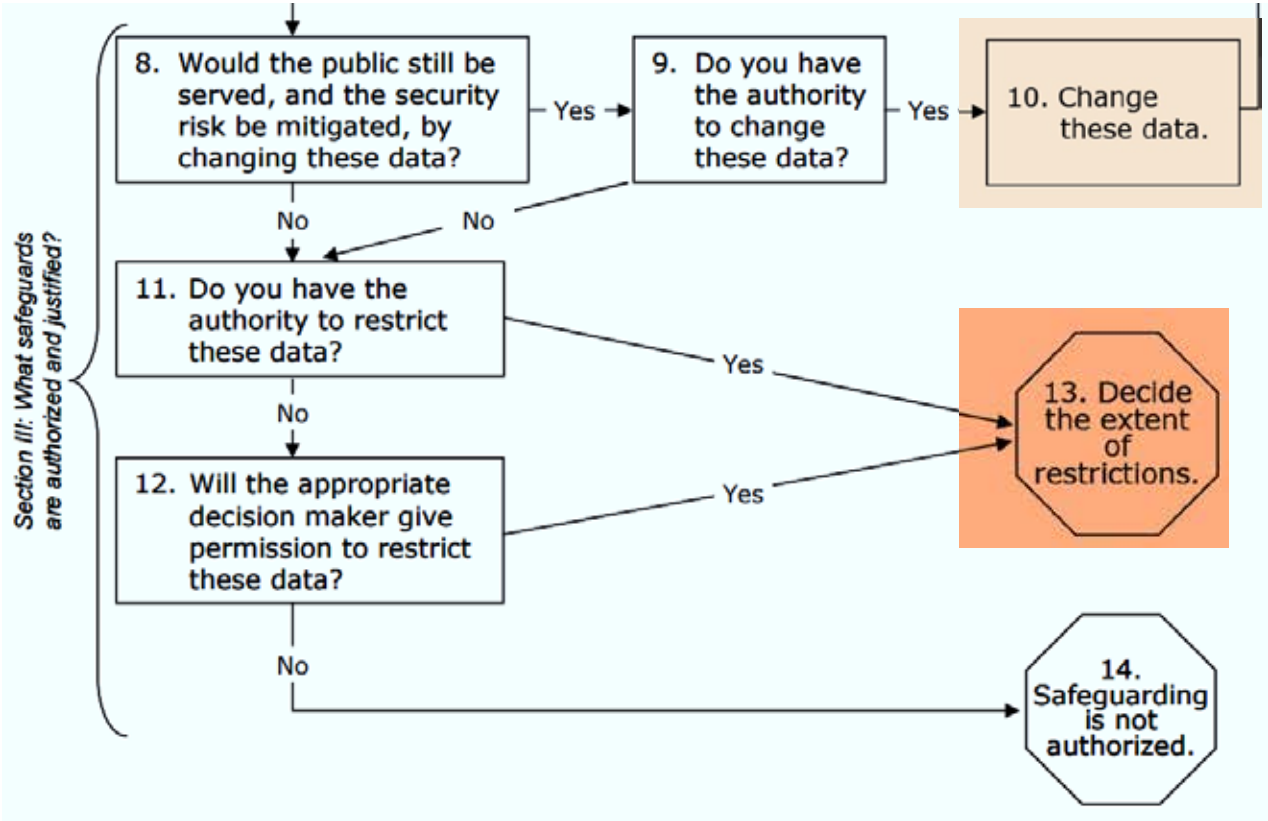
Assess the risk…



…control/mitigate the risk…



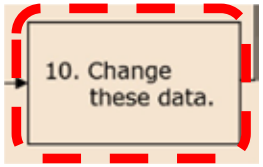
…control/mitigate the confidentiality risk…



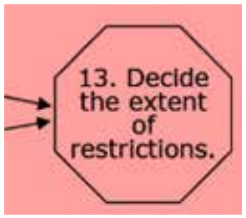
…control/mitigate the risk…

If security risks outweigh benefits of releasing the data to the public, agency can choose to safeguard data by:

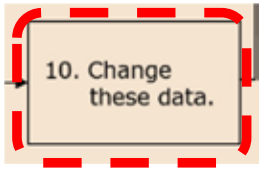
- **Modifying data**
  - Remove or reduce detail in offending data elements
    - either in the attributes, spatial representations, or both



- **Restricting access to data**
  - If agency lacks authority to change data, or believes modifying data will undermine its value to the public, then agency can restrict access

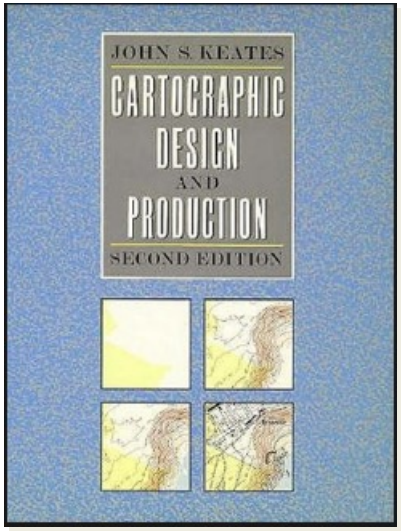


…control/mitigate risk…



To remove or reduce detail in offending data elements apply techniques of ***Cartographic Generalization***

1. *Selective Omission*
2. *Simplification*
3. *Combination*
4. *Exaggeration*
5. *Displacement*



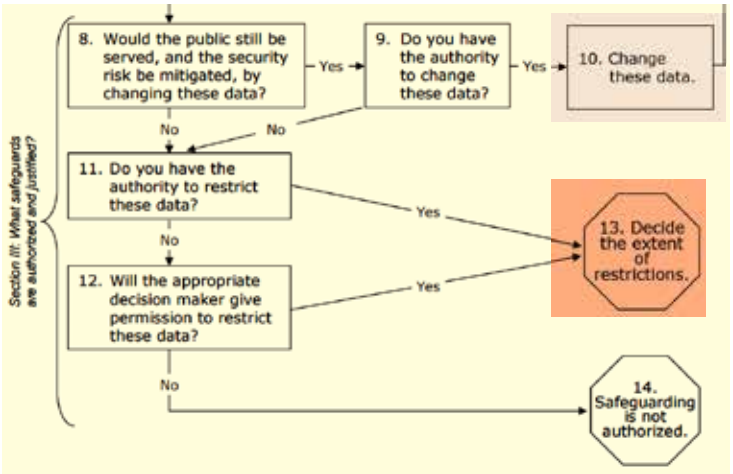
FIPS 199's and FGDC Guidelines' share a mutual security objective…

Confidentiality
Preserving authorized restrictions on information access and disclosure, including means for protecting personal privacy and proprietary information.

FGDC Guidelines' security objective

Integrity
Guarding against improper information modification or destruction, and includes ensuring information non-repudiation and authenticity.

Availability
Ensuring timely and reliable access to and use of information.



What FIPS 199 security objectives are at risk by implementing the FGDC's Guidelines ?

Metadata enables communicating data classification information

2 examples of metadata standards that include security categorization information for geographic datasets

FGDC-STD-001-1998

Content Standard for Digital Geospatial Metadata

Metadata Ad Hoc Working Group
Federal Geographic Data Committee

Federal Geographic Data Committee
Department of Agriculture • Department of Commerce • Department of Defense • Department of Energy
Department of Housing and Urban Development • Department of the Interior • Department of State
Department of Transportation • Environmental Protection Agency
Federal Emergency Management Agency • Library of Congress
National Aeronautics and Space Administration • National Archives and Records Administration
Tennessee Valley Authority

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 19115-1

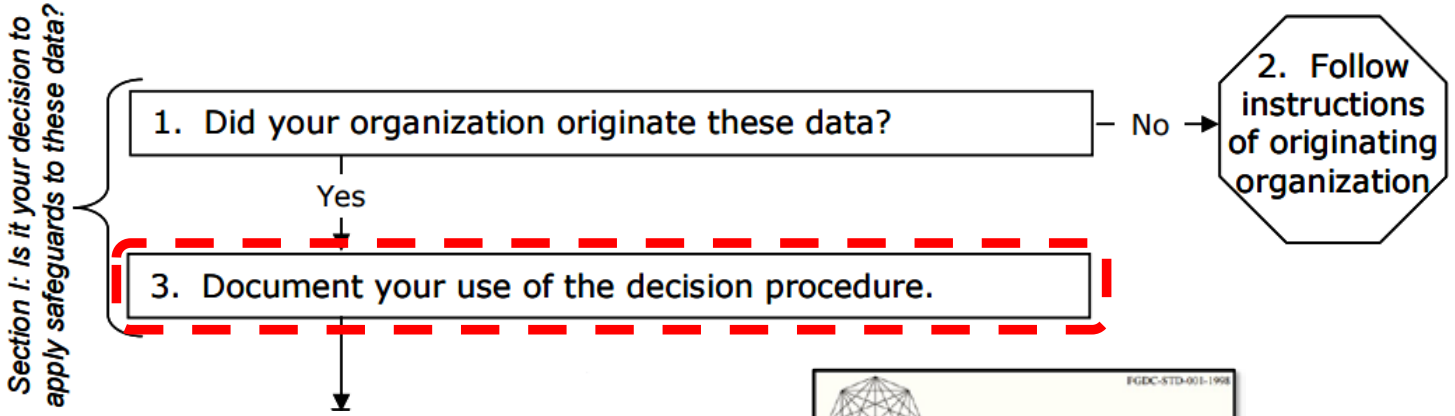
April 2014

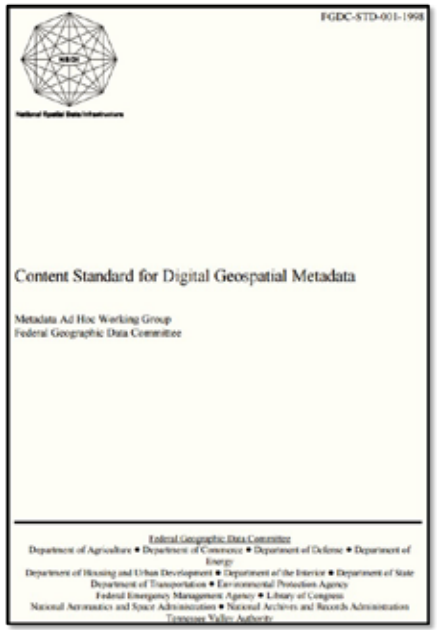
English Version

Geographic information — Metadata — Part 1: Fundamentals (ISO 19115-1:2014)

cen

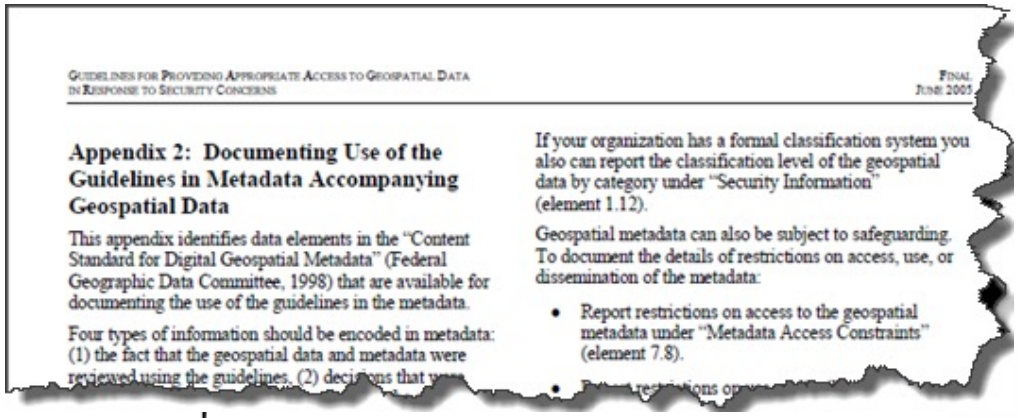
Decision Tree for Providing Appropriate Access to Geospatial Data in Response to Security Concerns




FGDC-STD-001-1998

Content Standard for Digital Geospatial Metadata

Metadata Ad Hoc Working Group
Federal Geographic Data Committee



GUIDELINES FOR PROVIDING APPROPRIATE ACCESS TO GEOSPATIAL DATA IN RESPONSE TO SECURITY CONCERNS

FINAL JUNE 2005

Appendix 2: Documenting Use of the Guidelines in Metadata Accompanying Geospatial Data

This appendix identifies data elements in the "Content Standard for Digital Geospatial Metadata" (Federal Geographic Data Committee, 1998) that are available for documenting the use of the guidelines in the metadata.

