Proposal for Cybersecurity Merit Badge

Description

This merit badge introduces Scouts to the subject of computer and network security, broadly known as cybersecurity. The focus of the badge is two-fold:

1) To teach Scouts the basic concepts they need to know to keep themselves and their families secure in our modern, connected world, and

2) To introduce them to the exciting and rapidly growing career opportunities in cybersecurity.

The badge will cover topics including ethics, security fundamentals, cyber threats, defenses, cryptography, mobile and connected devices, and careers. The activities are designed to help each Scout learn to secure their own computers and to explore the wider world of cybersecurity.

Rationale

Securing cyberspace is one of the most significant challenges facing our generation. Modern society has become dependent on a wide range of networked computer systems, and addressing the many security problems inherent to this dependence is an increasingly difficult task. One of the key components to doing so is employing enough skilled cybersecurity workers. However, organizations across all sectors of industry are having difficulty filling existing cybersecurity jobs. This labor shortage is only increasing as growth in the number of cybersecurity jobs significantly outpaces the number of workers entering the field. A recent study the Center for Cyber Safety and Education conducted in partnership with (ISC)[2], the world's leading information security professional organization, estimated that the cybersecurity worker shortage will grow to 1.8 million by 2022.[1] Among professionals surveyed in North America, 68% said there were too few cybersecurity workers in their department, and the majority believe that one of the main reasons for this is difficulty in finding qualified personnel.

This problem has wide-ranging effects on our society, from loss of private information to threats to national security. Experts estimate that cybercrime causes tens of billions of dollars of damage each year to the U.S. economy alone and hundreds of billions globally.[2] This problem impacts everyone. In recent Congressional testimony on the cybersecurity workforce, one industry leader put it this way: "The cybersecurity talent issue isn't limited to a few sectors; it runs across the board from government to education to healthcare and all industries. Strong talent is needed in all communities from rural farms that increasing rely on information technology to financial service companies in large urban areas."[3] At a

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[1] Center for Cyber Safety and Education. 2017. "2017 Global Information Security Workforce Study: Benchmarking Workforce Capacity and Response to Cyber Risk." https://iamcybersafe.org/gisws/.

[2] Lewis, James, and Stewart Baker. 2013. "The Economic Impact of Cybercrime and Cyber Espionage." Washington, DC. https://www.mcafee.com/es/resources/reports/rp-economic-impact-cybercrime.pdf.

[3] Jarvis, David, Security and CIO Lead, IBM Institute for Business Value. 24 Oct 2017. "Public-Private Solutions to Educating a Cyber Workforce." Statement for the Record. https://homeland.house.gov/hearing/public-private-solutions-educating-cyber-workforce/.

recent conference on this issue, a representative from the U.S. Department of Homeland Security called it "a national security crisis."[4] The U.S. President's Commission on Enhancing National Cybersecurity also identified this challenge, concluding that building the cybersecurity workforce was one of its strategic imperatives for bolstering the nation's cybersecurity posture.[5]

The Boy Scouts of America (BSA) is in a unique position to contribute to the solution of this crisis. The BSA merit badge program has long been a way to introduce young men to potential careers, as well as educate them in important subjects, even for those that don't pursue them as careers. The BSA has shown great leadership with the recent addition of its STEM-based merit badges. Some are even related to computing, such as Digital Technology and Programming, both of which include an element of online safety. However, online safety is very different from cybersecurity. Whereas online safety is all about smart personal behavior when using the Internet, cybersecurity is about protecting computer systems against abuse, attack, or other failures. This distinction is analogous to the difference between outdoor safety and First Aid/Medicine or between aquatics safety and Lifeguarding. The Girl Scouts of the USA has recognized this need, announcing in June of last year that they will be introducing a series of cybersecurity badges for their programs starting in fall 2018.[6] We propose that the BSA also create a separate and distinct Cybersecurity merit badge, which would introduce Boy Scouts to the fundamentals of securing the digital communications of our modern world, teach them to become responsible digital citizens and expose them to the wide range of careers in the field. Our nation and our society are in desperate need of this progress.

The Merit Badge Task Force stated in the inaugural issue of the *Counselor's Compass* newsletter that "developing merit badges that expand Scouts' horizons into technological careers […] will be the merit badge trend of the future."[7] A Cybersecurity badge positions the BSA on the cutting edge of this trend and is the ideal next step.

