Cybersecurity

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Homeland Security & Cybersecurity

Lesson 15
Cybersecurity

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1
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1

"Cyber"

- **Prefix referring to computers and anything related to them.**
- Derived from "cybernetics", study of control systems.
  - Norbert Weiner, 1948
- Current usage tied to 1990s rise of Internet and common reference as "Cyberspace".
- Broad application makes it a multi-disciplinary area of study.

cy·ber
/ˈsībər/

adjective
of, relating to, or characteristic of the culture of computers, information technology, and virtual reality.

synonyms: electronic, digital, wired, virtual, web, Internet, Net, online

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2
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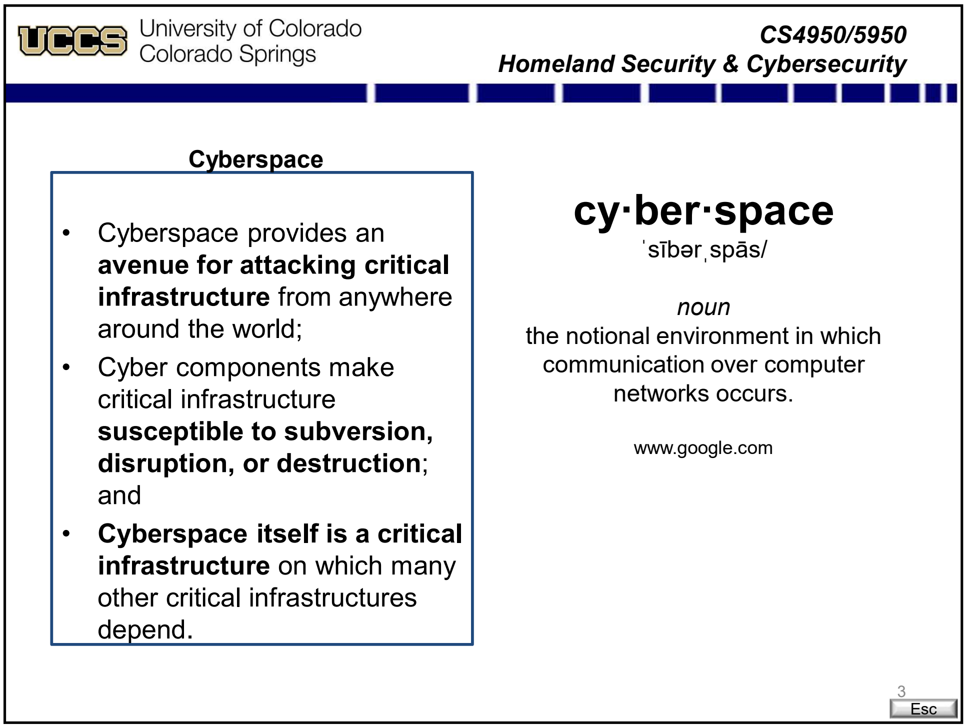

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Cyberspace

- Cyberspace provides an **avenue for attacking critical infrastructure** from anywhere around the world;
- Cyber components make critical infrastructure **susceptible to subversion, disruption, or destruction**; and
- **Cyberspace itself is a critical infrastructure** on which many other critical infrastructures depend.

cy·ber·space
ˈsībərˌspās/

noun
the notional environment in which communication over computer networks occurs.