Four types of information should be encoded in metadata: (1) the fact that the geospatial data and metadata were reviewed using the guidelines, (2) decisions that were

If your organization has a formal classification system you also can report the classification level of the geospatial data by category under "Security Information" (element 1.12).

Geospatial metadata can also be subject to safeguarding. To document the details of restrictions on access, use, or dissemination of the metadata:

- Report restrictions on access to the geospatial metadata under "Metadata Access Constraints" (element 7.8).
-

3. Document your use of the decision procedure.

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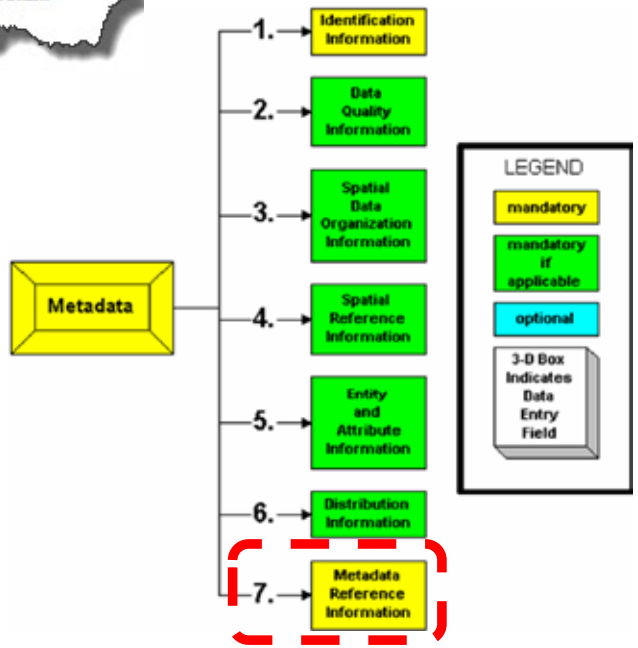
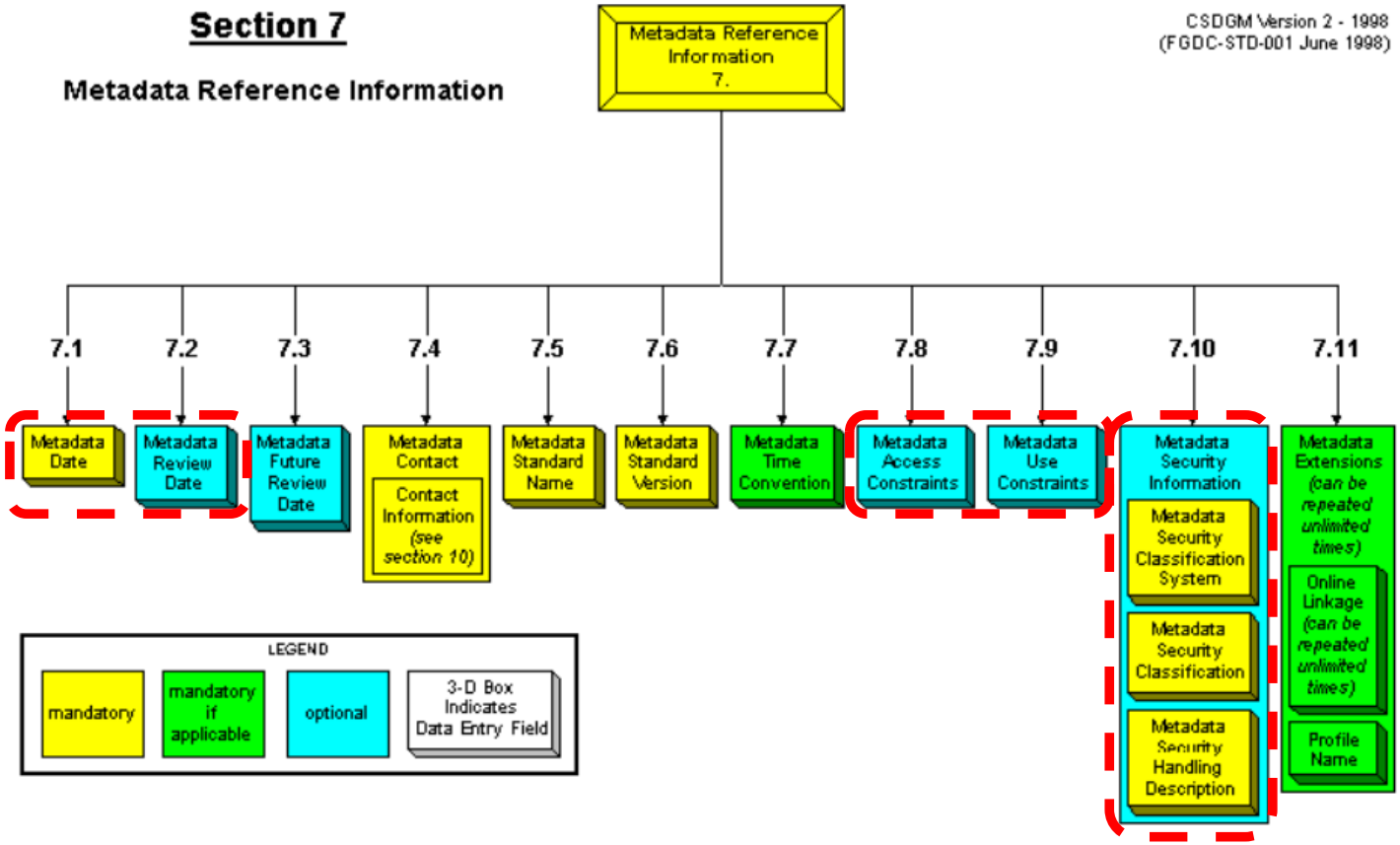
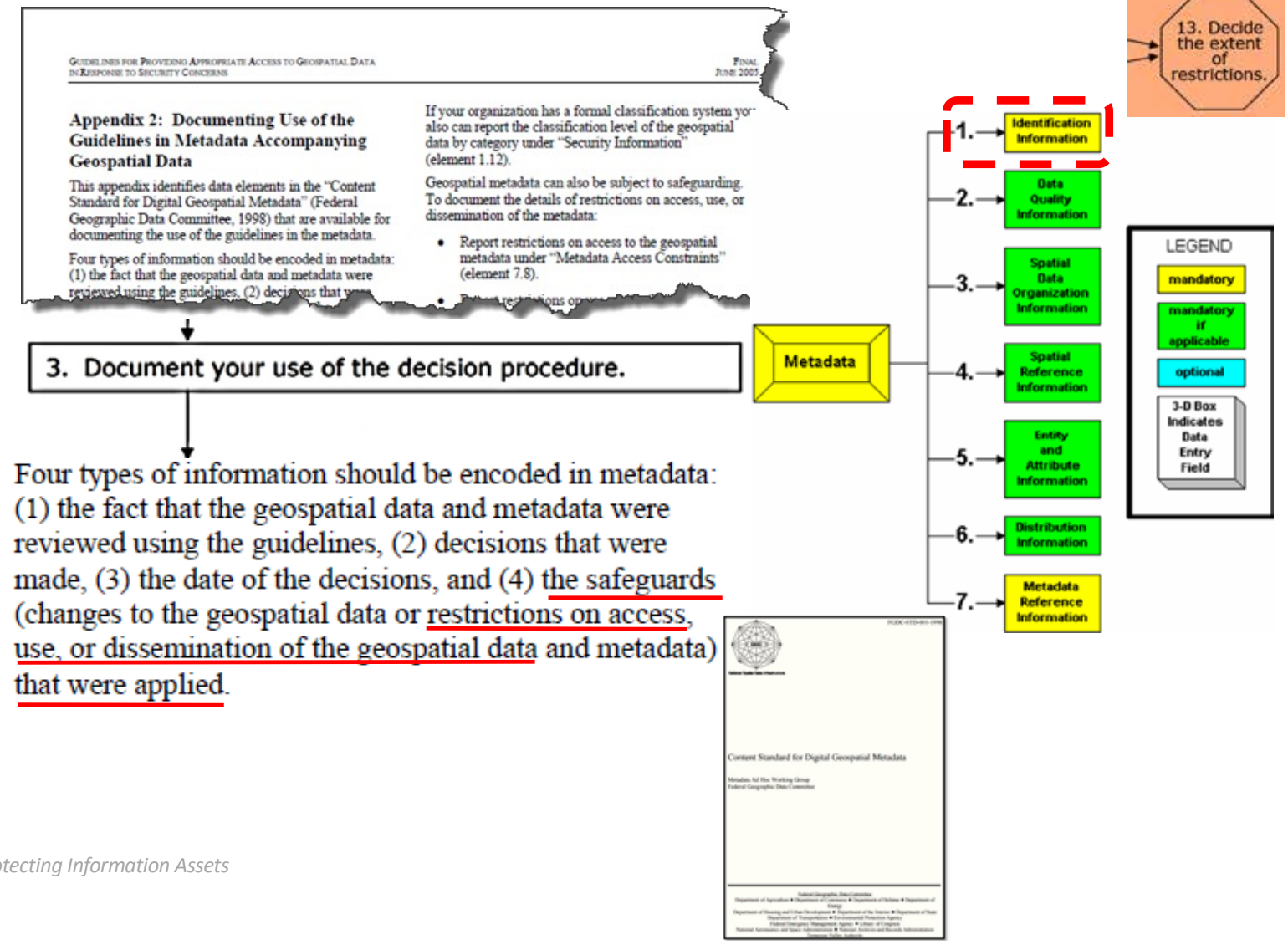



Section 7
Metadata Reference Information
Metadata Reference Information 7.
CSDGM Version 2 - 1998
(FGDC-STD-001 June 1998)
7.1
7.2
7.3
7.4
7.5
7.6
7.7
7.8
7.9
7.10
7.11
Metadata Date
Metadata Review Date
Metadata Future Review Date
Metadata Contact
Contact Information (see section 10)
Metadata Standard Name
Metadata Standard Version
Metadata Time Convention
Metadata Access Constraints
Metadata Use Constraints
Metadata Security Information
Metadata Security Classification System
Metadata Security Classification
Metadata Security Handling Description
Metadata Extensions (can be repeated unlimited times)
Online Linkage (can be repeated unlimited times)
Profile Name
LEGEND
mandatory
mandatory if applicable
optional
3-D Box Indicates Data Entry Field


