About Ryan

• Professor, Chair and Director of UQ Cyber Security since Feb 2019

• I established the Cyber Security Researchers of Waikato (CROW) (2012), NZ Cyber Security Challenge (2014) and the NZ Institute of Security and Crime Science (2017) at the University of Waikato

• I advise the INTERPOL, ministers, governments, and several listed companies on cyber security technologies.

• I wrote the cyber security ISO standard ISO/IEC 21878, co-authored the (ISC)2 CCSP certification, wrote the NZ level-6 curriculum on cyber security, and started 3 interdisciplinary degree programmes in cyber security: Waikato Uni: (Master of Cyber Security, Master of Security and Crime Science); UQ: Master of Cyber Security

• Across HP Labs and academia: I invent cyber security tools, e.g. HP security tools and data tracking tools used globally (e.g. USA Treasury, IRS, Singapore Government Cloud)

• During my career, I am blessed to have taught thousands of students, and supervised about 80+ research thesis students. Many are doing very well!
UQ CYBER SECURITY

INDUSTRY

AusCERT and members
UQ ITS
Industry, Governments & International Organisations

ACADEMIC RESEARCH

EAIT (ITEE)
Science (Maths & Physics)
HASS
BEL
Medicine
Centre for Policy Futures
Inst for Social Science Research
AusCERT Research

EDUCATION & TRAINING

CPD Courses
Bachelor Computer Science (Cyber Security Major)
Interdisciplinary Master of Cyber Security (Launched Aug 2019; any Bachelors degree)
PhD
My talk today…

I will be sharing stories from my past experiences at The University of Waikato, Dept of Prime Minister & Cabinet (DPMC) NZ Cyber Skills Taskforce, (ISC)2, NZQA, and my current experience at The University of Queensland.
When you think about cyber security jobs, what type of jobs do you think of?
Busting Stereotypes and Wrong Perceptions

- Hoodies
- Ethical hacking?
- Is there such a thing as ‘ethical burglary’?
- Training pilots, auditors and accountants.
- Cyber security as a business risk?
- Cyber security as part of national security?
Sai Honig, CISSP, CCSP (New Zealand)
(ISC)² Board Scheme Committee Chair

Originally from the United States, Sai now resides in New Zealand.

Sai is a multipotentialite who has worked in differing roles in various industries. She has experience in governance, audit and operations of IT. Her industrial experience includes manufacturing, healthcare, and education.

Sai has volunteered for Grameen Foundation assisting their global efforts in microfinance and alternative methods of assisting those to access capital in order to improve their lives, their families and their communities.

Sai’s proudest moment was when her volunteer efforts were recognized with The President’s Volunteer Service Award in May 2013.

Moving to New Zealand in 2014, Sai has worked in a hospital system serving a mostly rural community. One project she was involved with is the implementation of a cloud-based virtual health service. Sai's interest in cloud technologies has led to her contributing a chapter on cloud governance in “The Cloud Security Ecosystem: Technical, Legal, Business and Management Issues” and participation in writing various white papers.
When you see these news, what type of jobs come to mind?
A Wide Variety of Cyber Security Jobs

Political Science, Humanities
- Diplomats
- Policy Advisor
- Cyber Insurance Advisor and Provider
- IT Auditors

Physics and Mathematics
- Cryptanalysts
- Cryptographers
- Police (High Tech Crime Units)
- Digital Forensics Specialists
- Secure Software Engineers
- Cyber Security Analyst
- Incident Response Team
- Malware Researchers

Communications/Journalism
- Communications Advisor
- Cyber Psychologists
- Cyber Lawyers

Law
- Cyber Criminologists
- Industry and Academic Researchers
- Intelligence Community and Defence
- Many many more…

Business, Actuarial Science
- Postgraduate degrees

Computer Science/Software Engineering

Psychology
- Criminology
Focus Today: Technical Cyber Security Career
Industry Demand: Degrees (84%) and Experience
But what about ‘everyday’ cybersecurity jobs (which form the bulk of the market)?
Things to consider before starting your cyber security career

