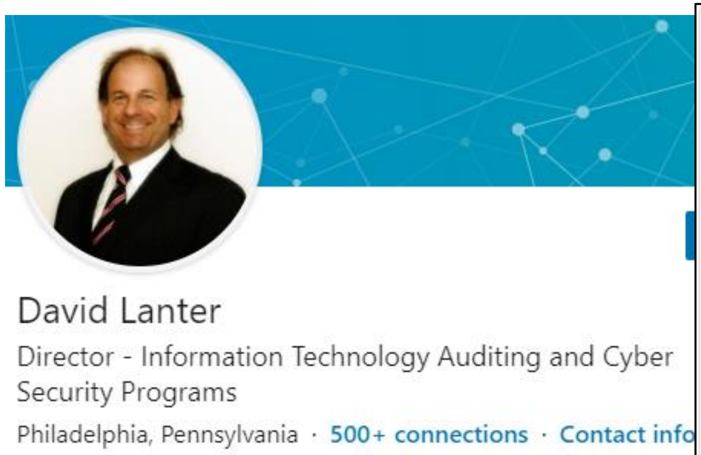
Managing Enterprise Cybersecurity
MIS 4596

Class 1

Agenda

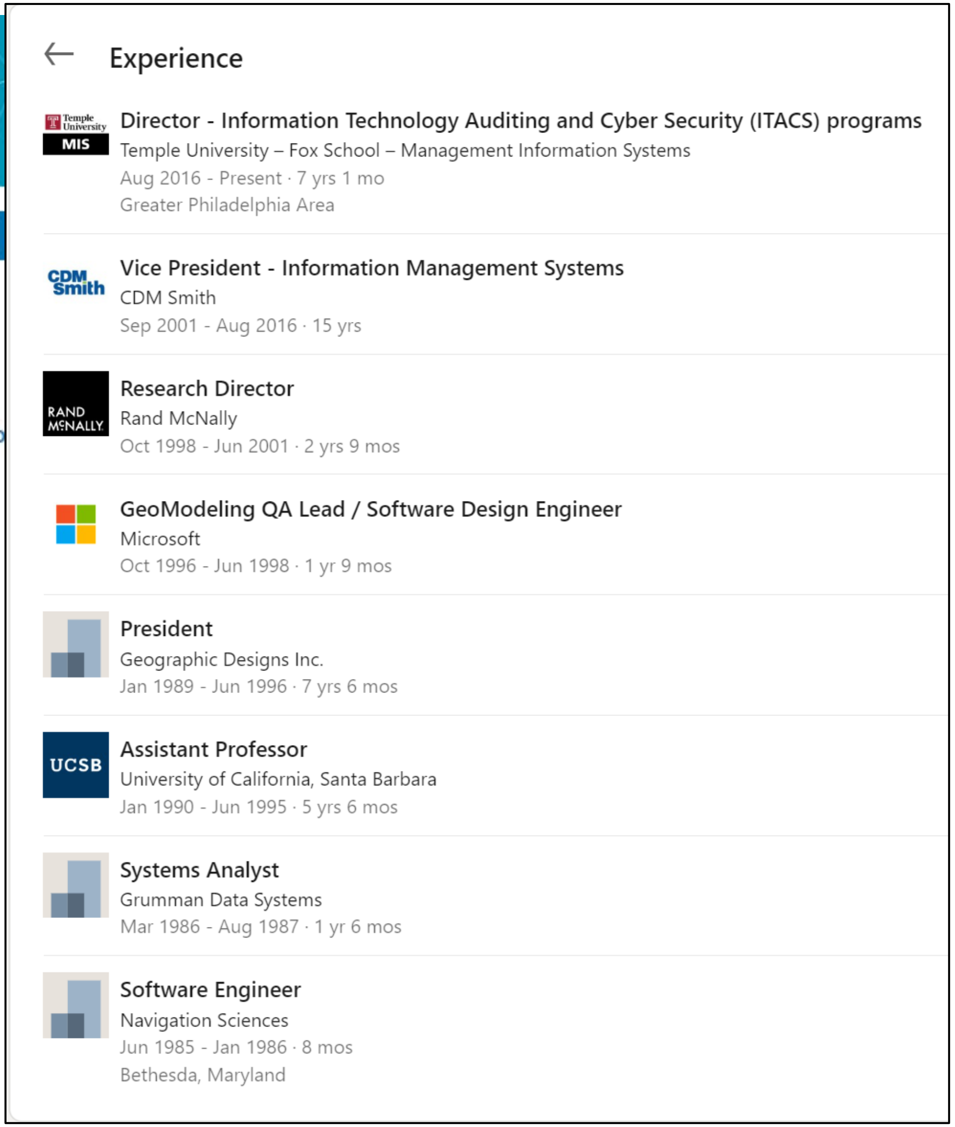
- Instructor
- Course overview
- Introduction
- Need for Cybersecurity Professionals

Instructor


David Lanter

Director - Information Technology Auditing and Cyber Security Programs

Philadelphia, Pennsylvania · 500+ connections · Contact info


Experience

Director - Information Technology Auditing and Cyber Security (ITACS) programs
Temple University – Fox School – Management Information Systems
Aug 2016 - Present · 7 yrs 1 mo
Greater Philadelphia Area

Vice President - Information Management Systems
CDM Smith
Sep 2001 - Aug 2016 · 15 yrs

Research Director
Rand McNally
Oct 1998 - Jun 2001 · 2 yrs 9 mos

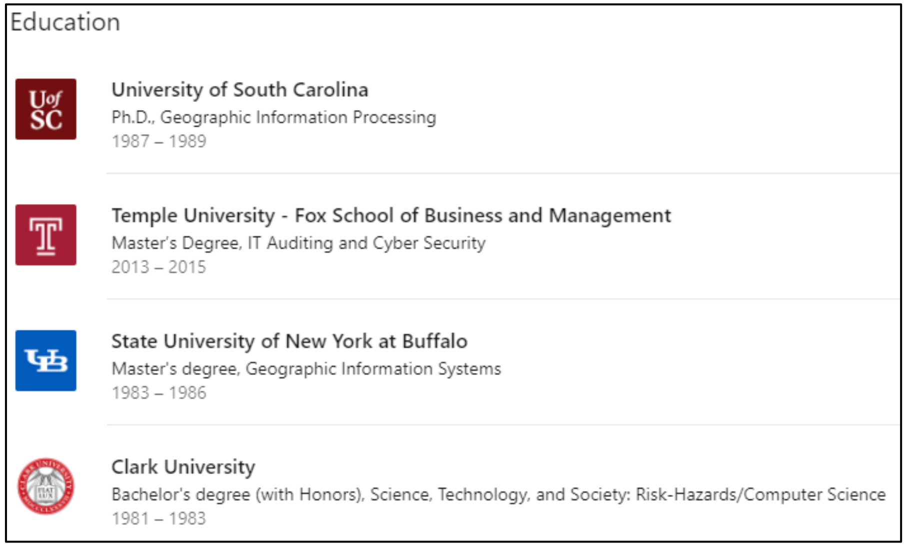
GeoModeling QA Lead / Software Design Engineer
Microsoft
Oct 1996 - Jun 1998 · 1 yr 9 mos

President
Geographic Designs Inc.
Jan 1989 - Jun 1996 · 7 yrs 6 mos

Assistant Professor
University of California, Santa Barbara
Jan 1990 - Jun 1995 · 5 yrs 6 mos

Systems Analyst
Grumman Data Systems
Mar 1986 - Aug 1987 · 1 yr 6 mos

Software Engineer
Navigation Sciences
Jun 1985 - Jan 1986 · 8 mos
Bethesda, Maryland

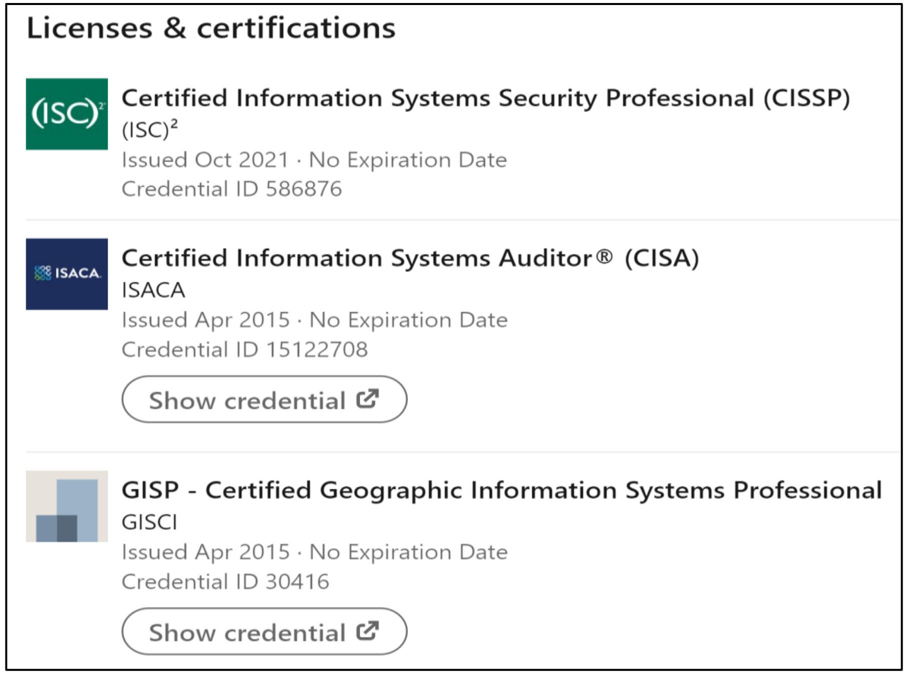

Education

University of South Carolina
Ph.D., Geographic Information Processing
1987 – 1989

Temple University - Fox School of Business and Management
Master's Degree, IT Auditing and Cyber Security
2013 – 2015

State University of New York at Buffalo
Master's degree, Geographic Information Systems
1983 – 1986

Clark University
Bachelor's degree (with Honors), Science, Technology, and Society: Risk-Hazards/Computer Science
1981 – 1983


Licenses & certifications

Certified Information Systems Security Professional (CISSP)
(ISC)²
Issued Oct 2021 · No Expiration Date
Credential ID 586876

Certified Information Systems Auditor® (CISA)
ISACA
Issued Apr 2015 · No Expiration Date
Credential ID 15122708
Show credential

GISP - Certified Geographic Information Systems Professional
GISCI
Issued Apr 2015 · No Expiration Date
Credential ID 30416
Show credential

Agenda

- ✓Instructor
- Introduction
- Course overview
- Need for Cybersecurity Professionals

Course objective

- This course is a broad introduction to the managerial issues of information security
- Because security is multifaceted, the topics of the class range widely, including technical, managerial, physical, and psychological issues
- A key objective of the class is to develop a security mindset, in which one learns to think like an attacker for ways to exploit a system

Course learning goals

- Develop a security mindset

  Learn to think like a security professional—how to identify threats like an attacker, and how to model and mitigate those threats.

- Gain a working knowledge of methods to protect data

  Gain a working knowledge of modern methods of protecting data: encryption, hashing, confidentiality, authentication, integrity, non-repudiation, certificates, and IP security.

- Learn methods of attack and defense

  Learn methods of attacking systems and how to protect against those methods of attacks.

- Appreciate the broad disciplines required for IS security

  Appreciate the broad disciplines required for information security to work. We'll cover subjects as comprehensive as cryptology, physical security, psychology, and management, based on based on:

  - NIST Cybersecurity Framework Version 1.1 (https://www.nist.gov/cyberframework/framework)
  - NIST Risk Management Framework (https://csrc.nist.gov/projects/risk-management/about-rmf)

- Communicate security risks and responses effectively

  This course is a Temple-designated writing intensive course

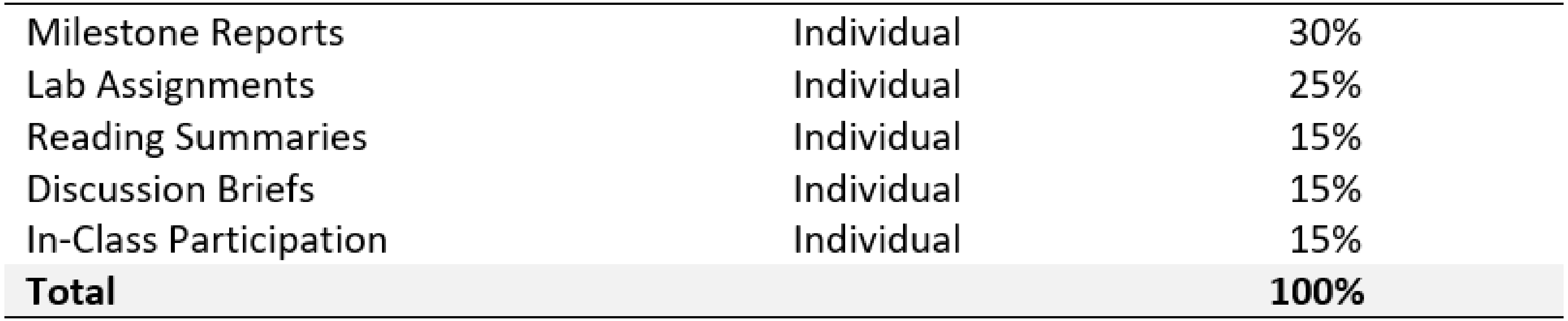
  As such, a substantial portion of the course will be devoted to practicing capable, proficient written and verbal communication of cybersecurity risks, threats, mitigations, and responses to relevant stakeholders for their decision making

Course learning goals

University-Designated Writing-Intensive (W) Course

- This is a University-designated writing-intensive course, and by passing this course, students will fulfill the University requirement that "All undergraduate students must complete at least two writing-intensive courses for a total of at least six credits" (https://bulletin.temple.edu/undergraduate/academic-programs/writing-intensive-courses/).
- As such, this course requires a substantial amount of writing for individual assignments throughout the semester.
- There is no group project in this class; all deliverables are individual assignments. There will be no mid-term and final exams.

Grading



Milestone Reports	Individual	30%
Lab Assignments	Individual	25%
Reading Summaries	Individual	15%
Discussion Briefs	Individual	15%
In-Class Participation	Individual	15%
Total		**100%**

Milestones

Milestones (30%)

Students will complete Milestone projects that utilize hands-on skills and apply knowledge from class discussions and lab activities. Each will require submission of a written report for superiors or consulting clients to advise them of important cybersecurity concerns.

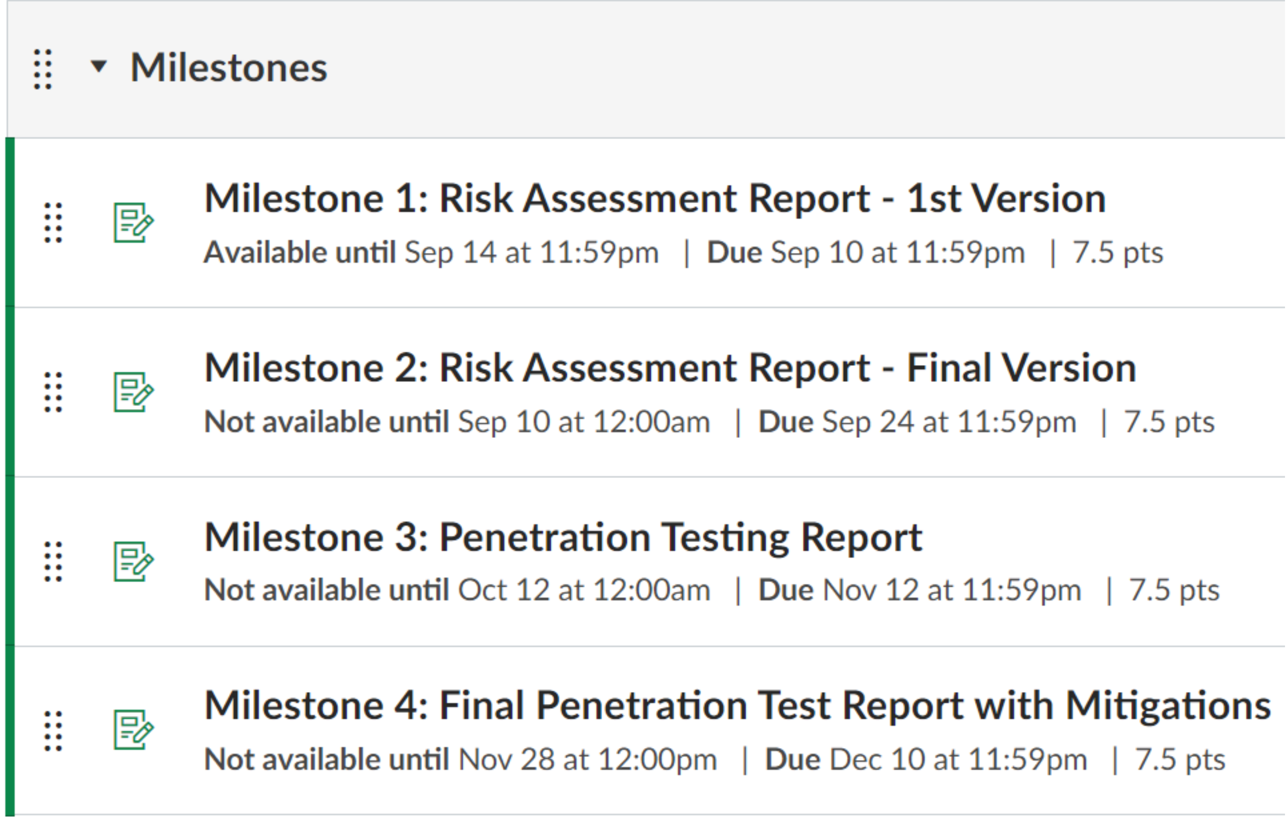
There are four milestone project reports that will help students develop professional written and verbal cybersecurity communication skills.

