2018 International Conference on Cyber Situational Awareness, **Data Analytics and Assessment** (Cyber SA 2018)

Scotland, United Kingdom 11-12 June 2018



IEEE Catalog Number: CFP18C12-POD **ISBN:**

978-1-5386-4566-6

Copyright © 2018 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

*** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

| IEEE Catalog Number: | CFP18C12-POD |
|-------------------------|-------------------|
| ISBN (Print-On-Demand): | 978-1-5386-4566-6 |
| ISBN (Online): | 978-1-5386-4565-9 |

Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



Contents

Sponsor / Technical Co-Sponsor (TCS) / Partnership

Preface

CyberSA 2018 Programme Committee

Invited Keynotes

Keynote Seminar 1

A Cyber Science Challenge: Evaluating Residual Risks and Propagating Harm *Professor Sadie Creese*

Keynote Seminar 2

Describing a CyberSA Analysis Model Dr Cyril Onwubiko

Keynote Seminar 3

Getting Real about the Reasons for Insecure Behaviours Professor Karen Renaud

Keynote Seminar 4

The Challenge to Policing in Investigating Cybercrime Detective Inspector Eamonn Keane

Keynote Seminar 5

Internet of Things – A Hacker Perspective Associate Professor Jens Myrup Pedersen

Keynote Seminar 6

An Imposter's Journey into Infosec Stu Hirst

CyberSA 2018 - Track 1: Adaptive Cyber Defence Operations

Chapter 1

Development and evaluation of information elements for simplified cyber-incident reports 1 Patrik Lif, Teodor Sommestad, Dennis Granåsen

Chapter 2

Towards an Adaptable System-based Classification Design for Cyber Identity 11 Mary C. (Kay) Michel and Michael C. King

Chapter 3

The Landscape of Industrial Control Systems (ICS) Devices on the Internet 13 *Wei Xu, Yaodong Tao and Xin Guan*

Chapter 4

Can We Evaluate the Impact of Cyber Security Information Sharing? 21 Adam Zibak and Andrew Simpson

CyberSA 2018 - Track 2: CyberSA Emerging Tools and Techniques

Chapter 5

Compound Password System for Mobile 23 Zachary Hills, David F. Arppe, Amin Ibrahim, and Khalil El-Khatib

Chapter 6

Analysis of Adversarial Movement Through Characteristics of Graph Topological Ordering 27 Nima Asadi, Aunshul Rege, and Zoran Obradovic

Chapter 7

Enhancing Cyber Situational Awareness: A New Perspective of Password Auditing Tools 33 *Eliana Stavrou*

Chapter 8

Towards Situational Awareness of Botnet Activity in the Internet of Things 37 Christopher D. McDermott, Andrei V. Petrovski, Farzan Majdani

CyberSA 2018 - Track 3: Malware Economics and Advanced Ransomware Analysis Chapter 9

Malware Economics and its Implication to Anti-Malware Situational Awareness 45 Arun Lakhotia, Vivek Notani and Charles LeDoux

Chapter 10

Cluster analysis for deobfuscation of malware variants during ransomware attacks 53 Anthony Arrott, Arun Lakhotia, Ferenc Leitold and Charles LeDoux

Chapter 11

Cyber security: Influence of patching vulnerabilities on the decision-making of hackers and analysts 62 Zahid Maqbool, V.S. Chandrasekhar Pammi and Varun Dutt

Chapter 12

A Netnographic Study on the Dark Net Ecosystem for Ransomware 70 Yara Fareed Fahmy Bayoumy, Per H°akon Meland and Guttorm Sindre

CyberSA 2018 - Track 4: Situational Awareness, Cyber Kill Chain, Threat Intel and CyberOps Chapter 13

CoCoa: An Ontology for Cybersecurity Operations Centre Analysis Process 78 *Cyril Onwubiko*

Chapter 14

Multilayer Perceptron Neural Network for Detection of Encrypted VPN Network Traffic 86 Shane Miller, Kevin Curran and Tom Lunney

Chapter 15

Cyber Kill Chain based Threat Taxonomy and its Application on Cyber Common Operational Picture 94

Sungyoung Cho, Insung Han, Hyunsook Jeong, Jinsoo Kim, Sungmo Koo, Haengrok Oh, Moosung Park

Chapter 16

A Taxonomy of Malicious Traffic for Intrusion Detection Systems 102 Hanan Hindy, Elike Hodo, Ethan Bayne, Amar Seeam, Robert Atkinson and Xavier Bellekens

CyberSA 2018 - Track 5: Human Factors, Cognition, Cyber Policy and GDPR

Chapter 17

A Human Vulnerability Assessment Methodology 106 Andrea Cullen and Lorna Armitage

Chapter 18

How to Make Privacy Policies both GDPR-Compliant and Usable 108 Karen Renaud and Lynsay A. Shepherd

CIRC 2018 - Track 1: Security Metrics for Cyber Insurance and Protection Chapter 19

Cyber Insurance and Security Interdependence: Friends or Foes? 116 Ganbayar Uuganbayar, Artsiom Yautsiukhin, and Fabio Martinelli

Chapter 20

When to Treat Security Risks with Cyber Insurance 120

Per H°akon Meland and Fredrik Seehusen

CyberSA 2018 - Track 6: Machine Learning and Blockchain in CyberSA Chapter 21

Redesign of Gaussian Mixture Model for Efficient and Privacy-preserving Speaker Recognition 128 *S Rahulamathavan, X Yao, R Yogachandran, K Cumanan, and M Rajarajan*

CIRC 2018 - Track 2: Collaborative Insurance Data for Strategic Investment Risk Decisions Chapter 22

Cyber Risk Economics Capability Gaps Research Strategy 136 Erin Kenneally, Lucien Randazzese and David Balenson

Chapter 23

Towards Integrating Insurance Data into Information Security Investment Decision Making 142 Daniel W. Woods and Andrew C. Simpson