GUIDELINES FOR PROVIDING APPROPRIATE ACCESS TO GEOSPATIAL DATA IN RESPONSE TO SECURITY CONCERNS
FINAL
JUNE 2005
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Geospatial metadata can also be subject to safeguarding. To document the details of restrictions on access, use, or dissemination of the metadata:
Report restrictions on access to the geospatial metadata under "Metadata Access Constraints" (element 7.8).
3. Document your use of the decision procedure.
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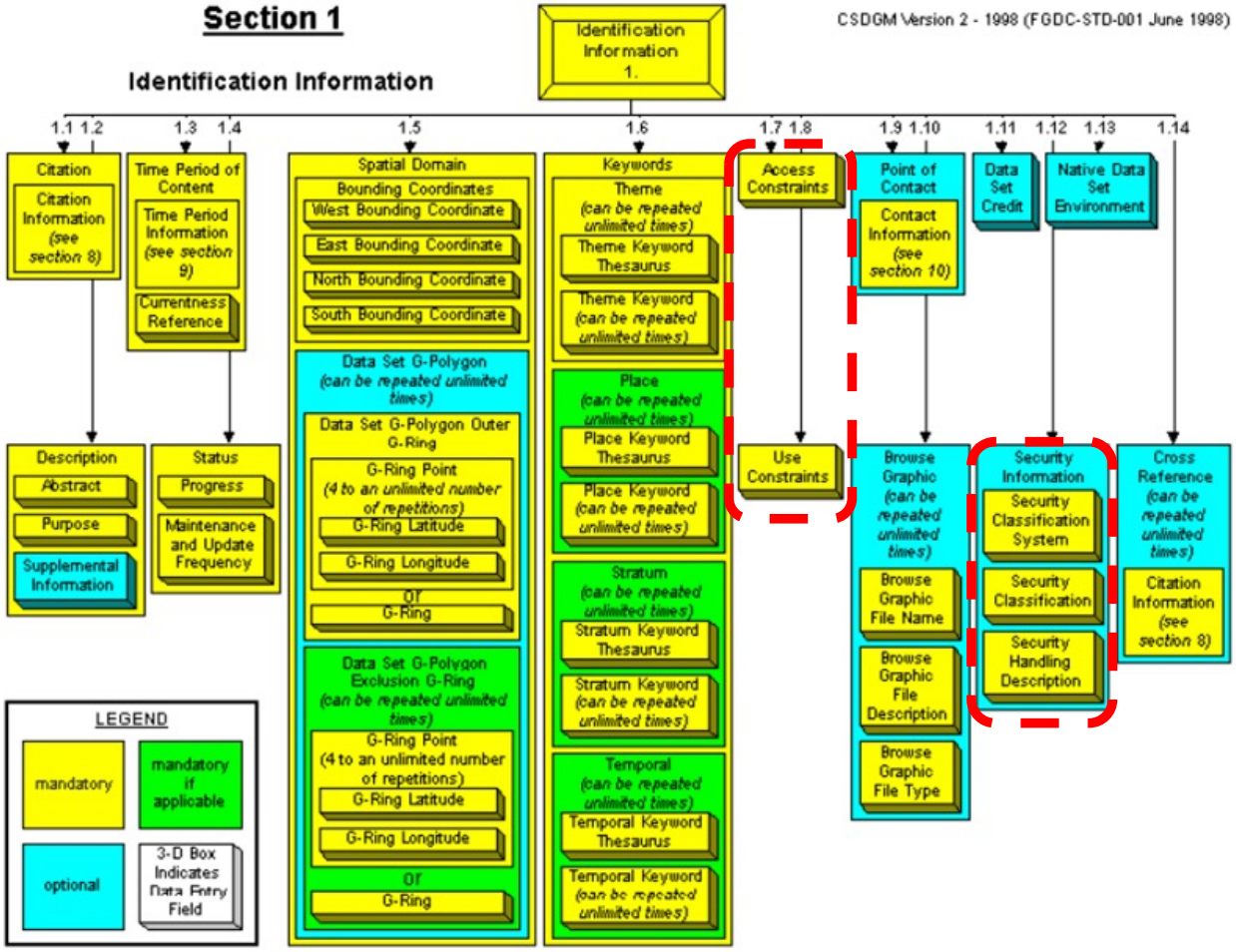
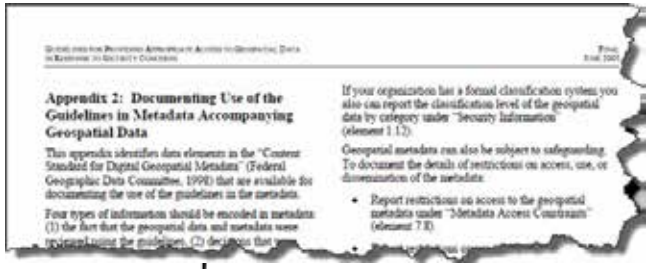
13. Decide the extent of restrictions.
Metadata
1. Identification Information
2. Data Quality Information
3. Spatial Data Organization Information
4. Spatial Reference Information
5. Entity and Attribute Information
6. Distribution Information
7. Metadata Reference Information
LEGEND
mandatory
mandatory if applicable
optional
3-D Box Indicates Data Entry Field
Content Standard for Digital Geospatial Metadata


Section 1
Identification Information
CSDGM Version 2 - 1998 (FGDC-STD-001 June 1998)
Identification Information 1.
1.1 1.2
1.3 1.4
1.5
1.6
1.7 1.8
1.9 1.10
1.11
1.12
1.13
1.14
Citation
Citation Information (see section 8)
Time Period of Content
Time Period Information (see section 9)
Currentness Reference
Spatial Domain
Bounding Coordinates
West Bounding Coordinate
East Bounding Coordinate
North Bounding Coordinate
South Bounding Coordinate
Data Set G-Polygon (can be repeated unlimited times)
Data Set G-Polygon Outer G-Ring
G-Ring Point (4 to an unlimited number of repetitions)
G-Ring Latitude
G-Ring Longitude
OR
G-Ring
Data Set G-Polygon Exclusion G-Ring (can be repeated unlimited times)
G-Ring Point (4 to an unlimited number of repetitions)
G-Ring Latitude
G-Ring Longitude
OR
G-Ring
Keywords
Theme (can be repeated unlimited times)
Theme Keyword Thesaurus
Theme Keyword (can be repeated unlimited times)
Place (can be repeated unlimited times)
Place Keyword Thesaurus
Place Keyword (can be repeated unlimited times)
Stratum (can be repeated unlimited times)
Stratum Keyword Thesaurus
Stratum Keyword (can be repeated unlimited times)
Temporal (can be repeated unlimited times)
Temporal Keyword Thesaurus
Temporal Keyword (can be repeated unlimited times)
Access Constraints
Use Constraints
Point of Contact
Contact Information (see section 10)
Data Set Credit
Native Data Set Environment
Description
Abstract
Purpose
Supplemental Information
Status
Progress
Maintenance and Update Frequency
Browse Graphic (can be repeated unlimited times)
Browse Graphic File Name
Browse Graphic File Description
Browse Graphic File Type
Security Information
Security Classification System
Security Classification
Security Handling Description
Cross Reference (can be repeated unlimited times)
Citation Information (see section 8)
LEGEND
mandatory
mandatory if applicable
optional
3-D Box Indicates Data Entry Field
13. Decide the extent of restrictions.



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Geospatial metadata can also be subject to safeguarding. To document the details of restrictions on access, use, or dissemination of the metadata:

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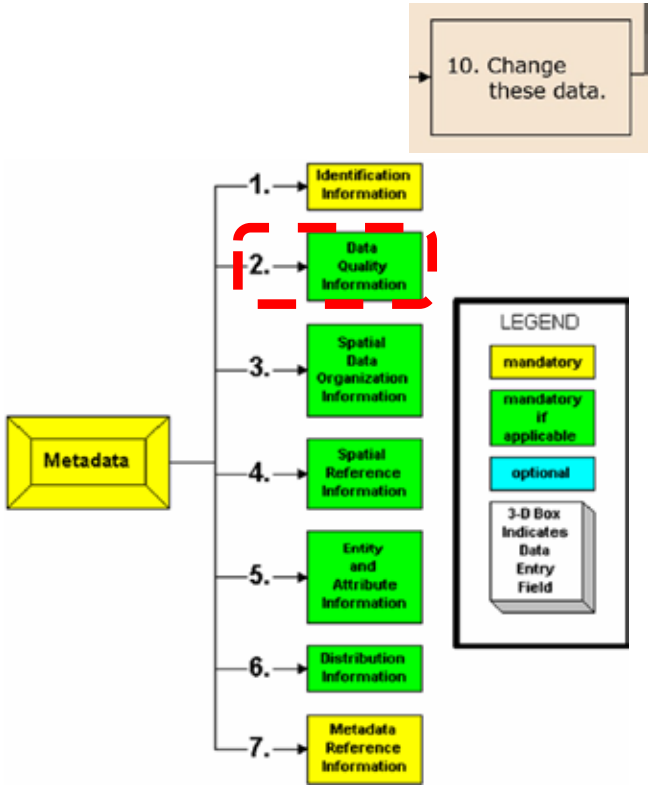
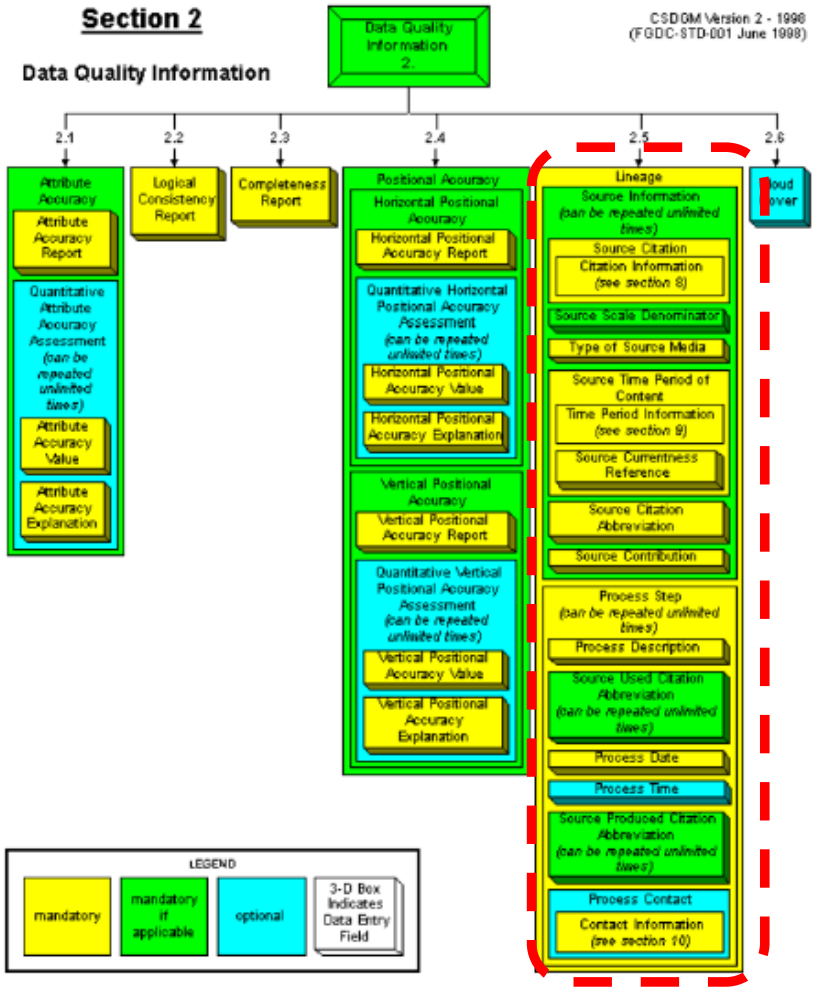
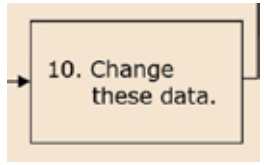
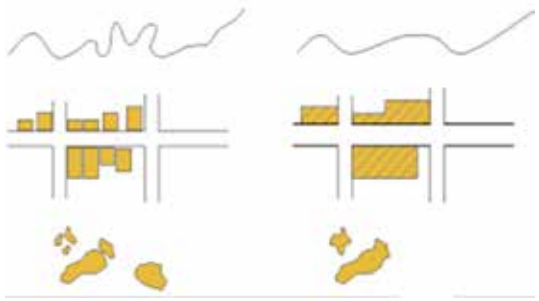
3. Document your use of the decision procedure.