- Milestone 1: Draft Risk Assessment Report
- Milestone 2: Final Risk Assessment Report
- Milestone 3: Penetration Test Findings Report
- Milestone 4: Penetration Test with Recommendations Report

- Late submissions are subject to a 20% deduction in points per each 12 hours late.
- **Note:** ***Completing lab assignments 1-7 will provide you with necessary knowledge and skills that will enable you to complete Milestones 3 & 4.***

Milestones are found in Canvas

Canvas: https://templeu.instructure.com/courses/132148



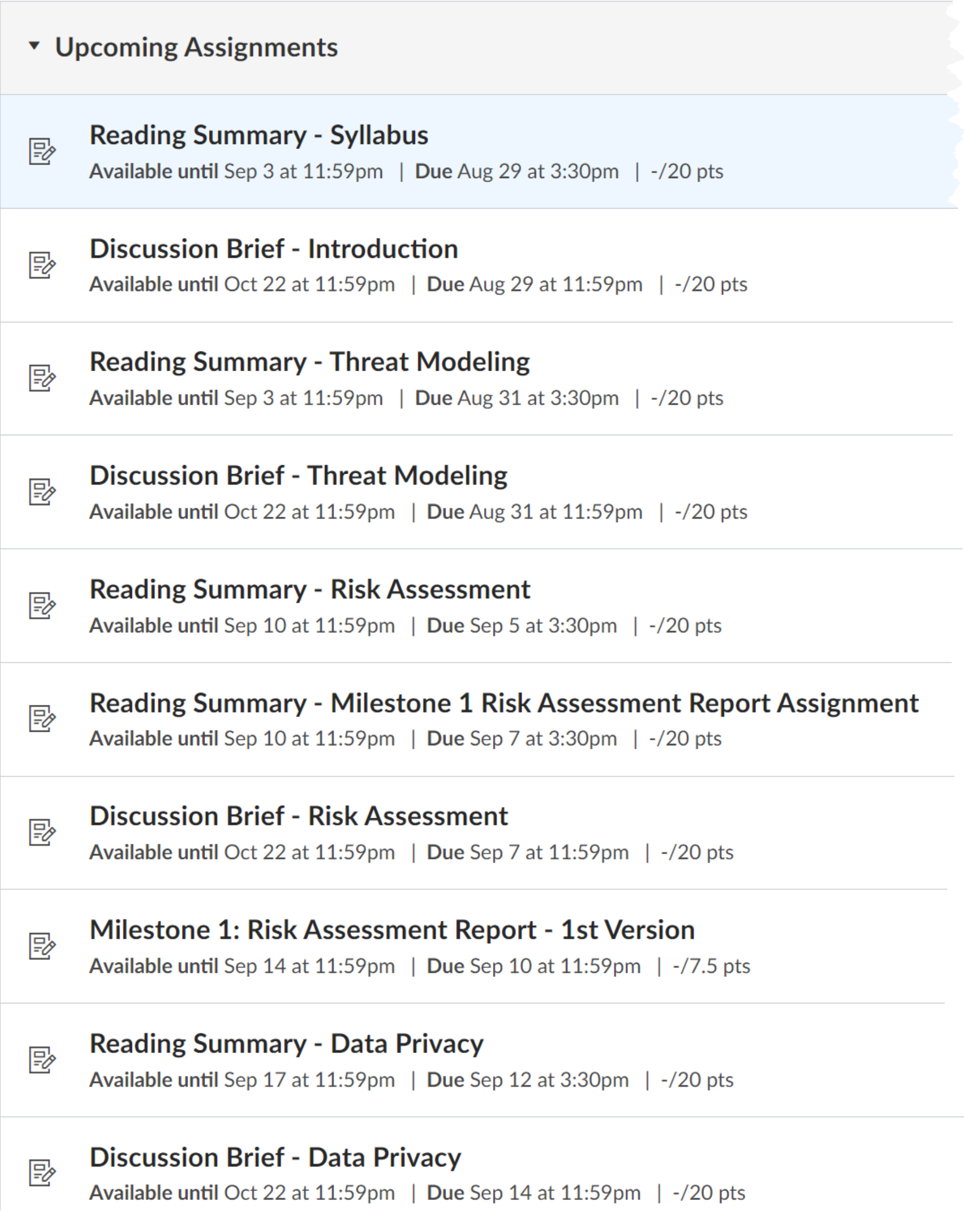
Milestones

Milestone 1: Risk Assessment Report - 1st Version
Available until Sep 14 at 11:59pm | **Due** Sep 10 at 11:59pm | 7.5 pts

Milestone 2: Risk Assessment Report - Final Version
Not available until Sep 10 at 12:00am | **Due** Sep 24 at 11:59pm | 7.5 pts

Milestone 3: Penetration Testing Report
Not available until Oct 12 at 12:00am | **Due** Nov 12 at 11:59pm | 7.5 pts

Milestone 4: Final Penetration Test Report with Mitigations
Not available until Nov 28 at 12:00pm | **Due** Dec 10 at 11:59pm | 7.5 pts



Upcoming Assignments

Reading Summary - Syllabus
Available until Sep 3 at 11:59pm | **Due** Aug 29 at 3:30pm | -/20 pts

Discussion Brief - Introduction
Available until Oct 22 at 11:59pm | **Due** Aug 29 at 11:59pm | -/20 pts

Reading Summary - Threat Modeling
Available until Sep 3 at 11:59pm | **Due** Aug 31 at 3:30pm | -/20 pts

Discussion Brief - Threat Modeling
Available until Oct 22 at 11:59pm | **Due** Aug 31 at 11:59pm | -/20 pts

Reading Summary - Risk Assessment
Available until Sep 10 at 11:59pm | **Due** Sep 5 at 3:30pm | -/20 pts

Reading Summary - Milestone 1 Risk Assessment Report Assignment
Available until Sep 10 at 11:59pm | **Due** Sep 7 at 3:30pm | -/20 pts

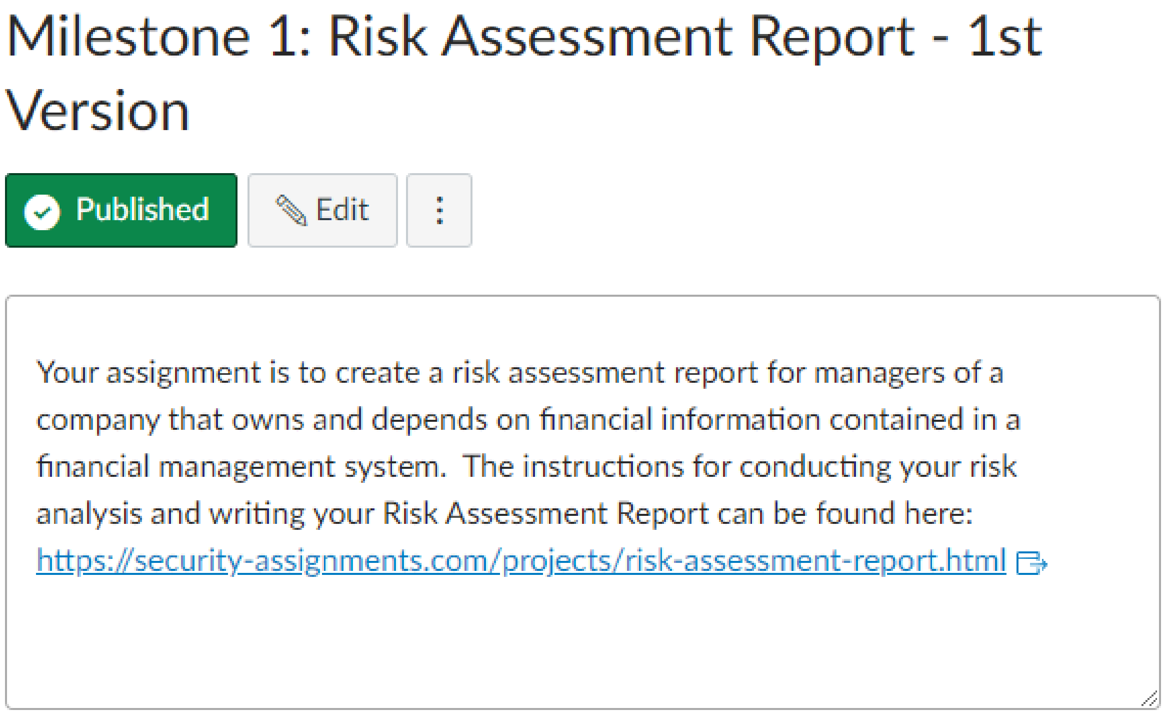
Discussion Brief - Risk Assessment
Available until Oct 22 at 11:59pm | **Due** Sep 7 at 11:59pm | -/20 pts

Milestone 1: Risk Assessment Report - 1st Version
Available until Sep 14 at 11:59pm | **Due** Sep 10 at 11:59pm | -/7.5 pts

Reading Summary - Data Privacy
Available until Sep 17 at 11:59pm | **Due** Sep 12 at 3:30pm | -/20 pts

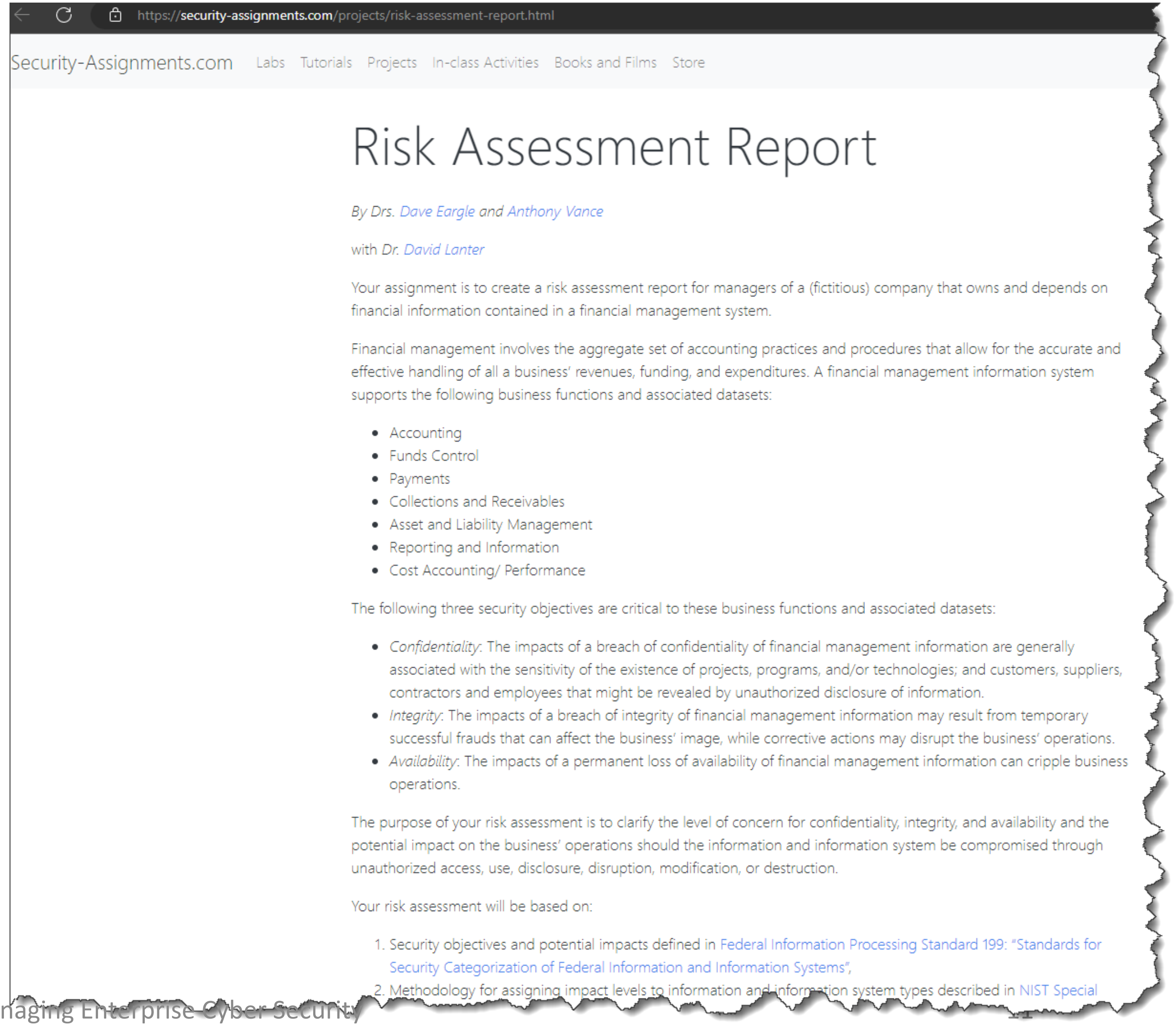
Discussion Brief - Data Privacy
Available until Oct 22 at 11:59pm | **Due** Sep 14 at 11:59pm | -/20 pts

Milestones are found in Canvas



Milestone 1: Risk Assessment Report - 1st Version

Your assignment is to create a risk assessment report for managers of a company that owns and depends on financial information contained in a financial management system. The instructions for conducting your risk analysis and writing your Risk Assessment Report can be found here: https://security-assignments.com/projects/risk-assessment-report.html



Risk Assessment Report

By Drs. Dave Eargle and Anthony Vance

with Dr. *David Lanter*

Your assignment is to create a risk assessment report for managers of a (fictitious) company that owns and depends on financial information contained in a financial management system.

Financial management involves the aggregate set of accounting practices and procedures that allow for the accurate and effective handling of all a business' revenues, funding, and expenditures. A financial management information system supports the following business functions and associated datasets:

- Accounting
- Funds Control
- Payments
- Collections and Receivables
- Asset and Liability Management
- Reporting and Information
- Cost Accounting/ Performance

The following three security objectives are critical to these business functions and associated datasets:

- *Confidentiality*: The impacts of a breach of confidentiality of financial management information are generally associated with the sensitivity of the existence of projects, programs, and/or technologies; and customers, suppliers, contractors and employees that might be revealed by unauthorized disclosure of information.
- *Integrity*: The impacts of a breach of integrity of financial management information may result from temporary successful frauds that can affect the business' image, while corrective actions may disrupt the business' operations.
- *Availability*: The impacts of a permanent loss of availability of financial management information can cripple business operations.

The purpose of your risk assessment is to clarify the level of concern for confidentiality, integrity, and availability and the potential impact on the business' operations should the information and information system be compromised through unauthorized access, use, disclosure, disruption, modification, or destruction.

Your risk assessment will be based on:

1. Security objectives and potential impacts defined in Federal Information Processing Standard 199: "Standards for Security Categorization of Federal Information and Information Systems",
2. Methodology for assigning impact levels to information and information system types described in NIST Special

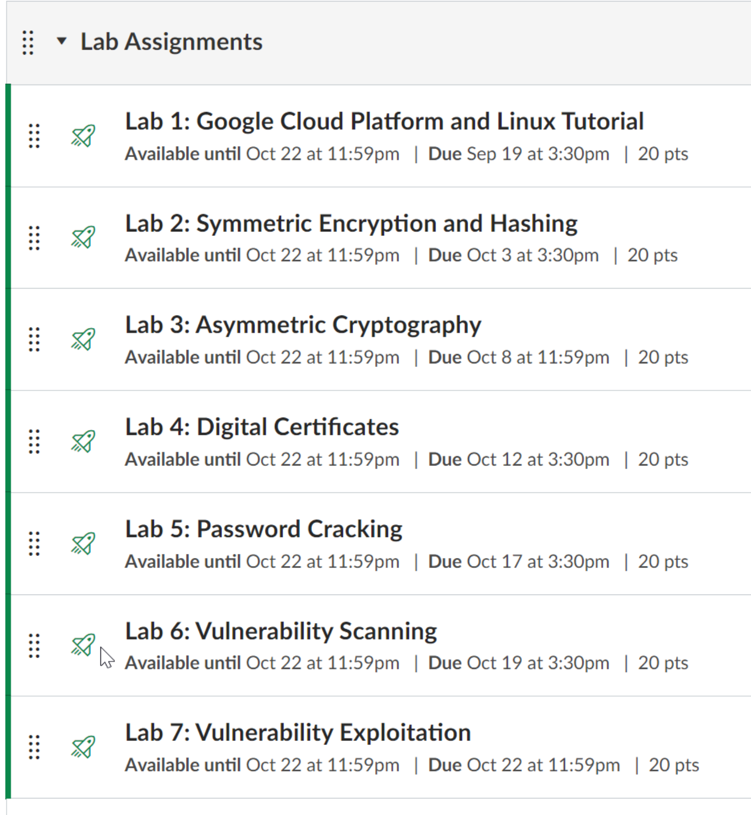
Labs

Lab Assignments (25%)

These are hands-on learning activities that are completed by students outside of class.

- There are 9 labs
- It is strongly recommended to complete each lab when it is due throughout the semester.

  Note: ***Completing lab assignments 1-7 will provide you with knowledge and skills necessary for completing Milestones 3 & 4.***
- Labs 1-7 are due by Sunday October 22, 2023
- Labs 8-9 are due by Sunday December 11, 2023
- No late submissions will be accepted.



Lab Assignments

Lab 1: Google Cloud Platform and Linux Tutorial
Available until Oct 22 at 11:59pm | **Due** Sep 19 at 3:30pm | 20 pts

Lab 2: Symmetric Encryption and Hashing
Available until Oct 22 at 11:59pm | **Due** Oct 3 at 3:30pm | 20 pts

Lab 3: Asymmetric Cryptography
Available until Oct 22 at 11:59pm | **Due** Oct 8 at 11:59pm | 20 pts

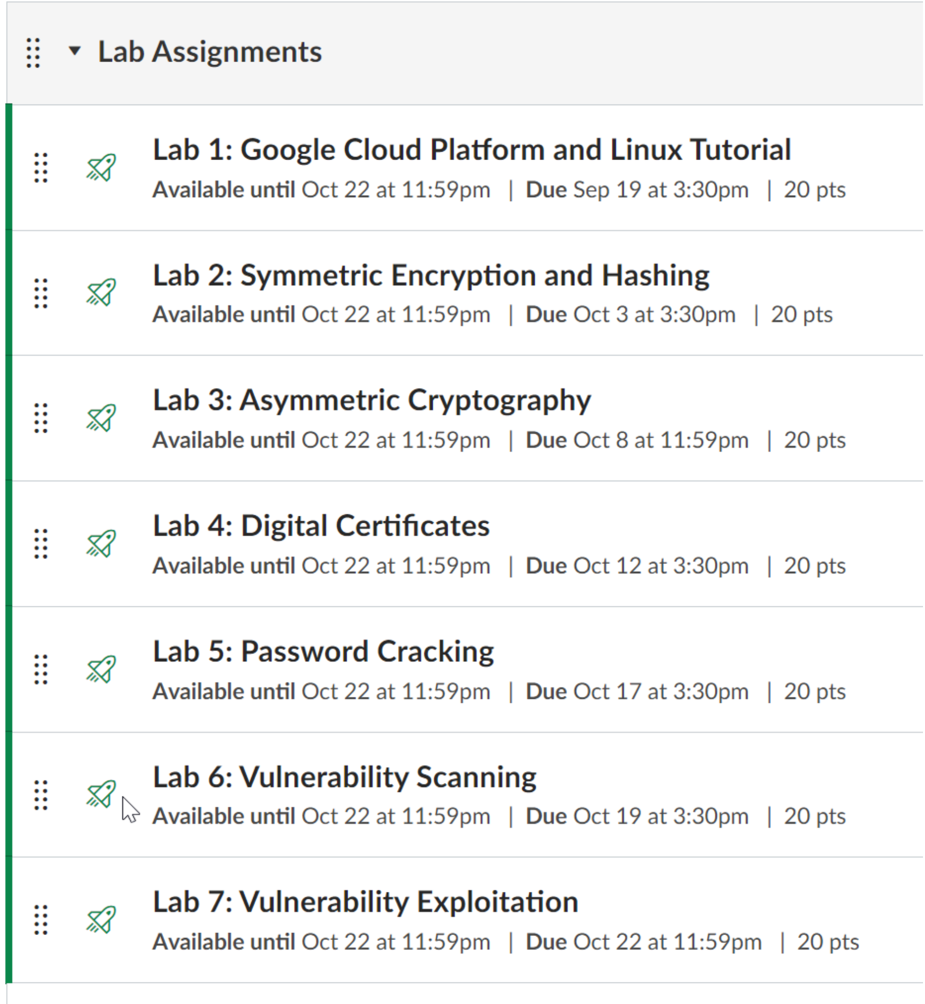
Lab 4: Digital Certificates
Available until Oct 22 at 11:59pm | **Due** Oct 12 at 3:30pm | 20 pts