Working Backwards:
• Your purpose in life
• Your desired cyber security job
• The relevant qualifications, skills and knowledge required

The Environment for Learning
• Facilities and equipment
• Mentors
• Ecosystem

Your Brand and Reputation:
• Training institution quality and focus on quality
• Continuous development
• Scoring wins and milestones

Passing It Forward:
• How can you help others who need the help (e.g. not-for-profits, schools, disadvantaged sectors of society)?
• How can you mentor someone?
Things to consider before starting your cyber security career

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## NIST NICE Framework

<table>
<thead>
<tr>
<th>Function</th>
<th>Category</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify</td>
<td>Asset Management</td>
<td>ID.AM</td>
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<tr>
<td></td>
<td>Business Environment</td>
<td>ID.BE</td>
</tr>
<tr>
<td></td>
<td>Governance</td>
<td>ID.GV</td>
</tr>
<tr>
<td></td>
<td>Risk Assessment</td>
<td>ID.RA</td>
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<tr>
<td></td>
<td>Risk Management Strategy</td>
<td>ID.RM</td>
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<tr>
<td>Protect</td>
<td>Access Control</td>
<td>PR.AC</td>
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<tr>
<td></td>
<td>Awareness and Training</td>
<td>PR.AT</td>
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<tr>
<td></td>
<td>Data Security</td>
<td>PR.DS</td>
</tr>
<tr>
<td></td>
<td>Information Protection Processes &amp; Procedures</td>
<td>PR.IP</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>PR.MA</td>
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<tr>
<td></td>
<td>Protective Technology</td>
<td>PR.PT</td>
</tr>
<tr>
<td>Detect</td>
<td>Anomalies and Events</td>
<td>DE.AE</td>
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<td>Security Continuous Monitoring</td>
<td>DE.CM</td>
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<tr>
<td></td>
<td>Detection Processes</td>
<td>DE.DP</td>
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<tr>
<td>Respond</td>
<td>Response Planning</td>
<td>RS.RP</td>
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<td></td>
<td>Communications</td>
<td>RS.CO</td>
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<td></td>
<td>Analysis</td>
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<td></td>
<td>Mitigation</td>
<td>RS.MI</td>
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<td></td>
<td>Improvements</td>
<td>RS.IM</td>
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<tr>
<td>Recover</td>
<td>Recovery Planning</td>
<td>RC.RP</td>
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<td></td>
<td>Improvements</td>
<td>RC.IM</td>
</tr>
<tr>
<td></td>
<td>Communications</td>
<td>RC.CO</td>
</tr>
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</table>
Cybersecurity Career Pathway

There are many opportunities for workers to start and advance their careers within cybersecurity. This interactive career pathway shows key jobs within cybersecurity, common transition opportunities between them, and detailed information about the salaries, credentials, and skillsets associated with each role.

Cybersecurity Analyst

- **Average Salary**: $85,000
- **Common Job Titles**:
  - Information Security Analyst
  - Security Analyst
  - Cyber Security Analyst
  - IT Security Analyst
  - Senior Security Analyst
- **Requested Education (%)**:
  - Sub-BA: 10
  - Bachelor's/Graduate Degree: 74
  - Top Skills Requested:
    1. Information Security
    2. Information Systems
    3. Network Security
    4. Linux

https://www.cyberseek.org/pathway.html
Flowchart – By Qualification Levels

High School
- Australian Computing Academy – Schools Cyber Security Challenges
- MOOCs and Online Courses
- Joining CTFs and Competitions

TAFE/Vocational Institutes
- Certificate IV in Cyber Security
- MOOCs and Online Courses
- Joining CTFs and Competitions

University
- Bachelors degree (Computer Science, Computer Engineering, IT, Software Engineering)
- Postgraduate Certificate (typically 6 months)
- Postgraduate Diploma (typically 1 year)
- Masters (Coursework)
- Masters (Coursework and Capstone)
- MPhil or PhD (Research)
**Professional Certification and Training Options**

