NICE Framework Success Story

Create Learning Outcomes

California Cyber Innovation Challenge, Cal Poly California Cybersecurity Institute

The voluntary NICE Cybersecurity Workforce Framework (NICE Framework) was developed through a collaborative process by industry, academia, and government stakeholders. It establishes a taxonomy and common lexicon that describes cybersecurity work and is intended for use in both the public and private sectors. NIST does not validate or endorse any individual organization or its approach to using the NICE Framework.

Organizational Profile

Cal Poly's California Cybersecurity Institute (CCI) teaches Californians to protect California. Cal Poly's CCI is located on the State of California, Army National Guard Base Camp San Luis Obispo, located in San Luis Obispo, CA. The CCI consists of three buildings (over 100,000 square feet) including a forensics lab, operations, training facility, and cyber range suitable for hosting large-scale, immersive training events. Through a combination of training courses, grants, special events, donations, and research efforts, the CCI offers an attractive environment for students from both technical as well as liberal arts majors to Learn by Doing. The CCI provides training to multiple government and quasi government entities such as the Bay Area Urban Area Security Initiatives, Northern California Regional Intelligence Center, State of California Commission on Peace Officer Standards and Training, and private organizations through California's Education Training Panel.

According to cyberseek.org, as of August 2020 there are 67,195 unfilled cybersecurity positions in the State of California. In today's global economy, there are more satellites in orbit than ever before. From intelligence gathering, weather, and GPS, satellites provide communications and information to people through our devices connected to the Internet of Things. The commercialization of space increases cybersecurity concerns for both the public and private sectors.

The California Cyber Innovation Challenge (CCIC) is the cybersecurity championship for the State of California. The CCIC 2020 consists of teams from both middle and high school. The 2020 competition will feature a virtual-immersive environment on Cal Poly's digital range. Students will respond to a fictional storyline of a satellite that was hacked and falls to Earth. Participants will engage in a 3D immersive environment featuring multiple space-themed set designs to solve the cyber mystery of how the satellite was hacked based on the NICE Framework. Click Photo 1 to watch the live, immersion environment for the 2020 event.

Photo 1 - The 2020 CCIC virtual environment: https://youtu.be/NGRVrURPeJU

The 2020 CCIC Developed by Cal Poly Interns on the Amazon Sumerian Platform

> "The California Cybersecurity Innovation Challenge (CCIC) has mapped the challenges to the NIST/NICE Framework. We want to recognize the importance of each student's cybersecurity career pathways, and their knowledge of the NICE Framework is paramount to their success. The CCIC Cal Poly student team who created the CCIC challenges understands the magnitude of including 'this blueprint to categorize, organize and describe cybersecurity work'. We are thrilled that NICE has supported our efforts in helping the next generation of cybersecurity professionals excel in this in-demand career!"
>
> – Henry Danielson, Program Manager.
> Cal Poly California Cyber Innovation Challenge

Process of Mapping CCIC to the NICE Framework

The California Cybersecurity Institute staff, students, and faculty adopted the NICE Framework for the California Cyber Innovation Challenge (CCIC). The California Cyber Innovation Challenge focuses on providing California middle and high school students an engaging introduction into cybersecurity through an immersive, hands-on environment. The NICE Framework publication provided a guide for our team to identify cybersecurity roles and skills. By leveraging the NICE Framework to conduct this competition, students will learn about:

- The Foundations of Cybersecurity
- Why Cybersecurity is Important
- Future Careers in Cybersecurity

Process (cont.)

The 2020 competition is themed around the convergence of space and cybersecurity. The first step for our team was to identify the critical cybersecurity roles relevant to our competition. Next, we built the challenge as well as team training exercises for the event around the NICE Framework. For example, specific sections of the event are mapped to NICE Knowledge, Tasks, and Skills.

