In 2011, AFA's premier high school cybersecurity competition for the first time included civilian teams.
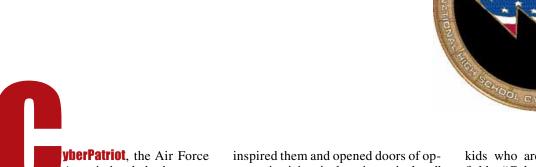
CyberPatriot Nation

By Peter Grier

CyberPatriot, the Air Force Association-led cybersecurity education initiative, is all grown up.

In April, CP completed its third annual championship—a competition which for the first time included civilian teams from public, private, and home schools across the US—as well as JROTC and Civil Air Patrol units.

The CyberPatriot III final round wrapped up April 1 during AFA's CyberFutures Conference at the Washington, D.C.-area Gaylord National Resort and Convention Center. Team Mantrap, of Red Bank Regional High School in Little Silver, N.J., took home the President's Trophy by winning CyberPatriot III's Open Division. Team Wilson, from CAP's Orlando, Fla., cadet squadron, won the Commander-in-Chief's Trophy by beating all other military-related teams.

In a larger sense, the nation won, too. CyberPatriot is helping increase the number of data defenders that private industry and the US government will depend upon to keep crucial computer systems up and running in coming decades.
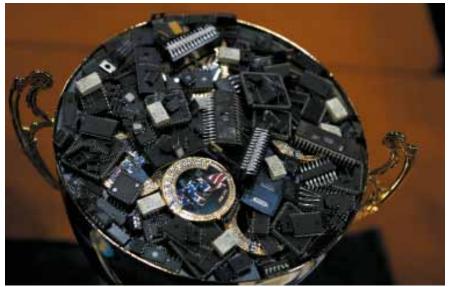
"I am so proud of this team," said CAP National Commander Maj. Gen. Amelia S. Courter about the winning Orlando cadet squad. "To hear from the members about their future career ideas and how the Air Force Association has

inspired them and opened doors of opportunity, it is priceless, just priceless."

CyberPatriot may not be as exciting a spectator sport as, say, high school football. It involves groups of students sitting around a computer, planning and coordinating, for hours at a time. But in its own way, it is just as intense as a physical competition. When winning teams are announced the cheers can be heard through walls, two meeting rooms away.

The point of CyberPatriot is to develop a fun and engaging way to stimulate

kids who are interested in technical fields. "CyberPatriot is playing a role in developing more cyber-savvy citizens in this country, truly engaging students with hands-on learning toward real-world challenges," said Bernard K. Skoch, CyberPatriot commissioner, at the April championship round. "All of the finalists ... have proven to be exceptionally talented students, building a keen understanding of the challenging tasks we have given them."

It has long been obvious the US needs to take an innovative approach

Microchips and CyberPatriot challenge coins fill the winner's cup at the CyberPatriot III competition.

to bolstering national science, technology, engineering, and math (STEM) proficiency. American students for years have lagged counterparts in other nations when it comes to math and science test scores. Last December, results from the triennial Program for International Student Assessment (PISA) showed the US in the middle in science, and near the bottom in math.

Chinese students scored an average of 600 on the PISA math test. US students scored an average of 487, placing them 25th among 34 participating nations. (PISA scores are on a scale with 500 as the average.) The state of American STEM education is such that earlier this year President Obama mentioned it in his State of the Union address. "We need to teach our kids that it's not just the winner of the Super Bowl who deserves to be celebrated, but the winner of the science fair," Obama said.

This is precisely the kind of national attitude CyberPatriot intends to foster.

CP began as a small-scale educational outreach effort at AFA's Orlando symposium in 2009, limited to eight JROTC and CAP teams from the surrounding area. Team Spaatz from Osceola High in nearby Kissimmee was the winner that year.

CyberPatriot II in the 2009-2010 school year expanded to include JROTC and CAP teams from across the country. It attracted more than 200 teams from 44 states. Team Doolittle, from Clearfield High School, Utah, was the second national CyberPatriot champion.

The just-completed CyberPatriot III marked the competition's maturity as it expanded further to include entrants not affiliated with military organizations. One hundred eighty-six such teams representing schools from coast to coast and border to border registered to participate. The unforeseen benefits of this program "are profound," said Skoch at a panel discussion during the CyberFutures conference. "We are reaching to inner-city schools. We are reaching to schools that never had any aspiration to excel in a field like cybersecurity."

Four hundred fifty service-related teams signed up for CP III as well. Together, the two divisions fielded students from 48 states, the District of Columbia, US Virgin Islands, Guam, and Department of Defense dependent schools from around the world. Qualifying competitions began last October. Teams assembled in their own schools

Team Wilson (left and below), consisting of cadets from the Orlando, Fla., Civil Air Patrol, earned the Commander-in-Chief's Trophy by finishing first among 450 military-related teams.

and engaged in a day-long cyber defense sessions. All were provided software that mimicked various attacks on operating systems and tied into central servers for real-time scoring. The point was to get the kids to play the role of information technology (IT) personnel defending an internal network against malware, viruses, and hacker attacks.

Showcasing Skills

Five service division teams and 12 open division teams earned trips to Washington, D.C., for the final round. The trip was a significant incentive, since a number of final round participants said they had never been to the nation's capital. More than a few noted they had never even been out of their own states. "The trip to Washington, D.C., is huge for us," said Sandra Marshall, coach of the team from tiny Lakewood Christian School in McAlester, Okla., before the championship event.

