Presentation Summary

Integrating Industry Certifications into Four-Year Degree Programs
Cybersecurity Convening

July 9-10, 2019

DAY ONE

TYPES OF CREDENTIALS

The project team reviewed the definitions of different types of credentials to provide a level-setting foundation for the convening.

TED-STYLE TALK: GLOBAL INFORMATION ASSURANCE CERTIFICATION

Jeff Frisk, director of the Global Information Assurance Certification (GIAC), discussed GIAC certifications and how courses offered in university programs could be aligned. Jeff explained that GIAC uniquely provides 35 skill-specific certifications that are directly aligned with critical cybersecurity job duties, and validate competencies by testing needed skills hands-on. GIAC is also aligned to the seven National Initiative for Cybersecurity Education (NICE) framework workforce categories. Currently, Jeff pointed out, there is a great need to alleviate the skills mismatch and talent shortage in cybersecurity, which provides the opportunity for greater collaboration between certification bodies and related university programs. For example, such curriculum as the prevention of attacks and detection of adversaries, networking concepts, secure communications, and foundational windows and Linux security relate to the GIAC Security Essentials Certification. Additionally, GIAC currently has a partnership with SANS Technology Institute in three areas:

- Master of Science in Information Security Engineering (MSISE): 36 credit hours, 3-4 years
- Graduate certificates: 5 industry focused programs, 12 credit hours, 24 months
- Certificate in Applied Cyber Security (undergraduate certificate, upper division): 4 courses, 6-12 months (must have an associate's degree or 48 hours of undergraduate study)

In the discussion that ensued, it was suggested that although not all university curriculum and certification competencies will fit together perfectly, focusing on the general components and critical job roles in cybersecurity would be a great start to aligning the programs.

TED-STYLE TALK: PURDUE UNIVERSITY GLOBAL'S CYBERSECURITY APPRENTICESHIP PROGRAM

Adam Downs, director of academic solutions, and Tina Burton, associate dean of the School of Business and Information Technology, with Purdue University Global showcased their new cybersecurity apprenticeship program that embeds certifications and culminates in a degree. The program features two levels of apprenticeship and employers have the ability to choose either one or both levels depending on their needs. Level one focuses on basic and intermediate competencies, which ends with an associate's degree and three certifications earned. Level two encompasses advanced skills and provides two pathways to a bachelor's degree and three or more certifications earned.

In the discussion that followed, Adam and Tina clarified that the required courses are offered online through Purdue University Global while the student receives hands-on training with the employer. Additionally, each student is assessed prior to beginning the program, so students can start at level two right away, or begin at level one and move on to level two depending on their ability and goals.

TED-STYLE TALK: NATIONAL SECURITY AGENCY'S NATIONAL CENTERS FOR ACADEMIC EXCELLENCE

Lynne Clark, chief of the National Centers of Academic Excellence (CAE) in Cyber Defense Program Office at the National Security Agency (NSA), provided background on the CAE and current efforts to integrate competency development into academic programs. Lynne explained that the program was developed to train the nation in cybersecurity, not just government agencies. The program places a lot of emphasis on collaboration, where participating schools help newly joined schools get up to speed. There are different requirements depending on what is needed in the region, but all paths are mapped to the National Initiative for Cybersecurity Education (NICE) framework. Students are evaluated on their ability to perform a task in the context of a work role, and students are often sourced in high school from dual credit for high school and community college courses, and even in middle school and earlier, often from disadvantaged groups. A major goal of the program is to prepare students and businesses to view cybersecurity as fundamental for all sectors – all businesses require these IT skills in order to remain successful and evolve with the times.

During the questions that followed, it was pointed out that cybersecurity needs more integration of education and experiences to produce a well-rounded student. There is an increasing demand for this, but will take a lot of collaboration from all sides.