Requirements

The following proposed requirements were developed by a team of cybersecurity experts representing academia, government, and industry. A complete list of contributors is at the end of this document.

Safety

As with all merit badges, safety comes first.

- Show your counselor your current, up-to-date **Cyber Chip**.

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[4] Dan Stein, Branch Chief, Cybersecurity Education and Awareness, U.S. Department of Homeland Security. 2 Aug 2017. Workshop on Cybersecurity Workforce Development. Chicago, IL.

[5] Commission on Enhancing National Cybersecurity. 2016. "Report on Securing and Growing the Digital Economy." https://www.nist.gov/cybercommission/.

[6] Palo Alto Networks. 13 Jun 2017. "Palo Alto Networks and Girl Scouts of the USA Announce Collaboration for First-Ever National Cybersecurity Badges." Santa Clara, CA. Press Release.

[7] BSA Merit Badge Task Force. 2014. "Counselor's Compass, Vol. 1, No. 1." Irving, TX: Boy Scouts of America. http://www.scouting.org/filestore/counselors_news/Fall_2014.pdf.

Knowledge

These requirements help a Scout understand some key cybersecurity terms and topics. This is important not only for laying the foundation for the activity requirements but also for helping the Scout become a well-informed citizen. So many of these concepts affect our everyday life, it is abundantly beneficial for citizens to have a basic understanding of them.

Ethics

- Relate one or more tenants of the Scout law to the purpose of cybersecurity.
- Explain what is and is not acceptable behavior in cyberspace.
- Discuss with your counselor what you should do if you discover a vulnerability in your school's computers or network, a public website, or software product.

Fundamentals

- Cybersecurity definitions. Explain to your counselor the meaning of: Vulnerability, Exploit, Identity, the "C.I.A." triad (confidentiality, integrity, availability), Authentication, and Authorization.
- Discuss with your counselor why cybersecurity is important and who benefits when it is done properly.

Cyber Defenses

- Describe three of the following and how they are used to defend a computer or network: firewall, antivirus software, intrusion detection system, intrusion prevention system, access control list, identity management.
- Describe multi-factored authentication and how it can be used to improve security (something you know, something you have, something you are).

Cyber Threats & Attacks

- Describe the following major categories of threats to computer systems, and give two examples of each: people, natural disasters, and accidents/mistakes.
- Describe at least four different categories or types of malware (for example: virus, worm, Trojan, backdoor, spyware, or ransomware).
- Explain what a botnet is, its purpose, and how it operates.
- Describe how to spot an online scam (e.g. phishing or scareware) and what to do when you encounter one.
- Discuss with your counselor the potential consequences of a cyberattack or disaster to individuals, companies, and governments.

Cryptography

- Describe the differences between symmetric encryption, asymmetric encryption, and hashing. Give an example of when each would be used.
- Explain what public key infrastructure (PKI) is and the use for certificates and digital signatures.

Mobile

- Describe at least two possible risks when using public Wi-Fi.
- List at least three best practices for securing a mobile device.

Do TWO of the following:

- Describe how a mobile device connects to the Internet, both when using Wi-Fi and when using "cellular data" and the difference in each one (speed, security, cost).
- With your or your counselor's mobile device, demonstrate how to check that it has the latest version of the OS and any installed apps.
- With your or your counselor's mobile device, demonstrate how to back it up to a local PC or the cloud.
- Describe potentials risks of jailbreaking a mobile device, application sideloading, and application permissions.

"Internet of Things" (IoT)

- Describe what the "Internet of Things" (IoT) is. Name four connected devices that might be found in a digital home.
- Discuss why it is more difficult to have good cybersecurity with IoT devices.

Critical Infrastructure

- Explain how computers are used in power and water plants and why they need to be secure.

Activities

These requirements give a Scout hands-on experience with real-life cybersecurity. Most of them revolve around the devices and networks a Scout is likely to have or use in his day-to-day life. They help a Scout learn to secure his computer, his home network, and his mobile device (e.g. smartphone). They also empower the Scout to help others secure their devices.

Ethics

- Locate and examine the code of ethics used by an information security professional society. Discuss your findings with your counselor.

Current Events. Do ONE of the following:

- Discuss with your counselor an article or a news report about a recent cybersecurity incident, such as a data breach or malware infection. Explain how the incident happened (to the best of

your ability based on the information available) and what the consequences are or might be to the victim.