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3
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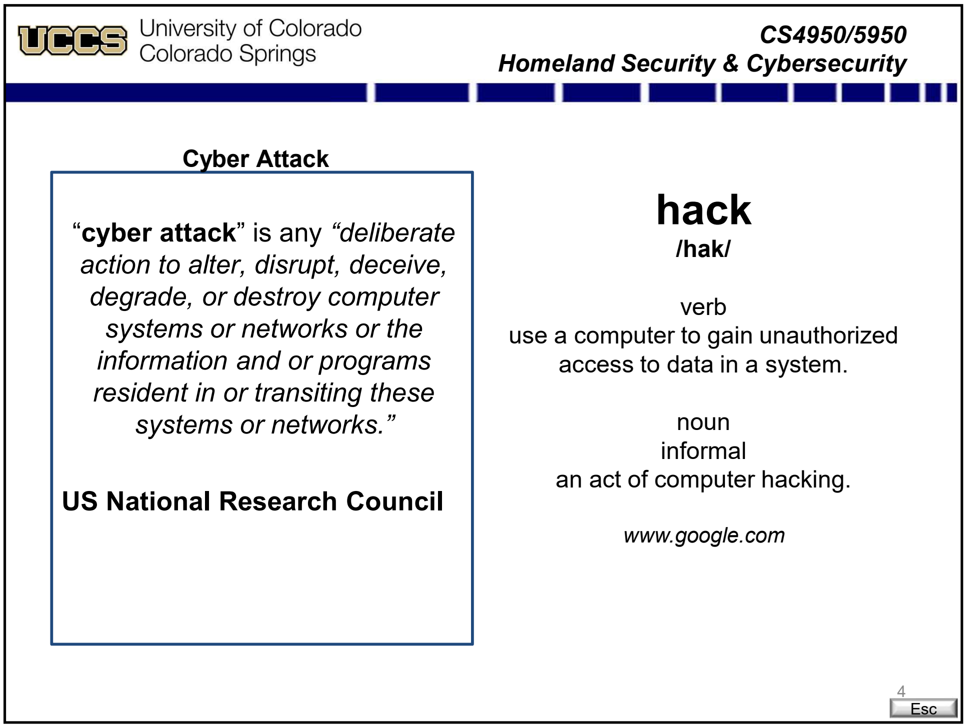

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Cyber Attack

"**cyber attack**" is any *"deliberate action to alter, disrupt, deceive, degrade, or destroy computer systems or networks or the information and or programs resident in or transiting these systems or networks."*

US National Research Council

hack
/hak/

verb
use a computer to gain unauthorized access to data in a system.

noun
informal
an act of computer hacking.

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4

Cybersecurity

Title 18 Section 1030 United States Code, **prohibits unauthorized access** to computers used by the Federal government, banks, and otherwise used for interstate or international commerce.

1984 Counterfeit Access Device & Computer Fraud & Abuse Act

cybersecurity

/ˌsībərsiˈkyo͝orədē/

noun
the state of being protected against the criminal or unauthorized use of electronic data, or the measures taken to achieve this.

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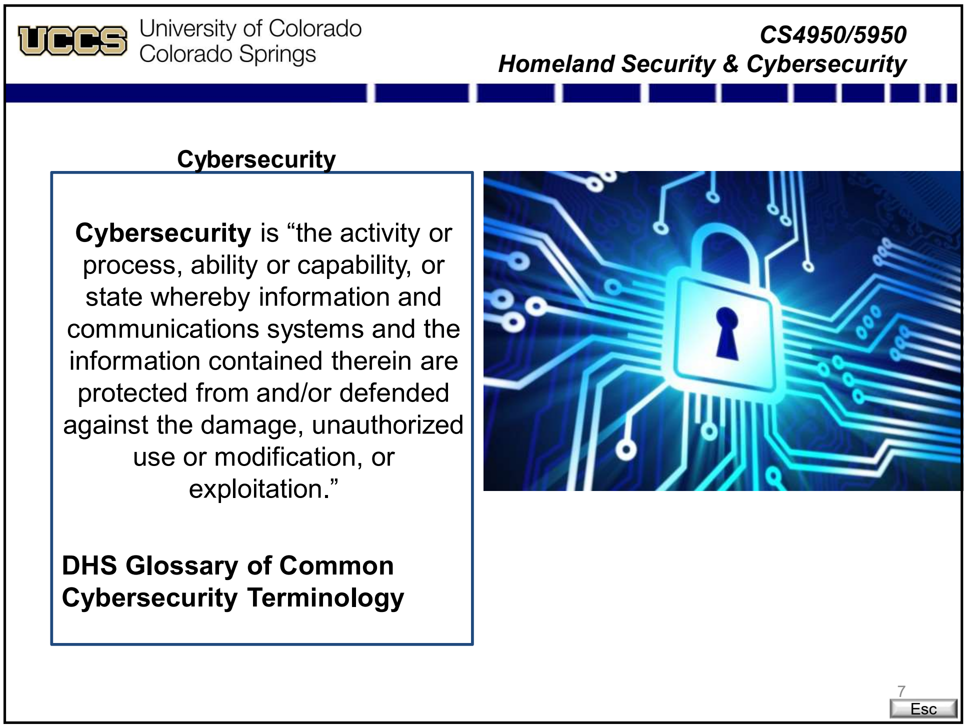
Cybersecurity

- Due to the inter-state nature of the Internet, **the law is interpreted to mean most all computers and cell phones.**
- A 1986 amendment made it a further **crime to distribute malicious code, traffic passwords, or conduct denial of service attacks.**



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Cybersecurity

Cybersecurity is "the activity or process, ability or capability, or state whereby information and communications systems and the information contained therein are protected from and/or defended against the damage, unauthorized use or modification, or exploitation."