TED-STYLE TALK: USING CERTIFICATION EXAM BLUEPRINTS

Bhaskar Dawadi, psychometric services manager at $(ISC)^2$, highlighted certification exam blueprints and how faculty can use them to align course competencies with certification exam content. Bhaskar led participants through an overview of the certification exam development process, which begins with a job task analysis (JTA). JTAs are led by psychometricians with input from subject matter experts (SMEs) to validate the content, discuss job responsibility, set eligibility requirements, and finalize the exam blueprint. Then a question bank is created and the exam is built following the exam blueprint. In addition, a common body of knowledge is developed and updated on a regular basis, which can be used to prepare for the certification.

During the discussion that ensued, Bhaskar explained that $(ISC)^2$ has an International Academic Program that works with colleges and universities on cyber-related course creation, development of curriculum, and offers course training packets. Additionally, the Associates of $(ISC)^2$ program allows students to fulfill the work experience requirements of the certification. Universities can partner with certification bodies by using the common body of knowledge in university course curriculum or align the course to with certification exams. In fact, organizations and businesses hiring for cybersecurity professionals look for a combination of certifications and related degrees when assessing potential candidates, so working together in this way benefits the students and the industry, which ultimately benefits those receiving the cybersecurity services.

DAY TWO

TED-STYLE TALK: USING THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY'S NATIONAL INITIATIVE FOR CYBERSECURITY EDUCATION FRAMEWORK

Marian Merritt, lead for industry engagement with the National Institute of Standards and Technology (NIST)'s National Initiative for Cybersecurity Education (NICE), showcased how the previously mentioned NICE Cybersecurity Workforce Framework can be used. Marian explained that about 10 years ago efforts began to better understand cybersecurity work, and a framework was developed to standardize occupations and associated information to help create career pathways, professionalize the industry, identify gaps, create position descriptions, identify areas of interest, and create an ecosystem that guides activities and reduces confusion. The Framework, which is available on the NIST website, is comprised of seven workforce categories, 33 specialty roles, and 52 work roles, which also include specific knowledge, skills, and abilities (KSAs) required to perform a set of tasks. It also allows users to search keywords and related tasks or KSAs, and users can link back to the relevant work role, work ID, category, or specialty area for comparison.

Other related resources include Cyber Seek, which provides an interactive map about the supply and demand in the cybersecurity job market, and the Cybersecurity Career Pathway tool that shows key jobs within cybersecurity, common transition opportunities between them, and detailed information about the salaries, credentials, and skillsets associated with each role. There is also a NICE working group training and certifications subgroup who have created an illustrative mapping matrix of how certifications may be of value to a particular work role within the NICE Framework. Focused originally on the government workforce, the May 2019 Executive Order on Cybersecurity Workforce now encourages wide adoption of the Framework – having been adopted across the federal government, now increasingly state and local governments, and even industry such as JPMorgan Chase and AT&T are adopting the Framework. In closing, Marian clarified that the typical profile in cybersecurity is a 40 year-old white male, but since the Framework was developed, they are seeing a shift in sources of talent – from traditionally businesses stealing employees of competitors to now recruiting more from underrepresented groups.

TED-STYLE TALK: CROSS-CUTTING CERTIFICATIONS IN PROJECT MANAGEMENT AND HUMAN RESOURCES

Ashley Dalton Forsyth, academic programs specialist at Project Management Institute (PMI), and Demetrius Norman, senior specialist of academic initiatives from the Society for Human Resource Management (SHRM) each highlighted how their resources could be used as examples in integrating cyber certifications into degrees.

