**The Cybersecurity Skills Survey: Response to the 2020 SIM IT Trends Study**

Chris Maurer  
McIntire School of Commerce  
 University of Virginia  
 Charlottesville, VA  
csm9y@comm.virginia.edu

Dan Mazzola  
 Information Systems  
 Arizona State University  
 Tempe, AZ  
 dan.mazzola@asu.edu

Mary Sumner  
 Computer Management & Information Systems  
 Southern Illinois University Edwardsville  
 Edwardsville, Illinois  
 msumner@siue.edu

Keri Pearlson  
Center for Cybersecurity Research  
MIT  
 Cambridge, MA  
 kerip@mit.edu

Tim Jacks  
 Computer Management & Information Systems  
 Southern Illinois University Edwardsville  
 Edwardsville, IL   
 tjacks@siue.edu

ABSTRACT

The Cybersecurity Skills Survey was developed and implemented to respond to the high demand for cybersecurity professionals, noted by the findings of the 2017, 2018, 2019, and 2020 SIM (Society for Information Management) IT Trends and Issues Study. These findings were based upon input from over 1,000 IT leaders representing 37 SIM Chapters. The goals of the cybersecurity skills survey were to identify: (1) What technical skills are needed for entry-level professionals in cybersecurity jobs? (2) What professional skills are needed for entry level professionals in cybersecurity jobs? (3) What technical skills are needed for early-career professionals in cybersecurity jobs? and (4) What professional skills are needed for early-career professionals in cybersecurity jobs? The survey findings provide key insights into in-demand skills and “difficult-to-find” competencies. This paper reports on 99 responses captured from IT leaders representing the SIM Chapters in St. Louis, Austin, Milwaukee, and Phoenix, and is part of an ongoing data collection effort to include the Chapters in Tampa, Los Angeles, Houston, Chicago, and Boston. Dialogues between academic professionals and industry leaders in each of these professional communities are contributing to meeting the demand for talented cybersecurity graduates.

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CCS CONCEPTS

•Professional topics, Computing education, IT education

KEYWORDS

Cybersecurity, IT workforce, Technical skills, Professional skills

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1. INTRODUCTION

SIM, the Society for Information Management, has 37 Chapters with over 5,000 IT Leaders and Chief Information Officers in the United States. In the 2020 SIM IT Trends Study, Cybersecurity remains the #1 concern for CIO’s and IT Leaders within organizations for the 4th year in a row. The overwhelming importance of the cybersecurity issue is combined with the high demand for IT talent in cybersecurity roles. Recent data on IT workforce trends cited in Forbes magazine indicates a shortage of cybersecurity professionals in the order of magnitude of 3.5 million jobs globally by 2021 (Sayegh, 2020). This “talent gap” challenges academic professionals and IT industry leaders to work together to identify in-demand skills for cybersecurity jobs and to develop programs which meet industry needs for trained graduates.

In June, 2020, the SIM Academic Council organized a research group to identify research opportunities addressing the Key Trends and Issues identified in the SIM IT Trends Studies. The SIM Academic Council consists of academic professionals who are interested in developing research which is relevant to practice and which addresses the concerns of IT leaders and SIM members. The talent gap in cybersecurity represented a key issue for further investigation. The cybersecurity research group decided to develop a survey to determine the skills needed by cybersecurity professionals in order to better meet these needs.

3. RESEARCH QUESTIONS

1. What technical skills are needed for entry-level professionals in cybersecurity jobs?
2. What professional skills are needed for entry level professionals in cybersecurity jobs?
3. What technical skills are needed for early-career professionals in cybersecurity jobs?
4. What professional skills are needed for early-career professionals in cybersecurity jobs?

4. METHOD

In June, 2020, the cybersecurity research group developed an on-line survey to identify cybersecurity skills, knowledge, and competencies for both entry-level candidates and early-career professionals (with 3 – 5 years’ experience). The survey includes an assessment of technical skills and soft skills. Between August and October, 2020, the cybersecurity research team rolled out the cybersecurity survey within SIM Chapters in St. Louis, Milwaukee, Austin, and Phoenix.

1. TECHNICAL SKILLS

The 99 respondents representing the St. Louis, Milwaukee, Austin, and Phoenix professional groups were both SIM and ISACA Chapter members. More than 15 industries were represented, with a range from $5 Million to more than $5 Billion in Revenue, and a range of fewer than 100 to more than 10,000 FTE’s (full-time equivalent employees). The technical skills needed for entry-level and early-career personnel are:

|  |  |  |
| --- | --- | --- |
| Entry-Level % | Technical Skills | Early Career % |
| 63.8% | Cybersecurity Frameworks | 72.4% |
| 41.9% | Risk assessment | 44.8% |
| 41.0% | Tools to detect/identify issues | 37.9% |
| 36.2% | Cloud technologies | 41.5% |
| 36.2% | Vulnerability assessment | 42.5% |
| 36.2% | Operating Systems | 20.7% |
| 31.4% | Incident Response | 35.6% |
| 27.6% | Regulatory/legal requirements | 42.5% |
| 24.8% | Networking / telecom | 16.1% |

1. PROFESSIONAL SKILLS

In terms of Professional Skills needed for entry-level and early-career cybersecurity roles, the top skill for both entry-level and early-career roles was Critical Thinking. This was followed by Attention to Detail and Problem-Solving Skills; Collaboration and Teamwork.

|  |  |  |
| --- | --- | --- |
| Entry Level Percent | Professional Skills | Early Career Percent |
| 73.3% | Critical thinking | 69.0% |
| 61.9% | Attention to detail | 35.6% |
| 58.1% | Collaboration / teamwork | 49.4% |
| 54.3% | Problem solving | 49.4% |
| 41.0% | Written communication | 42.5% |
| 39.0% | Oral communication | 44.8% |
| 35.2% | Self-learner | 26.4% |
| 24.8% | Innovative thinking | 33.3% |
| 15.2% | Time/project mgmt | 27.6% |
| 12.4% | Customer relationship mgmt | 21.8% |

In the open dialogues between practitioners and academic professionals, there was a preference for individuals who are self-learners, or life-long learners. Communications skills, including oral and written communications, were considered important for both entry-level and early-career cybersecurity professionals. Time management and project management were more important skills for early-career professionals.

1. PRIMARY TAKEAWAYS

Entry-level positions rely more on operational skills/knowledge. Both technical skills and professional skills were difficult-to-find. These “difficult-to-find” skills included cloud technologies, cybersecurity frameworks, and vulnerability assessment at the entry-level, and both risk assessment and cloud technologies at the early-career level. Professional skills (critical thinking, problem-solving) are more difficult to find than tangible/operational skills. One of the biggest implications from both the data and from the discussion sessions is that curriculum must firmly embed professional skill development within technical skills development.  While we see that understanding the fundamentals is important to landing early jobs in this field, we have evidence that employers find it just as difficult to find talent possessing strong professional skills that are contextualized to the field of cybersecurity.  General writing courses in an undergrad curriculum are not enough – institutes of higher ed need to evaluate their curriculum on both their ability to meet technical learning objectives as well as professional skill-related learning objectives throughout the entire curriculum. In addition, demonstrating understanding of cybersecurity roles and responsibilities is important.

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