DHS Glossary of Common Cybersecurity Terminology

7

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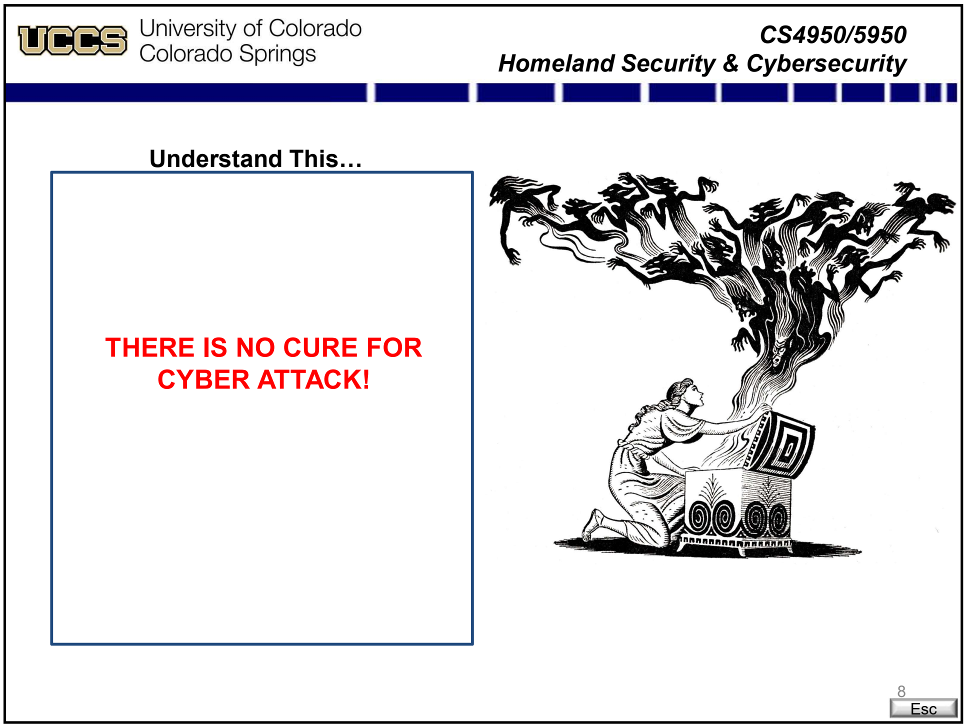
7



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Understand This…

THERE IS NO CURE FOR CYBER ATTACK!

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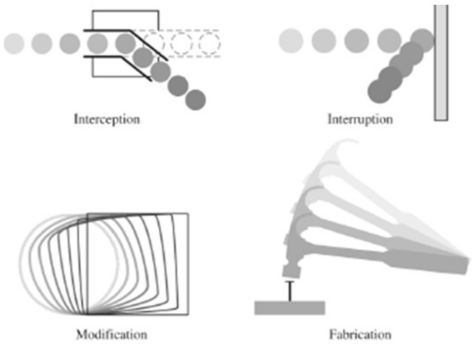
- In concept, cybersecurity is about ensuring the confidentiality, integrity, and availability of a computer and its data.
- **Confidentiality** ensures that the system and data are not accessed by an unauthorized agent.
- **Integrity** ensures that the system and data are not corrupted by an unauthorized agent.
- **Availability** ensures that the system and data are always accessible when needed.



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These seemingly simple goals, however, are very difficult to attain because computers are inherently stupid and fragile.