Lab 5: Password Cracking
Available until Oct 22 at 11:59pm | **Due** Oct 17 at 3:30pm | 20 pts

Lab 6: Vulnerability Scanning
Available until Oct 22 at 11:59pm | **Due** Oct 19 at 3:30pm | 20 pts

Lab 7: Vulnerability Exploitation
Available until Oct 22 at 11:59pm | **Due** Oct 22 at 11:59pm | 20 pts

Labs are found in Canvas



Lab 1: Google Cloud Platform and Linux Tutorial
Available until Oct 22 at 11:59pm | **Due** Sep 19 at 3:30pm | 20 pts

Lab 2: Symmetric Encryption and Hashing
Available until Oct 22 at 11:59pm | **Due** Oct 3 at 3:30pm | 20 pts

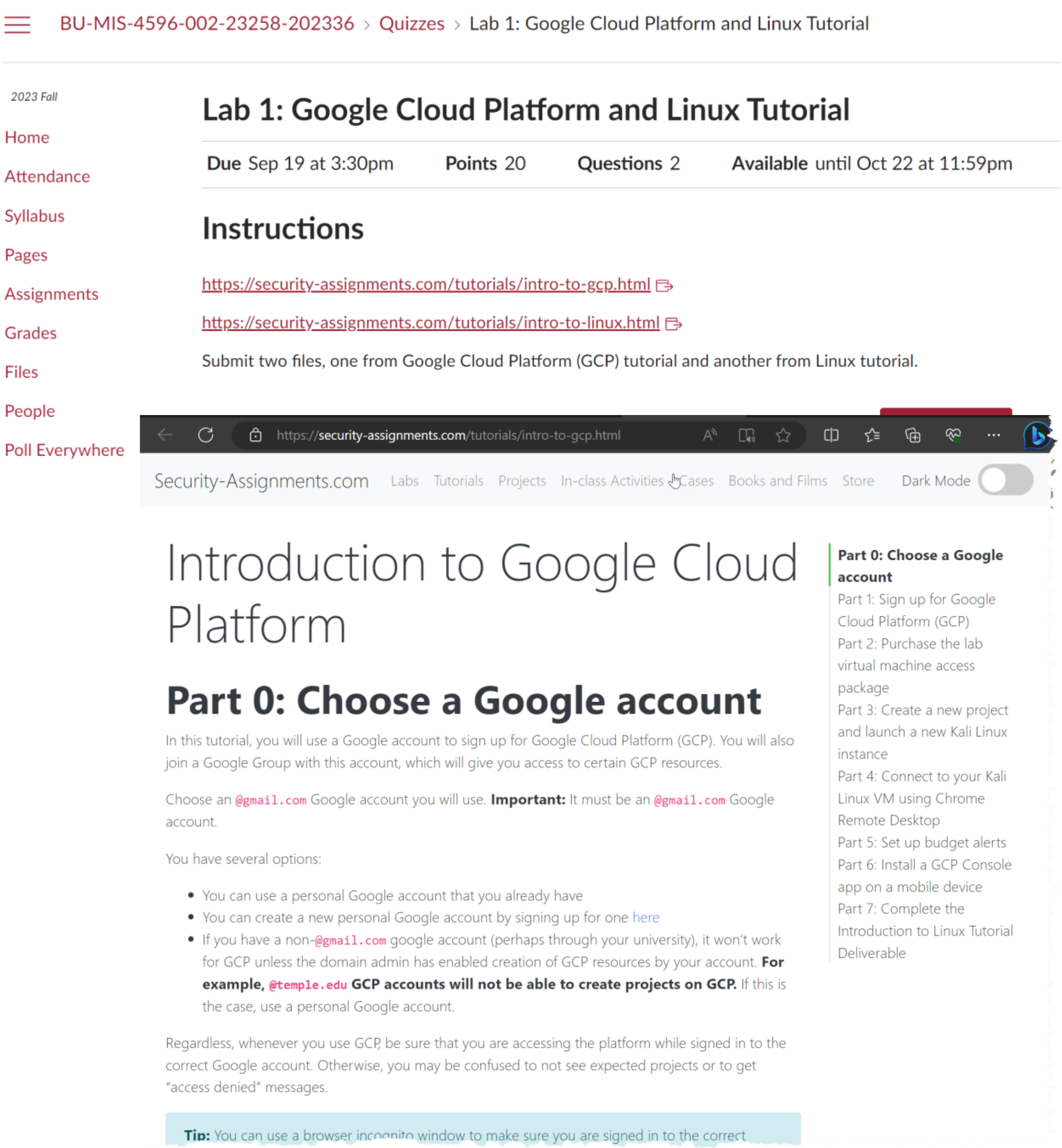
Lab 3: Asymmetric Cryptography
Available until Oct 22 at 11:59pm | **Due** Oct 8 at 11:59pm | 20 pts

Lab 4: Digital Certificates
Available until Oct 22 at 11:59pm | **Due** Oct 12 at 3:30pm | 20 pts

Lab 5: Password Cracking
Available until Oct 22 at 11:59pm | **Due** Oct 17 at 3:30pm | 20 pts

Lab 6: Vulnerability Scanning
Available until Oct 22 at 11:59pm | **Due** Oct 19 at 3:30pm | 20 pts

Lab 7: Vulnerability Exploitation
Available until Oct 22 at 11:59pm | **Due** Oct 22 at 11:59pm | 20 pts



BU-MIS-4596-002-23258-202336 › Quizzes › Lab 1: Google Cloud Platform and Linux Tutorial
2023 Fall
Home
Attendance
Syllabus
Pages
Assignments
Grades
Files
People
Poll Everywhere

Lab 1: Google Cloud Platform and Linux Tutorial

Due Sep 19 at 3:30pm **Points** 20 **Questions** 2 **Available** until Oct 22 at 11:59pm

Instructions

https://security-assignments.com/tutorials/intro-to-gcp.html

https://security-assignments.com/tutorials/intro-to-linux.html

Submit two files, one from Google Cloud Platform (GCP) tutorial and another from Linux tutorial.

Introduction to Google Cloud Platform

Part 0: Choose a Google account

In this tutorial, you will use a Google account to sign up for Google Cloud Platform (GCP). You will also join a Google Group with this account, which will give you access to certain GCP resources.

Choose an `@gmail.com` Google account you will use. **Important:** It must be an `@gmail.com` Google account.

You have several options:

- You can use a personal Google account that you already have
- You can create a new personal Google account by signing up for one here
- If you have a non-`@gmail.com` google account (perhaps through your university), it won't work for GCP unless the domain admin has enabled creation of GCP resources by your account. **For example, `@temple.edu` GCP accounts will not be able to create projects on GCP.** If this is the case, use a personal Google account.

Regardless, whenever you use GCP, be sure that you are accessing the platform while signed in to the correct Google account. Otherwise, you may be confused to not see expected projects or to get "access denied" messages.

Tip: You can use a browser incognito window to make sure you are signed in to the correct

Part 0: Choose a Google account
Part 1: Sign up for Google Cloud Platform (GCP)
Part 2: Purchase the lab virtual machine access package
Part 3: Create a new project and launch a new Kali Linux instance
Part 4: Connect to your Kali Linux VM using Chrome Remote Desktop
Part 5: Set up budget alerts
Part 6: Install a GCP Console app on a mobile device
Part 7: Complete the Introduction to Linux Tutorial
Deliverable

Labs

Lab Peer Support:

Students are encouraged to help each other complete lab assignments. When a student offers help to another to complete one lab assignment, he/she will receive a 3% extra credit to the lab assignment.

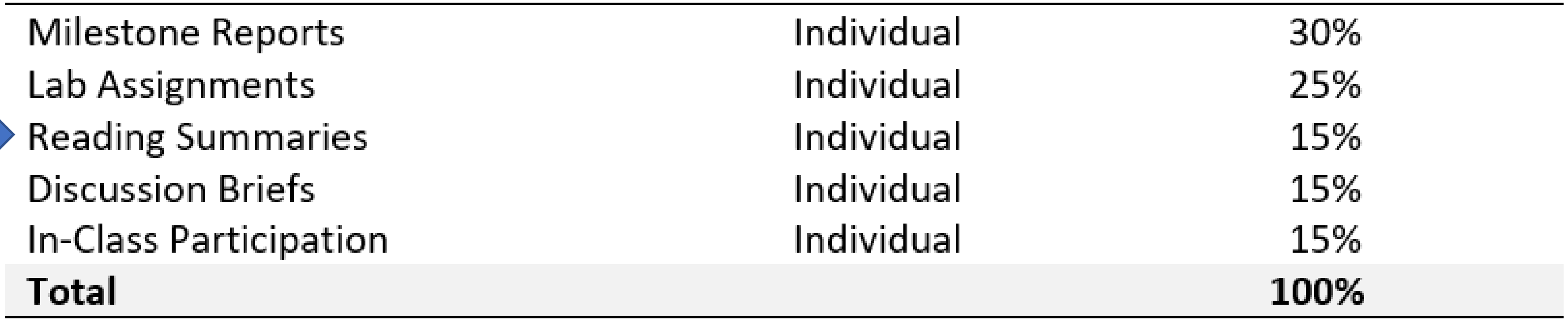
- **For example,**
  - If Michael reports that Molly helped him for Lab #2, Molly will receive a 3% extra credit to her Lab #2 grade.
  - If Molly is reported to have helped two of her classmates, she will receive an 6% extra credit.

MIS 4596 – Managing Enterprise Cyber Security

- The one who receives help must submit the helper’s name in an email submission to Prof. Lanter by December 4th.
  - In other words, Michael should send an email to Prof. Lanter reporting that he received help on Lab #2 from Molly.

- A student can report receiving help only from one student in one lab.
  - Michael cannot report help from both Molly and Stuart.

Grading



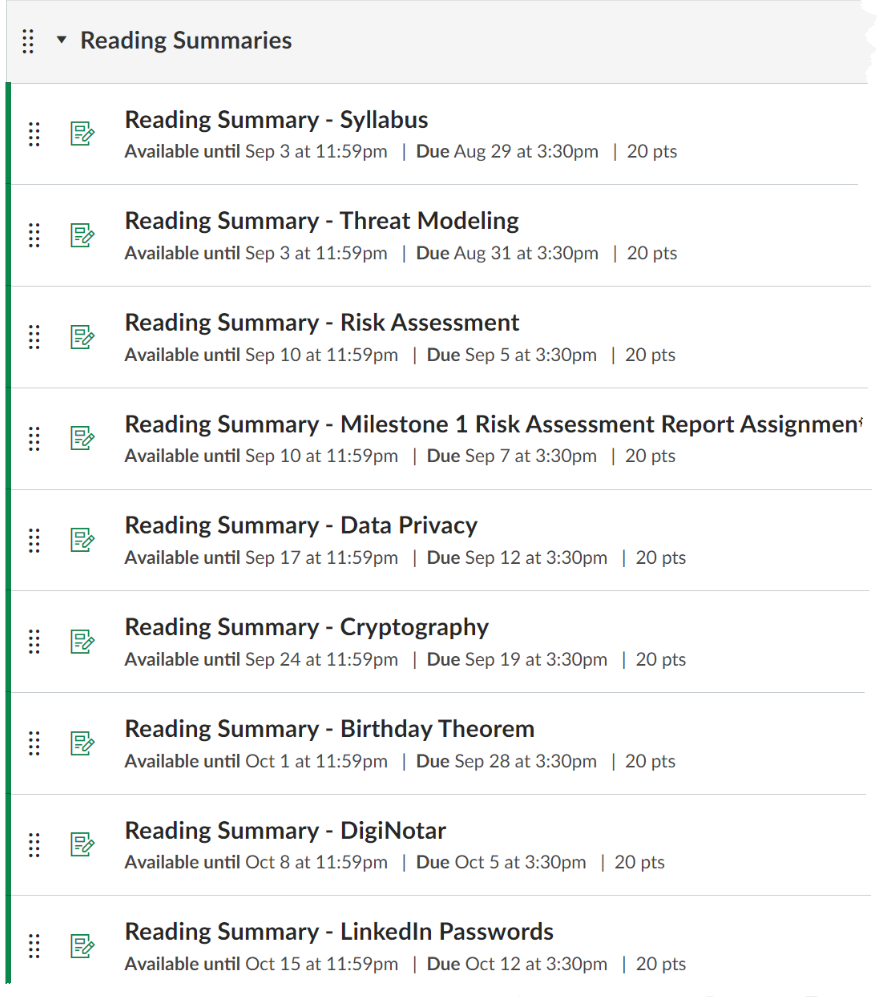
Milestone Reports	Individual	30%
Lab Assignments	Individual	25%
Reading Summaries	Individual	15%
Discussion Briefs	Individual	15%
In-Class Participation	Individual	15%
Total		**100%**

Reading Summaries (15%)

Students are to summarize assigned readings/videos (news articles, textbook chapters, or Harvard Business cases) before each week's class.

- Up to 200 words in each summary
- Due before the class on which the reading is assigned
- No late submission will be accepted
- Goal: This is to make sure students read assigned readings, which promote more effective in-class discussions
- Grading Criteria: Clarity, Comprehensiveness, Grammar, and Organization

Reading Summaries are found in Canvas



Reading Summaries

Reading Summary - Syllabus
Available until Sep 3 at 11:59pm | **Due** Aug 29 at 3:30pm | 20 pts

Reading Summary - Threat Modeling
Available until Sep 3 at 11:59pm | **Due** Aug 31 at 3:30pm | 20 pts

Reading Summary - Risk Assessment
Available until Sep 10 at 11:59pm | **Due** Sep 5 at 3:30pm | 20 pts

Reading Summary - Milestone 1 Risk Assessment Report Assignmen
Available until Sep 10 at 11:59pm | **Due** Sep 7 at 3:30pm | 20 pts

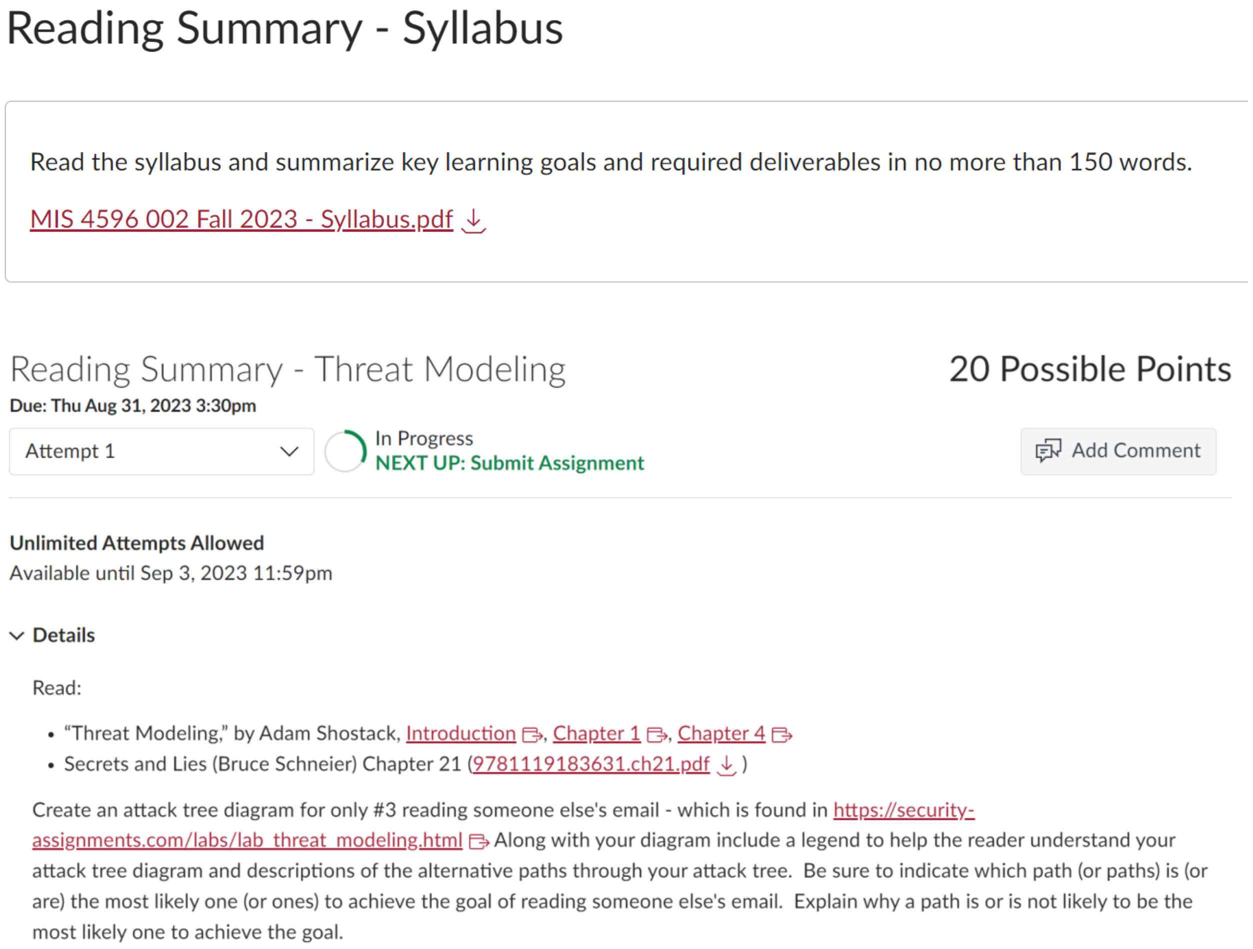
Reading Summary - Data Privacy
Available until Sep 17 at 11:59pm | **Due** Sep 12 at 3:30pm | 20 pts

Reading Summary - Cryptography
Available until Sep 24 at 11:59pm | **Due** Sep 19 at 3:30pm | 20 pts

Reading Summary - Birthday Theorem
Available until Oct 1 at 11:59pm | **Due** Sep 28 at 3:30pm | 20 pts

Reading Summary - DigiNotar
Available until Oct 8 at 11:59pm | **Due** Oct 5 at 3:30pm | 20 pts

Reading Summary - LinkedIn Passwords
Available until Oct 15 at 11:59pm | **Due** Oct 12 at 3:30pm | 20 pts



Reading Summary - Syllabus

Read the syllabus and summarize key learning goals and required deliverables in no more than 150 words.

MIS 4596 002 Fall 2023 - Syllabus.pdf

Reading Summary - Threat Modeling

20 Possible Points

Due: Thu Aug 31, 2023 3:30pm

Unlimited Attempts Allowed
Available until Sep 3, 2023 11:59pm

Details

Read:

- "Threat Modeling," by Adam Shostack, Introduction, Chapter 1, Chapter 4
- Secrets and Lies (Bruce Schneier) Chapter 21 (9781119183631.ch21.pdf)

Create an attack tree diagram for only #3 reading someone else's email - which is found in https://security-assignments.com/labs/lab_threat_modeling.html Along with your diagram include a legend to help the reader understand your attack tree diagram and descriptions of the alternative paths through your attack tree. Be sure to indicate which path (or paths) is (or are) the most likely one (or ones) to achieve the goal of reading someone else's email. Explain why a path is or is not likely to be the most likely one to achieve the goal.