**No IT Skills**
- Cyber Security Courses from Vendor Academies (e.g. Palo Alto Networks, Cisco, RSA, etc.)
- Veteran Training/Conversion: WithYouWithMe

**With IT Skills, Looking to Convert to Cyber Security**
- OR
- With Cyber Security Skills, Looking to Specialise
  - Systems:
    - (ISC)2 SSCP
    - COMPTIA Security+
    - Cloud: (ISC)2/CSA CCSP, CSA CCSK
    - Pentesting: OSCP (24 hour exam)
    - Healthcare: (ISC)2 HCISPP
    - Audit: ISACA CISA
    - Digital Forensics: ISFCE CCE
    - Range of Technical Skills:
      - CREST
      - SANS Institute

**With Cyber Security Skills, Looking to move into Management (e.g. CISO)**
- (ISC)2 CISSP
- ISACA CISM

**Disclaimer:** There are too many options out there, and I am simply listing the qualifications commonly sought after by employers. The example qualifications in this presentation are not an endorsement, and similarly, those not listed are not to be interpreted as “not endorsed”.

Ryan Ko, ACS Webinar, 19 November 2019
Best Value-for-Money Certification/Training? The one which will enhance your reputation…

• Employer perception:
  - Example: OSCP’s 24 hour examination proves to employers looking for pen-testers.
  - Example: (ISC)2 CISSP is an entry requirement for USA Federal jobs in information security management.

• Quality control of Curriculum / Common Body of Knowledge
  - How do they regulate the CBK?
  - Is it refreshed regularly?

• Proctoring of Exams
  - Examinations run by Pearson VUE – biometric and facial ID verification
  - Integrity of examination, e.g. exam fraud
  - Ability/inability to ‘buy’ qualifications
Things to consider before starting your cyber security career

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• Your purpose in life
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The Environment for Learning
• Facilities and equipment
• Mentors
• Ecosystem

Your Brand and Reputation:
• Training institution quality and focus on quality
• Continuous development
• Scoring wins and milestones

Passing It Forward:
• How can you help others who need the help (e.g. not-for-profits, schools, disadvantaged sectors of society)?
• How can you mentor someone?
Find a Mentor

Australian Computer Society – join the local meetings

Australian Information Security Association – find your local branch

Cyber Century Mentoring across Australia and NZ
Do you know this person?

Security

*Reg meets 'Lokihardt', quite possibly the world's best hacker*

Korean chap finds flaws in moments, scores $100k apiece for fun

By Darren Pauli 11 Nov 2016 at 07:22

Jung Hoon Lee at PwnFest, Seoul.

**Power of Community** If Jung Hoon Lee is not the world's best hacker, he can't be far from the top of the dais: the 22 year-old South Korean better known as Lokihardt has an uncanny knack for finding zero-day exploits in the world's most popular and most secure systems.
SECCON 2016 Final competition

Sat, 28 Jan. 2017, 02:00 UTC — Sun, 29 Jan. 2017, 05:00 UTC

On-site
Tokyo Denki University
A SECCON CTF event.
Format: Jeopardy
Official URL: http://2016.seccon.jp/
This event's weight is subject of public voting!
Future weight: 25.00
Rating weight: 25.00
Event organizers
- SECCON CTF

Scoreboard

<table>
<thead>
<tr>
<th>Place</th>
<th>Team</th>
<th>CTF points</th>
<th>Rating points</th>
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<tr>
<td>1</td>
<td>CyKOR</td>
<td>3433.00</td>
<td>50.00</td>
</tr>
<tr>
<td>2</td>
<td>PwnPineappleApplePwn</td>
<td>2234.00</td>
<td>28.769</td>
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<tr>
<td>3</td>
<td>eee</td>
<td>1899.00</td>
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<td>4</td>
<td>217</td>
<td>1798.00</td>
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<tr>
<td>5</td>
<td>binja</td>
<td>1469.00</td>
<td>15.698</td>
</tr>
<tr>
<td>6</td>
<td>CodiSec</td>
<td>1464.00</td>
<td>14.828</td>
</tr>
<tr>
<td>7</td>
<td>Plaid Parliament of Pwning</td>
<td>1259.00</td>
<td>12.740</td>
</tr>
</tbody>
</table>
Korea University + KITRI (Gov’t) = South Korea’s DEFKOR + Best of the Best (BoB)

Dept. of CYDF @ Korea Univ. (Cont.)

