CS 4910: Intro to Computer Security

Ethical
Decision-Making in Cybersecurity

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Connecting the dots…

Ethics

Ethics are the principles you hold that guide your behavior and decisions.

- Strong ethics help make good decisions in new situations.
- An **ethical situation** occurs when a decision's outcome may cause harm to someone or something.
  - An **ethical dilemma** is when no decision is **harmless**.

Cybersecurity

Cybersecurity is the field of practice that protects computer system data, information, and functionality from harm.

- A **harm** is a negative consequence to an asset: information/resource with value.
- An **attack** is the act of causing harm by exploiting a vulnerability.
- A **vulnerability** is an aspect of a system that can cause it to behave incorrectly.

Connecting the dots…
Ethics and Cybersecurity are Strongly Related

Ethics

Ethics are the principles you hold that guide your behavior and decisions.

Cybersecurity

Cybersecurity is the field of practice that protects computer system data, information, and functionality from harm.

Attacks create ethical situations by causing harm

- An **ethical situation** occurs when a decision's outcome may cause harm to someone or something.
  - An **ethical dilemma** is when no decision is harmless.

- An **attack** is the act of causing harm by exploiting a vulnerability.
- A **vulnerability** is an aspect of a system that can cause it to behave incorrectly.

Vulnerabilities also Cause an Ethical Situation

Suppose Penny discovers a vulnerability in a software product used in many computer systems.

Penny has an *obligation* not to exploit that vulnerability

- Could face legal consequences

Penny also has a *decision* whether or not to **disclose** that vulnerability

- Could tell the software product vendor
- Could tell the world
- Could tell nobody

Ethical Situation: Disclosure

Could tell the software product vendor — Private Disclosure

- The vendor may fix it, and thereby prevent harm from coming.
- The vendor may do nothing about it, and thereby allow harm to come.

Ethical Situation: Disclosure

Could tell the software product vendor — Private Disclosure

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Could tell the world — Public/Full Disclosure

- Raise awareness of it; may encourage the vendor/others to fix it and prevent harm.
- Facilitates adversaries to exploit it and allow harm.

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Could tell the world — Public/Full Disclosure

- Raise awareness of it; may encourage the vendor/others to fix it and prevent harm.
- **Facilitates adversaries to exploit it and allow harm.**

Could tell nobody — Non-Disclosure

- If no one knows about it, no one can exploit it, so may avoid harm.
- Adversaries may already know it or find it independently, so may allow harm.

Ethical Situation: Disclosure

Could tell the software product vendor — Private Disclosure

- The vendor may fix it, and thereby prevent harm from coming.
- The vendor may do nothing about it, and thereby allow harm to come.

Could tell the world — Public/Full Disclosure

Vulnerability disclosure is an ethical dilemma

Could tell nobody — Non-Disclosure

- If no one knows about it, no one can exploit it, so may avoid harm.
- Adversaries may already know it or find it independently, so may allow harm.

Stacking up disclosure models with DFEI principles

Disclosure Model	
Integrity	Act with honesty in all situations
Trust	Build trust in all stakeholder relationships
Accountability	Accept responsibility for all decisions
Transparency	Maintain open and truthful communications
Fairness	Engage in fair competition and create equitable and just relationships
Respect	Honor the rights, freedoms, views, and property of others
Rule of Law	Comply with the spirit and intent of laws and regulations
Viability	Create long-term value for all relevant stakeholders

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Stacking up disclosure models with DFEI principles

Disclosure Model	Private	Public	Non
Integrity	✓	✓	✗
Trust	✗	✗	✗
Accountability	✗	✓	✗
Transparency	?	✓	✗
Fairness	✗	✓	✗
Respect	✓	✗	?
Rule of Law	✓	?	✓
Viability	✓	✓	✗

Responsible (Coordinated) Disclosure

Model for cybersecurity researchers (aka ethical hackers*) to engage with vendors:

1. Independent researcher discovers a vulnerability
2. The **researcher privately discloses** the vulnerability to the vendor, with a timeline
   - Allows vendor time to address a security vulnerability
   - Often between 3-6 months from date of disclosure
3. If not fixed in time, the **researcher publicly discloses** the vulnerability.

Premise is to hold vendors accountable for security problems.