Four types of information should be encoded in metadata: (1) the fact that the geospatial data and metadata were reviewed using the guidelines, (2) decisions that were made, (3) the date of the decisions, and (4) the safeguards (changes to the geospatial data or restrictions on access, use, or dissemination of the geospatial data and metadata) that were applied.





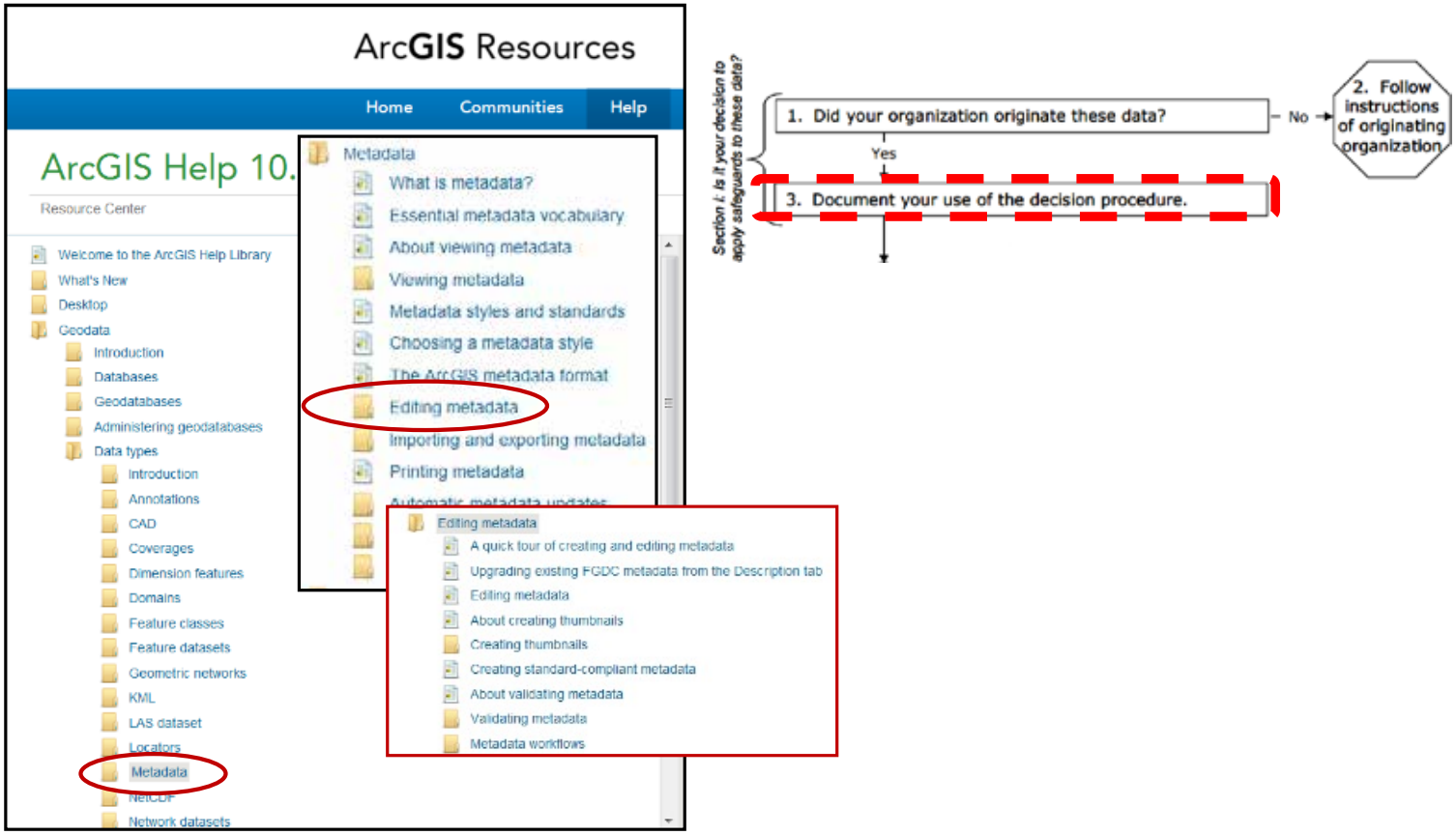




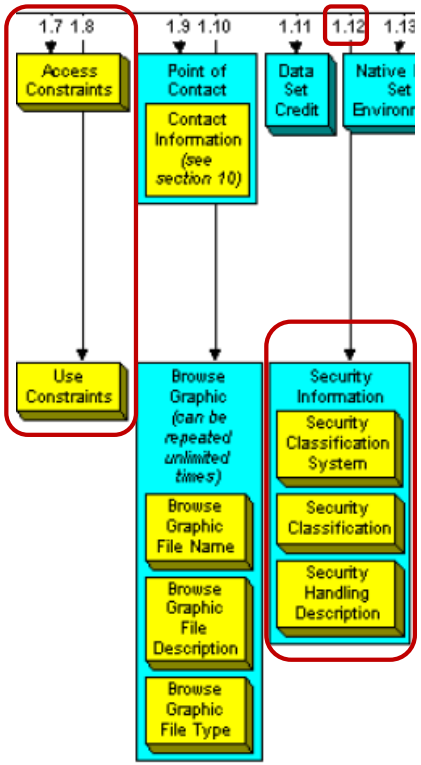
Before… *…after*

Techniques of Cartographic Generalization

1. *Selective Omission*
2. *Simplification*
3. *Combination*
4. *Exaggeration*
5. *Displacement*


ArcGIS Resources
Home
Communities
Help
ArcGIS Help 10.
Resource Center
Welcome to the ArcGIS Help Library
What's New
Desktop
Geodata
Introduction
Databases
Geodatabases
Administering geodatabases
Data types
Introduction
Annotations
CAD
Coverages
Dimension features
Domains
Feature classes
Feature datasets
Geometric networks
KML
LAS dataset
Locators
Metadata
NetCDF
Network datasets
Metadata
What is metadata?
Essential metadata vocabulary
About viewing metadata
Viewing metadata
Metadata styles and standards
Choosing a metadata style
The ArcGIS metadata format
Editing metadata
Importing and exporting metadata
Printing metadata
Editing metadata
A quick tour of creating and editing metadata
Upgrading existing FGDC metadata from the Description tab
Editing metadata
About creating thumbnails
Creating thumbnails
Creating standard-compliant metadata
About validating metadata
Validating metadata
Metadata workflows
Section 1. Is it your decision to apply safeguards to these data?
1. Did your organization originate these data?
No
2. Follow instructions of originating organization
Yes
3. Document your use of the decision procedure.

Communicating risk classification and controls…



Note: Be wary of m*etadata with undefined or free text domains which block use in automated controls…*

1.7 Access Constraints -- restrictions and legal prerequisites for accessing the data set. These include any access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the data set.
Type: text
Domain: "None" free text ←
Short Name: accconst

1.8 Use Constraints -- restrictions and legal prerequisites for using the data set after access is granted. These include any use constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on using the data set.
Type: text
Domain: "None" free text ←
Short Name: useconst

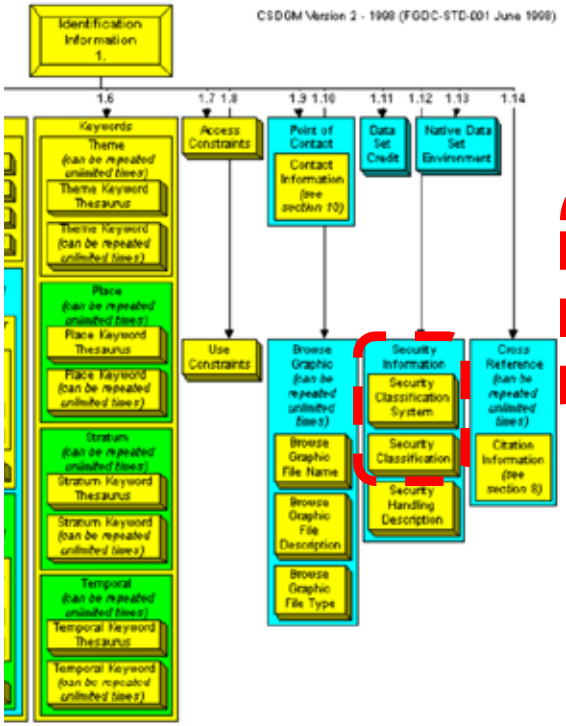
1.12 Security Information -- handling restrictions imposed on the data set because of national security, privacy, or other concerns.
Type: compound
Short Name: seciinfo

1.12.1 Security Classification System -- name of the classification system.
Type: text
Domain: free text ←
Short Name: secsys

1.12.2 Security Classification -- name of the handling restrictions on the data set.
Type: text
Domain: "Top secret" "Secret" "Confidential" "Restricted" "Unclassified" "Sensitive" ←
free text ←
Short Name: secclass

1.12.3 Security Handling Description -- additional information about the restrictions on handling the data set.
Type: text
Domain: free text ←
Short Name: sechandl

…security classification for geospatial data…



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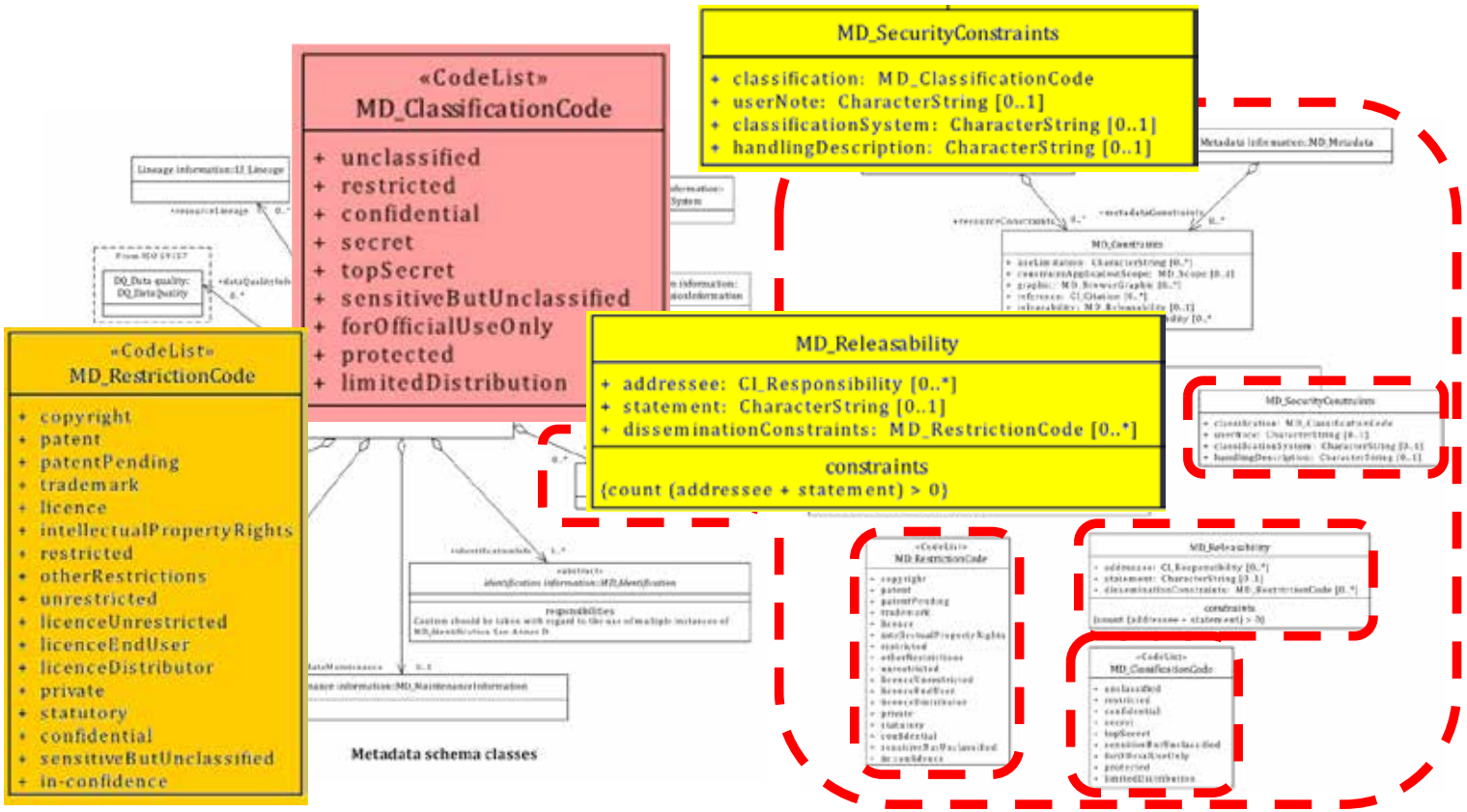
ISO19115-1 Geospatial metadata standard