- In 2015, "DEFKOR," the team comprised of 8 students from Dept. of CYDF at Korea University and 3 from Korea-based IT security solution provider Raonsecure, and 2 Korean students studying in the U.S. won the **TOP prize at the DEFCON CTF 23**!

- In this year, 4,000+ teams qualified, 15 teams made finalists!
BoB Facilities
Key Environmental Elements Supporting Success

Let’s look at the BoB programme:

• An investment mindset to resources and infrastructure
• Student-centred success strategy
• Internationally benchmarked (e.g. DEFCON CTF)
• True integration of cyber teaching, research, operations and extra curricular activities
Cyber security professionals are in high demand across Australia and the need for expertise is growing, with an estimated 18,000 new positions to be filled over the next seven years.

Protecting fundamental human rights, such as the right to privacy and freedom of speech, led University of Queensland honours student Tim Kallioinen to consider a career path in cyber security.

"As people increasingly incorporate technology into daily life, cyber security becomes the primary mechanism to protect these human rights," he said.

Tim teamed up with second year IT student Haoxi Tan to take part in a national cyber security challenge, known as the Pwn2Drone Capture the Flag (CTF) Challenge at the 2019 AusCERT conference.

Equipped with the appropriate knowledge, skillset and plenty of practice, the pair managed to secure first place, showcasing their abilities to a room filled with industry leaders.
Success at Cyber 9/12 Australia
– by the Atlantic Council & IFRS

The interdisciplinary UQ Cyber Squad won the Best Written Submission, and overall 3rd prize.
Things to consider before starting your cyber security career

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Passing It Forward:
• How can you help others who need the help (e.g. not-for-profits, schools, disadvantaged sectors of society)?)
• How can you mentor someone?
Cyber Security as a Profession – just like doctors, accountants, engineers, etc.

**CPE Requirements for cycles beginning on or after 1 January 2015:**

<table>
<thead>
<tr>
<th>Certification</th>
<th>Type</th>
<th>Suggested Annual</th>
<th>3-Year Total</th>
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</thead>
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<td>CISSP</td>
<td>Group A</td>
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<td>90</td>
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<tr>
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<td>Group A or B</td>
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<td>30</td>
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<td>Total Required</td>
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<tr>
<td>CSSLP, CCSP</td>
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<td>60</td>
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<tr>
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<td>Group A or B</td>
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<td>30</td>
</tr>
<tr>
<td></td>
<td>Total Required</td>
<td>30</td>
<td>90</td>
</tr>
<tr>
<td>SSCP, CAP, HCISPP</td>
<td>Group A</td>
<td>15</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Group A or B</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Total Required</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>ISSAP, ISSEP, ISSMP</td>
<td>Group A</td>
<td>N/A</td>
<td>20*</td>
</tr>
<tr>
<td></td>
<td>Total Required</td>
<td></td>
<td>20*</td>
</tr>
</tbody>
</table>

**Concentrations**

If you hold a CISSP concentration, 20 CPE credits of the total number of Group A CPEs required in the CISSP three-year cycle must be directly related to your concentration. If you hold more than one concentration, you must earn 20 credits in each concentration. CPEs required for a concentration are automatically counted toward the CISSP CPE requirement.

<table>
<thead>
<tr>
<th>Certification</th>
<th>Type</th>
<th>Suggested Annual</th>
<th>3-Year Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISSP, CCSP, SSCP, CSSLP, CAP, HCISPP</td>
<td>Group A</td>
<td>15</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Institution Reputation – lessons learned and implications

EC Council Website Hacked and used to serve malicious code
March 25, 2016, by Pietro Pagani

Researchers at Fox-IT warn that the website of security certification provider EC Council has been compromised to host the malicious Angler Exploit Kit.