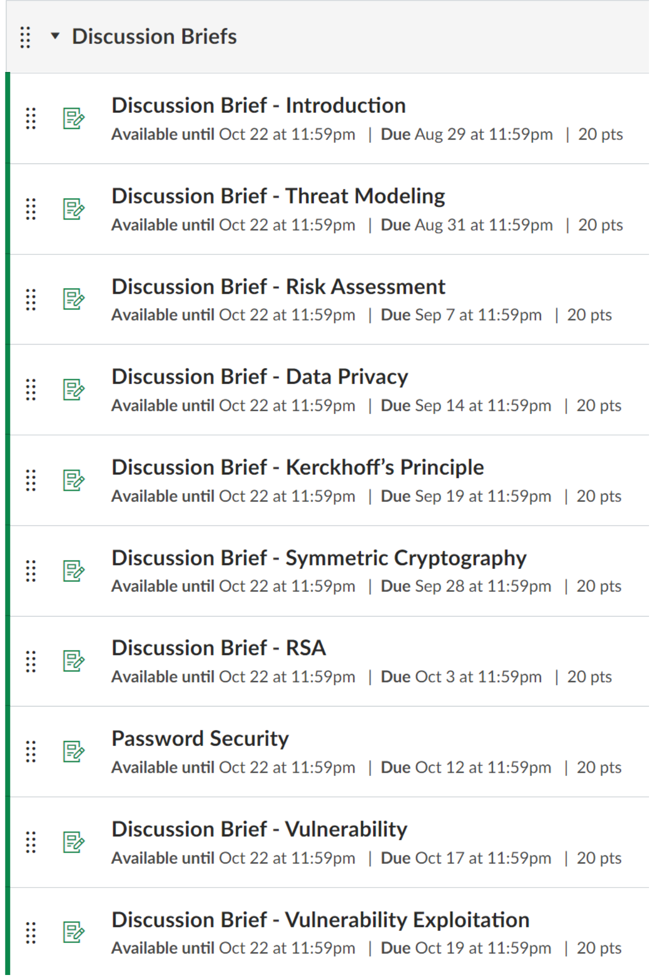
Discussion Briefs

<u>Discussion Briefs (15%)</u>

After each week's class, students are to write a short write-up that is based on in-class lecture & discussions.

- At least 150 words and no more than 300 words in each brief
- Students can skip up to two discussion briefs throughout the semester.
- Two deadlines:
  - Sunday, October 22 for discussion briefs for classes covered in weeks 1-8
  - Sunday, December 11 for discussion briefs for classes covered in weeks 9-13
- No late submission is to be accepted.
- Grading Criteria: Clarity, Comprehensiveness, Grammar, and Organization

Discussion Briefs are found in Canvas



Discussion Briefs

Discussion Brief - Introduction
Available until Oct 22 at 11:59pm | **Due** Aug 29 at 11:59pm | 20 pts

Discussion Brief - Threat Modeling
Available until Oct 22 at 11:59pm | **Due** Aug 31 at 11:59pm | 20 pts

Discussion Brief - Risk Assessment
Available until Oct 22 at 11:59pm | **Due** Sep 7 at 11:59pm | 20 pts

Discussion Brief - Data Privacy
Available until Oct 22 at 11:59pm | **Due** Sep 14 at 11:59pm | 20 pts

Discussion Brief - Kerckhoff's Principle
Available until Oct 22 at 11:59pm | **Due** Sep 19 at 11:59pm | 20 pts

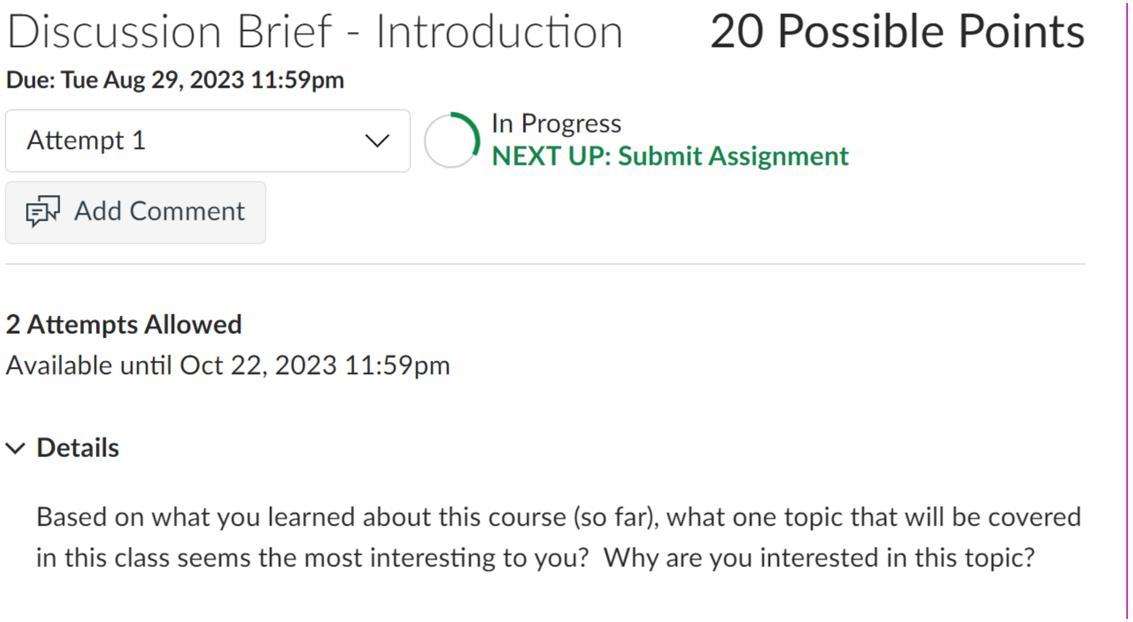
Discussion Brief - Symmetric Cryptography
Available until Oct 22 at 11:59pm | **Due** Sep 28 at 11:59pm | 20 pts

Discussion Brief - RSA
Available until Oct 22 at 11:59pm | **Due** Oct 3 at 11:59pm | 20 pts

Password Security
Available until Oct 22 at 11:59pm | **Due** Oct 12 at 11:59pm | 20 pts

Discussion Brief - Vulnerability
Available until Oct 22 at 11:59pm | **Due** Oct 17 at 11:59pm | 20 pts

Discussion Brief - Vulnerability Exploitation
Available until Oct 22 at 11:59pm | **Due** Oct 19 at 11:59pm | 20 pts



Discussion Brief - Introduction **20 Possible Points**

Due: Tue Aug 29, 2023 11:59pm

In Progress
NEXT UP: Submit Assignment

2 Attempts Allowed
Available until Oct 22, 2023 11:59pm

Details

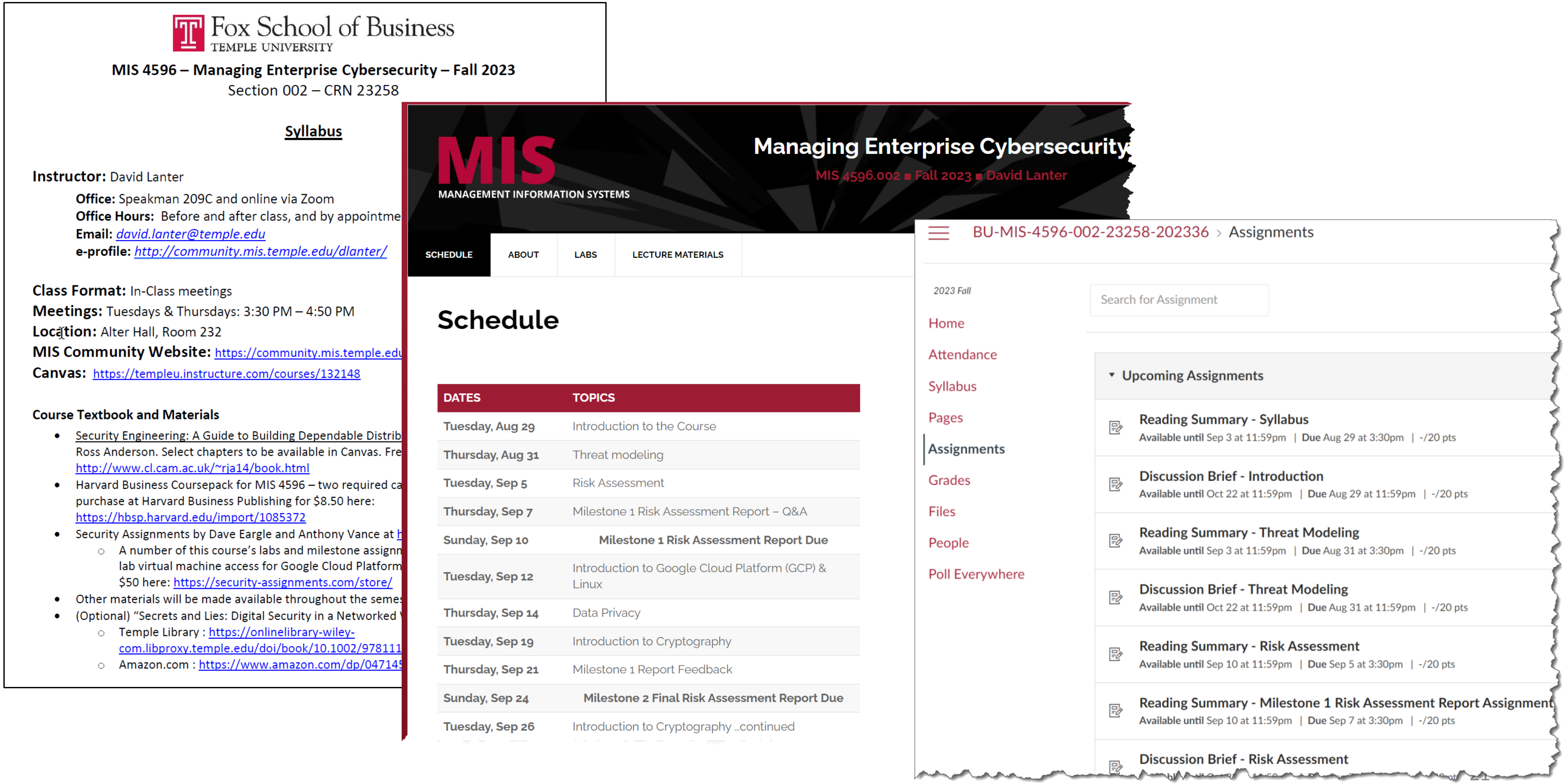
Based on what you learned about this course (so far), what one topic that will be covered in this class seems the most interesting to you? Why are you interested in this topic?

In-Class Participation (15%)

In-Class Participation **(15%)**

- Attendance and in-class participation are a key component of learning experiences
- It is strongly encouraged to read/review assigned materials (readings, case studies, labs, milestone assignment, etc.) prior to class to enable you to actively take part in class discussions and activities

Syllabus and Course websites



Fox School of Business
TEMPLE UNIVERSITY

MIS 4596 – Managing Enterprise Cybersecurity – Fall 2023
Section 002 – CRN 23258

Syllabus

Instructor: David Lanter
- **Office:** Speakman 209C and online via Zoom
- **Office Hours:** Before and after class, and by appointme
- **Email:** *david.lanter@temple.edu*
- **e-profile:** *http://community.mis.temple.edu/dlanter/*

Class Format: In-Class meetings
Meetings: Tuesdays & Thursdays: 3:30 PM – 4:50 PM
Location: Alter Hall, Room 232
MIS Community Website: https://community.mis.temple.edu
Canvas: https://templeu.instructure.com/courses/132148

Course Textbook and Materials
- Security Engineering: A Guide to Building Dependable Distrib Ross Anderson. Select chapters to be available in Canvas. Fre http://www.cl.cam.ac.uk/~rja14/book.html
- Harvard Business Coursepack for MIS 4596 – two required ca purchase at Harvard Business Publishing for $8.50 here: https://hbsp.harvard.edu/import/1085372
- Security Assignments by Dave Eargle and Anthony Vance at h
  - A number of this course's labs and milestone assignm lab virtual machine access for Google Cloud Platform $50 here: https://security-assignments.com/store/
- Other materials will be made available throughout the semes
- (Optional) "Secrets and Lies: Digital Security in a Networked
  - Temple Library : https://onlinelibrary-wiley-com.libproxy.temple.edu/doi/book/10.1002/978111
  - Amazon.com : https://www.amazon.com/dp/047145

MIS
MANAGEMENT INFORMATION SYSTEMS

Managing Enterprise Cybersecurity
MIS 4596.002 ■ Fall 2023 ■ David Lanter

Schedule

DATES	TOPICS
Tuesday, Aug 29	Introduction to the Course
Thursday, Aug 31	Threat modeling
Tuesday, Sep 5	Risk Assessment
Thursday, Sep 7	Milestone 1 Risk Assessment Report – Q&A
Sunday, Sep 10	**Milestone 1 Risk Assessment Report Due**
Tuesday, Sep 12	Introduction to Google Cloud Platform (GCP) & Linux
Thursday, Sep 14	Data Privacy
Tuesday, Sep 19	Introduction to Cryptography
Thursday, Sep 21	Milestone 1 Report Feedback
Sunday, Sep 24	**Milestone 2 Final Risk Assessment Report Due**
Tuesday, Sep 26	Introduction to Cryptography ..continued

BU-MIS-4596-002-23258-202336 › Assignments

▾ **Upcoming Assignments**

- **Reading Summary - Syllabus**
  Available until Sep 3 at 11:59pm | **Due** Aug 29 at 3:30pm | -/20 pts
- **Discussion Brief - Introduction**
  Available until Oct 22 at 11:59pm | **Due** Aug 29 at 11:59pm | -/20 pts
- **Reading Summary - Threat Modeling**
  Available until Sep 3 at 11:59pm | **Due** Aug 31 at 3:30pm | -/20 pts
- **Discussion Brief - Threat Modeling**
  Available until Oct 22 at 11:59pm | **Due** Aug 31 at 11:59pm | -/20 pts
- **Reading Summary - Risk Assessment**
  Available until Sep 10 at 11:59pm | **Due** Sep 5 at 3:30pm | -/20 pts
- **Reading Summary - Milestone 1 Risk Assessment Report Assignment**
  Available until Sep 10 at 11:59pm | **Due** Sep 7 at 3:30pm | -/20 pts
- **Discussion Brief - Risk Assessment**

Technology requirements

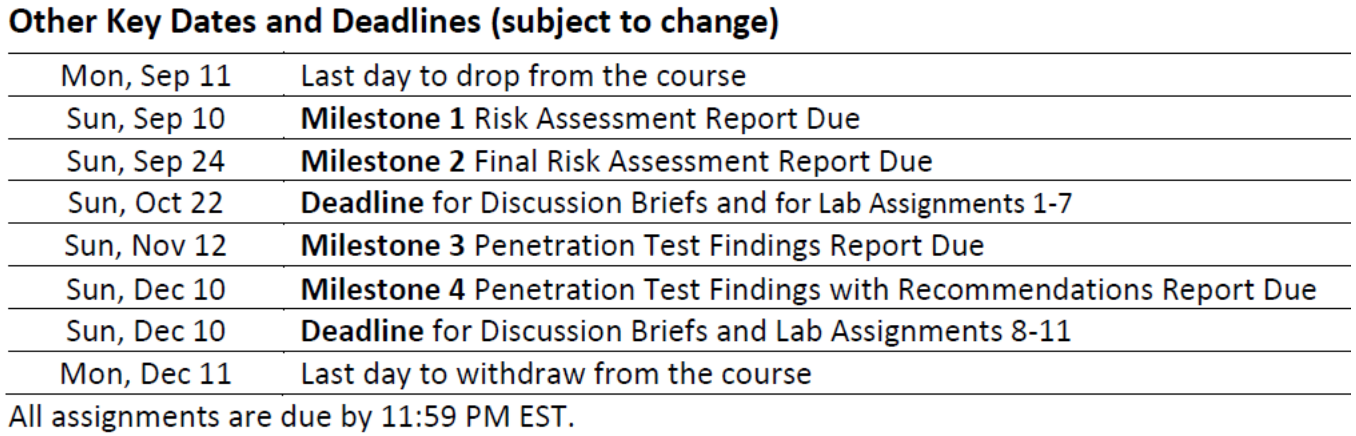
Information Security Assignments: Labs & Milestones 3 & 4

- This course will use lab and milestone project assignments at http://security-assignments.com/, developed by Dave Eargle and Anthony Vance.
- Access to the resources in this site will require subscription with a fee. A number of this course's labs and milestone assignments beginning with Lab 4 require lab virtual machine access for Google Cloud Platform (GCP) available for purchase for $50 here: https://security-assignments.com/store/

Google Cloud Platform (GCP)

- This course uses GCP to run tools and virtual machines necessary to complete assignments.
- New accounts on GCP receive a $300 credit for no cost.
- Students should be able to complete this class without going over the credit and incurring cost.
- The instructor will have the students launch a Kali virtual machine instance on GCP from which they can complete class assignments.
- The students will be able to remotely connect to the instance using Chrome Remote Desktop, which works just like a browser tab. To help reduce the risk of incurring costs above the free $300 students should manage their GCP accounts and shut down the machine between uses.

