



Lecture 1: Basic Information Security Concepts

Question 1

- a. Which vulnerability(ies) is/are mainly exploited by phishing attacks?
- b. Propose security controls (methods) to prevent phishing attacks.

Answer

- a. Social engineering exploits vulnerabilities in humans, such as human ignorance, gullibility and lack of awareness.
- b. Possible controls to prevent phishing attacks could be awareness training so people are better able to identify e.g. attackers who pretend to be legitimate persons, or fake email messages, and by using practical security mechanisms to detect social engineering attacks e.g. by filtering email, making email authentication practical, and by clearly indicating when a website server certificate is fake.

Question 2

- a. Mention threats against the registration phase of access control.
- b. Look at the definition of authorization in X.800 (<http://www.uio.no/studier/emner/matnat/ifi/INF3510/v10/learningdocs/X0800E.pdf>).
 - i) Is this definition of confidentiality and integrity from X.800 meaningful with relation to how authorization is defined? Why or why not?
 - ii) Is the US Computer Fraud and Abuse Act meaningful from the same perspective? See e.g. the section 18 U.S. Code § 1030 - Fraud and related activity in connection with computers <http://www.law.cornell.edu/uscode/text/18/1030>
 - iii) Explain how authorization should be defined to make meaningful the definitions of confidentiality and integrity in X.800, and also the US Computer Fraud & Abuse Act.
 - iv) Is the text book (Shon Harris CISSP, 6th edition) clear on the interpretation of authorization ?

Answer

- a. Potential threats are e.g.:
 - i. A person registers with the wrong name
 - ii. The person is correctly registered, but the credentials (e.g. password or token) are sent to the wrong person
 - iii. Correct registration and provisioning, but too powerful access permissions, inconsistent with the authorization policy, are implemented on the system.
- b. Authorization
 - i) The definitions of confidentiality and integrity in X.800 become meaningless when authorization is defined in the sense that the system grants access to anyone who

types the right password. Then an attacker with a stolen password is authorized, and would not breach confidentiality, which is meaningless.

- ii) The US Computer Fraud and Abuse Act would become meaningless if anybody with the correct password were authorized simply by logging on.
- iii) It is only meaningful to say that a system approves access based on authorizations previously defined by an authority (a human) or by his delegate within the domain. Authorization is a policy process that takes place during the registration phase prior to the user accessing the system. It defines the access privileges that the user gets when accessing the system.
- iv) The text book is totally confused on the interpretation of authorization. See e.g. p.161 where authorization is described in two different ways that are contradicting.

Question 3

Articulate a simple security policy for your personal computer, stating who has authorized access.

Answer

E.g.: *"Only I can use my laptop", or "My partner can use it to go online, but only I can access files"*.

Question 4

X.800 specifies security for computer networks, such as OSI and TCP/IP based computer networks. Check Table 1 (p.15) in X.800 to see which security mechanisms (controls) can be used to support the communication security services below, and explain how each mechanism provides the service.

- i. Connection-less confidentiality (i.e. message confidentiality)
- ii. Connection-less integrity (i.e. message integrity)

Answer

- i. (Connection-less) confidentiality can be provided by encipherment and routing control. Encipherment means that the data is encrypted and therefore unreadable for attackers who can not decrypt. Routing control means that the data packets are routed through protected networks where non-authorized parties do not have access.
- ii. (Connection-less) integrity can be provided by encipherment, digital signature, and data integrity. Encipherment means that the message is encrypted which makes it impossible for attackers to change or fabricate messages without detection because any change would make the message impossible to decrypt, but an attacker could possibly interrupt (delete) encrypted messages without detection, which would destroy integrity. Digital signature and Data integrity (aka. Message Authentication Code) means that a cryptographic checksum is sent with the original message, which can be verified by the recipient, so attackers can not modify or fabricate messages without detection because the verification by the recipient would fail, but an attacker could possibly interrupt (delete) a message without detection.

Question 5

A user is authenticated to an online web service at the start of a session, and sends data to the web server through his client computer. Explain to what degree the service provider can assume that the data received during the session are authentic as a result of the user authentication.

Answer

User authentication provides relatively low assurance of data/message authentication. It is e.g. plausible that the user has left the client computer to get a coffee or go to the toilet, and that another person uses the client computer to send data to the server. Another possibility is that the client computer is infected with a Trojan which sends data to the server without the user's knowledge, even if the user physically sits in front of the computer.

Question 6

In risk assessment assume that a threat agent is an attacker. The strength of the attacker can be modelled as the conjunction of capacity (skills and resources) and motivation. Discuss how the capacity and motivation of the attacker can be influenced by system vulnerabilities and asset values,

Answer

These considerations are only approximate.

- i. The capacity can be seen as relatively greater in case of vulnerabilities.
- ii. The motivation is greater in case of high gain, which normally is a function of asset value.
- iii. Motivation could also be influenced by the ease of attacking a target (vulnerability)