**You may see ethical hackers referred to as "white hat" or "gray hat" hackers. These terms should be avoided as they connote a negative color-based association that has racial overtones.* https://www.acm.org/diversity-inclusion/words-matter

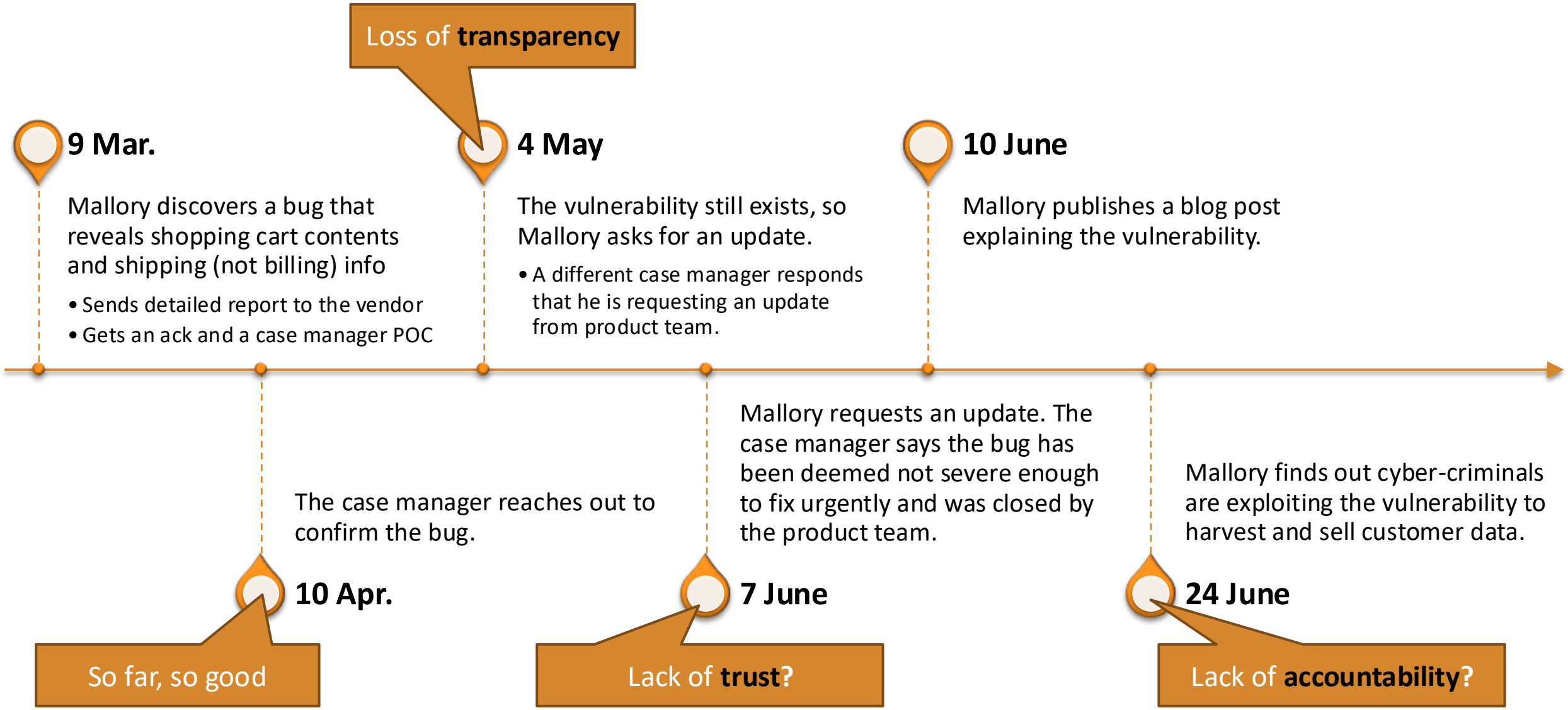
Responsible Disclosure Can Go Badly (Case)

9 Mar.

Mallory discovers a bug that reveals shopping cart contents and shipping (not billing) info

- Sends detailed report to the vendor
- Gets an ack and a case manager POC

What Went Wrong? Is anyone at fault?



How fares Responsible (Coordinated) Disclosure?

Disclosure Model	Private	Public	Non	Responsible
Integrity	✓	✓	✗	
Trust	✗	✗	✗	
Accountability	✗	✓	✗	
Transparency	?	✓	✗	
Fairness	✗	✓	✗	
Respect	✓	✗	?	
Rule of Law	✓	?	✓	
Viability	✓	✓	✗	

How fares Responsible (Coordinated) Disclosure?

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Accountability	✗	✓	✗	✓
Transparency	?	✓	✗	✓
Fairness	✗	✓	✗	✓
Respect	✓	✗	?	✓
Rule of Law	✓	?	✓	?
Viability	✓	✓	✗	✓

Learn More

Daniels Fund Ethics Initiative

https://www.danielsfund.org/ethics/overview
https://business.uccs.edu/resources/ethics

Disclosure

https://iamthecavalry.org/about/disclosure/
https://googleprojectzero.blogspot.com/