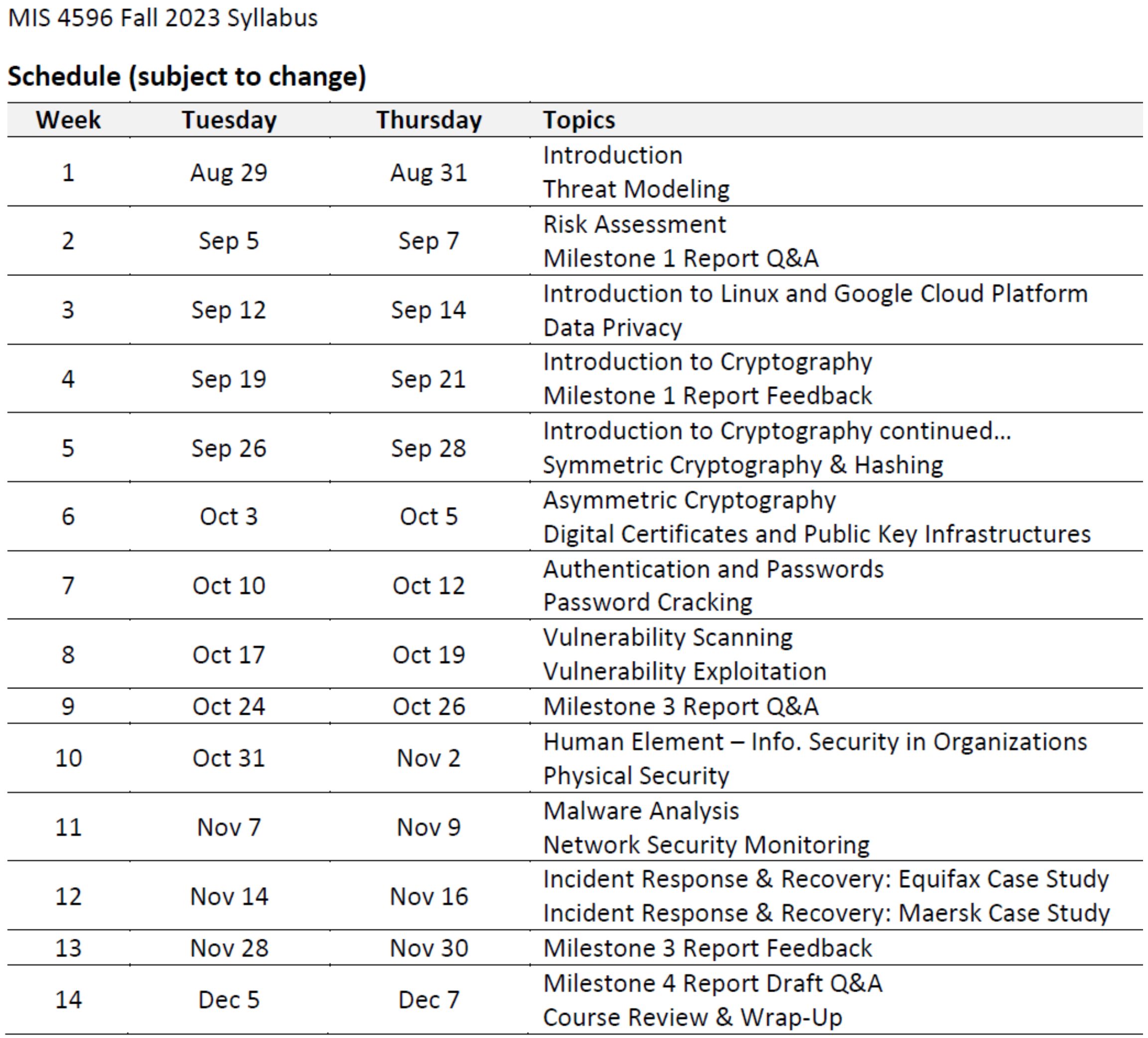
Schedule



Other Key Dates and Deadlines (subject to change)

Mon, Sep 11	Last day to drop from the course
Sun, Sep 10	**Milestone 1** Risk Assessment Report Due
Sun, Sep 24	**Milestone 2** Final Risk Assessment Report Due
Sun, Oct 22	**Deadline** for Discussion Briefs and for Lab Assignments 1-7
Sun, Nov 12	**Milestone 3** Penetration Test Findings Report Due
Sun, Dec 10	**Milestone 4** Penetration Test Findings with Recommendations Report Due
Sun, Dec 10	**Deadline** for Discussion Briefs and Lab Assignments 8-11
Mon, Dec 11	Last day to withdraw from the course

All assignments are due by 11:59 PM EST.



MIS 4596 Fall 2023 Syllabus

Schedule (subject to change)

Week	Tuesday	Thursday	Topics
1	Aug 29	Aug 31	Introduction Threat Modeling
2	Sep 5	Sep 7	Risk Assessment Milestone 1 Report Q&A
3	Sep 12	Sep 14	Introduction to Linux and Google Cloud Platform Data Privacy
4	Sep 19	Sep 21	Introduction to Cryptography Milestone 1 Report Feedback
5	Sep 26	Sep 28	Introduction to Cryptography continued… Symmetric Cryptography & Hashing
6	Oct 3	Oct 5	Asymmetric Cryptography Digital Certificates and Public Key Infrastructures
7	Oct 10	Oct 12	Authentication and Passwords Password Cracking
8	Oct 17	Oct 19	Vulnerability Scanning Vulnerability Exploitation
9	Oct 24	Oct 26	Milestone 3 Report Q&A
10	Oct 31	Nov 2	Human Element – Info. Security in Organizations Physical Security
11	Nov 7	Nov 9	Malware Analysis Network Security Monitoring
12	Nov 14	Nov 16	Incident Response & Recovery: Equifax Case Study Incident Response & Recovery: Maersk Case Study
13	Nov 28	Nov 30	Milestone 3 Report Feedback
14	Dec 5	Dec 7	Milestone 4 Report Draft Q&A Course Review & Wrap-Up

Agenda

- ✓Instructor
- ✓Course overview
- Introduction
- Need for Cybersecurity Professionals

The value of business’ data is at a peak

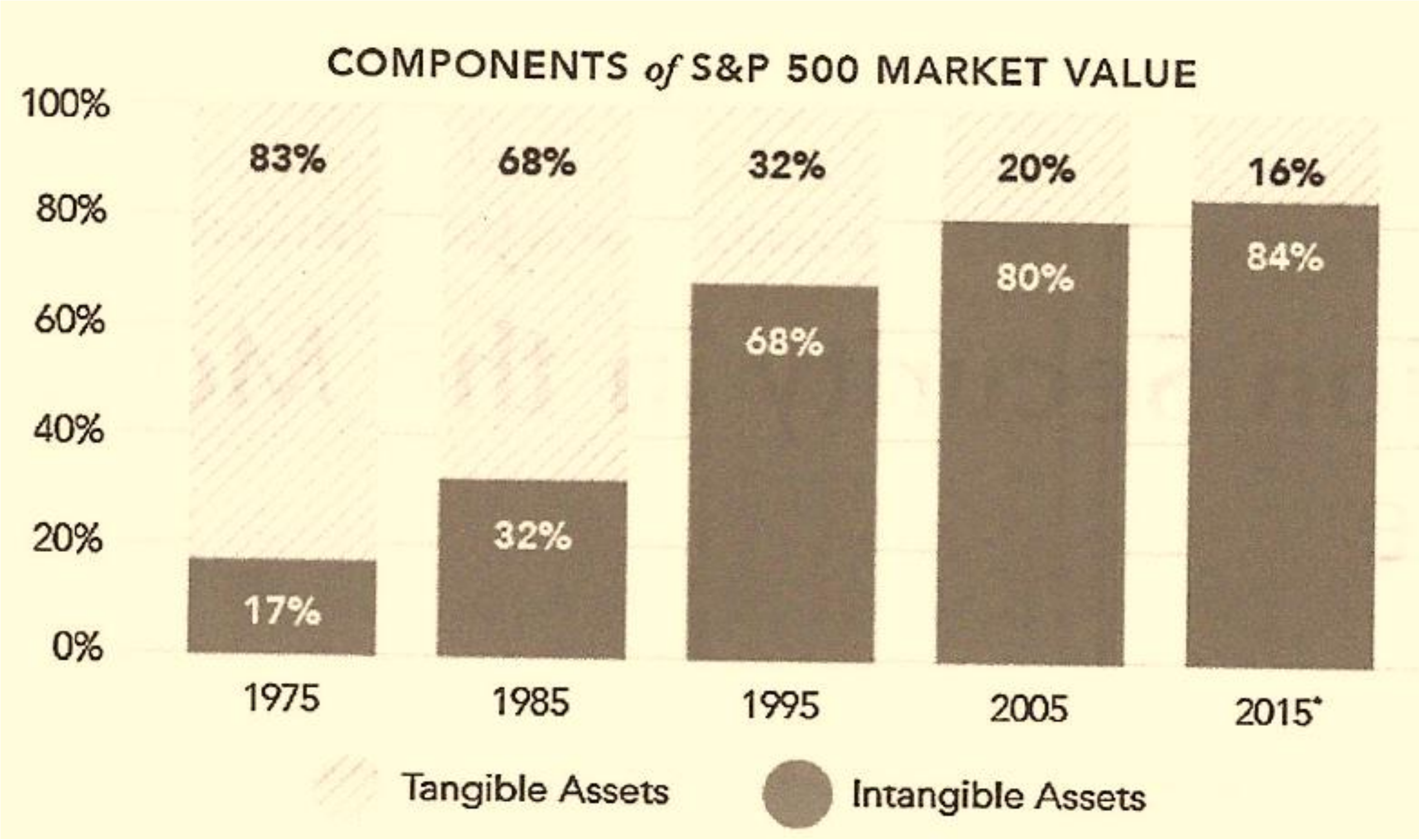


FIGURE 1.1 Change in public company assets from tangible to intangible.

“A generation ago the asset base of US public companies was more than 80% tangible property” (e.g. raw materials, real estate, railroad cars…)

“Today… intangibles… account for more than 80% of listed company value”

Computers and Information Security Handbook, J. Vacca, 2017, pp. 3-4

Transformation of Information Security

1970 data security examples

Guarding the photocopier

Watching who went in and out of the front door

Today's data security must consider

Devices able to grab gigabytes of data and move them anywhere in the world in an instant

Laptops, tablets and smartphones with direct connection to company data are endpoints in a global network, creating thousands to millions of "front doors" leaving industry at its most vulnerable

What one thing about information security has not changed over the years?

Human beings remain the primary vector for loss of corporate value

AND

Humans also control the processes and technologies central to information security function that preserves corporate value

INTEGRITY
AVAILABILITY
CONFIDENTIALITY

Key concepts

Information and Information System security = Cybersecurity

…means protecting information and information systems from unathorized:

- *Access, use, disclosure of information* **Confidentiality**
- *Unauthorize modification of information* **Integrity**
- *Disruption and destruction of information* **Availability**

Key concepts

Threat

Potential for the occurrence of a harmful event such as a cyber attack

Vulnerability

Weakness that makes targets susceptible to an attack

Risk

Potential of loss from an attack

Risk Mitigation

Strategy for dealing with risk

What is a threat?

Anything that has the potential to lead to unauthorized:

- ***Access, use, disclosure***
- ***Modification***
- ***Disruption or Destruction***

of an enterprises’ information or information systems

Physical

Technical

Administrative

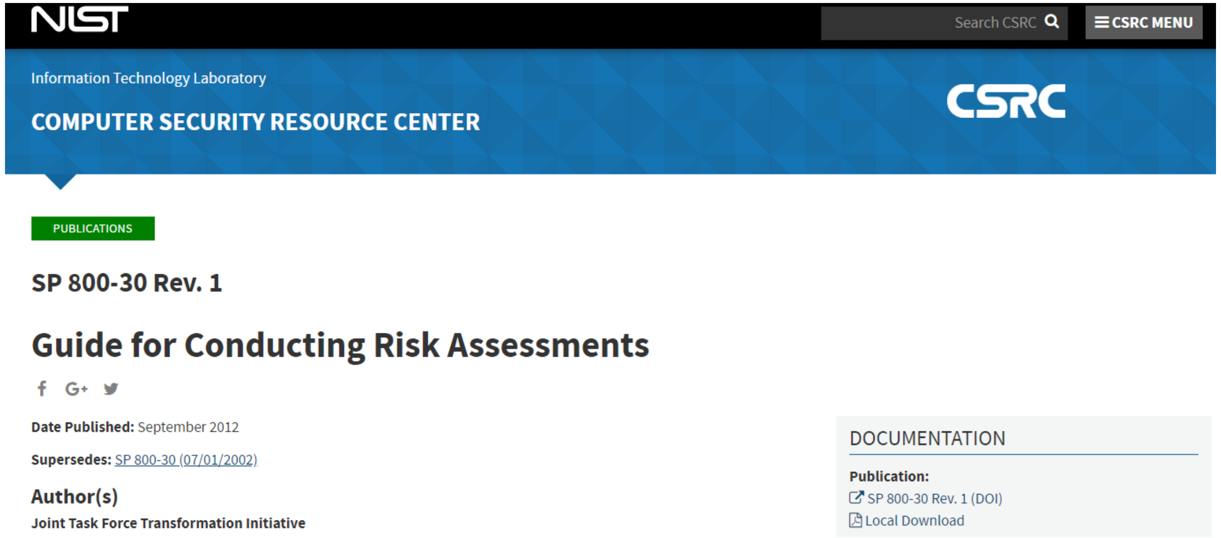
What is a threat…

Threats to information and information systems include:

- Purposeful attacks
- Human errors
- Structural Failures
- Environmental disruptions

Taxonomy of threat sources

1. Adversarial
2. Accidental
3. Structural
4. Environmental



NIST
Search CSRC
CSRC MENU
Information Technology Laboratory
COMPUTER SECURITY RESOURCE CENTER
CSRC
PUBLICATIONS

SP 800-30 Rev. 1

Guide for Conducting Risk Assessments

Date Published: September 2012

Supersedes: SP 800-30 (07/01/2002)

Author(s)

Joint Task Force Transformation Initiative

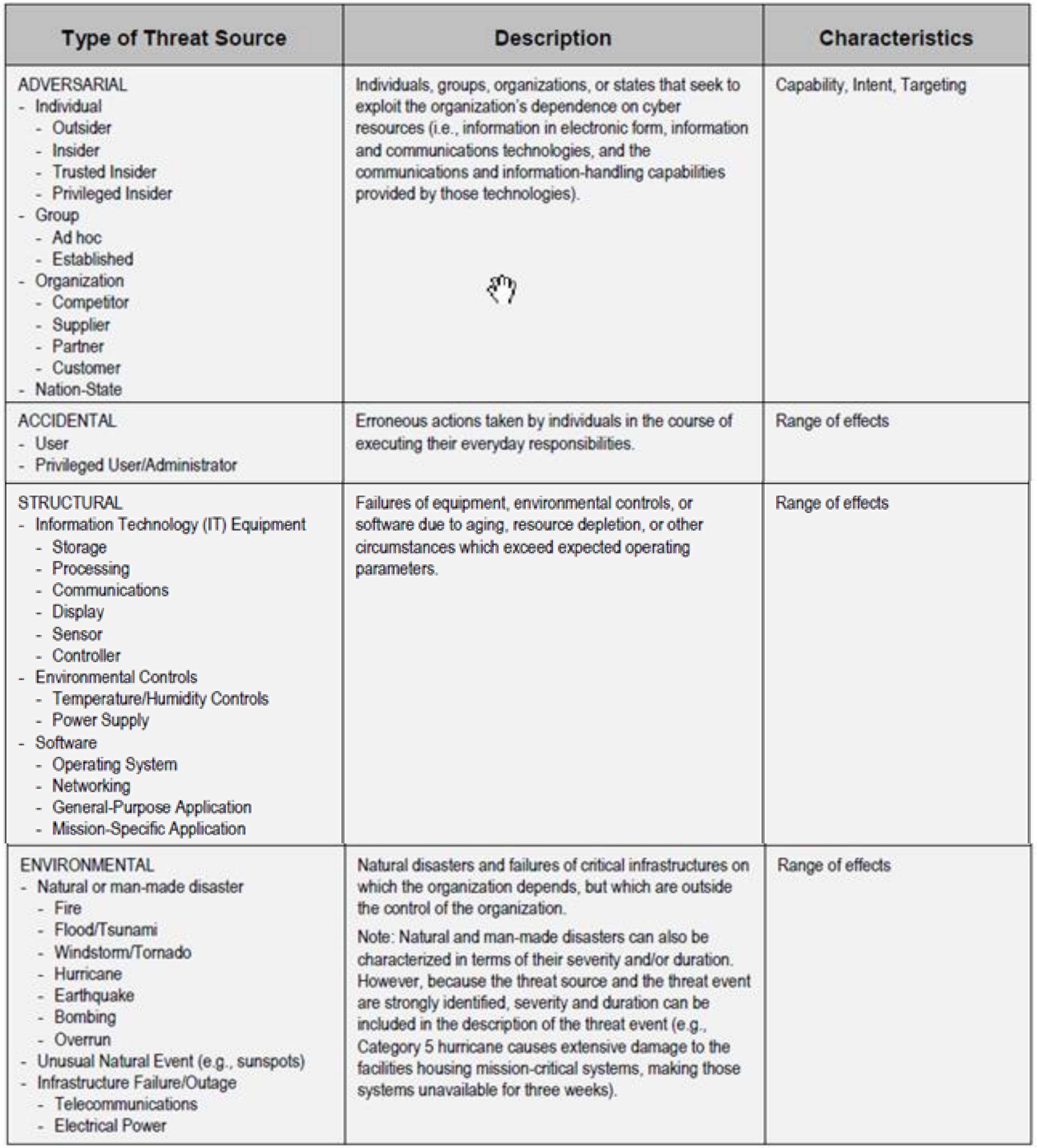
DOCUMENTATION

Publication:

SP 800-30 Rev. 1 (DOI)

Local Download

https://csrc.nist.gov/publications/detail/sp/800-30/rev-1/final

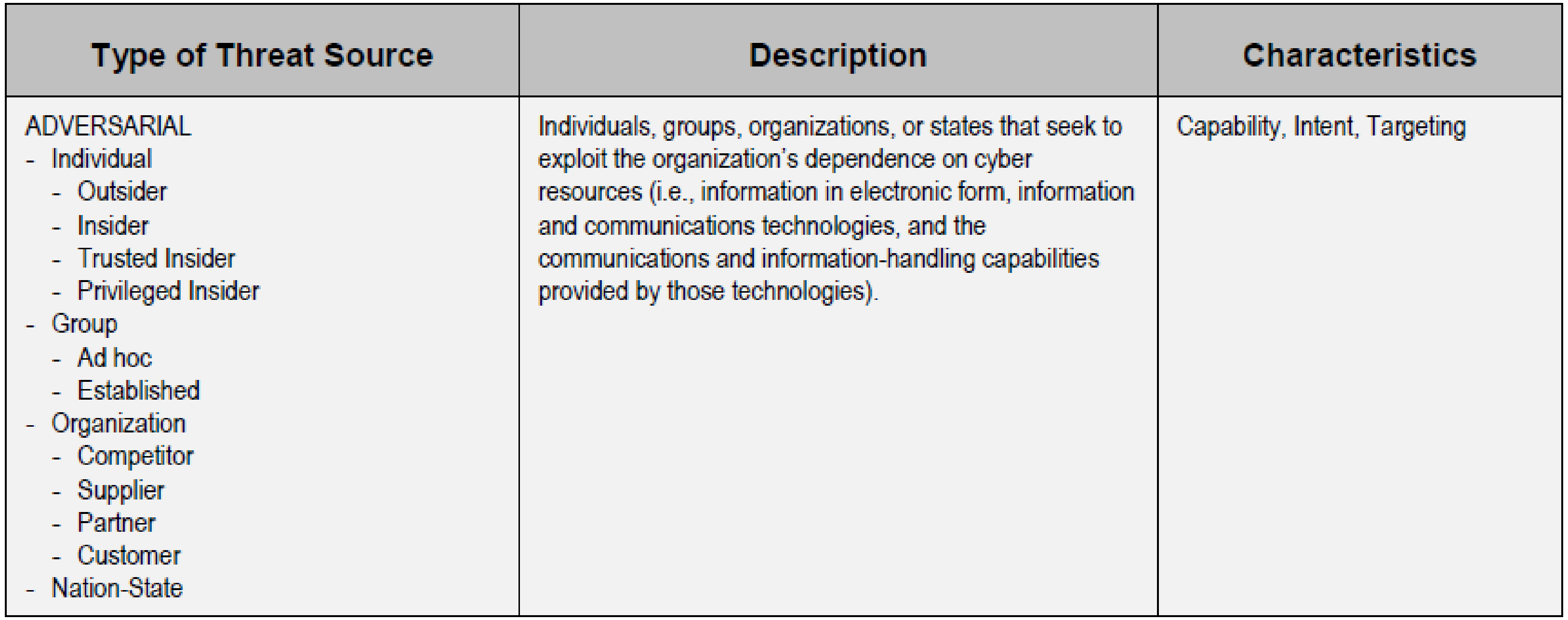


Type of Threat Source	Description	Characteristics
ADVERSARIAL - Individual - Outsider - Insider - Trusted Insider - Privileged Insider - Group - Ad hoc - Established - Organization - Competitor - Supplier - Partner - Customer - Nation-State	Individuals, groups, organizations, or states that seek to exploit the organization's dependence on cyber resources (i.e., information in electronic form, information and communications technologies, and the communications and information-handling capabilities provided by those technologies).	Capability, Intent, Targeting
ACCIDENTAL - User - Privileged User/Administrator	Erroneous actions taken by individuals in the course of executing their everyday responsibilities.	Range of effects
STRUCTURAL - Information Technology (IT) Equipment - Storage - Processing - Communications - Display - Sensor - Controller - Environmental Controls - Temperature/Humidity Controls - Power Supply - Software - Operating System - Networking - General-Purpose Application - Mission-Specific Application	Failures of equipment, environmental controls, or software due to aging, resource depletion, or other circumstances which exceed expected operating parameters.	Range of effects
ENVIRONMENTAL - Natural or man-made disaster - Fire - Flood/Tsunami - Windstorm/Tornado - Hurricane - Earthquake - Bombing - Overrun - Unusual Natural Event (e.g., sunspots) - Infrastructure Failure/Outage - Telecommunications - Electrical Power	Natural disasters and failures of critical infrastructures on which the organization depends, but which are outside the control of the organization. Note: Natural and man-made disasters can also be characterized in terms of their severity and/or duration. However, because the threat source and the threat event are strongly identified, severity and duration can be included in the description of the threat event (e.g., Category 5 hurricane causes extensive damage to the facilities housing mission-critical systems, making those systems unavailable for three weeks).	Range of effects

Adversarial Threats

“Security involves making sure things work, not in the presence of random faults, but **in the face of an intelligent and malicious adversary** trying to ensure that things fail in the worst possible way at the worst possible time.”