- Watch a movie or read a book in which cybersecurity plays a significant role. Discuss with your counselor how cybersecurity topics were depicted and how realistic you think it was.

Installing updates. Do the following:

- Explain to your counselor the importance of installing the latest updates on your computer, why they are needed, and what kinds of problems they can prevent.
- Demonstrate to your counselor how to check for, download, and install the latest updates for your computer or another computer you have permission to use. Show your counselor how to verify that your computer is up-to-date.

Virus scanning.

- Run a virus scanner on your home computer or another computer you have permission to use. Show the results to your counselor.

System security. Using on your own computer, a mobile device, or a computer that you have permission to use, do any FOUR of the following:

- Describe what makes a good password and why. Set or change an account password to one that is “strong.”
- Add a new regular (non-administrator) user account to your computer and show how to check that the permissions are set correctly. Check if the computer has a guest account enabled. If it is not needed and you have permission, disable the guest account.
- Install and set up a password manager.
- Use two different methods to see what programs or processes are running on your computer.
- Use a command line interface to view your computer’s open network connections. Discuss the results with your counselor.
- On a mobile device, install a free app (from an official app store) to scan the local network and run it to identify all network devices.
- Show how you can check that your computer’s firewall is on. Show how you would turn it on if it wasn’t already.
- Identify one or more other vulnerabilities on your home computer or network or another computer or network you have permission to use, and take the necessary actions to fix it.

Network security. Do TWO of the following:

- If your home has a Wi-Fi router, verify that it has the highest available settings that it supports, such as WPA2 (not WEP). Also, set a password that is considered “strong”. Explain to your counselor what a “strong” password is.

- Run a network port scan on your home computer. Write down the ports that are open and show this list to your counselor. Discuss what programs could be using the open ports and whether they are needed on your computer.
- Using a Raspberry Pi device or laptop computer, show the available Wi-Fi networks nearby and how to tell which ones are running with encryption. Show how to connect it to a known, trusted network that uses a passphrase.
- Design a simple network for an imaginary company or organization. Draw a network diagram showing the Internet gateway, routers, switches, public-facing servers, and workstations. Include security features such as firewalls, DMZ, IDS or IPS, and web proxy. Share your diagram with your counselor, and discuss the purpose of each of the security features you included.

Cryptography. Do ONE of the following:

- Create an encrypted ZIP file. Place this on a thumb drive or email it to your counselor then tell them (verbally, not through email) the password to unlock it [7zip is a free online program Scouts can use for this].
- Create your own PGP (pretty good privacy) email key. Share your public key with others (and your counselor). Also, get their public keys and add them to your computer's key ring. Send a message that has been digitally encrypted.
- Use a hashing algorithm (for example, SHA or MD5) to create a checksum for a file. Have a fellow Scout or your counselor make a change to the file. Recreate the checksum for the file and compare the new checksum to the original as a demonstration of file integrity checking.

Cybersecurity activity. Do ONE of the following:

- Learn about three cybersecurity competitions, camps, or other activities you could participate in (either now or in the future). Tell your counselor about these, including the type of activity, time commitment, and age of participants.
- Organize a cybersecurity competition for members of your troop, school, or some other group approved by your counselor. Either design your own competition or use an existing platform that teams or individuals can race to lock down all vulnerabilities.
- Give a presentation to your patrol, troop, or another group approved by your counselor, on a cybersecurity topic of your choice. Your presentation must include at least one demonstration and/or hands-on activity.

Careers. Do TWO of the following:

- Investigate three careers that involve cybersecurity. Pick one and find out what education, training, and experience are required for this profession. Discuss this with your counselor, and explain why this profession might interest you.
- Visit a business or organization that does work in cybersecurity. Find out about different work roles and what they do. Share what you learned with your counselor.

- Discuss the role of certifications in cybersecurity. Pick two and find out the following: purpose, governing organization, and requirements. Share what you learned with your counselor.

Additional Information for Consideration

Applicability to Scouting

How well the proposed topic fits with Scouting (values, Scout Oath, Scout Law, Guide to Safe Scouting, etc.)