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- **Computers are stupid** because unlike humans, computers are incapable of making value judgments regarding their actions and will perform as directed regardless of the outcome, even if the consequences are catastrophic.
- **Computers are also fragile**; a single wrong character can disrupt millions of lines of code.
- **Finding such flaws is impossible.**

11
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- **Even a small 100-line program** with some nested paths and a single loop may contain **100 trillion paths.**
- Assuming each path could be evaluated in a millisecond, that's 1,000 paths tested every second, **it would take 3,170 years to test all possible paths through the code.**
- **The Android operating system for mobile devices has 12 million lines of code.**

12
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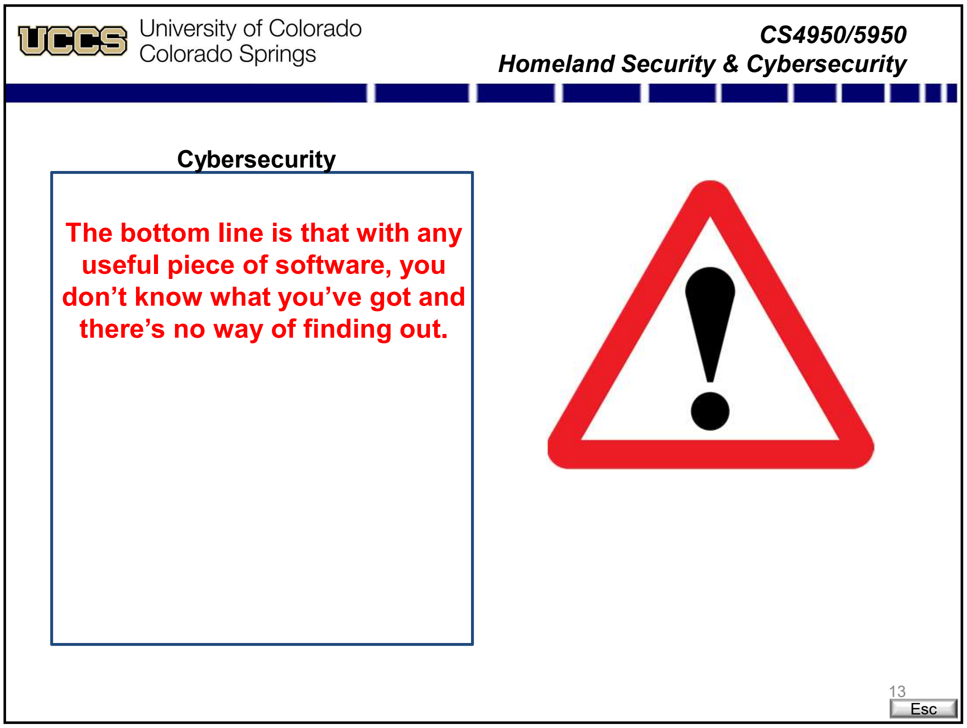
12



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The bottom line is that with any useful piece of software, you don't know what you've got and there's no way of finding out.

13

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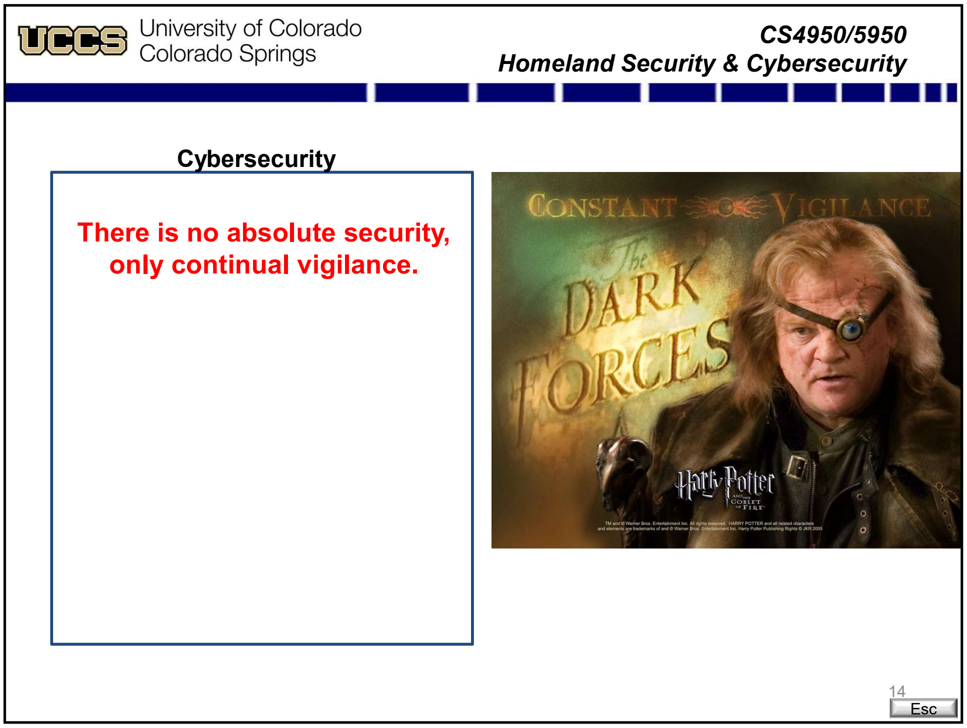

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There is no absolute security, only continual vigilance.

