

New Approaches to Cybersecurity Education (NACE) Workshop

What are some good ways to “future-proof” the education we provide?

Bridge Jobs (NICE Work Roles) and Course Offerings

There is an opportunity to measure the gap in program offerings and existing job functions by mapping the *NICE Cybersecurity Workforce Framework's* (NICE CWF) Work Roles to NSA/DHS National Centers of Academic Excellence in Cyber Defense (CAE CD) Focus Areas (FAs) or the more granular CAE Knowledge Units (KUs). This mapping will allow SFS to measure if there is sufficient coverage of the tasks, knowledge, skills and abilities for a given degree plan to allow a graduate to fill and succeed in a NICE Work Role.

Creating this mapping will highlight any gaps between CAE CD curricula and existing jobs. As Work Roles and Focus Areas are aligned, programs can offer students pre-defined *Plans of Study* (curricular paths) that are tied to a job function in the cybersecurity workforce. Maintaining this mapping will also provide an opportunity for programs to ensure that course offerings remain up-to-date with job offerings. As new NICE Work Roles and CAE Focus Areas are created and refined, this mapping will allow programs across institutions to adjust their course offerings accordingly and offer new *Plans of Study* where their courses offer the appropriate coverage. While this does not completely capture all jobs and roles in industry, it provides a starting point for institutions to measure “coverage”.

Encourage External Learning Opportunities

Xavier University's Williams College of Business created a *Business Profession Passport Program* that "provides a structured way in which undergraduate students can gain knowledge, skills and networking contacts to complement their education and to educate them on the fundamentals of the working world [4]." This same concept and mechanism can be adopted for cybersecurity students. To account for the pace of change in cybersecurity, programs should consider creating a passport-like program that encourages students to go outside of their coursework and programs to seek out other opportunities, challenges and learning opportunities.

Programs can define specific activities or provide general categories, but the goal is to get students to seek out resources and opportunities that the program might not offer or does not have the capacity to offer in the near term (prior to the student's graduation). This passport concept also reinforces the importance of seeking out new opportunities and being in a mode of constant learning. Cybersecurity changes rapidly and, sometimes, at a pace faster than an employee's organization or student's program can adapt and marshal adequate training and resources to help the employee or student succeed. These activities might include:

- serve as an officer in a cybersecurity student organization or external organization
- obtain a certification (CISSP, OSCP, Security+, etc.)
- attend a conference, talk, colloquium or presentation
- create a presentation for a local businesses group around cybersecurity
- work with a local business to better secure their systems and assets or provide training
- co-author a paper with a faculty member
- create and maintain a security blog

-
- learn a new programming language
 - complete an internship or co-op
 - create and host a capture-the-flag (CTF) event
 - create one or more demonstrations and presentations to teach fellow students and faculty a new skill or technology
 - create a module or series of modules that can be incorporated into a new or existing course

Programs can modify the passport idea and attach “points” to activities based on difficulty or work-effort required to complete the task. Students could be required to earn a minimum number of points on their passport prior to graduation. Again, the goal is to supplement the coursework with other learning opportunities. Learning outcomes and objectives can be created in advance to tie the external learning opportunity with measurable outcomes.

Responding to Changing Workforce Demands

One of the benefits to using a *Plan of Study* for each student is the flexibility they offer. If courses are under development or are out-of-date, programs can adjust Plans of Study to provide students appropriate coursework that meets their educational goals. Additionally, programs can use the passport program, referenced above, to fill in gaps as curriculum is updated and developed.

Along with program flexibility, cybersecurity programs should look at the “Executive in Residence” model to help bridge gaps between industry and the classroom. For programs focused on producing graduates with more technical skills, development of a “Technologist/Specialist in Residence” might be more appropriate. Regardless of the terminology used, the goal is to bring in individuals working in organizations with experience using tools and techniques currently in practice. Programs can leverage these

individuals by having them teach and develop courses, mentor students, partner with industry, collaborate with faculty and provide input on curriculum.

Looking to bring in a technologist or executive would also allow the program capacity for development activities that both faculty and students could benefit from. Higher education focuses heavily on teaching and research and development should be added to the mix. The rapid pace at which technology changes may outpace what we research and teach and having a technologist may help a program grow new skill sets and expose students to new technologies not currently integrated into the curriculum.

Curriculum Development and Access to Resources

Should SFS institutions partner together to secure agreements with security and IT vendors to acquire software and hardware for use in course work and course infrastructure for a heavy discount or for free? Essentially create a *SFS School Consortium* whose members prioritize needed resources and work to secure those tools for students and faculty.

Lastly, SFS institutions should consider developing and using open-source courseware that maps to CAE KUs and CAE FAs. For institutions that have expertise in an area and have a quality offering, SFS students should have access to that content, regardless of where it is housed. Measuring quality and creating a platform to share courses would take time to spin up, but this would allow SFS students to leverage the best courses across the SFS ecosystem benefiting the SFS students' employers, too.

About the Author

Eugene Rooney is an Analyst/Programmer III and Adjunct Faculty member at the University of New Mexico's Anderson School of Management. Eugene earned a B.S. in Computer Engineering with a Minor in Economics and a MBA from the University of

New Mexico. Prior to his current role at UNM, Eugene worked at Century Link (formerly Qwest Communications), Sandia National Laboratories and UNM's Center for Development and Disability.

In his current role, Eugene provides reporting and forecasting for school leadership along with web application development and system administration duties. He was also actively involved in securing UNM's CAE-CD and CAE-R (re)designations the last 2 cycles. In his role as an adjunct faculty member, Eugene is looking forward to teaching *Windows Scripting and Automation (PowerShell)* and *Cybersecurity Competitions* in the Fall 2018 semester to undergraduate B.B.A. Management Information Systems (MIS) students and M.S. in Information Systems and Assurance (MS ISA) students.

References

- [1] Baron, Ethan. "Executives-In-Residence: Filling A Business School Education Gap." Poets & Quants, Inc. May 2005. 12 April 2018
poetsandquants.com/2015/12/04/executives-residence-filling-business-school-education-gap/.
- [2] Bennis, Warren, and James O'Toole. "How Business Schools Lost Their Way." *Harvard Business Review*, Harvard Business Publishing. May 2005. 12 April 2018
hbr.org/2005/05/how-business-schools-lost-their-way.
- [3] "The Business Profession Passport." *Xavier University Williams College of Business*. 2017. 12 April 2018
www.xavier.edu/williams/business-profession/documents/Passport2017.pdf.
- [4] "Business Profession Program." *Xavier University Williams College of Business*. 2018. 12 April 2018 www.xavier.edu/williams/business-profession/.