The 3D Cybersecurity Pipeline: Bridging Schools, Higher Education, and Industry 2025 Survey Report

Prepared by

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Executive Summary

Virginia faces a severe cybersecurity workforce shortage, with **only 75% of positions filled** and more than **50,000 open jobs, including 11,000 requiring CompTIA Security+.** In response, the 3D Cybersecurity Pipeline initiative, led by VSGC, VPCC, BCC, and ODU's COVE CCI and supported by NIST, NICE, and RAMPS, aims to expand access to cybersecurity education and align training with workforce needs. Feedback from 44 industry partners is guiding efforts to build a scalable, inclusive talent pipeline that meets the state's rapidly evolving cybersecurity demands.

Introduction

The project strengthens the cybersecurity workforce pipeline across Virginia's Regions 1 and 2 by coordinating K–12 schools, community colleges, universities, and industry. Efforts center on a three-dimensional model: **Internships, Education, and Industry Engagement**.

Professional development was organized by Dr. Penland and delivered in partnership with Dr. Michael Mann (VPCC) and Mr. Erik Breede (Phoebus High School). A post-training survey report will assess outcomes.

These collaborations support creation of the *Virginia Cybersecurity Pipeline Blueprint*, which outlines academic programs, certifications, and career pathways. The blueprint maps when students encounter cybersecurity concepts and provides region-specific guidance for continuing education or entering the workforce.

Second Dimension: Education

This component strengthens the pathway from high school to postsecondary institutions and into the cybersecurity workforce. A two-day professional development workshop brought together high school teachers, dual-enrollment instructors, and community college faculty from Brightpoint and VPCC.

The workshop, aligned with the NICE Framework, emphasized content knowledge, performance-based assessments, workplace skills, certifications, and career pathways. Surveys

conducted in summer and fall 2025 helped tailor training to participants' needs and improve their ability to guide students toward meaningful engagement in cybersecurity.
Educators presented insights and proposed course updates at the Fall 2025 Symposium, with additional presentations planned for Spring 2026.

Workforce Survey Summary

The 2025 VSGC Cybersecurity Workforce Survey reveals continued gaps in technical and soft skills. **Most respondents (70%)** were from private or profit organizations, with half representing small businesses (≤50 employees). High-demand technical areas include access controls, AI security, cloud security, and DevSecOps. **Key skill deficits** include analytic skills **(29%),** technical proficiency **(20%),** and project management **(18%).**

Soft-skill needs include communication (18%), teamwork (16%), and emotional intelligence (16%). Respondents also recommended strengthening curricula in threat intelligence, network security, and risk management, while incorporating AI, machine learning, and ransomware defense.

The survey emphasizes **expanding hands-on learning, such as internships, apprenticeships, and cooperative education, and deepening academic-industry partnerships** to keep curricula aligned with emerging threats.

Recommendations from Industry Respondents

- **Align curriculum with employer needs**, especially those of medium-sized organizations.
- **Strengthen hard-skill development** in analytics, technical proficiency, and project management through labs, certifications, and simulations.
- **Embed soft-skill training**, communication, teamwork, adaptability, into coursework.
- **Expand industry partnerships** for curriculum design, mentoring, internships, and job shadowing.
- **Maintain a continuous feedback loop** through surveys and advisory boards.
- **Incorporate emerging technologies** such as AI, machine learning, and ransomware defense.
- **Increase experiential learning** through cooperative education and apprenticeships.