14

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14

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DHS Cybersecurity

- **2002 Homeland Security Act** makes DHS responsible for national cybersecurity.
- However, **DHS has no control over computers** outside the Federal Government.
- You may ask DHS for help, but **their resources are very limited.**
- Moreover, **DHS has no more ability to make anything more secure than anybody else.**

15
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15

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Cybersecurity Front Line

That is why today the first and last line of cyber defense rests with system owners and operators.

16
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Primary Hacking Methods

- **Exploitation**. Takes advantage of software flaws.
- **Phishing**. Try to steal somebody's credentials.

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Team Effort

- The best defense involves all members of the agency.
- IT protects your systems from exploits.
- Everybody protects your agency from phishing.
- Your defense is only as strong as your weakest member!

18
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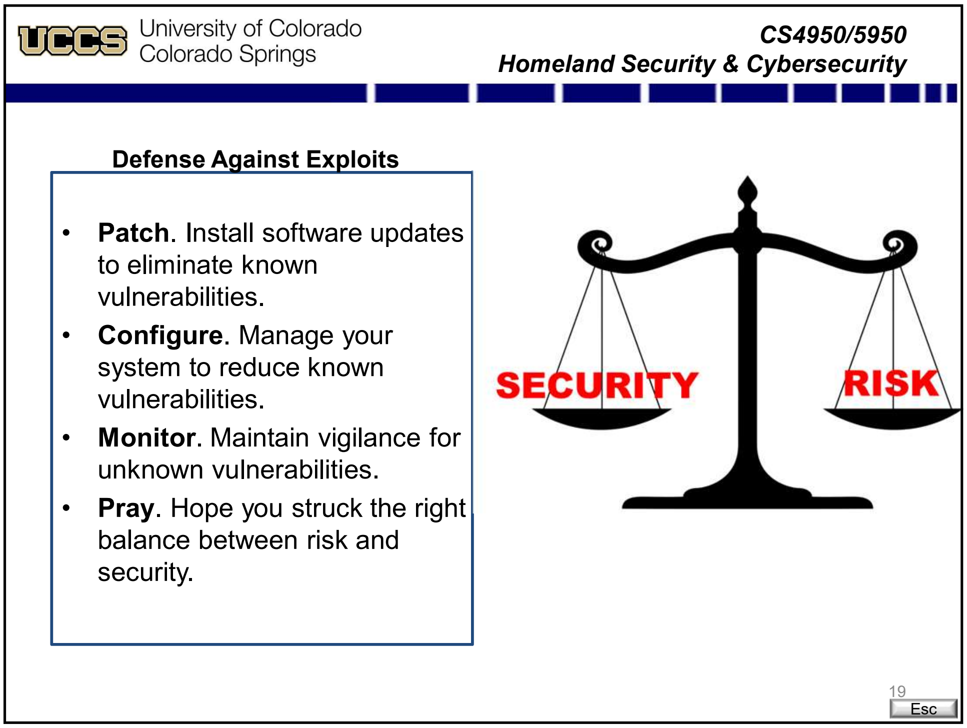
18