How fun and engaging the subject is for Scout-age youth (depth and breadth of appeal, age appropriateness)

Scouting's Mission and Values

Cybersecurity is a topic extremely well suited to the Boy Scouts of America. By its very nature, the cybersecurity profession requires individuals of high moral character. Security professionals often have access to sensitive data and systems, making it imperative that they be trustworthy and ethical. The technical and creative skills possessed by many young people interested in computer technology can easily be used for illegal purposes when pursued outside the context of a strong ethical framework. Young people with these interests will pursue and obtain these skills anyway. It is consistent with the BSA's mission to give these young people the necessary ethical framework to apply their interests and skills to help others.

Furthermore, this is something that is badly needed by the nation. As mentioned earlier, the state of cybersecurity has become a national crisis. Billions of dollars are lost by all sectors of our economy. Criminal networks are stealing personal information, exposing millions of people to identity theft and other crimes. Ransomware threatens hospital operations and therefore patients. Military and defense networks are under constant attack. Critical infrastructure is at risk of compromise by foreign states. The BSA has a long and proud history of supporting the nation in times of need, from planting Victory gardens in World War II, to distributing emergency handbooks and Civil Defense posters during the Cold War, to the National Good Turns fighting national problems such as soil erosion and homelessness.[8] Hands-on experiences such as those provided by the merit badge program have been demonstrated to increase young people's interest in certain careers.[9,10] In the same way, hands-on

[8] Boy Scouts of America. 2014. Scouting Heritage (Merit Badge Series). Irving, TX: Boy Scouts of America.

[9] Alberts, Bruce. 2010. "An Education That Inspires." Science 330 (6003): 427. doi:10.1126/science.1199138.

[10] Maxim, Bruce R, and Bruce S Elenbogen. 2009. "Attracting K-12 Students to Study Computing." In 39th ASEE/IEEE Frontiers in Education Conference, M1H 1-5. San Antonio, TX: IEEE. doi:10.1109/FIE.2009.5350694.

cybersecurity activities have the potential to increase Scouts' interest in cybersecurity careers in a meaningful way.[11]

Interest and Age-Appropriateness for Scouts

One of the issues of concern to the BSA is whether there would be enough interest in this new merit badge. We believe there is ample evidence to suggest there would be. CyberPatriot[12], a cyber defense competition for middle and high school students run by the Air Force Association, has been growing like wildfire. The number of registered teams has grown by over 330% over the last five years. This year, they continued this growth trend, registering nearly 5,600 teams -- over 15,000 registered participants.[13] These teams are spread throughout the country and attract a diverse group of students.[14] Even more remarkable, these are students who chose to commit to spending several hours per week for up to an entire school year on the program and belong to a school or other organization with the resources to field such a team. A Cybersecurity merit badge would reach a significantly broader audience. A growing body of research indicates that young people get excited about cybersecurity when given the chance to explore it hands-on. For example, in a survey of CyberPatriot participants, 81% indicated that it was more fun than other extracurricular activities, and 33% said it was the *most* fun of all their extracurricular activities![15] Additionally, the success of Robotics, Programming, Digital Technology, and others validates that there is significant interest among Scouts in exploring technology fields and in pursuing technology-related merit badges.

Practicality

The practicality of the proposed merit badge (resources to recruit merit badge counselors, uniqueness, existence of standardized "rules" and administrative organization, safety and risk considerations, etc.)

Resource requirements (cost to Scouts/units, camp implications, etc.)

Availability of Merit Badge Counselors

According to data from CyberSeek, a job analytics site sponsored by the National Initiative for Cybersecurity Education, there are approximately 747,000 cybersecurity workers in the United States (this includes both those in primary cybersecurity jobs and those in other roles that require

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[11] Dunn, Michael H., and Laurence D. Merkle. 2018. "Assessing the Impact of a National Cybersecurity Competition on Students' Career Interests." In Proceedings of the 49th ACM Technical Symposium on Computer Science Education (SIGCSE '18), Baltimore, MD, USA. doi:10.1145/3159450.3159462.

[12] "Air Force Association's CyberPatriot: The National Youth Cyber Education Program." 2017. http://uscyberpatriot.org/.

[13] Air Force Association. 23 Oct 2017. "CyberPatriot Breaks Registration Record Again." Arlington, VA. Press Release.

[14] CyberPatriot Program Office. 2017. "CyberPatriot Impact Report." https://www.uscyberpatriot.org/Documents/Fact Sheets/Impact Report_2017.pdf.

