CyBOK Showcase Event | March 3, 2022

Case Studies in Support of the CyBOK 1.1 Curriculum

Nancy R Mead, **Bastian Tenbergen**

OSWEGO
STATE UNIVERSITY OF NEW YORK

Welcome

Nancy R Mead (ret.)

Software Engineering Institute

Carnegie Mellon

Bastian Tenbergen

OSWEGO
STATE UNIVERSITY OF NEW YORK

A Look Back…

18 individual case studies covering
84% of CyBOK 1.0 Knowledge Areas (KAs)

7 KAs with only 1 case study (each)

9 KAs with at least 2 case studies (each)

3 KAs not currently covered

Cat.	Knowledge Area	Case Study Mapping
Human, Organizational & Regulatory Aspects	Risk Management & Governance	ACME Water Arch. Users Personae non Gratae FAA ERAM UAV GPS Spoofing Nat. Grid SAP Adoption Widget Company
	Law & Regulation	
	Human Factors	ACME Water FAA ERAM
	Privacy & Online Rights	Driver Asst. Sys.
Attacks & Defences	Malware & Attack Technologies	Mt. Gox Theft Malware Analysis for Sec. Reqs
	Adversarial Behaviour	Heartland Breach Mt. Gox Theft
	Security Operations & Incident Mgmt	Heartland Breach Mt. Gox Theft
	Forensics	Mt. Gox Theft
Systems Security	Cryptography	Mt. Gox Theft
	Operating Systems & Virtualisation	Heartland Breach Mt. Gox Theft
	Distributed Sys. Sec.	Driver Asst. Sys.
	Authentication, Authorisation & Accountability	ACME Water Heartland Breach
Software Platform Security	Software Security	Driver Asst. Sys. FAA ERAM
	Web & Mobile Security	Driver Asst. Sys.
	Secure Software Lifecycle	ACME Water Aircraft Serv. App. Drone Swarm Nat. Grid SAP Secure Acquisition SQUARE Tokeneer ID Station Malware Analysis for Sec. Reqs
Infrastruct. Security	Network Security	
	Hardware Security	Driver Asst. Sys.
	Cyber-Physical Systems Security	Driver Asst. Sys.
	Physical Layer & Telecommunications	

OSWEGO
STATE UNIVERSITY OF NEW YORK

Continuing the journey…

CyBOK 1.1 Case Studies

7 additional case studies

Deciphering

National Cybersecurity Governance

Penetration Test

Ransomware

Role Based Access Control

Secure LAN Design

100% of CyBOK 1.1 KA Coverage

14 KAs with 3 or more case studies (each)

Existing case studies checked against new and old KAs

Cat.	Ch.	Knowledge Area	Case Study Mapping
Human, Organizational and Regulatory Aspects	2	Risk Management & Governance	ACME Water Archetypal Users – Personae non Gratae FAA ERAM Outage GPS Spoofing of UAV National Cybersecurity Governance National Grid SAP Adoption Organization Risk Management: The Widget Company Penetration Test Ransomware Secure LAN
	3	Law & Regulation	National Cybersecurity Governance Ransomware
	4	Human Factors	ACME Water FAA ERAM Outage
	5	Privacy & Online Rights	ACME Water Driver Assistance System Safety & Security Penetration Test Role Based Access Control
Attacks and Defences	6	Malware & Attack Technologies	Deciphering Mt. Gox Bitcoin Theft Penetration Test Ransomware Using Malware Analysis to Improve Security Reqs Wireshark
	7	Adversarial Behaviours	Heartland Payment System Breach Mt. Gox Bitcoin Theft Penetration Test Ransomware
	8	Security Operations & Incident Management	Heartland Payment System Breach Mt. Gox Bitcoin Theft National Cybersecurity Governance Penetration Test Ransomware
	9	Forensics	Mt. Gox Bitcoin Theft Wireshark
Systems Security	10	Cryptography	Deciphering Mt. Gox Bitcoin Theft Penetration Test
	11	Operating Systems & Virtualisation Security	Deciphering Heartland Payment System Breach Penetration Test Secure LAN
	12	Distributed System Security	Driver Assistance System Safety & Security Secure LAN Wireshark
	13	Formal Methods for Security	Deciphering Tokeneer ID Station Project
	14	Authentication, Authorisation &	ACME Water Heartland Payment System Breach

Data on Classroom Use

Experiences and Educator Feedback of **six Case Studies**

Penetration Test Case Study became key driver in student enrollment, leading to direct job placements.

Quantitative Data on Classroom Application of **Driver Assistance System Case Study**

T-Test shows significant ($p<0.05$) difference between the 2021 and 2020 shows increase in students' learning outcome.

	2021	2020	2019
Mean	91.88%	74.38%	42.15%
Variance	20.38%	28.50%	20.86%
Sample Size	16	16	31
dF	27		
F	0.5113 (unequal variances)		
Student's T	0.0318		
Cohen's d	0.706 (medium-large effect size)		

OSWEGO
STATE UNIVERSITY OF NEW YORK

For the Future:

- survey industry trainers and univ. instructors regarding coverage of CyBOK coverage
- survey industry and governments for gaps in coverage
- gather quantitative results from case study use

https://www.cybok.org/resources_developed_through_funded_projects/