After working on this year's CCIC, Cal Poly California Cybersecurity Institute intern Bree Zedar said, *"It was really exciting to see how creating the challenge on the back end allowed for the staff's growth and achievement of certain NICE Standards."*

Adapting NICE for Middle and High School

The NICE Framework injected into our competition is geared for cybersecurity professionals. Our challenge was to adapt this framework for middle and high school students that are new to cybersecurity. We introduced a blended approach to expose students to different career fields and skillsets required in the cybersecurity marketplace. For example, Rene Wynn (retired CIO NASA) will participate as a volunteer at the 2020 event and provide a charge to students on the need for cybersecurity professionals in space.

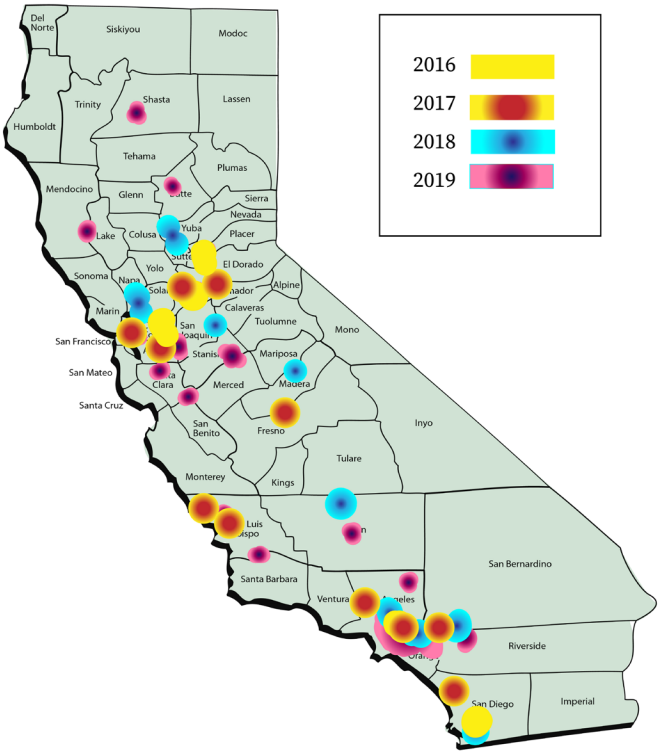

Photo 2 - Where students have participated in past CCICs

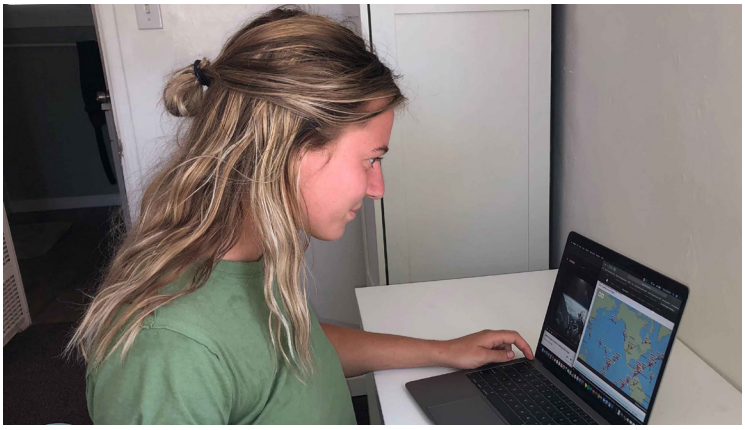

Photo 3 - CCIC intern Bree Zedar

Benefits & Impact

The 2020 CCIC is particularly unique to our team. One of our past high school competitors is now part of the CCIC planning. This student was involved in several past CCICs. Upon graduating high school, he began an internship at the California Cybersecurity Institute. This student intern has had an active role in designing this year's competition. Having his perspective as a past competitor, as well as insights on this event has been invaluable to our team. The heat map on this page depicts where students have participated in past CCICs. Our goal is to expose more and more students in underrepresented communities to a career in cybersecurity and the NICE Framework by participating in the CCIC. We are tracking the success of many of our student participants. We are amazed at how this challenge has catapulted many students to explore cybersecurity has a future career.