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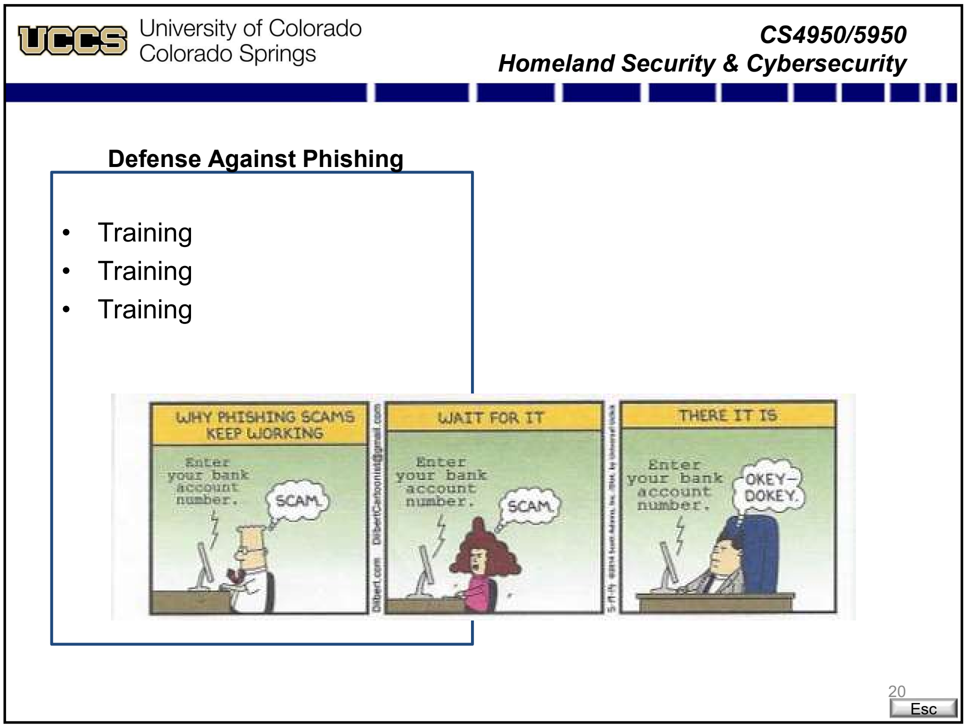
Defense Against Exploits

- **Patch**. Install software updates to eliminate known vulnerabilities.
- **Configure**. Manage your system to reduce known vulnerabilities.
- **Monitor**. Maintain vigilance for unknown vulnerabilities.
- **Pray**. Hope you struck the right balance between risk and security.



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Defense Against Phishing

- Training
- Training
- Training

WHY PHISHING SCAMS KEEP WORKING
Enter your bank account number.
SCAM
WAIT FOR IT
Enter your bank account number.
SCAM
THERE IT IS
Enter your bank account number.
OKEY-DOKEY.
Dilbert.com DilbertCartoonist@gmail.com

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Plan to Fail

- Backup & Recovery
- Insurance

There are only two types of systems: Those that have been hacked and those that don't know they've been hacked.

IF OUR BUSINESS PLAN FAILS, DO WE HAVE A PLAN FOR THAT?
ONLY LOSERS PLAN FOR FAILURE.
I THINK WE'RE ON THE SAME PAGE, BUT FOR SOME REASON YOU'RE ANGRY ABOUT IT.
Dilbert.com DilbertCartoonist@gmail.com
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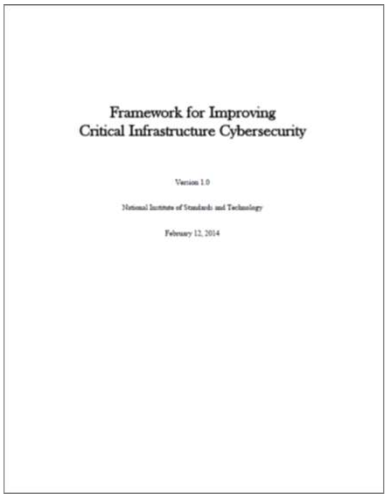
Hope is Not a Strategy

- Approach cybersecurity in systematic manner.
- **Facilitates strategic planning.**
  - Where are you now?
  - Where do you want to go?
  - How are you getting there?
  - What is it going to cost?
  - What is the residual risk?