– Bruce Schneier



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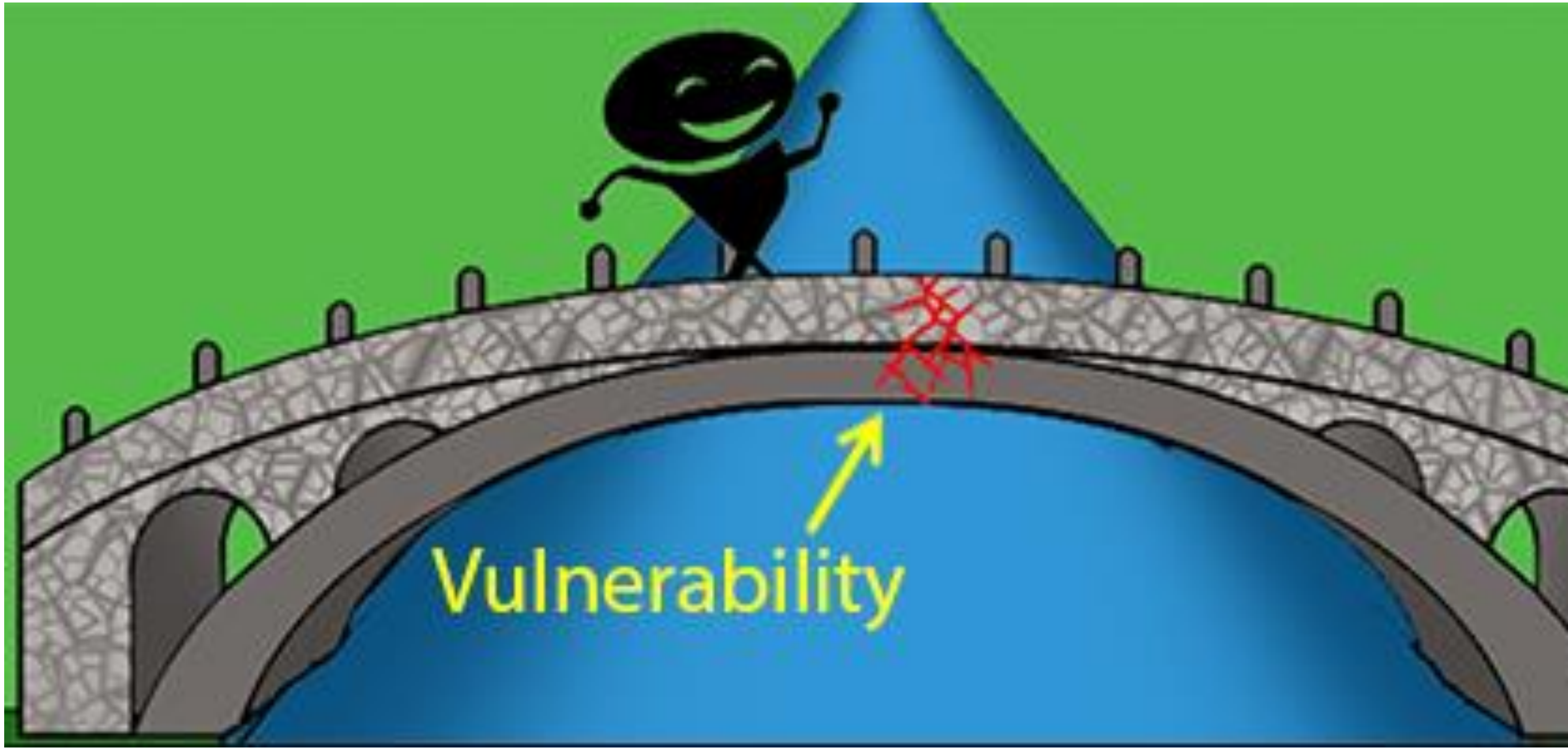
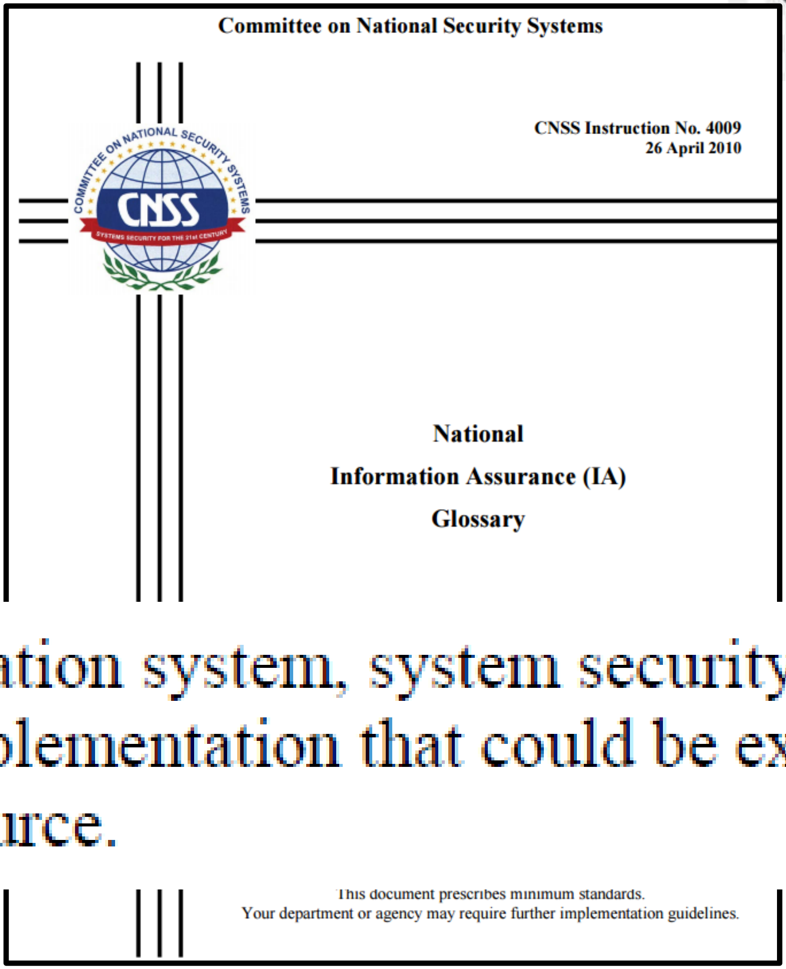
More information can be found in class notes

What is a Vulnerability?



What is a Vulnerability?

Any unaddressed susceptibility to a Adversarial, Accidental, Structural or Environmental threat is an information security vulnerability


Committee on National Security Systems

CNSS Instruction No. 4009
26 April 2010

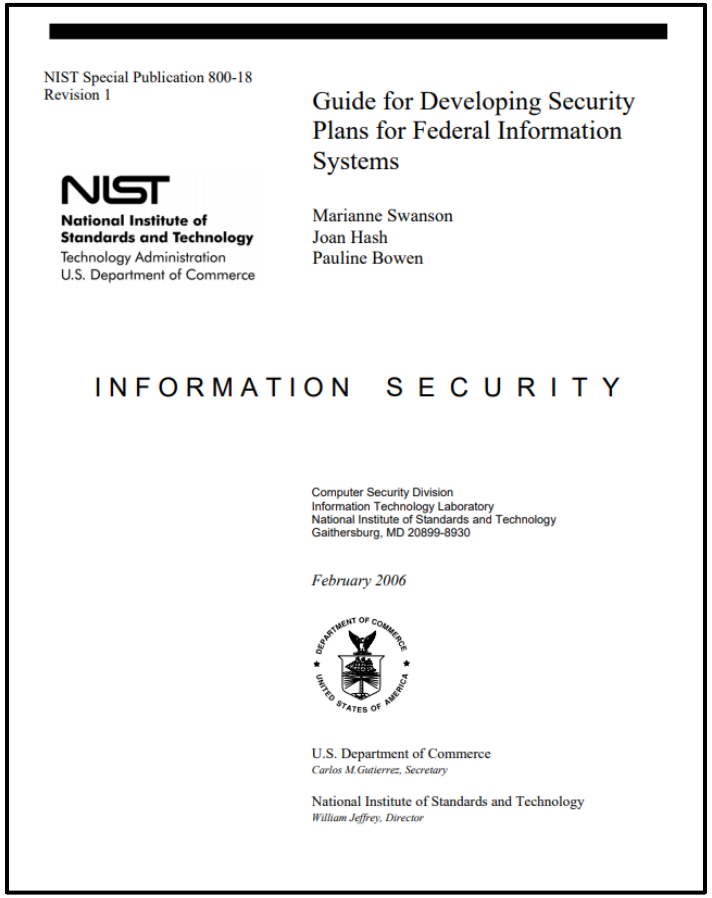
National
Information Assurance (IA)
Glossary

This document prescribes minimum standards.
Your department or agency may require further implementation guidelines.

Weakness in an information system, system security procedures, internal controls, or implementation that could be exploited or triggered by a threat source.

Vulnerabilities are…

Inadequacies in any of these areas which can lead to negative impacts:



NIST Special Publication 800-18
Revision 1

Guide for Developing Security Plans for Federal Information Systems

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

Marianne Swanson
Joan Hash
Pauline Bowen

INFORMATION SECURITY

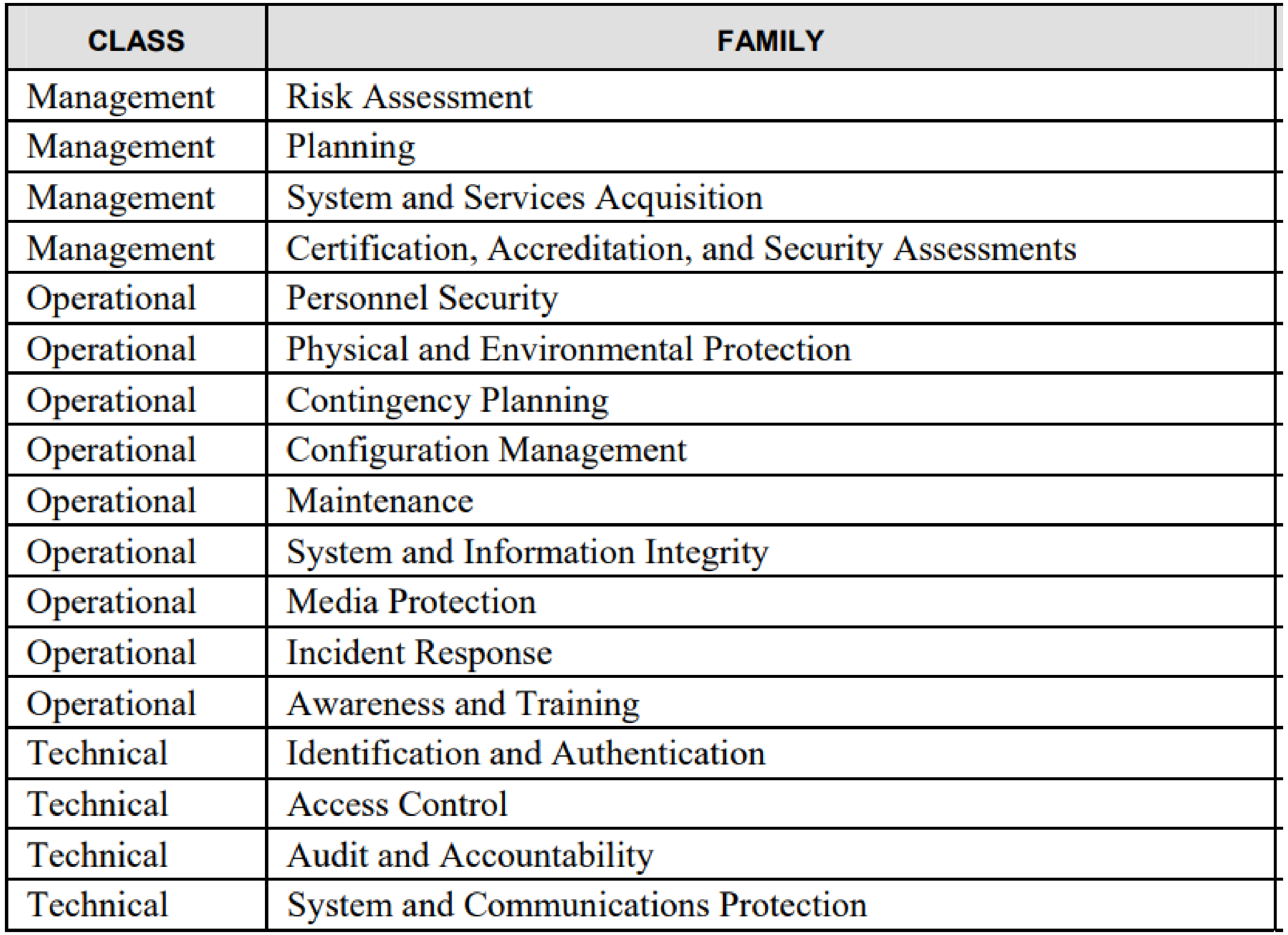
Computer Security Division
Information Technology Laboratory
National Institute of Standards and Technology
Gaithersburg, MD 20899-8930

February 2006

U.S. Department of Commerce
Carlos M. Gutierrez, Secretary

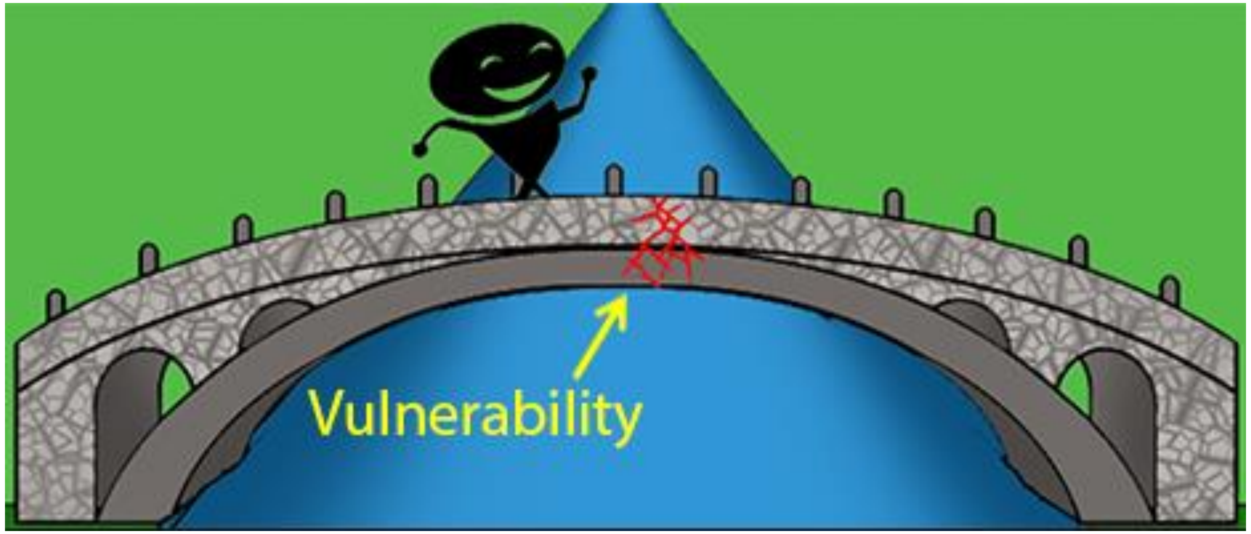
National Institute of Standards and Technology
William Jeffrey, Director

Cybersecurity Controls protect against impacts

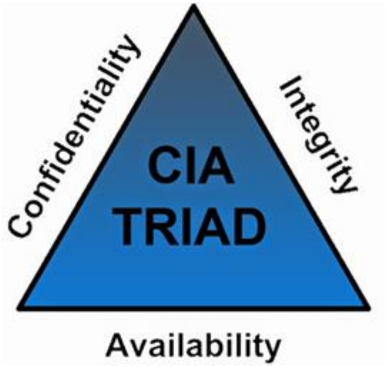


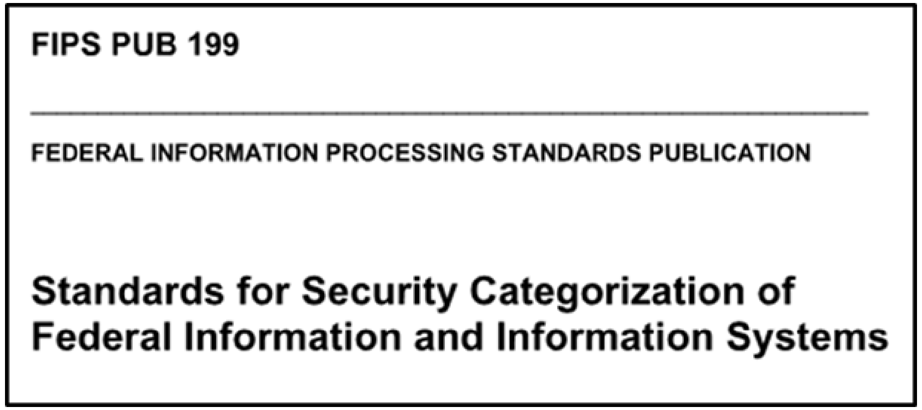
CLASS	FAMILY
Management	Risk Assessment
Management	Planning
Management	System and Services Acquisition
Management	Certification, Accreditation, and Security Assessments
Operational	Personnel Security
Operational	Physical and Environmental Protection
Operational	Contingency Planning
Operational	Configuration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

Vulnerability to what ?



