Digital Security Capacity Building: Role of the University

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Outline

- Evolution of security
- Digital security domains
- Digital security needed competencies and certifications
  - Digital workforce shortage
  - Role of the university
  - Cybersecurity career pathway
Evolution of Security

Digital Security

- Physical and Environmental Security
- Internet of Things (IoT) Security
- Operational Technology (OT) Security
- Information Technology (IT) Security
- Cyber Security
- Information Security

Digital Security
Experts are predicting that digital crime will cost businesses 6 trillion dollars annually by 2021

- 556 Million victims per year, 1.5 Million victims per day and 1.8 victims per second
- Digital crime is going mobile: 2/3 of Internet users are using mobile devices and 31% of victims are mobile users
- Digital crime is going social: 40% of social network users have fallen victim
- In 2020, 20.8 billion Internet connected things: Human will be more exposed to digital criminality

Digital economy and digital business environment are built on trust: Digital ethics and Digital security:
- Legal framework (Laws, decrees and regulation texts)
- Institutional framework (National Digital Security Agencies, Government Certification Authorities, ..)
- Technical framework (Last emerging technologies)

Organisations that are able to attract and retain digital security talent will be much more successful in profiting from the digital opportunity and managing the digital security risk
Digital Security Domains

Nine main domains

- CASB
- Federated Identity
- Data Protection
- Network Design
- Secure Application Development
- Baseline Configuration
- Cloud Security
- Access Control
- Identity Management
- Identity & Access Management
- Security Architecture
- Cryptography
- Security Engineering
- Certification
- Conferences
- Peer Groups
- Self Study
- Training
- Framework and Standard

- Physical Security
  - Vulnerability scan
  - Assets inventory
  - 4th Party Risk
  - 3rd Party Risk
  - Penetration test
  - Redteam
  - Blue team
  - Social Engineering
  - Application
  - Infrastructure

- Risk Assessment
  - Source Code Scan
  - Data-Centric Risk Assessment
  - Data-Flow Map

- Threat Intelligence
  - Company's Written Supervisory Procedures (WSPs)
  - Reports and Scorecards
  - Executive Management Involvement
  - Risk Informed
  - KPIs/KRIs
  - Compliance & Enforcement
  - Guideline
  - Policy
  - Procedure
  - Standard

- User Education
  - External
  - Internal
  - IOCs
  - Intel. Sharing
  - Training (new skills)
  - Contextual
  - Awareness (reinforcement)

- Security Operation
  - DR
  - Recovery
  - Detection
  - Protection
  - BCP
  - Prevention
  - SIEM
  - SOC
  - Vulnerability Management
  - Incident Response
  - Data Leakage
  - Active Defense
  - Containment
  - Eradication
  - Forensics
  - Investigation

- Career Development
  - Peer Groups
  - Self Study
  - Training
  - Framework and Standard

- Global ICT Capacity Building Symposium 2018
# Digital Security Expertise

## Top Skills and Certifications

<table>
<thead>
<tr>
<th>TOP SKILLS</th>
<th>TOP CERTIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Security</td>
<td>CISA (Certified Information Systems Auditor)</td>
</tr>
<tr>
<td>System &amp; Network Security</td>
<td>CISM (Certified Information Security Manager)</td>
</tr>
<tr>
<td>System &amp; Network Administration</td>
<td>GIAC (Global Information Assurance Certification)</td>
</tr>
<tr>
<td>Linux / UNIX</td>
<td>CompTIA Security+ Certification</td>
</tr>
<tr>
<td>Audit Planning</td>
<td>CCNA (Cisco Certified Network Associate)</td>
</tr>
<tr>
<td>Audit Reporting</td>
<td>CEH (Certified Ethical Hacker)</td>
</tr>
<tr>
<td>Risk Assessment</td>
<td>CHFI (Computer Hacking Forensic Investigator)</td>
</tr>
<tr>
<td>Computer Forensics</td>
<td>CISSP (Certified Information Systems Security Professional)</td>
</tr>
<tr>
<td>Malware Analysis</td>
<td>ISO 2700X</td>
</tr>
<tr>
<td>Project Management</td>
<td>CIA (Certified Internal Auditor)</td>
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<tr>
<td></td>
<td>CRISC (Certified in Risk and Information Systems Control)</td>
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</table>
Digital Workforce Shortage

High Demand

- Digital security skills ranked first in both demand and talent gap
- Digital security workforce gap will reach **1.8 million in 2022** according to the 2017 Global Information Security Workforce Study of the International Information System Security Certification Consortium (ISC²)

![Bar chart showing skill demand vs. proficiency]

- **Cybersecurity:**
  - Employer: Demand for this digital skill = 68%
  - Employee: Proficiency level of skill = 43%
- **Cloud computing:**
  - Employer: Demand for this digital skill = 65%
  - Employee: Proficiency level of skill = 42%
- **Analytics:**
  - Employer: Demand for this digital skill = 64%
  - Employee: Proficiency level of skill = 51%
- **Web development:**
  - Employer: Demand for this digital skill = 64%
  - Employee: Proficiency level of skill = 39%
- **Mobile application design and development:**
  - Employer: Demand for this digital skill = 62%
  - Employee: Proficiency level of skill = 38%
- **Data science:**
  - Employer: Demand for this digital skill = 62%
  - Employee: Proficiency level of skill = 45%
- **Big data:**
  - Employer: Demand for this digital skill = 61%
  - Employee: Proficiency level of skill = 41%
- **Master data management:**
  - Employer: Demand for this digital skill = 61%
  - Employee: Proficiency level of skill = 42%
- **Innovation strategy:**
  - Employer: Demand for this digital skill = 61%
  - Employee: Proficiency level of skill = 40%
- **User interface design:**
  - Employer: Demand for this digital skill = 60%
  - Employee: Proficiency level of skill = 39%