[15] CyberPatriot Program Office. 2014. "CyberPatriot Survey Results: CyberPatriot VI Post-Season Competitor Survey 2013-2014."

cybersecurity skills).[16] Members of IT/cybersecurity professional organizations regularly volunteer for community outreach and education efforts. (ISC)[2] and ISSA, two of the largest and most prominent such organizations and co-sponsors of this proposal, have already committed to supporting and helping to recruit new merit badge counselors. Several other national and international organizations for cybersecurity professionals also have significant volunteer efforts focused on youth education, including ISACA, AFCEA, and the Military Cyber Professionals Association.[17] These organizations will be excellent places to start recruiting additional merit badge counselors.

CyberPatriot, described above, recruits thousands of volunteers every year to coach and mentor teams for its competitions. Each of the 5,600 teams nationwide has at least one coach or mentor that is knowledgeable in cybersecurity, and often more than one. Since merit badge counseling requires a significantly smaller time commitment than coaching or mentoring a CyberPatriot team, we expect that we will be able to recruit even more volunteers.

Resource Requirements

All proposed requirements can be completed by an individual Scout with just a computer and access to the Internet. If the Scout does not have a computer or Internet access of his own, the requirements can be completed on a school or library computer (with permission), or a computer supplied by the merit badge counselor.

In order to run a merit badge class/clinic, a unit would need one computer for every Scout participating, or at least enough computers such that Scouts can rotate through and each get sufficient time on the computer, plus Internet access with sufficient bandwidth. Appropriate computers can be purchased new for as little as $200-300, sometimes even cheaper. However, a unit need not buy new computers, since the computers available in most school or library computer labs would be sufficient. The unit would merely need permission to install any software they were using for the class and/or to access any security settings the Scouts might be working with.

Safety and Risk Considerations

The primary safety concern is online safety, just as with any activity where a young person is using the Internet. For this reason, this merit badge proposal relies on the BSA's existing best practice, the Cyber Chip, which is the first requirement.

Another risk consideration that should be taken any time young people engage with information technology is the potential for misuse. Skilled young people are likely to be able to engage in unethical activities, including circumventing security and safety controls, manipulating computers and people to their own ends, or participating in illegal activities online. This is why the proposed requirements address ethics and ethical conduct immediately following safety. It is imperative that Scouts consider the way in which they can apply Scouting's values to their activities with computers and the Internet.

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[16] http://cyberseek.org/heatmap.html

[17] https://www.isaca.org/ | https://www.afcea.org/ | http://public.milcyber.org/

Development Resources

Availability of outside resources for developmental support

Sponsorship/Funding

This merit badge proposal is sponsored by the ISSA Education Foundation (issa-foundation.org) and the Center for Cyber Safety and Education (www.iamcybersafe.org) and is endorsed and supported by (ISC)[2] (www.isc2.org). The ISSA Education Foundation has donor funds specifically designated to support the development of a Cybersecurity merit badge program for Boy Scouts. See the "Sponsoring Organizations" section near the end of this document for more information about each of these organizations.

When it comes time to launch the new Cybersecurity merit badge, or if the development costs exceed the funds available from the sponsoring organizations, a corporate sponsor can be solicited. As leading cybersecurity professional and education organizations, both ISSA and (ISC)[2]/Center for Cyber Safety and Education have valuable connections with industry. In the past, large information technology and security companies have been eager to sponsor, support, and promote cyber education programs. For example, Palo Alto Networks is sponsoring development of the GSUSA cybersecurity badges,[6] and CyberPatriot has at least nine large corporate sponsors annually, including Cisco, Microsoft, and Facebook (in addition to several government and academic sponsors).[18]

The following resources aid in the understanding of the topic and will be helpful in the future development of the merit badge and pamphlet.

Ethics

The following leading cybersecurity professional organizations provide a Code of Ethics:

- ISACA: https://www.isaca.org/certification/code-of-professional-ethics/
- (ISC)[2]: https://www.isc2.org/Ethics
- ISSA: http://www.issa.org/?page=CodeofEthics
- IEEE: https://www.ieee.org/about/corporate/governance/p7-8.html

Additional ethics resource(s):

- Richard A. Spinello, *Cyberethics: Morality and Law in Cyberspace, Sixth Edition* (Jones & Bartlett, 2017)
- Herman T. Tavani, Ethics and Technology (Wiley, 2015 ISBN 978-1119355311)
- Stanford Encyclopedia of Philosophy: Computer and Information Ethics
- Stanford Encyclopedia of Philosophy: Information Technology and Moral Values
- Communications of the ACM: "A uniform code of ethics: business and IT professional ethics" by Brett Landry

[18] http://uscyberpatriot.org/about/sponsors

- International Society for Ethics & Information Technology: Promotes and facilitates scholarship, education, discussion, and debate, and other activities, on the ethical issues in and surrounded by information technology; distinctly devoted to normative issues.