Department of Defense' Information Assurance (IA)

…also categorizes information systems and data in terms of CIA…

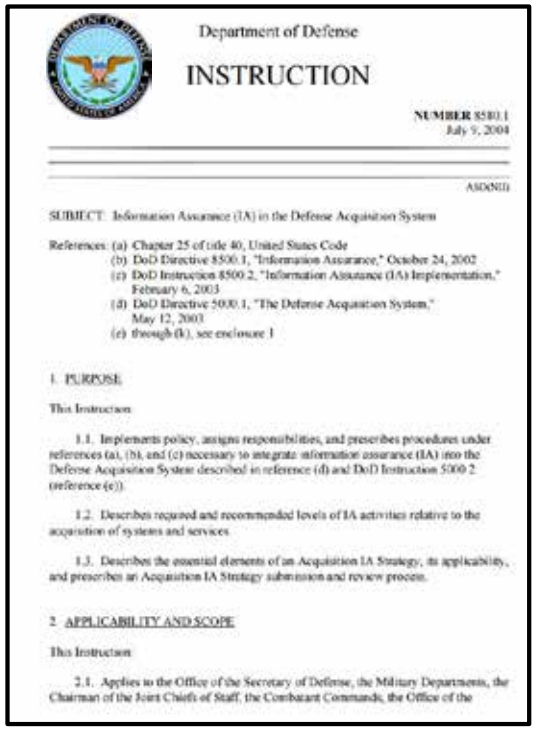
Confidentiality Levels

LEVEL	DEFINITION
High	Classified Information
Medium	Sensitive Information, Not Cleared for Public Release
Basic	Information Cleared for Public Release

+

Mission Assurance Categories

- MAC I – vital to operational readiness or mission effectiveness of deployed or contingency forces. Loss of integrity or availability unacceptable. Requires most stringent protective measures.
- MAC II – important to the support of deployed or contingency forces. Loss of integrity unacceptable, unavailability tolerable only for short time. Require additional safeguards beyond best practices.
- MAC III – necessary to conduct of day-to-day business. Protection commensurate with commercial best practices.



Department of Defense

INSTRUCTION

NUMBER 8510.1
July 9, 2004

ASD(NII)

SUBJECT: Information Assurance (IA) in the Defense Acquisition System

References: (a) Chapter 25 of title 40, United States Code
(b) DoD Directive 8500.1, "Information Assurance," October 24, 2002
(c) DoD Instruction 8500.2, "Information Assurance (IA) Implementation," February 6, 2003
(d) DoD Directive 5000.1, "The Defense Acquisition System," May 12, 2003
(e) through (k), see enclosure 1

1. PURPOSE

This Instruction

1.1. Implements policy, assigns responsibilities, and prescribes procedures under references (a), (b), and (c) necessary to integrate information assurance (IA) into the Defense Acquisition System described in reference (d) and DoD Instruction 5000.2 (reference (e)).

1.2. Describes required and recommended levels of IA activities relative to the acquisition of systems and services.

1.3. Describes the essential elements of an Acquisition IA Strategy, its applicability, and prescribes an Acquisition IA Strategy submission and review process.

2. APPLICABILITY AND SCOPE

This Instruction

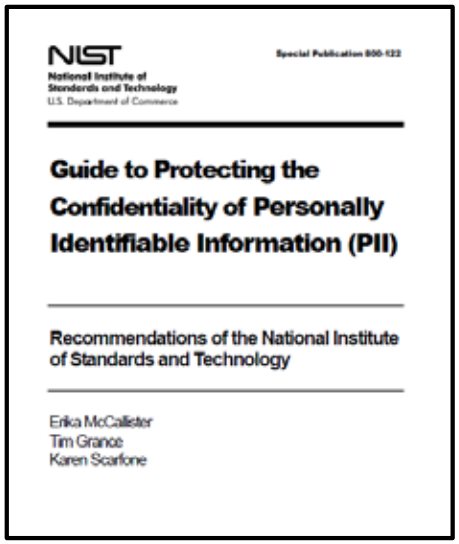
2.1. Applies to the Office of the Secretary of Defense, the Military Departments, the Chairman of the Joint Chiefs of Staff, the Combatant Commands, the Office of the

Agenda

- ✓ Categorizing Information for IT Risk Management
- ✓ Revisit Risk & Controls of Publicly Shared Geographic Information
- More on Confidentiality: Linked & Linkable PII
- Risk Evaluation
- Risk Management Techniques, a brief review
- Test taking tip
- Quiz

NIST SP 800-122 – Guide to Protecting Confidentiality of PII

- Specifically focused on:
  - Identifying PII
  - **Determining PII confidentiality** impact level needed to supplement the FIPS 199 confidentiality impact level of an information system

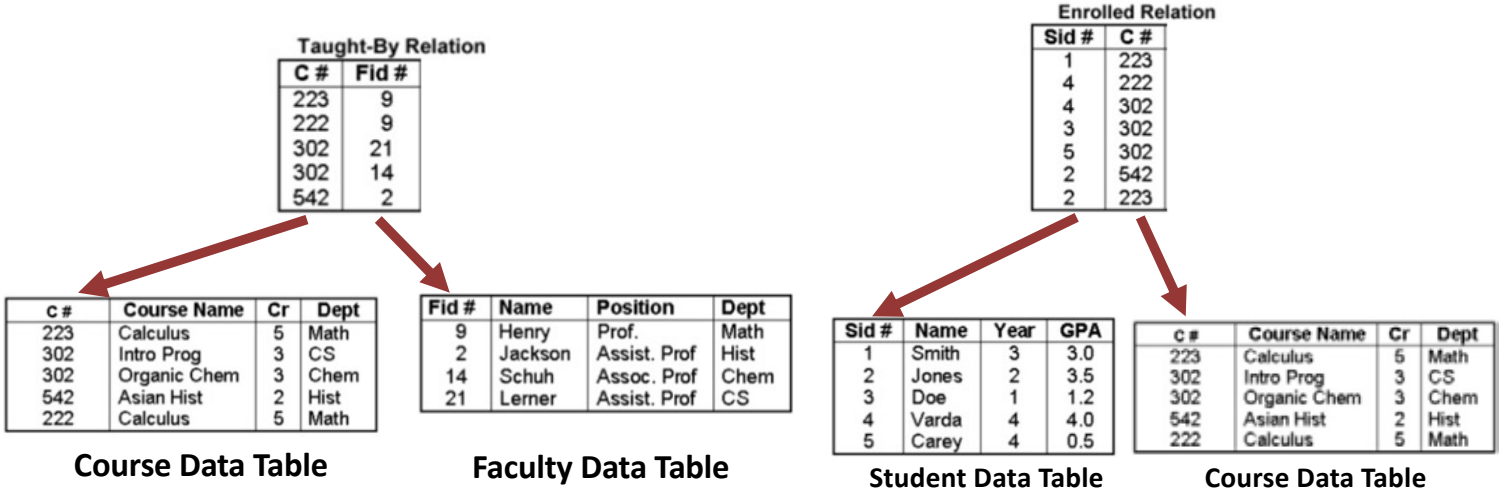


Personally Identifiable Information (PII)

Any information about an individual maintained by an agency, including:

1. Any information that can be used to distinguish (i.e. identify) or trace an individual's identity, such as:
   - *Name*
   - *Identifying number*
   - *Address*
   - *Asset identifier*
   - *Telephone number*
   - *Personal characteristics*
   - *Personally owned property identifiers*
2. Any other information that is linked or linkable to the identifiers listed in #1:
   - Date of birth
   - Place of birth
   - Race
   - Religion
   - Weight
   - Geographic indicators
   - Medical information
   - Educational information
   - Financial information
   - Employment information
   - …

Linked information



Course Data Table

Faculty Data Table

Student Data Table

Course Data Table

Linkable information

Property ("Parcel") Data Table

Shape	ID	PIN	Area	Addr	Code
	1	334-1626-001	7,342	341 Cherry Ct.	SFR
	2	334-1626-002	8,020	343 Cherry Ct.	UND
	3	334-1626-003	10,031	345 Cherry Ct.	SFR
	4	334-1626-004	9,254	347 Cherry Ct.	SFR
	5	334-1626-005	8,856	348 Cherry Ct.	UND
	6	334-1626-006	9,975	346 Cherry Ct.	SFR
	7	334-1626-007	8,230	344 Cherry Ct.	SFR
	8	334-1626-008	8,645	342 Cherry Ct.	SFR

Owner Tax Data Table

PIN	Owner	Acq.Date	Assessed	TaxStat
334-1626-001	G. Hall	1995/10/20	$115,500.00	02
334-1626-002	H. L Holmes	1993/10/06	$24,375.00	01
334-1626-003	W. Rodgers	1980/09/24	$175,500.00	02
334-1626-004	J. Williamson	1974/09/20	$135,750.00	02
334-1626-005	P. Goodman	1966/06/06	$30,350.00	02
334-1626-006	K. Staley	1942/10/24	$120,750.00	02
334-1626-007	J. Dormandy	1996/01/27	$110,650.00	01
334-1626-008	S. Gooley	2000/05/31	$145,750.00	02

PIN ("Property Identity Number") is a common identifying attribute that can serve as a "foreign key" to link the data tables together

Is this PII ?