The final round took place in a large exhibition hall at the Gaylord, where each team had its own sectioned-off area. Over five hours of competition, as the students swatted at electronic adversaries, a scoreboard that listed positions without team names showed things were pretty close—except for a single team that kept maintaining a lead. At the close, that winning team was revealed as Team Mantrap, the only East Coast representative left in the competition. Each member of the winning team took home a $2,000 scholarship from CyberPatriot presenting sponsor Northrop Grumman, as well as memories for a lifetime.

At an evening banquet following the competition, the members of the top three teams from each division were also awarded scholarship money good for college or vocational education. The Army JROTC team from Buena High School in Sierra Vista, Ariz., placed second in the All-Service Division, while last year's CyberPatriot II champion, the Air Force JROTC contingent from Clearfield High in Utah, placed third.

In the Open Division, Westview High School of San Diego won second, while Alamo Area Academies of San Antonio took third.

Among those congratulating the Open Division winning team was New Jersey Gov. Chris Christie, who patted members on the back (metaphorically speaking) in his Twitter feed. "Congrats to Team Mantrap at Red Bank Regional High for becoming CyberPatriot III national champions. Keep up the good work," Christie wrote.

The team members in the final round got more than just a shot at scholarship money and a trophy, of course. They also had a chance to showcase their skills for possible future employers. The US is dreadfully short of cyber defenders, and helping to close that gap is one of CyberPatriot's main reasons for existence. In fact, CyberPatriot has already had a direct—albeit small—positive effect on the US cyber corps. Presenting sponsor Northrop Grumman has hired the captain of last year's winning team, said Diane G.

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Miller, the firm's director of operations for the cybersecurity group. Northrop Grumman is also offering internship opportunities for CyberPatriot participants. "We're excited about hiring more CyberPatriots," said Miller.

The industry-CyberPatriot interaction can be two-way, with the students inspiring existing industry workers. Miller said she was "shocked" to find out that more than 50 Northrop Grumman employees volunteered to be technical advisors and mentors to entrants. "They've done things from spending their evenings and Saturdays at the schools with the students or even providing support over the Internet as virtual advisors for teams that aren't near one of our offices," she said.

To help create a new pipeline for cyber professionals, CyberPatriot now should perhaps link up with college-level programs and cyber defense competitions, said Natalie J. Granado of the Center for Infrastructure Assurance and Security at the University of Texas at San Antonio. That could provide for more seamless professional development. "We really need to start building programs that can allow those students to have a pathway to get into this field," said Granado.

That would be one part of what panelists at the CyberFutures Conference agreed should be the competition's next step: expansion. "This is a really needed opportunity for these kids, and they really get excited about it. ... The footprint needs to get much larger," said Granado. One option in this regard would be to open the CyberPatriot experience to middle school students—or perhaps even elementary school students—in some manner. "We've got to get them young," said Miller.

No Limit

There are aspects of cyber defense that children at all levels can absorb, panelists at the conference agreed. Even second-graders might benefit from awareness training that would stress the need of online self-protection. CyberPatriot's strategy of building interest via competition could be expanded to include simpler computer games. "We've had middle schoolers participate and actually place for an award in a competition that we had back in San Diego," said Duke Ayers, program manager for the CyberNEXS platform at SAIC.

"We know the kids are capable if they're given positive instruction and then immediately allowed, in some sort of live environment, to reinforce that training."

Could international expansion be a viable opportunity? At least one panelist was dubious, not because other nations might benefit, but because the US has limited resources and a long way to go in educating its own math and science students. "There's a lot of opportunity left in the United States to work with our students at all levels," said Miller.

But others felt that reaching out to allies and friends on cyber defense education was imperative. "If we put our heads in the sand and try to focus simply on the United States, we lose the opportunity to find what's the best of breed for training and exercising," said Ayers.

In a sense, cyber defense itself is already a global exercise, in that the US is attacked from everywhere in the world. It must defend its computer systems in far-flung outposts. Defense contractors are hiring internationally and partnering with foreign firms. "We need to do this at an international level with all of the friendly folks out there that are working with us and participating with us. I agree, it's imperative," said Granado.

CyberPatriot might consider expanding within its core audience of high school age students by offering education in more technical subjects and a wider array of competitions that stretch out over an entire year, panelists suggested. Once students get experienced in cyber defense, they could continue on and conduct forensic analysis of their systems. Some might go further, into penetration testing. "That is where they will determine what the vulnerabilities are of their own systems, not hack against others. They need to know these things, if they're going to understand what it is that they want to ... learn in their formal education process, in college," said Ayers.

There are 26,000 high schools in the US, Ayers pointed out. Hook just 40 kids at each school on CyberPatriot, and the nation would have a new corps of a million cyber defenders.

This would take quite a bit of money, of course, in an era where defense spending cutbacks are limiting the resources of the Pentagon and military contractors alike. But US schools as a whole are often more strapped than defense, and welcome even limited amounts of outside aid. The current structure of CyberPatriot does not cost a lot of money at the school level, panelists pointed out. It depends instead on lots of dedicated volunteers putting in time and effort to help out.

"I don't think there's really a limit. It's just really getting the word out. It's getting people to understand and getting people to become involved," said Granado. ∎

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