DefCon is the world's premier cybersecurity and hacker convention. In August of 2020, Cal Poly's California Cybersecurity provided the Aerospace Village access to the training platform for the 2020 CCIC built on the NICE Framework. CCI is providing a gamified satellite cybercrime challenge scenario intended for beginner-level participants that will be used for the 2020 CCIC in October. The challenge is comprised of a multi-layered cybercrime plot written by Cal Poly students, complete with complex characters, physical and digital evidence chains, and puzzles that challenge participants are required to search through and analyze to solve a satellite hacking crime.

Contact Information & Resources

Cal Poly CCI Website: www.cci.calpoly.edu
CCI Contact: Martin Minnich, mminnich@calpoly.edu
NICE Framework Website: nist.gov/nice/framework
NICE Framework Contact: niceframework@nist.gov

Cybersecurity Competitions

Cybersecurity competitions are interactive, scenario-based events or exercises, in person or virtual, where individuals or teams engage in cybersecurity activities including methods, practices, strategy, policy and ethics. Competitions encourage players to practice, hone cybersecurity skills, and build confidence in a controlled, real-world environment and are available for all ages and levels, from as young as elementary school and for those considered experts in the field. Achievements may be measured and evaluated against a large field of competitors. While they are not the only method for educating, developing skills, and measuring performance, cybersecurity competitions play an integral role in stimulating interest at all levels in the field and developing a pipeline of resources to fill cybersecurity roles.

Local, state, regional, national, and international competitions can be found today in a variety of formats ranging from face-to-face, virtual, or a combination of both. Several large competitions, such as the National Collegiate Cyber Defense Competition, CyberPatriot, National Cyber League, and US Cyber Challenge, conduct qualifier rounds in virtually and some host the final competitions face-to-face. These competitions can also range from being a one-day event to a series of events across the year.

Cybersecurity Competitions may have different areas of focus including:

- Secure Coding
- Cybersecurity Policy
- Cryptography
- Forensics
- Malware Detection
- Social Engineering
- System Hardening
- System Administration
- Web Application Exploitation
- Reverse Engineering
- Incident Response
- Network Traffic Analysis
- And More…!

Cybersecurity Competitions have proven to:

- Encourage ethical practice and skill development in a controlled, legal environment
- Present authentic circumstances where students can apply theory and protocol skills learned in formal educational environments
- Provide access to mentoring, resources, and potential employers
- Provide access to scholarships, internships, and job opportunities
- Offer an opportunity to identify talent
- Contribute to the knowledge-base of practitioners to resolve current issues, develop new tools, technologies, and methodologies
- Provide anytime-anywhere learning opportunities for individuals (from middle school to college and on to professionals and career changers)
- Contribute to curriculum and educator capacity to meet employer and national security needs
- Increase on-going knowledge of the work of cybersecurity professionals

Visit nist.gov/nice to learn more about the Cybersecurity Skills Competition Community of Interest.

Ten Things to Know About Cybersecurity Competitions

CYBERSECURITY COMPETITIONS:

1

Are A Mental Sport

Players in cybersecurity competitions are athletes demonstrating expertise and skills with cybersecurity tools and techniques

2

Are Fun

The fun comes with being able to overcome obstacles and solve challenges, as well as learning new skills and being a team player

3

Promote Values and Ethics

Competitions are governed by rules to ensure ethical behavior

4

Have Different Levels and Categories

Competitions exist at every skill level and take many different forms

5

Encourage Growth and Learning

New tools surface and new skills are constantly needed

6

Support Diversity

There are competitions for everyone! Diversity of thought is key in solving challenges

7

Foster Team-Building Skills

Leadership, communication, and social skills are all needed for collaboration and competition

8

Are Easy to Access

Many online competitions only require a modern browser and access to the internet

9

Promote Career Awareness

Competitions help individuals understand what areas interest them

10

Help Locate Talent

Competitions help recruiters and employers find qualified candidates

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