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Dr. Ultan J. Neville (B.Sc., M.Sc., Ph.D.)

Summary

Driven and adaptable Cyber Security leader, with demonstrated expertise in theoretical and practical Cyber Security across academia and industry. Accomplished public speaker and author; published in peer-reviewed Cyber Security journals and international conference transactions. Core competences include Product Security, Enterprise Application Security, and Enterprise Security Governance. Core domains include Web, Mobile, Cloud and IoT. Experienced Cyber Security professional, with direct line responsibility for managing product and corporate Cyber Security risk, engineering and architecture.

Current Position

Feb. 2020 – Present **Cyber Security Lead**, Global Shares, Cork, Ireland.

A trusted advisor to C-suite management for multi-year, global, Cyber Security strategic initiatives and programs. Highlights include:

- Developing a best-in-class Product Security Program for the business, encompassing Web and mobile-based technologies
- Global responsibility for building from new a company-wide Cyber Security Center of Excellence
- Development and implementation of corporate and product Cyber Security Reference Architectures
- Responsible for internal security testing and orchestration of 3rd-party pentest engagements
- Development and delivery of Cyber Security training and awareness programs
- Hands-on architectural design and deployment operations and engineering exercises, including configuration management oversight for policies, tools and controls
- Instilling a culture of best-practice security principals across the wider organisation
- Client-facing Cyber Security representative for the business

Professional Experience

Nov. 2018 – Feb. 2020 **Principal Cyber Security Engineer**, Global Shares, Cork, Ireland.

Highlights include:

- Secure Software Development Life-cycle best-practice, including security code reviews
- Security architecture design, including the development of Security Reference Architectures
- Security standards & compliance auditing
- Application security training for developers
- Cyber Security training for the wider company, including Phishing awareness
- Security testing, including, but not limited to, manual security testing, DAST, 3rd-party library risk analysis, the development of an automated AppSec pipeline

Oct. 2017 – Oct. 2018 **Senior Engineer - Global Product Security Engineering & Innovation Services**, Johnson Controls (JCI), Cork, Ireland.

Highlights include: Leading the conceptual, architectural and engineering development of a distributed, automated Red Teaming ecosystem for the GPS - Engineering & Innovation Services team. The work defined a best-in-class scalable system for internal security assessment and pen-testing capabilities, applied to various product lines at JCI.

Jul. 2017 – Oct. 2017 **Post-Doctoral Researcher – Cyber Security**, University College Cork (UCC), Ireland.

Highlights include: Working as part of the Mobile and Internet Systems Laboratory (MISL) research group in the Department of Computer Science at UCC under the CHIST-ERA DYPOSIT project. Research was focused on autonomic security control reconfiguration, and the problem of large, shared Cyber-Physical System infrastructures under attack. Research output included high-end Cyber Security journal publication.

Jan. 2014 – Dec. 2016 **Researcher – Cyber Security**, The Insight Centre for Data Analytics, University College Cork, Ireland.

Highlights include: Working under the direction of Dr. Simon Foley, with research focused on the automation of anomaly-free network access control configuration. Research output included the development of a generic firewall policy algebra, practical application proved both mathematically and through a Proof-of-Concept Python implementation, in conjunction with high-end international Cyber Security conference publications.

Jan. 2012 – Dec. 2013 **Researcher – Cyber Security**, Cork Constraint Computation Centre (4C), University College Cork, Ireland.

Highlights include: Research focused on autonomic security control reconfiguration in mobile and Web environments. Collaborating and contributing with a number of project partners from industry for example, Cisco, and academia, for example TCD and TSSG. The research was partially supported by the Science Foundation Ireland (SFI) funded strategic research cluster project: Federated, Autonomic Management of End-to-end communication services (FAME). Research output included high-end Cyber Security journal and conference publications.

Education

2012 – 2017 **Ph.D., Computer Science (specializing in Cyber Security)**, University College Cork, Ireland.

Title *"Reasoning About Firewall Policies Through Refinement and Composition"*

2010 – 2011 **M.Sc., Software and Systems for Mobile Networks**, University College Cork, Ireland.

Title *"Smartphone Firewall Configuration management"* (major dissertation)

2006 – 2010 **B.Sc. (Hons.), Computer Science**, University College Cork, Ireland.

Awards

2014 **Best Student Presentation** – Award received at the Cyber Network Exploitation and Defence (NED) Forum's inaugural Cyber Security and resilience strategy conference.

2010 **UCC College Scholar** – Awarded the title of College Scholar for performance in undergraduate exams.

Research

Publications

1 U. Neville and S.N. Foley. Reasoning about firewall policies through refinement and composition. *Journal of Computer Security (JCS) 26(2): 207-254, 2018.*

2 U.J. Neville. Reasoning About Firewall Policies Through Refinement and Composition. *PhD thesis, University College Cork, Ireland, 2017.*

3 U. Neville and S.N. Foley. Reasoning About Firewall Policies Through Refinement and Composition. In *Data and Applications Security and Privacy XXX: 30th Annual IFIP WG 11.3 Conference, DBSec 2016, Trento, Italy, July 18-20, 2016. Proceedings*, 2016.

4 S.N. Foley and U. Neville. A Firewall Algebra for OpenStack. In *2015 IEEE Conference on Communications and Network Security, CNS 2015, Florence, Italy, September 28–30, 2015, pages* 541–549. IEEE, 2015.