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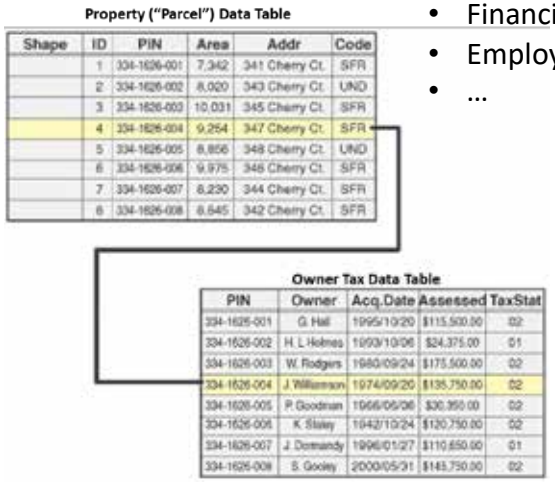
   - Medical information
   - Educational information
   - Financial information
   - Employment information
   - …



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- ✓ Categorizing Information for IT Risk Management
- ✓ Revisit Risk & Controls of Publicly Shared Geographic Information
- ✓ More on Confidentiality: Linked & Linkable PII
- Risk Evaluation
- Risk Management Techniques, a brief review
- Test taking tip
- Quiz

Risk Evaluation

Risk evaluation is the process of identifying risk scenarios and describing their potential business impact

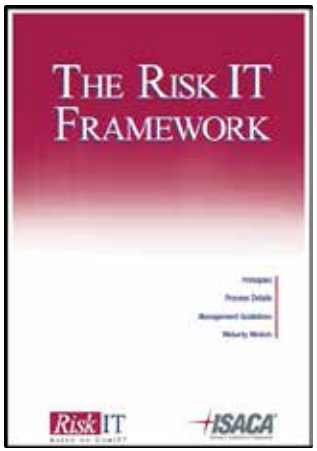
Risk Evaluation - Key Components

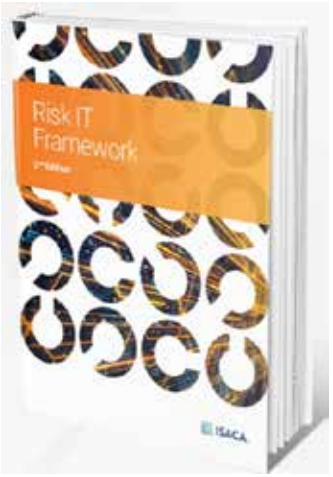
Collect Data	Identify relevant data to enable effective IT-related risk identification, analysis and reporting
Analyze Risk	Develop useful information to support risk decisions that take into account the business impact of risk factors
Maintain Risk Profile	Maintain and up-to-date and complete inventory of known risks and attributes as understood in the context of IT controls and business processes

Risk Evaluation - Collect Data (RE-1)

- **Goal:** Ensure IT-related risks are identified, analyzed and presented in business terms

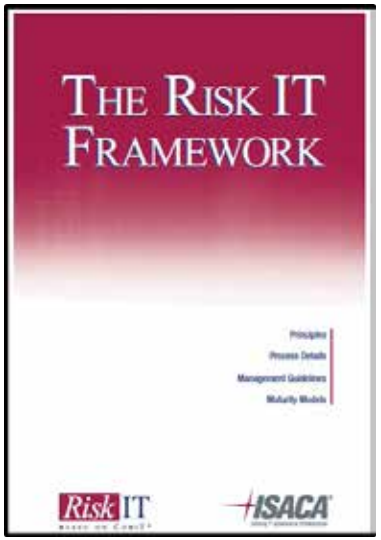
- **Metrics:**
  - # of loss events with key characteristics not captured or measured
  - Degree to which collected data support
    - Visibility and understanding of the threat landscape
      - Analyzing scenarios and reporting trends
      - Visibility and understanding of the control state





Risk Evaluation - Collect Data (RE1)

- Existence of a documented risk data collection model
  - # of data sources
  - # of data items with identified risk factors
  - Completeness of
    - Risk event data
      - Affected assets
      - Impact data
      - Threats
      - Controls
      - Measures of the effectiveness of controls
    - Historical data on risk factors

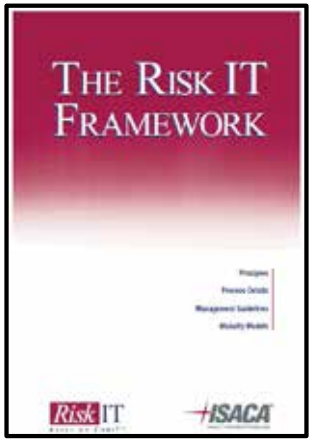


Risk Evaluation - Collect Data: Governance Roles

RACI Chart

Key Activities \ Roles	Board	CEO	CRO	CIO	CFO	Enterprise Risk Committee	Business Management	Business Process Owner	Risk Control Functions	HR	Compliance and Audit
RE1.1 Establish and maintain a model for data collection.	I	I	A/R	C	C	C	C	C	C		C
RE1.2 Collect data on the operating environment.		I	A/R	C	I	I	C	I	I	I	C
RE1.3 Collect data on risk events.		I	A	R	C	I		C	C		I
RE1.4 Identify risk factors.			A	R	I	I	C	C	R	C	C

A **RACI** chart identifies who is **R**esponsible, **A**ccountable, **C**onsulted and/or **I**nformed.



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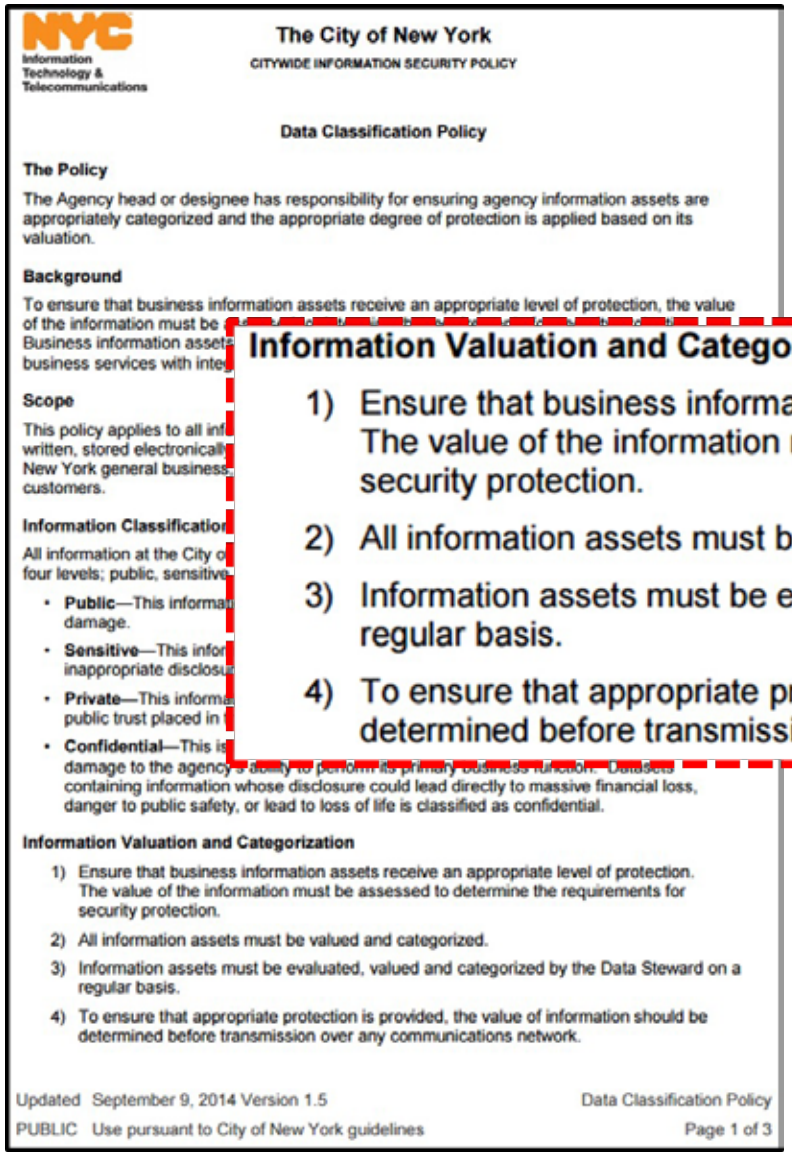

The City of New York

CITYWIDE INFORMATION SECURITY POLICY

Information Technology & Telecommunications

Data Classification Policy

The Policy

The Agency head or designee has responsibility for ensuring agency information assets are appropriately categorized and the appropriate degree of protection is applied based on its valuation.

Background

To ensure that business information assets receive an appropriate level of protection, the value of the information must be
Business information asset
business services with inte

Scope

This policy applies to all inf
written, stored electronicall
New York general business
customers.

Information Classificatio

All information at the City o
four levels; public, sensitive

- **Public**—This informa
damage.
- **Sensitive**—This infor
inappropriate disclosu
- **Private**—This informa
public trust placed in
- **Confidential**—This is
damage to the agency's ability to perform its primary business function. Datasets containing information whose disclosure could lead directly to massive financial loss, danger to public safety, or lead to loss of life is classified as confidential.

Information Valuation and Categorization

1) Ensure that business information assets receive an appropriate level of protection. The value of the information must be assessed to determine the requirements for security protection.
2) All information assets must be valued and categorized.
3) Information assets must be evaluated, valued and categorized by the Data Steward on a regular basis.
4) To ensure that appropriate protection is provided, the value of information should be determined before transmission over any communications network.

Updated September 9, 2014 Version 1.5 Data Classification Policy

PUBLIC Use pursuant to City of New York guidelines Page 1 of 3

Information Valuation and Categorization

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Question:

How to approach prioritizing an enterprise's data for protection?

Let’s set up an information security categorization for an example: Health Catalyst’s product line data

Determine the overall information security categorization of the different datasets

Datasets	Confidentiality	Integrity	Availability	"Overall" Impact Rating
Financial Management				
Accountable Care				
Population Health Management				
Operational and Workflow Improvement				
Patient Injury Prevention				

Remember the application of FIPS 199 to derive overall categorization of the Dean's laptop:

Asset \ Impact to	Confidentiality	Integrity	Availability	Categorization
Staff Salary Data	High	Low	Medium	High
Student Data	High	Low	Low	High
Fundraising Presentations	Medium	Medium	High	High
Dean's Personal Data	Low	Low	Medium	Medium

Synonyms: impact rating, security categorization, …

How can you find a way to transform the ordinal FIPS 199 impact ratings to ratio data to conduct a quantitative risk analysis?

Datasets	Impact	Likelihood	Risk
Financial Management	High	High	?
Accountable Care	High	Moderate	?
Population Health Management	Moderate	Moderate	?
Operational and Workflow Improvement	Low	Moderate	?
Patient Injury Prevention	Low	Low	?

Analyze risk to prioritize protection

An authoritative lookup table for transforming ordinal to ratio risk data…

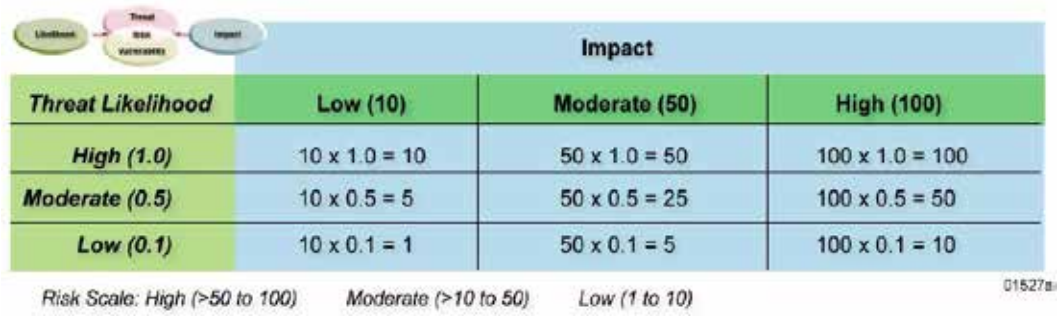
	Impact		
Threat Likelihood	**Low (10)**	**Moderate (50)**	**High (100)**
High (1.0)	10 x 1.0 = 10	50 x 1.0 = 50	100 x 1.0 = 100
Moderate (0.5)	10 x 0.5 = 5	50 x 0.5 = 25	100 x 0.5 = 50
Low (0.1)	10 x 0.1 = 1	50 x 0.1 = 5	100 x 0.1 = 10

01527a

Risk Scale: High (>50 to 100) Moderate (>10 to 50) Low (1 to 10)

NIST SP 800-100 "Information Security Handbook: A Guide for Managers", page 90
found via SCHEDULE menu item in MIS Community site