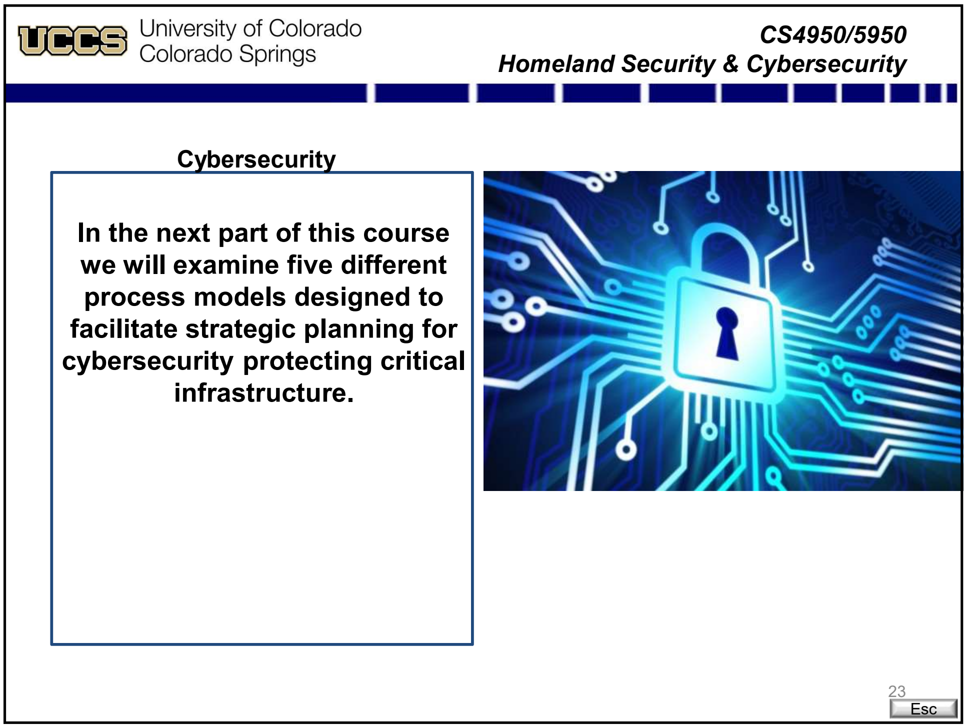


Framework for Improving
Critical Infrastructure Cybersecurity

Version 1.0

National Institute of Standards and Technology

February 12, 2014



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In the next part of this course we will examine five different process models designed to facilitate strategic planning for cybersecurity protecting critical infrastructure.

23

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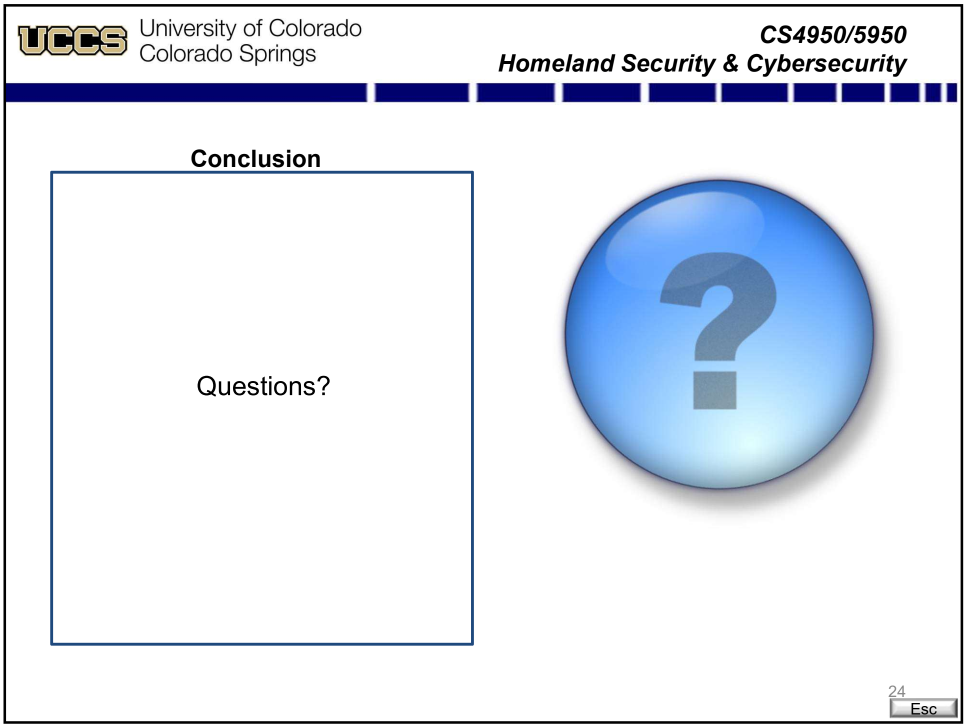
23



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Conclusion

Questions?

24

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24