5 W.M. Fitzgerald, U. Neville, and S.N. Foley. MASON: Mobile Autonomic Security for Network Access Controls. *Journal of Information Security and Applications (JISA)*, 18(1):14–29, 2013.

6 W.M. Fitzgerald, U. Neville, and S.N. Foley. Automated Smartphone Security Configuration. In *Data Privacy Management and Autonomous Spontaneous Security, 7th International Workshop, DPM 2012, and 5th International Workshop, SETOP 2012, Pisa, Italy, September 13–14, 2012. Revised Selected Papers*, pages 227–242, 2012.

Ph.D. Research

Title *Reasoning About Firewall Policies Through Refinement and Composition*

Supervisor Dr. Simon N. Foley

Examiners Prof. Joaquín García-Alfaro (external) & Dr. John Herbert (internal)

Description The thesis of the dissertation is that *a firewall policy should be anomaly-free by construction, and as such, there is a need for a firewall policy language that allows for constructing, comparing, and composing anomaly-free policies.* An algebra is proposed for constructing and reasoning about anomaly-free firewall policies. Based on the notion of refinement as safe replacement, the algebra provides operators for sequential composition, union and intersection of policies. The effectiveness of the algebra is demonstrated by its application to anomaly detection, and standards compliance. The effectiveness of the approach in practice is evaluated through a mapping to/from Linux iptables. The evaluation shows that the approach is practical for large policies. The effectiveness is also evaluated through a mapping to OpenStack network and host-based access controls, and the development of a policy management framework for the Android OS.

M.Sc. Research (1H - First Class Honors)

Title *Smartphone Firewall Configuration Management* (Major dissertation)

Supervisors Dr. Simon N. Foley & Dr. William M. Fitzgerald

Description Developed a prototype application for the Google Android mobile platform that can automatically manage the configuration of the underlying Linux iptables firewall on behalf of the non-expert end-user in different network environments. The firewall configurations are based on a compliance-driven threat-model. A catalogue of firewall best practice countermeasures, with which to mitigate known network-based smartphone threats was developed. This catalogue is based upon best practice standards, for example Internet RFC's that mitigate anti-bogon threats, and guidelines from the National Institute of Standards and Technology on firewalls, firewall policy and information security. Performance analysis of the smartphone firewall, in conjunction with best practice standards, was also used to determine suitable firewall countermeasures. For example, one may be willing to sacrifice some security in a particular network environment in order to reduce battery consumption.

Presentations

- *Reasoning About Firewall Policies Through Refinement and Composition.* Presented at the 30th Annual IFIP WG 11.3 Conference on Data and Applications Security and Privacy (DBSec 2016), June 2016.
- *A Firewall Algebra for OpenStack.* Presented at the 1st IEEE Workshop on Security and Privacy in the Cloud (SPC 2015), September 2015.

- *Autonomic Security Control Reconfiguration.* Presented at the NED Forum's inaugural Cyber Security and resilience strategy conference, November, 2014. See also, Awards section.

Other Relevant Experience

Cyber Security Teaching

Jan 2012 – Mar 2014 Teaching assistant, lab demonstrator, tutor, for undergraduate System Security and Network Security modules, and postgraduate Mobile Systems Security at Department of Computer Science, UCC.

Undergraduate and Postgraduate Cyber Security Project Supervisor

Co-supervised the following B.Sc. degree final year projects with Dr. Simon N. Foley:

2016 O'Riordan, J.: **Location-based permissions manager for Android**

2016 McDonald, C.: **Anomaly analysis of OpenStack firewall polices**

2015 Barrett, E.: **WYSIWIP for Android: What you see is what is permitted**

2014 O'Keefe, D.: **E-client Enforcement of Chinese Wall policies in Openfire**

2014 Hanley, S.: **Anomaly analysis of Openfire packet filter polices**

and the following taught M.Sc. degree project:

2012 Li, X.: **Botnet Analysis and Detection for the Smartphone**

Cyber Security Conference & Workshop Reviewer

2014 Served as a nominated peer-reviewer of scientific publications for the European Symposium on Research in Computer Security (ESORICS).

Software Developer (Cyber Security Prototypes)

Jan 2012 – Dec 2013 Worked as part of the SFI-funded Federated, Autonomic Management of End-to-end communication services (FAME) Strategic Research Cluster (SRC). Primary contribution to the FAME SRC was the Java implementation of an autonomic, peer-to-peer, SAML-based agent. Asynchronous messaging was utilized to distribute Trust Management authorization/delegation credentials. This allowed for the dynamic reconfiguration of the network access controls on the XMPP servers in the test-bed, and permitted safe (secure) federation between collaborating agents.

Jan 2015 – Dec 2015 Developed as part of Ph.D. research, a Python implementation of the firewall policy algebra described in the Ph.D. Research section for iptables. The prototype was developed following a model-driven engineering approach, and experiments have been conducted on policy operators. Overall, the results are promising and have been reported in publications [1-3].

Cyber Security Consultant

Oct. 2014 – Dec. 2014 Conducted a security audit and pen-test for a company involved in fault-reporting systems for buildings. The assessment encompassed Web and mobile technologies. Worked closely with the lead-developer throughout the consult, and upon completion, furnished a full report on the findings with recommendations. Also provided remediation assistance, thereby helping to implement/apply the security controls outlined in the final report.

Interests

Music Playing the button accordion, with various associated achievements, including first-place All-Ireland medals for competing at Fleadh Cheoil na hÉireann in both junior and senior Grúpa Cheoil competitions.

Other Films, reading, gardening.

Referees

Available on request.