Analyze risk to prioritize protection



	Impact		
Threat Likelihood	**Low (10)**	**Moderate (50)**	**High (100)**
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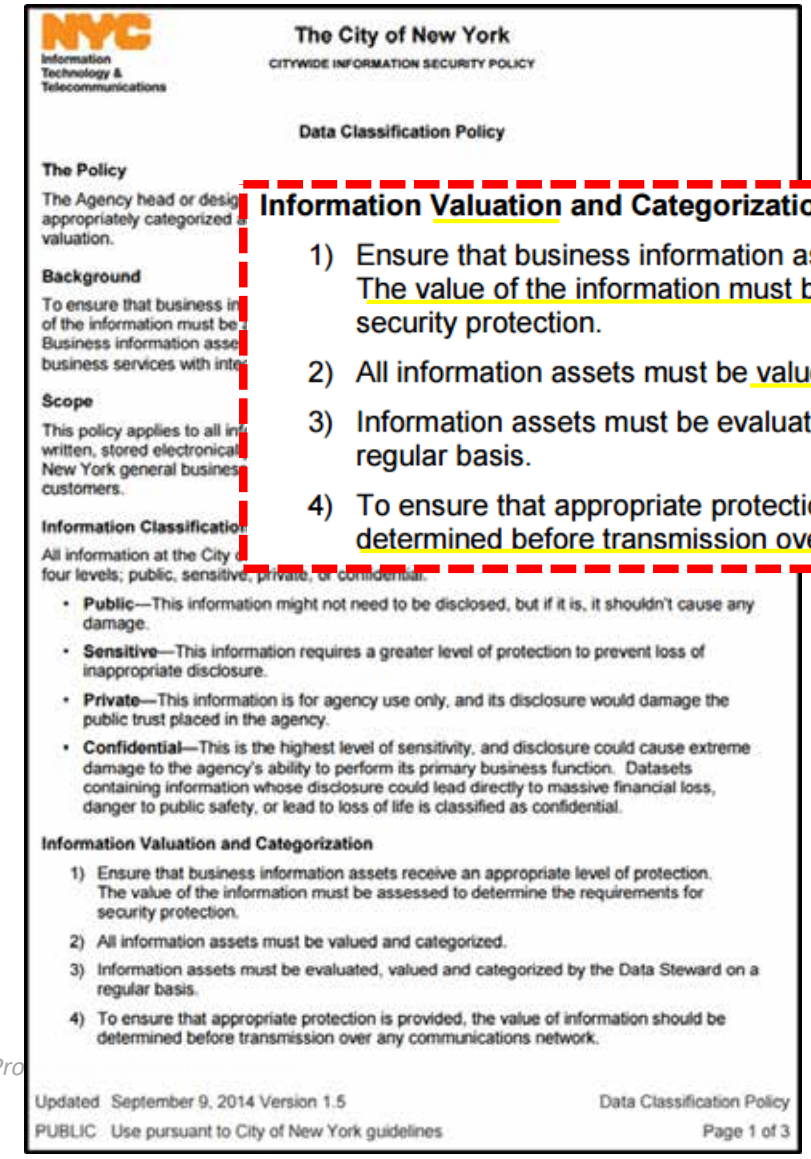
Moderate (0.5)	10 x 0.5 = 5	50 x 0.5 = 25	100 x 0.5 = 50
Low (0.1)	10 x 0.1 = 1	50 x 0.1 = 5	100 x 0.1 = 10

Risk Scale: High (>50 to 100) Moderate (>10 to 50) Low (1 to 10)

Transforming ordinal risk rankings to interval risk measures

Datasets	Impact	Likelihood	Risk
Financial Management	High	High	?
Accountable Care	High	Moderate	?
Population Health Management	Moderate	Moderate	?
Operational and Workflow Improvement	Low	Moderate	?
Patient Injury Prevention	Low	Low	?

Datasets	Impact	Likelihood	Risk
Financial Management	100	1.0	100
Accountable Care	100	0.5	50
Population Health Management	50	0.5	25
Operational and Workflow Improvement	10	0.5	5
Patient Injury Prevention	10	0.1	1



NYC Information Technology & Telecommunications

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CITYWIDE INFORMATION SECURITY POLICY

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The Agency head or desig
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Background

To ensure that business in
of the information must be
Business information asse
business services with inte

Scope

This policy applies to all in
written, stored electronica
New York general busines
customers.

Information Classificatio

All information at the City
four levels; public, sensitive, private, or confidential.

- **Public**—This information might not need to be disclosed, but if it is, it shouldn't cause any damage.
- **Sensitive**—This information requires a greater level of protection to prevent loss of inappropriate disclosure.
- **Private**—This information is for agency use only, and its disclosure would damage the public trust placed in the agency.
- **Confidential**—This is the highest level of sensitivity, and disclosure could cause extreme damage to the agency's ability to perform its primary business function. Datasets containing information whose disclosure could lead directly to massive financial loss, danger to public safety, or lead to loss of life is classified as confidential.

Information Valuation and Categorization

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Updated September 9, 2014 Version 1.5 Data Classification Policy

PUBLIC Use pursuant to City of New York guidelines Page 1 of 3

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How do you assess the value of information to an organization?

Quantitative Risk Assessment

*E*xpected losses can be weighed against the costs of counter-measures and provides a basis for trading Information Security ("InfoSec") costs and benefits

- One simple assessment technique calculates the annual loss expectancy (ALE) as a product of the cost of a single event (single loss expectancy, SLE) and the annualized rate of occurrence (ARO)

$$Annual\ Loss\ Expectancy = \text{Single Loss Expectancy} \times \text{Annualized Rate of Occurrence}$$

annual rate of occurrence (ARO)= how many times is this expected to happen in one year?

- NOTE: The calculation assumes total loss of an asset. If an asset retains part of its useful value, the SLE should be adjusted by an appropriate amount.

Single loss expectancy (SLE) = Asset value X Exposure factor

Problem

How would you determine the Annual Loss Expectance (ALE) for the theft of the Dean's laptop from the Case Study 'Snowfall and a stolen laptop' ?

Annual Loss Expectancy Calculation example

Note the assumptions of:

- *5% probability of annual rate of occurrence*
- *Credit monitoring service for 1,000 individuals*

greatly influence the results…

Annual Loss Expectancy Calculation		
Credit Monitoring Service (1000 records):		$15,000
Dean's Lost Productivity (assume $300,000 salary):		
10 hours restoring data from various sources		$ 3,000
10 hours re-doing lost work		$ 3,000
Replacement Device:		$ 1,000
IT investigation:		$ 200
Single Loss Expectancy:		$22,200
Annualized Rate of Occurrence:	0.05	
Annual Loss Expectancy:		$ 1,100

Risk management decision

Decision:

- Mitigate expected loss of a dean's laptop through purchase of security countermeasures
  - Avoid
  - Accept
  - Transfer
  - ✓ **Mitigate**

Annual Loss Expectancy Calculation		
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10 hours re-doing lost work		$ 3,000
Replacement Device:		$ 1,000
IT investigation:		$ 200
Single Loss Expectancy:		$22,200
Annualized Rate of Occurrence:	0.05	
Annual Loss Expectancy:		$ 1,100
Annual Cost of Countermeasures (per device)		
Automatic Backups:		$ 300
Managed Device Service:		$ 100
Annual Cost of Countermeasures:		$ 400

Analyze Risk

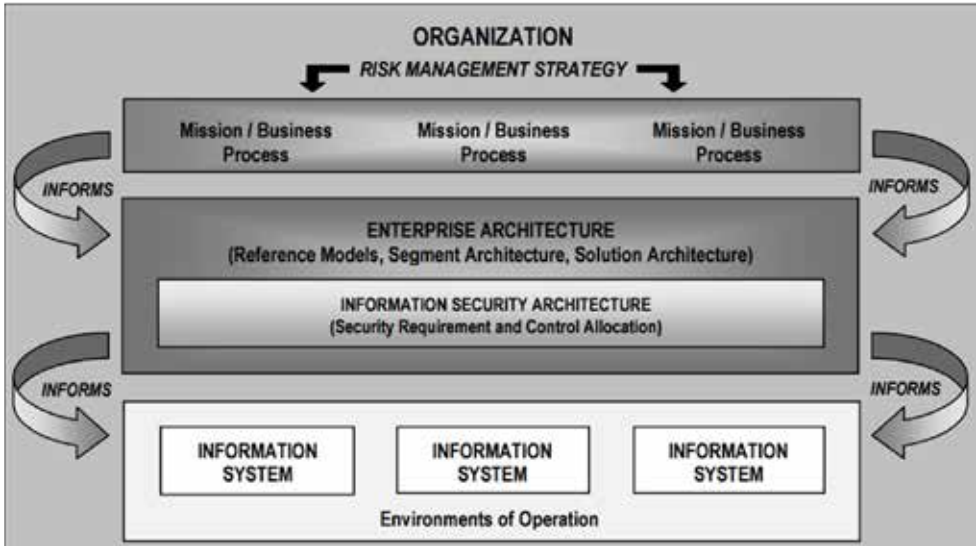
MANAGEMENT GUIDELINES—RE2

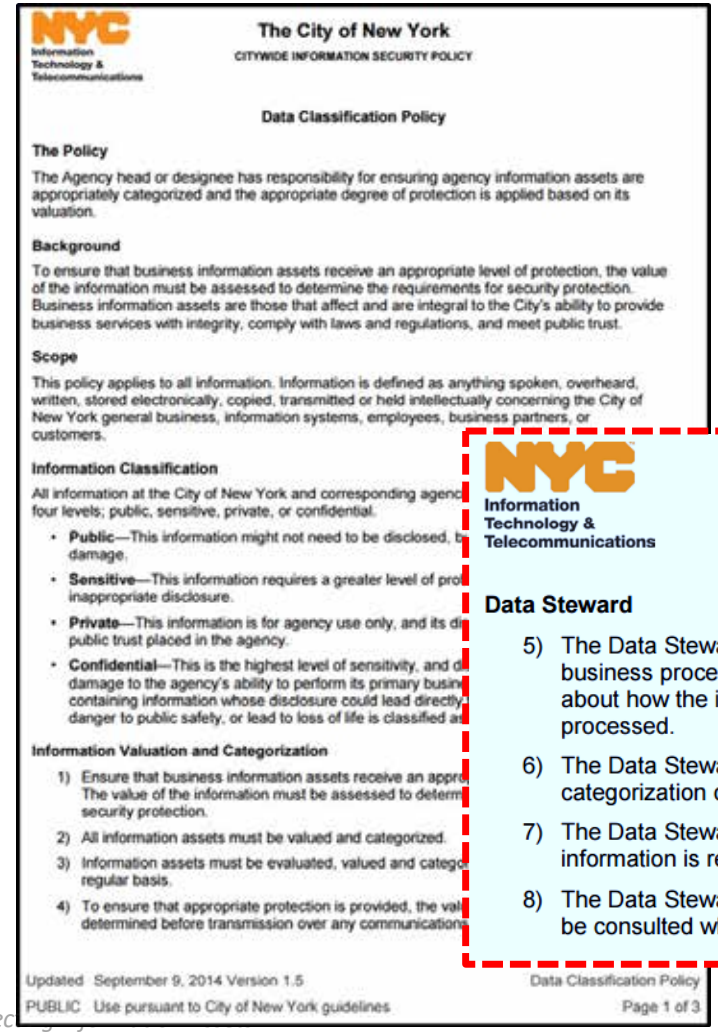
RACI Chart **Roles**

Key Activities	Board	CEO	CRO	CIO	CFO	Enterprise Risk Committee	Business Management	Business Process Owner	Risk Control Functions	HR	Compliance and Audit
RE2.1 Define IT risk analysis scope.		I	R	C	I	C	A	R	C		C
RE2.2 Estimate IT risk.		I	R	C	C	I	A/R	R	R		C
RE2.3 Identify risk response options.			C	C	C	R	A	R	R		I
RE2.4 Perform a peer review of IT risk analysis.			A/R				I		I		I

A **RACI** chart identifies who is **R**esponsible, **A**ccountable, **C**onsulted and/or **I**nformed.

But… who really knows the value and impact a breach implies for the business?