Ashley explained that they are starting to see multithreaded projects where project managers oversee several different aspects, including IT/cybersecurity. This makes a certification in other fields such as project management valuable to seemingly unrelated industries such as technology, and vice versa. To that end, Ashley shared information through this presentation about how PMI currently works with universities:

- Develops and provides teaching resources such as reading lists, outlines of topical areas, examples of assessments and outcomes, and project management curriculum to project management faculty through their website (pmiteach.org)

- Provides an Academic Network in which researchers, faculty, program directors, and academic administrators who teach, develop, or manage project management programs or courses can expand project management knowledge and offerings, and also offers a place to share best practices and other information with each other
    - The network is also open to faculty from schools that are interested in developing project management courses
- Offers funding for new research, and opportunities for publication and presentation of research findings
- Approves Registered Education Providers (REP) to offer training in project management and issue professional development units to meet the continuing education requirements needed by PMI credential holders
- Runs the Global Accreditation Center to confirm that an institution's program has been carefully assessed and that its scale, scope, and quality meet comprehensive, global standards for accreditation
- Works with their Academic Member Advisory Board (made up of faculty and researchers across academic disciplines, field of research interest/expertise, industry and professional role, and PMI geographic region) to provide expert support for and recommendations on the array of programs and services provided by PMI
- Offers group discounted student memberships

In addition, PMI has relationships with universities where certifications are part of the curriculum, students are awarded prior learning credit for having a certification and can finish the degree program sooner, instructors accept attainment of a certification for the final exam, or prepare students to take the certification exam on their own by aligning content to the course. Agreements differ for all universities partners, so future partnerships can be semi-customized for what the university wants.

Likewise, Demetrius from SHRM presented how they work with universities to offer students more opportunities:

- Develops and defines the competencies and knowledge necessary for effective practice as an HR professional through the SHRM Academic Alignment Program
- Offers students the opportunity to take related courses at partner schools and then sit for the certification exam
    - Students reach eligibility to sit for the exam upon reaching 500 HR-related experience hours, which can come from internships, work-study programs, directed projects, and/or independent study
- Provides SHRM HR curriculum guidelines and related content to teach
- Supports HR practitioners in their career and professional development

FOCUS GROUP: DATA ANALYTICS/DATA SCIENCE CERTIFICATION

Randy Gross, chief information officer and SVP of certification operations for CompTIA, facilitated a discussion with attendees about how a new certification in data analytics/science could be beneficial to academic programs and other certification bodies. Randy began with an overview of CompTIA, which

offers 13 certifications ranging from core IT skills to professional IT or cybersecurity mastery. CompTIA also has an Academy Partner Program, which is intended for schools, nonprofit organizations, job corps centers, and correctional facilities to provide resources for recruiting, training, and upgrading the skills of students in IT (partners.comptia.org). CompTIA has also developed an IT framework that defines technology operations and skills within four key pillars, each containing many different IT roles – infrastructure (e.g., network admin), development (e.g., apps), security (e.g., compliance), and data (e.g., analyst).

Randy explained that there is a significant and growing data analytics market; estimates show double-digit job growth and a widening skills gap in this industry worldwide. CompTIA is currently exploring skill sets in data analysis in reaction to a shortage of data analysis skills, a wide variation in job titles and responsibilities, and a lack of consistency in educational program offerings and credentials. CompTIA is initially focusing efforts on data science, and is recruiting subject matter experts to begin building the exam in the next six to nine months. Randy then collected data on the following topics related to the development of this new certification:

- Overview
    - What data analytics/science skills gap that universities are trying to address? What trends are emerging, present and/or accelerating?
        - Statisticians who can program
        - Partnership with general education to include math and IT
        - Differs per employer
        - Hard to determine what was learned
        - Distinction between data science and data analytics
- Who
    - Where are universities experiencing a demand for data analytics/science skills?
    - Who is asking for these skills? Is this pressure for data analytics/science skills coming from students, employers, both?
        - Mainly from employers
- Complementary opportunities?
    - How could a data analytics/science certification offered by CompTIA help universities demonstrate that students have acquired the specific skills? What is going to complement work that is underway?
        - Obtain needed/wanted certifications as you go, do not wait until the end
- Job-Task Analysis
    - What domains in data analytics/science would be most relevant in a certification? What specifically would you want a certification to help with ensuring competency with data analysis?
        - Interpretation and importing
        - Soft skills – communication, writing, animation/visualizations, and code of conduct
        - Data standardization and anonymization