No one is secure, we are all potential targets, even if you are a skilled expert and the fact that I'm going to tell you demonstrates it. The website of security certification provider EC Council, that organization that offers the Certified Ethical Hacker program, has been hacked and used to spread the Angler exploit kit.

According to the security researchers at Fox-IT, the official website of EC Council was compromised by hackers, this means that for several days visitors with vulnerable systems were open to malware infections.

The Angler EK used in the attack is serving the TeslaCrypt ransomware, the website is redirecting visitors to the Angler EK since Monday, March 21.

"Since Monday the 21st of March the Fox-IT Security Operations Center (SOC) has been observing malicious redirects towards the Angler exploit kit coming from the security certification provider known as the EC-COUNCIL. As of writing this blog article on the Thursday, the 24th of March, the redirect is still present on the EC-COUNCIL's IClass website for CISM certification located at iclass@ecouncil.org. We have reached out and notified the EC-COUNCIL but no corrective action has been taken yet," explains the Fox-IT senior threat intelligence analyst Jonathan Almama.

The experts reported the issue to the EC Council, but they also added that the organization "didn't seem to care."
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- How can you help others who need the help (e.g. not-for-profits, schools, disadvantaged sectors of society)?
- How can you mentor someone?
Create Cyber Awareness Campaigns

Examples from my university…
Credits: Marc Blum, Shelly Mills

Stay cyber safe

Cyber security for staff and students is a top priority. To ensure your personal information and UQ’s data, systems and intellectual property remain safe, it’s important to be aware of cyber security. This information will show you how to recognise cyber security threats, and how to report incidents and risks.
Mandy Turner – Great role model and advocate

Branch chair Mandy Turner receives top accolade

It's well known that AISA has the best voluntary contributors in the business, exemplified by our Brisbane branch chair, Mandy Turner, who was recognised this month with a top industry award.

Ms Turner (pictured) was named AusCERT’s Information Security Excellence professional of the year at their conference at the Gold Coast on Thursday, May 30. The 2018 winner was Troy Hunt, founder of the Have I Been Pwned? website.

The Queenslander told AISA she was surprised and delighted to receive the accolade.

"I am a career geek, and love technology, analysis, security, educating people about cybercrime, investigations, mentoring, and providing leadership, so the work I currently do and the work I will be doing soon in my new role are my dream jobs.

"I have worked in a variety of roles over the years that relate to analysis, fraud, cybercrime and security and believe I am just a small cog in a massive wheel that is the information security industry.

"I am therefore highly honoured that AusCERT chose me, out of a massive cohort of highly skilled professionals," Ms Turner said.
Grandpa Siuta

From computer newbie to a Master of Cyber Security

7 June 2017

Six years ago, Siuta Laulupe’a’alu could barely use a computer. Today, his Master of Cyber Security research has proved fundamental in bringing the University of Waikato and the Government of Tonga together to work collaboratively on cyber security issues.

Siuta is from Okoa, a tiny island in Vava’u, Tonga, where everyone knows each other and computers are a rare sight. "Okoa has a population of about 400 people," he says. "And it’s poverty-stricken."

In 2007, Siuta and his family were given the opportunity to immigrate to New Zealand. Now a permanent resident, Siuta says his life ambition now is to give back to the islands he was raised in. "The reason I am studying is to help my people," he says. "And I don't just want to help Tonga, I want to help the whole Pacific."
Craig Scoon presenting to the Governor-General, and Director, NSA Research Directorate in 2016
Resources to get started
Cybersecurity Career Pathway

There are many opportunities for workers to start and advance their careers within cybersecurity. This interactive career pathway shows key jobs within cybersecurity, common transition opportunities between them, and detailed information about the salaries, credentials, and skills associated with each role.