FIPS 199 Standards: Security objectives relate to avoiding negative impacts



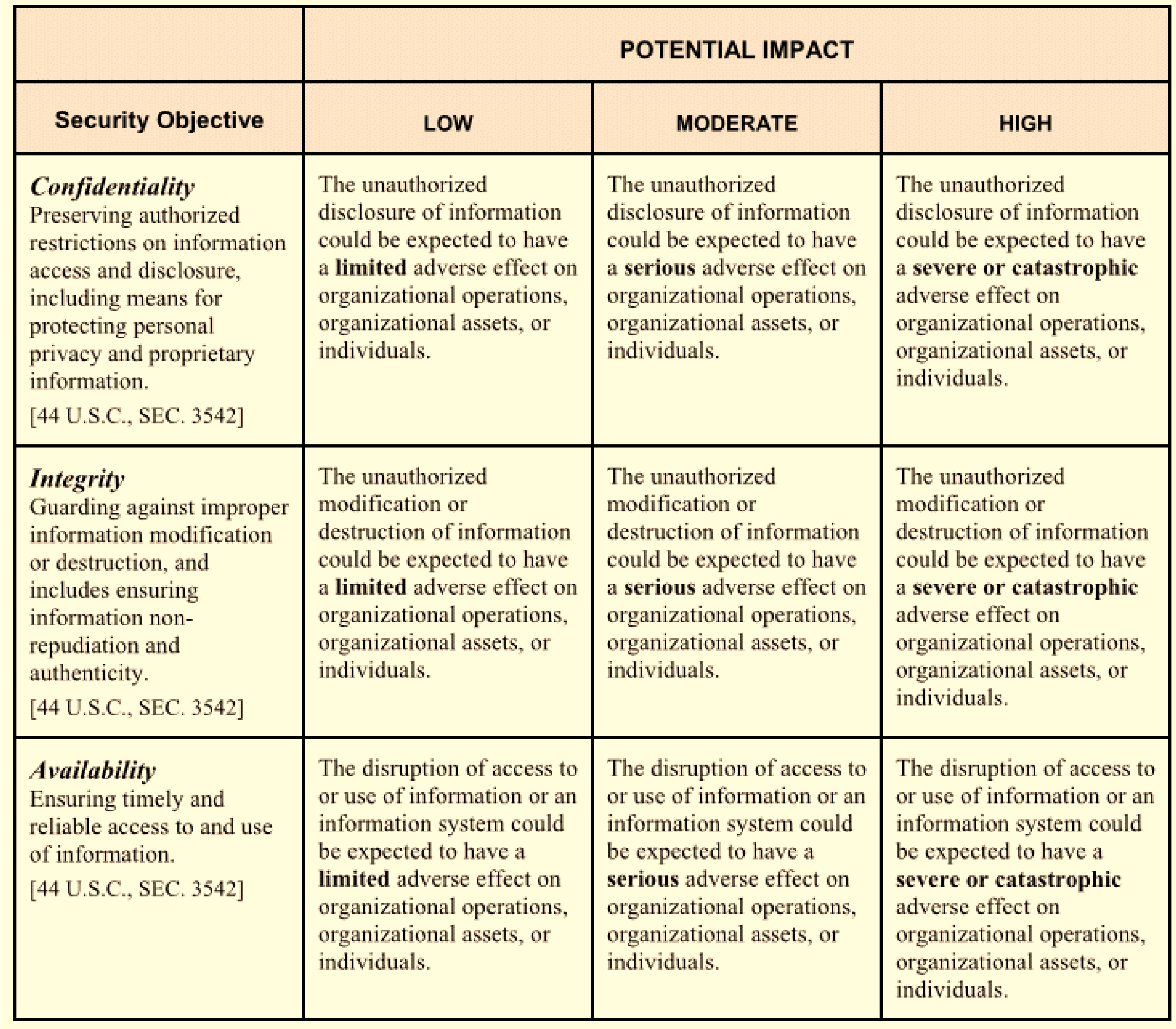

FIPS PUB 199

FEDERAL INFORMATION PROCESSING STANDARDS PUBLICATION

Standards for Security Categorization of Federal Information and Information Systems

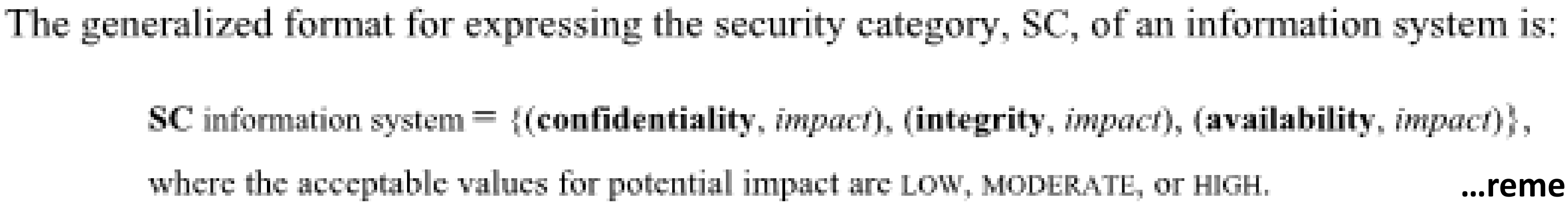
Impact ratings:

- ***High:*** *Severe or catastrophic adverse effect*
- ***Moderate:*** *Serious adverse effect*
- ***Low:*** *Limited adverse effect*



	POTENTIAL IMPACT		
Security Objective	**LOW**	**MODERATE**	**HIGH**
Confidentiality Preserving authorized restrictions on information access and disclosure, including means for protecting personal privacy and proprietary information. [44 U.S.C., SEC. 3542]	The unauthorized disclosure of information could be expected to have a **limited** adverse effect on organizational operations, organizational assets, or individuals.	The unauthorized disclosure of information could be expected to have a **serious** adverse effect on organizational operations, organizational assets, or individuals.	The unauthorized disclosure of information could be expected to have a **severe or catastrophic** adverse effect on organizational operations, organizational assets, or individuals.
Integrity Guarding against improper information modification or destruction, and includes ensuring information non-repudiation and authenticity. [44 U.S.C., SEC. 3542]	The unauthorized modification or destruction of information could be expected to have a **limited** adverse effect on organizational operations, organizational assets, or individuals.	The unauthorized modification or destruction of information could be expected to have a **serious** adverse effect on organizational operations, organizational assets, or individuals.	The unauthorized modification or destruction of information could be expected to have a **severe or catastrophic** adverse effect on organizational operations, organizational assets, or individuals.
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.

Security Categorization Standard is used to determine the security categorization of an information system that contains, processes and/or transports information



The generalized format for expressing the security category, SC, of an information system is:

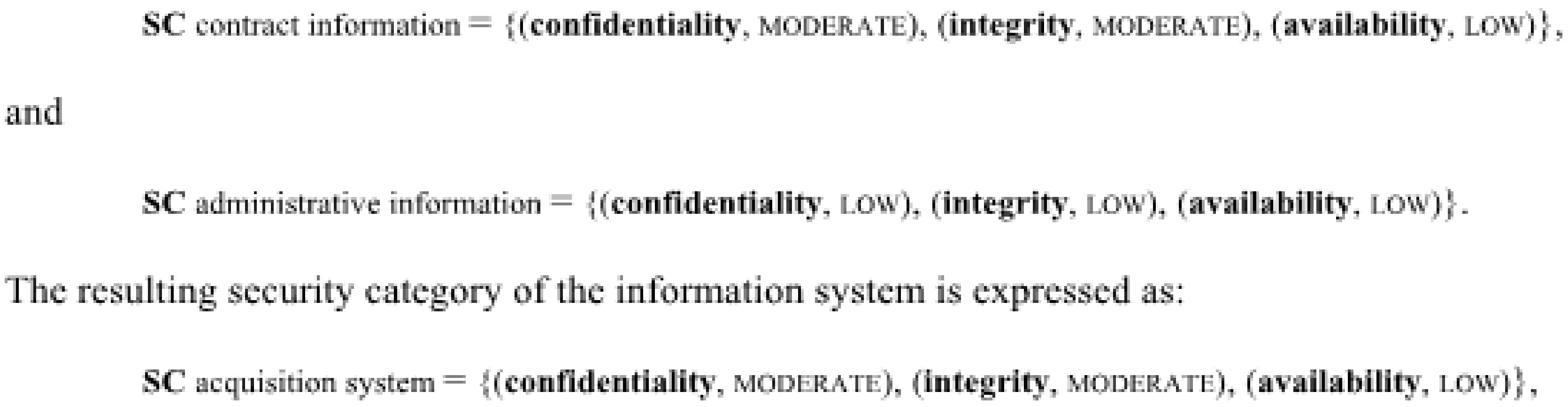
SC$_{\text{information system}}$ = {(**confidentiality**, *impact*), (**integrity**, *impact*), (**availability**, *impact*)},

where the acceptable values for potential impact are LOW, MODERATE, or HIGH.

…remember the impact ratings:

- **High impact:** Severe or catastrophic adverse effect
- **Moderate impact:** Serious adverse effect
- **Low impact:** Limited adverse effect

Example with multiple information types:



SC$_{\text{contract information}}$ = {(**confidentiality**, MODERATE), (**integrity**, MODERATE), (**availability**, LOW)},

and

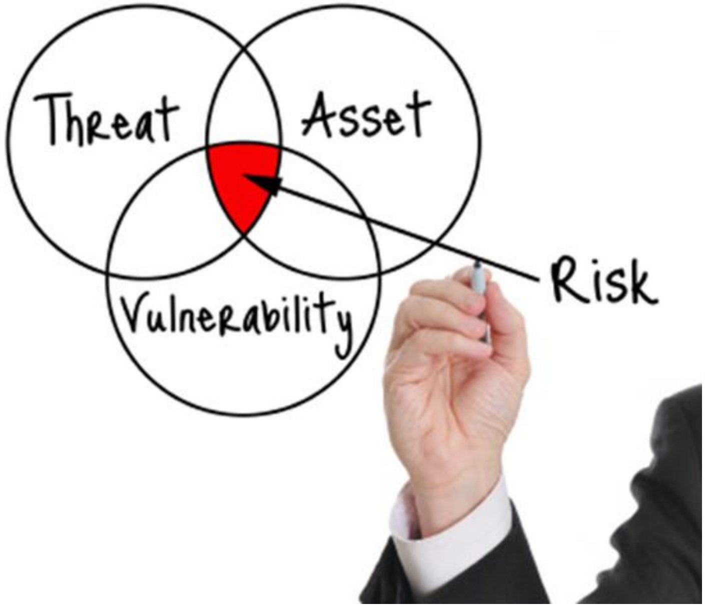
SC$_{\text{administrative information}}$ = {(**confidentiality**, LOW), (**integrity**, LOW), (**availability**, LOW)}.

The resulting security category of the information system is expressed as:

SC$_{\text{acquisition system}}$ = {(**confidentiality**, MODERATE), (**integrity**, MODERATE), (**availability**, LOW)},

What are examples of Information security risks ?

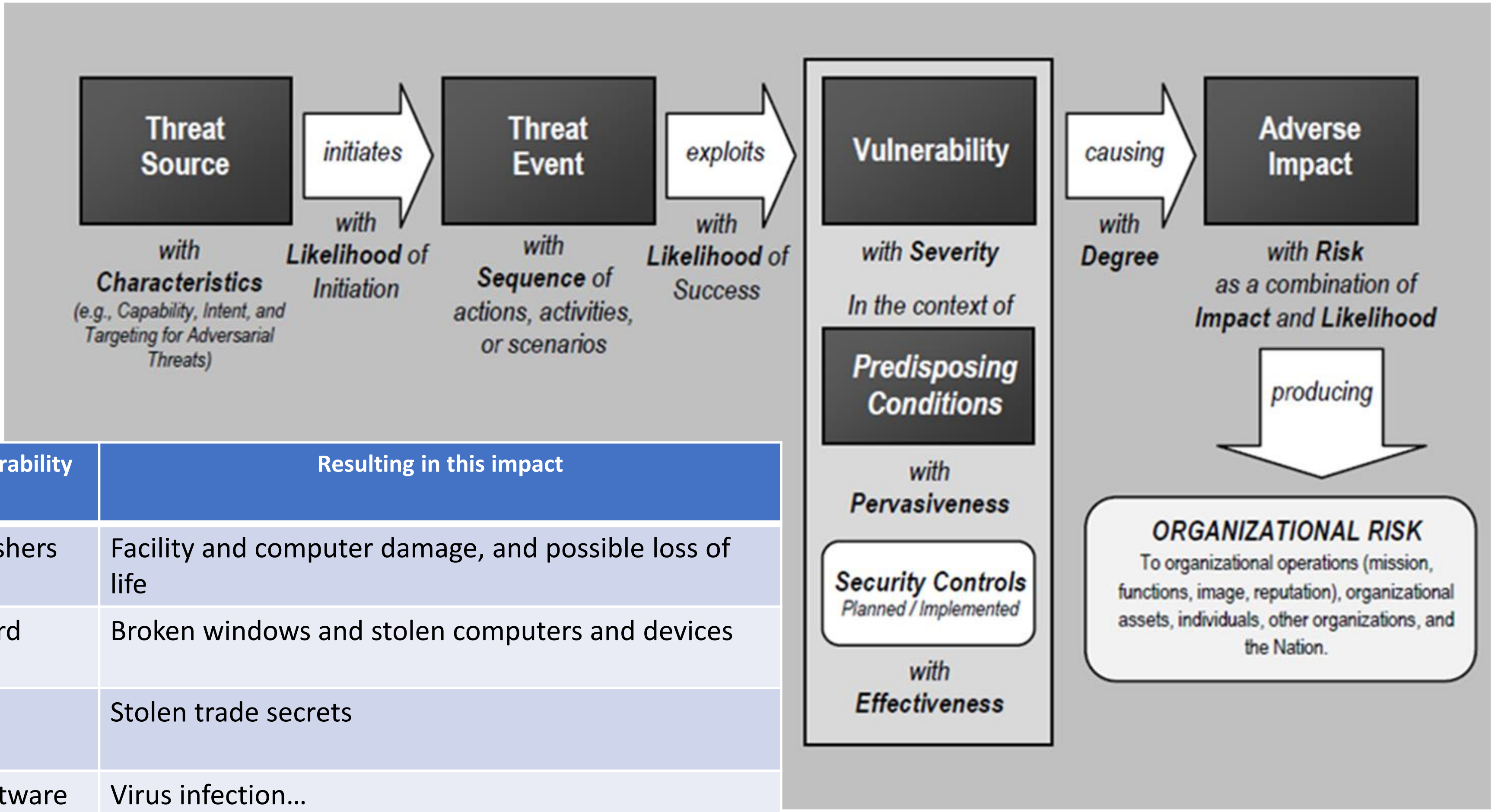
- Economic impact and financial loss
  - Replacement costs (software, hardware, other)
  - Backup restoration and recovery costs
  - Reprocessing, reconstruction costs
  - Theft/crime (non-computer, computer)



- Loss of life
- Losses due to fraud, theft, larceny, bribery
- Impact of
  - lost competitive edge
  - lost data
  - lost time
  - lost productivity
  - lost business

- Bankruptcy
- Business interruption
- Frustration
- Ill will
- Injury
- Impacts of inaccurate data

An IT risk model

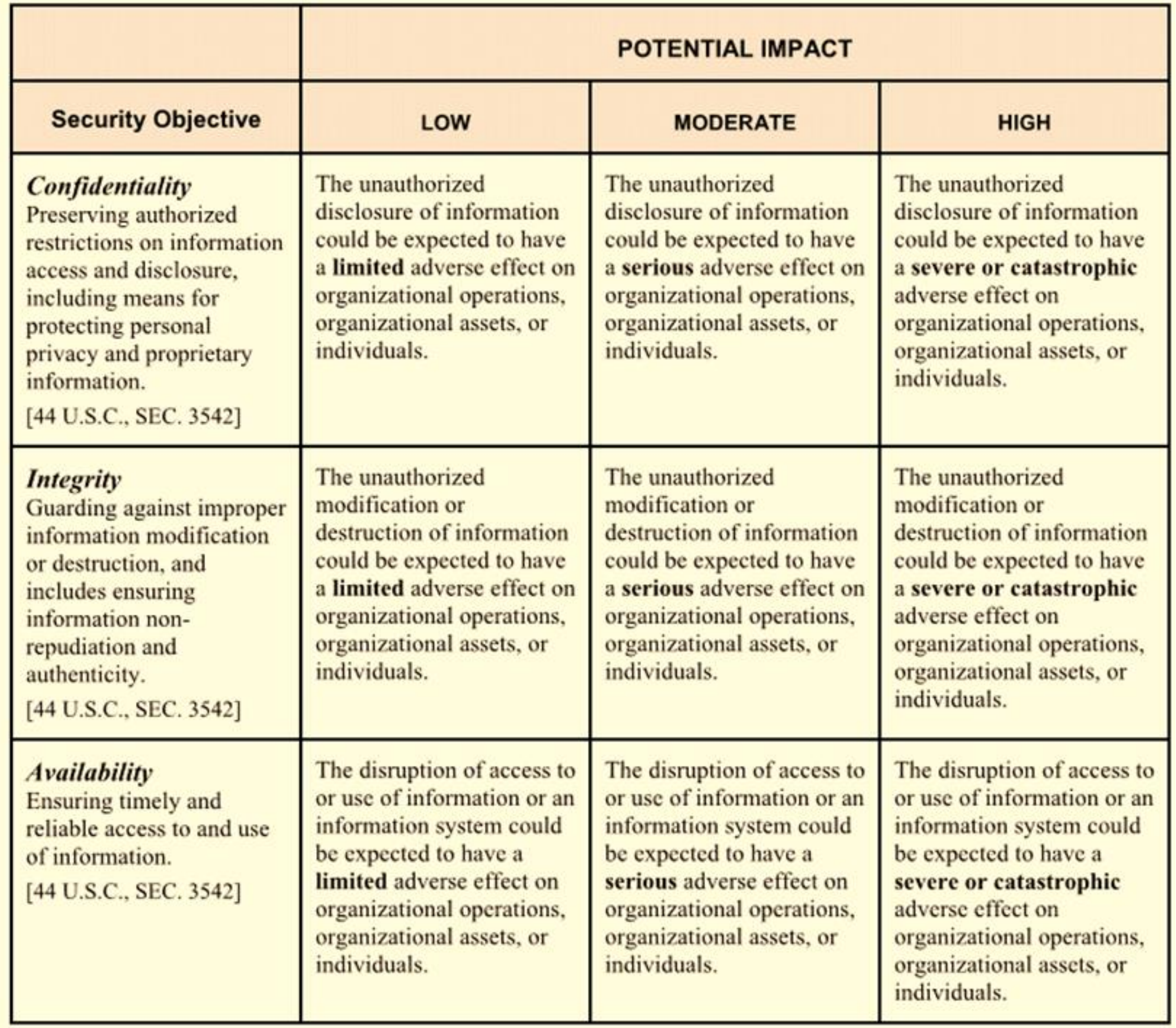

Threat Source
with Characteristics
(e.g., Capability, Intent, and Targeting for Adversarial Threats)
initiates
with Likelihood of Initiation
Threat Event
with Sequence of actions, activities, or scenarios
exploits
with Likelihood of Success
Vulnerability
with Severity
In the context of
Predisposing Conditions
with Pervasiveness
Security Controls
Planned / Implemented
with Effectiveness
causing
with Degree
Adverse Impact
with Risk as a combination of Impact and Likelihood
producing
ORGANIZATIONAL RISK
To organizational operations (mission, functions, image, reputation), organizational assets, individuals, other organizations, and the Nation.