The City of New York

CITYWIDE INFORMATION SECURITY POLICY

Data Classification Policy

The Policy

The Agency head or designee has responsibility for ensuring agency information assets are appropriately categorized and the appropriate degree of protection is applied based on its valuation.

Background

To ensure that business information assets receive an appropriate level of protection, the value of the information must be assessed to determine the requirements for security protection. Business information assets are those that affect and are integral to the City's ability to provide business services with integrity, comply with laws and regulations, and meet public trust.

Scope

This policy applies to all information. Information is defined as anything spoken, overheard, written, stored electronically, copied, transmitted or held intellectually concerning the City of New York general business, information systems, employees, business partners, or customers.

Information Classification

All information at the City of New York and corresponding agenc
four levels; public, sensitive, private, or confidential.

- **Public**—This information might not need to be disclosed, b
damage.
- **Sensitive**—This information requires a greater level of pro
inappropriate disclosure.
- **Private**—This information is for agency use only, and its di
public trust placed in the agency.
- **Confidential**—This is the highest level of sensitivity, and d
damage to the agency's ability to perform its primary busin
containing information whose disclosure could lead directly
danger to public safety, or lead to loss of life is classified a

Information Valuation and Categorization

1) Ensure that business information assets receive an appro
The value of the information must be assessed to determ
security protection.
2) All information assets must be valued and categorized.
3) Information assets must be evaluated, valued and catego
regular basis.
4) To ensure that appropriate protection is provided, the val
determined before transmission over any communication

Updated September 9, 2014 Version 1.5 Data Classification Policy

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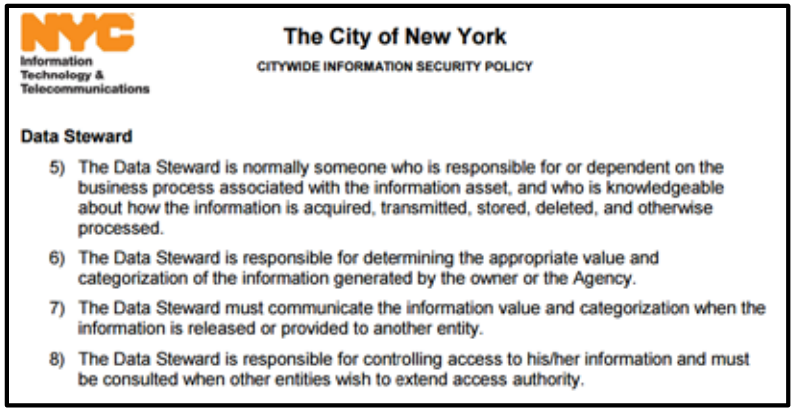

The City of New York

CITYWIDE INFORMATION SECURITY POLICY

Data Steward

5) The Data Steward is normally someone who is responsible for or dependent on the business process associated with the information asset, and who is knowledgeable about how the information is acquired, transmitted, stored, deleted, and otherwise processed.
6) The Data Steward is responsible for determining the appropriate value and categorization of the information generated by the owner or the Agency.
7) The Data Steward must communicate the information value and categorization when the information is released or provided to another entity.
8) The Data Steward is responsible for controlling access to his/her information and must be consulted when other entities wish to extend access authority.

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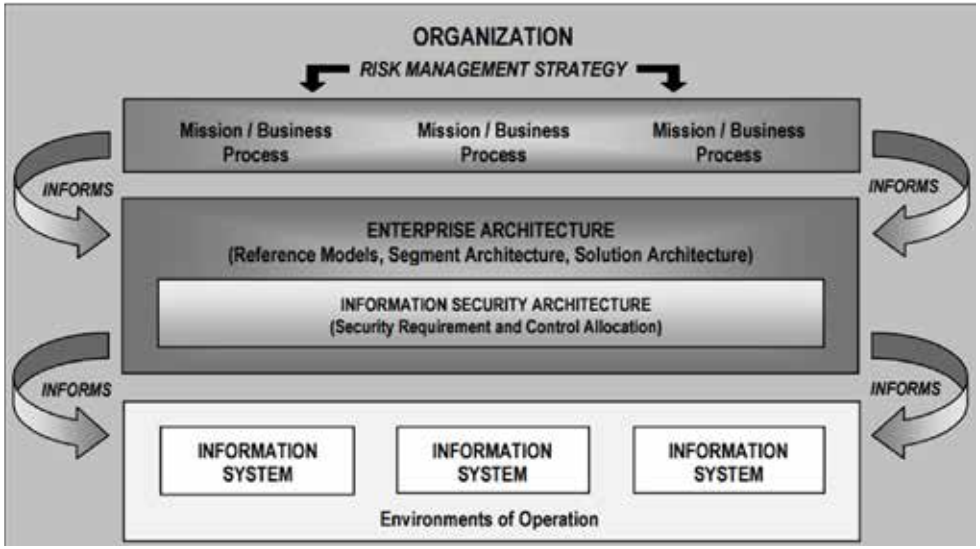
Where are the people who really know the value of the information and impact a breach implies for the business?



Maintain Risk Profile

RACI Chart **Roles**

Key Activities	Board	CEO	CRO	CIO	CFO	Enterprise Risk Committee	Business Management	Business Process Owner	Risk Control Functions	HR	Compliance and Audit
RE3.1 Map IT resources to business processes.			I	R			C	A/R	C		I
RE3.2 Determine business criticality of IT resouces.		C		R		C	A	R			I
RE3.3 Understand IT capabilities.			C	A/R				C	C		I
RE3.4 Update IT risk scenario componenets.			C	R	I	C	C	A	R		C
RE3.5 Maintain the IT risk register and IT risk map.		I	A	R	I	I	I	R/C	C		I
RE3.6 Develop IT risk indicators.			A	C			C	C	R	C	C

A **RACI** chart identifies who is **R**esponsible, **A**ccountable, **C**onsulted and/or **I**nformed.

NYC Information Technology & Telecommunications

The City of New York

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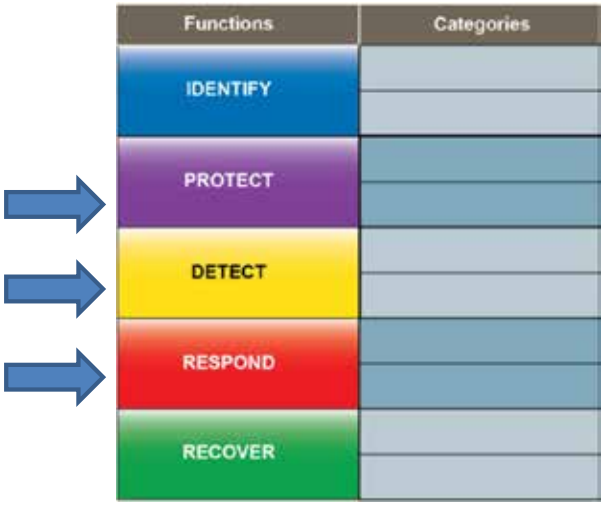
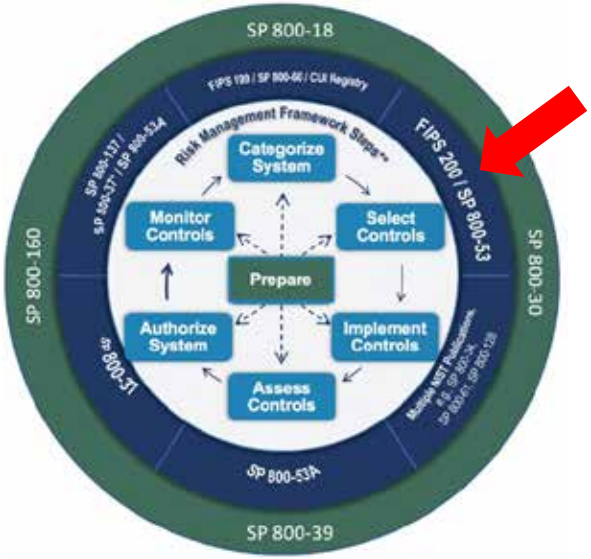
Review: Risk Management Techniques

Once threats and risks are identified, each risk can be managed by:

1. Avoidance
2. Acceptance
3. Transfer
4. Mitigation ("Controls")





Agenda

- ✓ Categorizing Information for IT Risk Management
- ✓ Revisit Risk & Controls of Publicly Shared Geographic Information
- ✓ More on Confidentiality: Linked & Linkable PII
- ✓ Risk Evaluation
- ✓ Risk Management Techniques, a brief review
- Test taking tip
- Quiz

Test Taking Tip

- Eliminate any "probably wrong" answers first -

Focus on the "highest likelihood" answers for test taking efficiency

Here's why:

- Some of the answers use unfamiliar terms and stand out as unlikely and can therefore be discarded immediately
- Some answers are clearly wrong and you can recognize them based on your familiarity with the subject
- The correct answer may require a careful reading of the wording of the question and eliminating the unlikely answers early in the evaluation process helps you focus on key concepts for making the choice

Test Taking Tip

Example:

The promotion manager of Northeast Electronics has been made the owner of the department's printers and other resources. The manager can now designate who in the department can use the the large format printer. What term is used to describe this type of access control?

A. Mandatory
B. Role-Based
C. Discretionary
D. Distributed

Test Taking Tip

Example:

The promotion manager of Northeast Electronics has been made the owner of the department's printers and other resources. The manager can now designate who in the department can use the the large format printer. What term is used to describe this type of access control?

~~A. Mandatory~~ Nothing seems mandatory about this scenario

B. Role-Based

C. Discretionary

D. Distributed

Test Taking Tip

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~~A. Mandatory~~

B. Role-Based Maybe ….

C. Discretionary

D. Distributed

Test Taking Tip

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~~A. Mandatory~~

~~B. Role-Based~~ Nothing about roles other than manager in the question

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D. Distributed

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C. Discretionary
~~D. Distributed~~ Distributed is not relevant to the information in the question

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C. Discretionary
~~D. Distributed~~

Answer: C

Quiz

Quiz

The overall objective of risk management is to:

A. eliminate all vulnerabilities, if possible
B. reduce risk to the lowest possible level
C. manage risk to an acceptable level
D. implement effective counter measures

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Quiz

The information security manager should treat regulatory compliance as:

A. an organizational mandate
B. a risk management priority
C. a purely operational issue
D. another risk to be managed

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Quiz

To address changes in risk, an effective risk management program should

A. ensure that continuous monitoring processes are in place
B. establish proper security baselines for all information resources
C. implement a complete data classification process
D. change security policies on a timely basis to address changing risk

Quiz

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Quiz

Information classification is important to properly manage risk PRIMARILY because:

A. it ensures accountability for information resources as required by rolesand responsibilities
B. it is a legal requirement under various regulations
C. it ensures adequate protection of assets commensurate with the degree of risk
D. asset protection can then be based on the potential consequences ofcompromise

Quiz

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Quiz

Data owners are PRIMARILY responsible for creating risk mitigation strategies to address which of the following areas?

A. Platform security
B. Entitlement changes
C. Intrusion detection
D. Antivirus controls

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D. Antivirus controls

An entitlement is a provision made in accordance with a legal framework of a society. Typically, entitlements are based on concepts of principle which are themselves based in concepts of social equality or enfranchisement. Wikipedia

Quiz

A risk analysis should:

A. limit the scope to a benchmark of similar companies
B. assume an equal degree of protection of all assets
C. address the potential size and likelihood of loss
D. give more weight to the likelihood vs. the size of the loss

Quiz

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Quiz – *Bonus question*

A year ago when Sam carried out a risk analysis, he determined that the company was at too much of a risk when it came to potentially loosing trade secrets.

The countermeasures his team implemented reduced this risk, and Sam determined that the annualized loss expectancy of the risk of a trade secret being stolen once in a hundred-year period is now $400.

What is the associated single loss expectancy value in this scenario?

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