Cybersecurity Analyst

AVERAGE SALARY
$85,000

COMMON JOB TITLES
- Information Security Analyst
- Security Analyst
- Cyber Security Analyst
- IT Security Analyst
- Senior Security Analyst

REQUESTED EDUCATION (%)

<table>
<thead>
<tr>
<th>Sub-BA</th>
<th>Bachelor's/Graduate Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>74</td>
</tr>
</tbody>
</table>

TOP SKILLS REQUESTED
1. Information Security
2. Information Systems
3. Network Security
4. Linux

https://www.cyberseek.org/pathway.html
Useful Reading

• https://www.nist.gov/itl/applied-cybersecurity/nice/resources/nice-cybersecurity-workforce-framework

• https://niccs.us-cert.gov/workforce-development/cyber-security-workforce-framework/search

• https://niccs.us-cert.gov
Resources closer to home...
Briefing Slides - May 2019

What is the ASD CyberEXP?

The ASD CyberEXP is an online career awareness program designed to inspire students (Year 7 - Tertiary) to consider the exciting pathways available in the cyber security field.

The program takes students through a day in the life of five cyber specialists working in the Australian Signals Directorate. They help to secure the government’s information, services, and personnel.

The Australian Signals Directorate has co-designed and sponsored the program, making the resource free for all students, teachers, parents, and schools in Australia.

The program can be undertaken by individual students on their own time, or facilitated by a teacher/school as a classroom activity accompanied by a range of supporting curriculum resources for teachers.

The ASD CyberEXP is run on the LifeJourney cloud-platform and is supported by the LifeJourney Australian team with deep experience in education program implementation.
3 Components of the ASD CyberEXP

- Mentor Exploration
- Incident Response Simulation
- Field Trips - Beginning Cyber
Mentor Selection “Home Page”

Students select and review 3 mentors here.

(Remaining 2 reviewed later in Dashboard.)
ASD CyberEXP Teacher Resources

The following resources and tools have been developed to ease the learning curve for Australian teachers implementing the ASD CyberEXP in the classroom. LJ will continue to update these documents and adding additional resources (i.e. Connecting cyber security to the mathematics curriculum).
Acknowledgements

- Soli Deo Gloria
- Special thanks to ACS (Kylie Barringer, Holly Bretherton) for inviting me to give this webinar.
- Grants: NZ MBIE STRATUS, InternetNZ, Office of the Privacy Commissioner, NZ Law Foundation, UQ Cyber Security Strategic Funding, AFP.
- University of Queensland ITEE colleagues
- University of Waikato mentors (Ian Witten, Bill Rogers, Kevin Broughan, Alister Jones), staff (Tania Robinson, Brian Cole, Trevor Drage) and colleagues
- Mentors: Corey Schou, Stephen Lee, Ted Humphreys, Ken Barker, Veena Mendiratta, Liqun Chen
- Colleagues at STRATUS, INTERPOL, NZ Police, NZDF, ISO/IEC JTC 1/SC 27, (ISC)2, and CSA
- Ex-HP Labs colleagues: Markus Kirchberg, Peter Jagadpramana, Suen Chun Hui, Lim Teck Hooi
- Ex-CROW Staff: Taejun Choi, Harpreet Kaur, Aleksey Ladur, Meena Mungr, Cameron Brown, Aleksey Ladur
- Ex-Postdocs: Raja Naeem Akram, Sivadon Chaisiri, Harris Lin, Abigail Koay
- PhD Students: Olive Chen, Kevin Ng, Alan Tan, Joshua Scarsbrook, Mark Will, Sam Shute, Jeff Garae, Thye Way Phua, Brandon Nicholson, Daniel Roodt, Hee Meng Ho
- Masters Students: Mickey Law Tsz Fung, Shaun Stricot-Tarboton, Sjoerd de Feijter, Patrick Yangchao Dong, Spencer Tang, Cheng Cheng, Craig Scoon, Saurabh Naik, Jeffrey Garae, Baden Delamore, Mohammad BaniTaha, Jeffrey Yeh, Brian Ong, Milton Markose, Jeremy Symon, Lizhu Su, Saira Boban
Thank you – and all the best with your cyber security career!

Prof Ryan Ko | Chair and Director
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W: https://researchers.uq.edu.au/researcher/23784

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https://www.linkedin.com/in/ryan-k-l-ko-38894824/

Join us at UQ Cyber Security!

https://cyber.uq.edu.au