Type	Threat Source	Can exploit this vulnerability	Resulting in this impact
Physical	Fire	Lack of fire extinguishers	Facility and computer damage, and possible loss of life
Physical	Intruder	Lack of security guard	Broken windows and stolen computers and devices
Technical	Contractor	Lax access control mechanisms	Stolen trade secrets
Technical	Malware	Lack of antivirus software	Virus infection…
Technical	Hacker	Unprotected services running on a server	Unauthorized access to confidential information
Administrative	Employee	Lack of training	Unauthorized distribution of sensitive information

NIST SP 800-30r1 “Guide for Conducting Risk Assessments”, page 21

Cybersecurity Objectives

Qualitative Risk Assessment



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Quantitative Risk Assessment

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

Course objectives

- Explain cybersecurity as a key enterprise risk and how it can be managed
- Understand methods used to identify, protect against, detect, respond to, and recover from cybersecurity threats
- Use techniques of ethical hacking to perform penetration testing to assess vulnerabilities in information systems
- Communicate risk in assessment reports that support management decisions

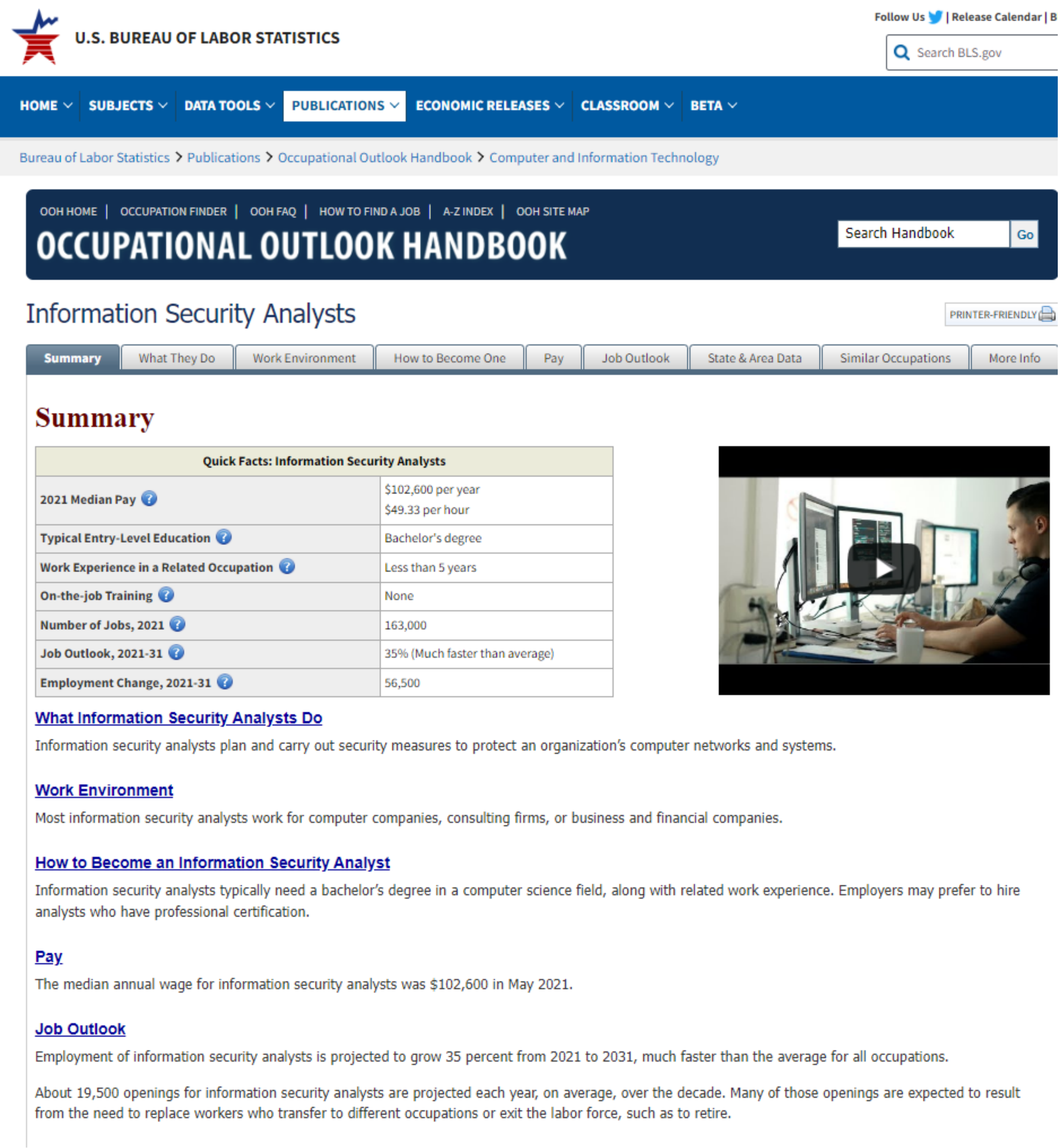
Risk Management Techniques

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

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

Agenda

- ✓Instructor
- ✓Course overview
- ✓Introduction
- ➢Need for Cybersecurity Professionals



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Work Environment
How to Become One
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Job Outlook
State & Area Data
Similar Occupations
More Info

Information Security Analysts

Summary

Quick Facts: Information Security Analysts	
2021 Median Pay	$102,600 per year $49.33 per hour
Typical Entry-Level Education	Bachelor's degree
Work Experience in a Related Occupation	Less than 5 years
On-the-job Training	None
Number of Jobs, 2021	163,000
Job Outlook, 2021-31	35% (Much faster than average)
Employment Change, 2021-31	56,500

What Information Security Analysts Do

Information security analysts plan and carry out security measures to protect an organization's computer networks and systems.

Work Environment

Most information security analysts work for computer companies, consulting firms, or business and financial companies.

How to Become an Information Security Analyst

Information security analysts typically need a bachelor's degree in a computer science field, along with related work experience. Employers may prefer to hire analysts who have professional certification.

Pay

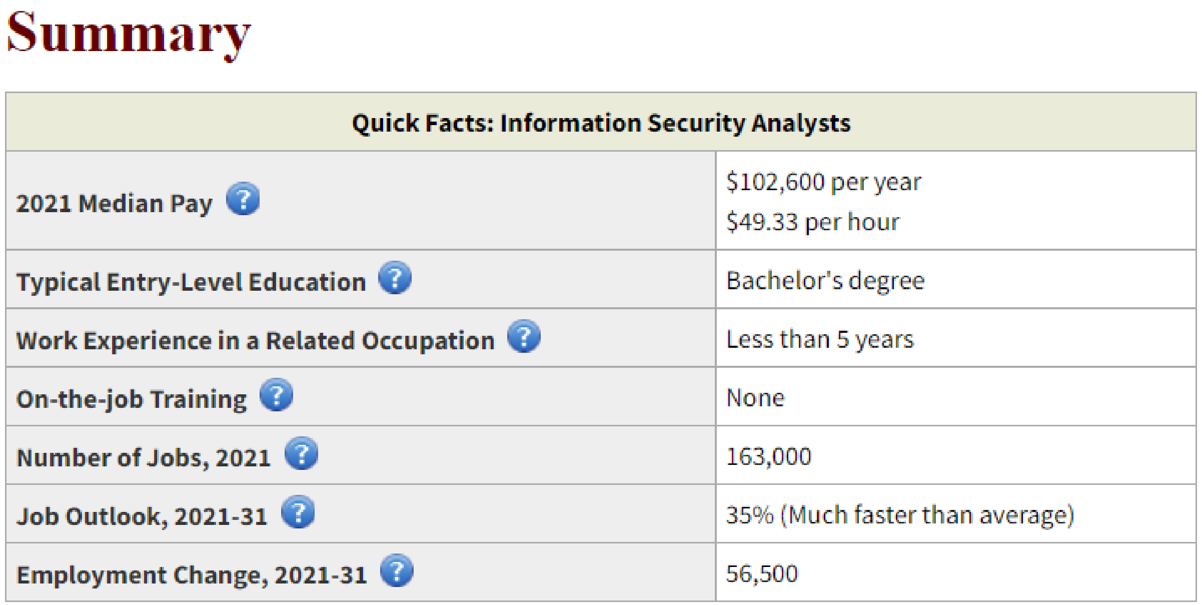
The median annual wage for information security analysts was $102,600 in May 2021.

Job Outlook

Employment of information security analysts is projected to grow 35 percent from 2021 to 2031, much faster than the average for all occupations.

About 19,500 openings for information security analysts are projected each year, on average, over the decade. Many of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as to retire.

https://www.bls.gov/ooh/computer-and-information-technology/information-security-analysts.htm



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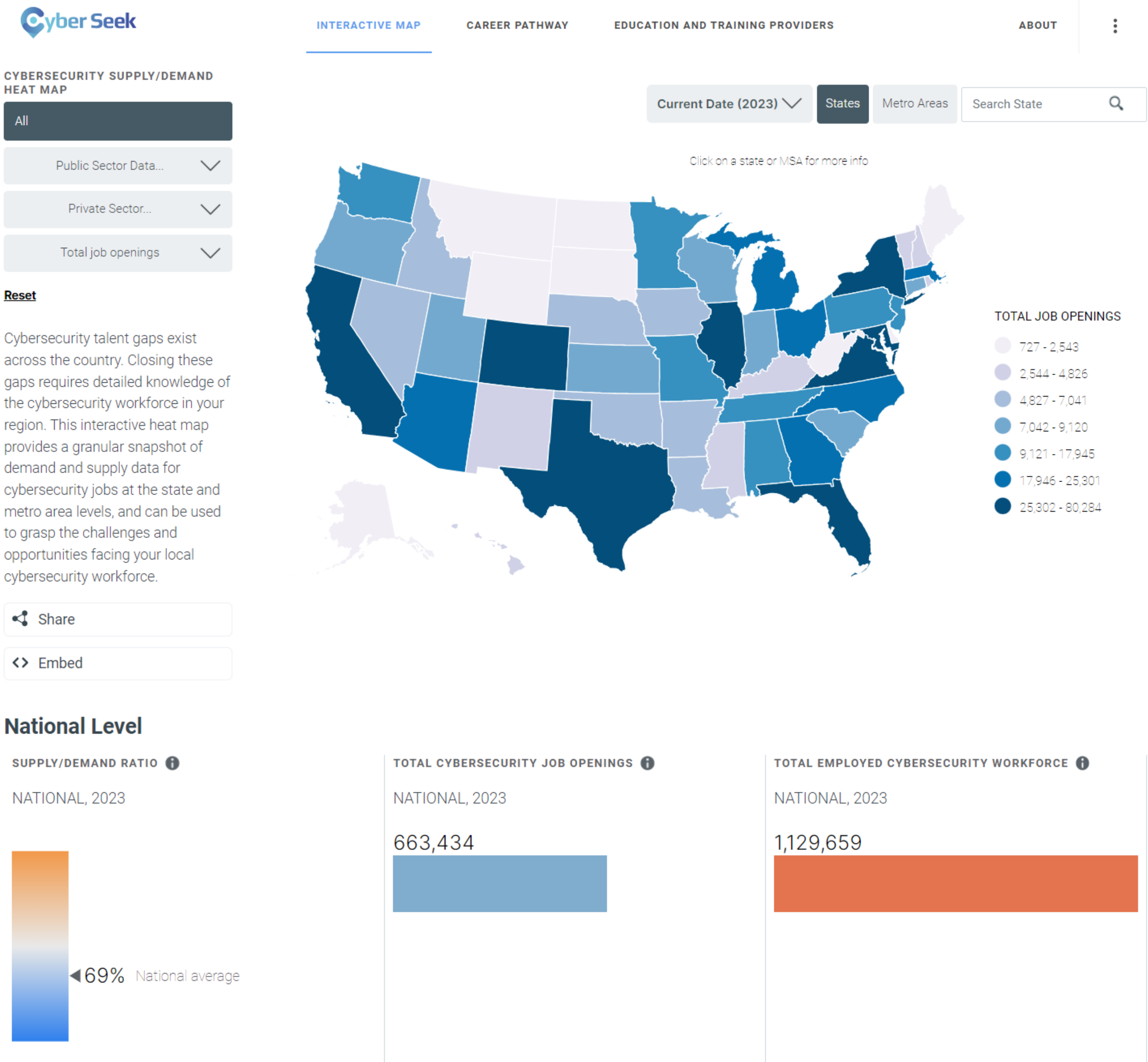


CYBERSECURITY SUPPLY/DEMAND HEAT MAP

Click on a state or MSA for more info

TOTAL JOB OPENINGS

●	727 - 2,543
●	2,544 - 4,826
●	4,827 - 7,041
●	7,042 - 9,120
●	9,121 - 17,945
●	17,946 - 25,301
●	25,302 - 80,284

Cybersecurity talent gaps exist across the country. Closing these gaps requires detailed knowledge of the cybersecurity workforce in your region. This interactive heat map provides a granular snapshot of demand and supply data for cybersecurity jobs at the state and metro area levels, and can be used to grasp the challenges and opportunities facing your local cybersecurity workforce.

National Level

SUPPLY/DEMAND RATIO

NATIONAL, 2023

69% National average

TOTAL CYBERSECURITY JOB OPENINGS

NATIONAL, 2023

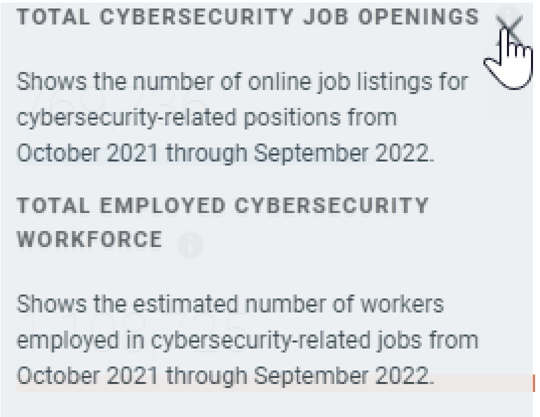
663,434

TOTAL EMPLOYED CYBERSECURITY WORKFORCE

NATIONAL, 2023

1,129,659

https://www.cyberseek.org/heatmap.html



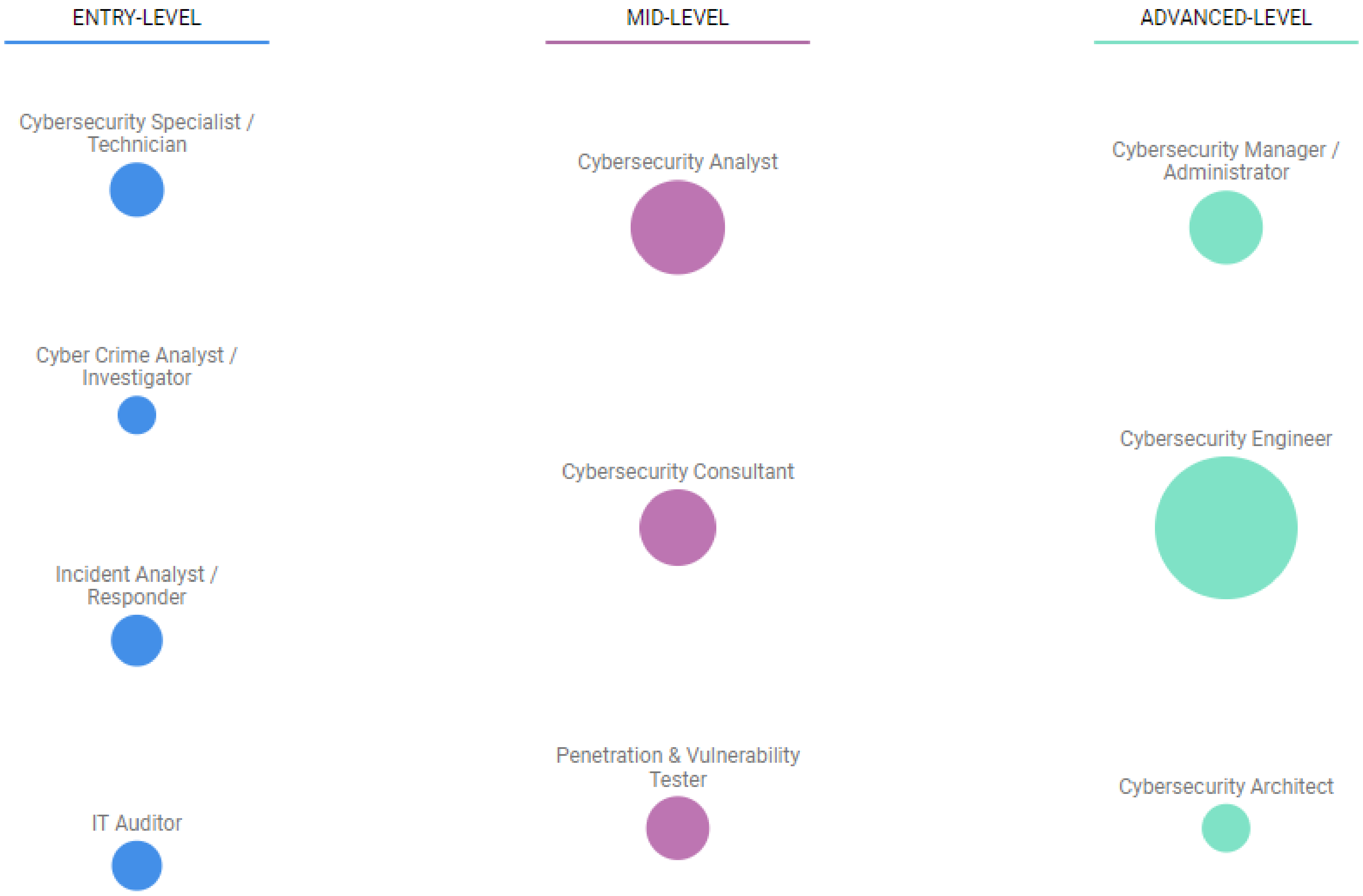
TOTAL CYBERSECURITY JOB OPENINGS

Shows the number of online job listings for cybersecurity-related positions from October 2021 through September 2022.

TOTAL EMPLOYED CYBERSECURITY WORKFORCE

Shows the estimated number of workers employed in cybersecurity-related jobs from October 2021 through September 2022.

Example job types



ENTRY-LEVEL

Cybersecurity Specialist / Technician

Cyber Crime Analyst / Investigator

Incident Analyst / Responder

IT Auditor

MID-LEVEL

Cybersecurity Analyst

Cybersecurity Consultant

Penetration & Vulnerability Tester

ADVANCED-LEVEL

Cybersecurity Manager / Administrator

Cybersecurity Engineer

Cybersecurity Architect

http://www.cyberseek.org/pathway.html

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