Capgemini Digital Transformation Institute Survey (June-July 2017)
Top Reasons for Shortage
Global Information Security Workforce Study (2017)

- Reasons for shortage are various and vary mainly by region:
  - Problem in finding qualified persons with knowledge, skills and abilities
  - Hybrid job combining different skill sets that are not traditionally taught together
  - Certifications become prominent for the employers and candidates are filtered out of the hiring process on the basis of certifications
  - Women not well involved and encouraged to practice this profession: Only make up 11% of the cyber workforce
  - Leadership not understanding the requirements for digital security skills
  - Focus on senior professionals with years of experience and overlook recent grads
  - Distribution of the digital security resources (private/public, country/abroad, ...)
  - Not well defined career path
  - Inability to retain cyber security employees
Role of the University
Apply possible solutions as early as possible better than recycling

- Universities have a big role to play in the solution to
  - Adapt the university programs to the digital security job market to have a better aligned education and training pipelines
  - Provide students with the needed skills
  - Prepare for entry-level certifications since IT digital security positions request at least one of certifications (CISA, CEH, CISSP, ...) and industry certification increase salaries
  - Frequently update the content of the course materials to keep pace with this fast evolving demand
  - Career centres at universities should provide students with guidance and advices regarding the job market needs to avoid unemployment and underemployment
  - Universities could support the growth of technology-based new ventures especially in digital security (create job opportunities for recent grads)
  - Encourage female students to study and pursue degrees and careers in cybersecurity
  - ...
Cybersecurity Career Pathway

Cybersecurity Specialist / Technician

University → Entry-Level → Mid-Level → Advanced-Level

TOP 5 SKILLS
1. Information Security
2. System & Network Security
3. System & Network Administration
4. Linux / UNIX
5. Audit Planning

TOP 5 CREDENTIALS
1. CISA
2. CISM
3. GIAC
4. Security+
5. CCNA

TOP 5 SKILLS
1. Penetration & Vulnerability Tester
2. IT Auditor
3. Cybercrime Analyst / Investigator
4. Incident Analyst / Responder
5. Cybersecurity Analyst

TOP 5 CREDENTIALS
1. CEH
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Cybersecurity Specialist / Technician

Cybersecurity Analyst

Senior Cybersecurity Engineer

Cybersecurity Architect
Cybersecurity Career Pathway

Incident Analyst / Responder

University → Entry-Level → Mid-Level → Advanced-Level

**TOP 5 SKILLS**

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2. System & Network Security
3. System & Network Administration
4. Linux / UNIX
5. Audit Planning
6. Audit Reporting
7. Risk Assessment
8. Computer Forensics
9. Malware Analysis
10. Project Management

**TOP 5**

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**TOP 5 CREDENTIALS**

1. CRISC

Cybersecurity Specialist / Technician → Cybersecurity Analyst → Cybersecurity Analyst / Investigator → Penetration & Vulnerability Tester → Cybersecurity Manager

Incident Analyst / Responder → IT Auditor → Cybercrime Analyst / Investigator → Cybersecurity Consultant → Senior Cybersecurity Engineer

Cybersecurity Architect

Nizar Ben Neji

GLOBAL ICT CAPACITY BUILDING SYMPOSIUM 2018
Cybersecurity Career Pathway

University → Entry-Level → Mid-Level → Advanced-Level

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- TOP 5
  1. Cybersecurity Specialist / Technician
  2. Incident Analyst / Responder
  3. Cybersecurity Analyst
  4. Cybersecurity Consultant
  5. Penetration & Vulnerability Tester

- TOP 5
  1. IT Auditor
  2. Cybercrime Analyst / Investigator
  3. Cybersecurity Manager
  4. Senior Cybersecurity Engineer
  5. Cybersecurity Architect

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GLOBAL ICT CAPACITY BUILDING SYMPOSIUM 2018
Cybersecurity Career Pathway
Cybersecurity Consultant

University → Entry-Level → Mid-Level → Advanced-Level

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2. Information Systems
3. Cryptography
4. Project Management
5. Risk Management

**TOP 5 CERTIFICATIONS**
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**1. Cybersecurity Specialist / Technician**
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Cybersecurity Career Pathway

Cybersecurity Manager

University → Entry-Level → Mid-Level → Advanced-Level

TOP 5 SKILLS
1. Information Security
2. Information Systems
3. Cryptography
4. Project Management
5. Risk Management

TOP 5
1. Linux / UNIX
2. Business Process
3. Software Development
4. Scanners
5. Security Operations

TOP 5 CERTIFICATIONS
1. CISA
2. CISM
3. GIAC
4. Security+
5. CCNA

Cybersecurity Specialist / Technician

Incident Analyst / Responder

IT Auditor

Penetration & Vulnerability Tester

Cybersecurity Analyst

Cybercrime Analyst / Investigator

Cybersecurity Consultant

Penetration & Vulnerability Tester

Cybersecurity Architect

Senior Cybersecurity Engineer

Cybersecurity Manager
Conclusion

Digital Security Capacity Building

- Digital security is the cornerstone of the digital economy
- Evolution of security: new needs, constraints, trends and challenges
- Digital security domains, required skills and certifications
- Digital security workforce shortage and universities simply aren’t in a position to fill the void
- Career pathway starts at the university
- Universities have a big role to play in the solution (update programs, include certifications, university career centres, partnerships with firms, research activities, entrepreneurship, …)
- Make clear and concise cyber security path ways to save the cyber security professions
THANK YOU FOR YOUR ATTENTION

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