Cybersecurity Basics

The following resources give an introduction to cybersecurity fundamentals. These resources can be used as guidance in developing the merit badge, and by Scouts while working on earning the badge.

- Cyber Aces - free online cybersecurity courses from SANS, a leader in IT security training
- CyberPatriot training modules - slides used for training CyberPatriot teams, covering a number of important cybersecurity topics
- Cyberspace Principals Course - text for an introductory course developed by Civil Air Patrol, the U.S. Air Force's auxiliary cadet program
- Cybersecurity Labs - videos and hands-on activities from PBS NOVA Labs
- 20 Critical Security Controls - list of top industry-consensus best practices, from the Center for Internet Security (CIS)
- List of additional online resources from CyberPatriot
- *Cybersecurity for Dummies* free from Palo Alto Networks. (ISBN-13 978-1-119-25029-6)
- *An Introduction to Information Security* NIST SP 800-12 Rev. 1, from the National Institute for Standards and Technology - Computer Security Resource Center.

Vendor-Specific

These resources will assist the team in developing how-to guides for securing specific operating systems. Since the details of how to work with specific operating systems change more quickly than the merit badge pamphlet cycle, we recommend that this information be put on a companion website.

- Microsoft: Windows 8, Windows 10
- Ciprian Adrian Rusen and Joli Ballew, *Windows 8 Step by Step* (Microsoft Press, 2012)
- Joan Lambert, *Windows 10 Step by Step* (Microsoft Press, 2015)
- Woody Leonhard, "Securing Windows 10," *Windows 10 All-In-One For Dummies* (Wiley, 2016)
- Bob LeVitus, "Safety First: Backups and Other Security Issues," *macOS Sierra For Dummies* (Wiley, 2016)
- Bob LeVitus, "Safety First: Backups and Other Security Issues," *macOS High Sierra For Dummies* (Wiley, 2017)

Mobile Device Security

- Mobile device security tips - guide from the Privacy Rights Clearinghouse
- Mobile device security guidelines from MIT's Information Systems and Technology office

Internet of Things

- YouTube video: IBM How It Works: Internet of Things video
- YouTube video: How the Internet of Things Will Change the World
- YouTube video: Making the Internet of Things Safe

Cybersecurity Activities

While Scouts working on this badge would not be required to participate in any specific outside activity, they are encouraged (via an optional requirement) to explore which options are out there for them if they wish to do more. These are just some of the cybersecurity competitions and camps they could consider, all of which are available at no or low cost to the student:

- CyberPatriot - With over 5,600 teams in 2017 and growing every year, this is the big one. Teams are available at hundreds of schools, JROTC and Civil Air Patrol units, and other youth groups nationwide at no or very low cost to the youth. Scout troops are also eligible to field teams (several have done so already), at a relatively minimal cost.
- picoCTF - A "capture the flag" style security game, specifically designed for middle and high school students. FREE.
- Cyber Aces - FREE online cybersecurity courses from top instructors at the SANS Institute, plus a quiz-based competition.
- GenCyber - An NSA-sponsored program of locally funded camps run by universities and other organizations around the country. FREE to attendees.
- AFA CyberCamp - A program created by CyberPatriot that can be used to run local camps hosted by any interested organization. In its fourth year, there are already 160 camps.[19] Participant fees are set by the hosting organization and will vary.

Careers

The CyberSeek website (www.cyberseek.org) – supported by CompTia, Burning Glass Technologies, and the U.S. government's National Initiative for Cybersecurity Education (NICE) – interactively shows where cybersecurity jobs are located in the United States and also shows career pathways within the cybersecurity profession.

List of 20 information security jobs, with brief descriptions, from SANS Cyber Aces: http://www.cyberaces.org/careers.

The National Security Agency (NSA) sponsors an online program called "Day of Cyber" to give students an "online, interactive cyber career exploration experience." Students, either individually or as part of a classroom group, explore cyber careers by virtually shadowing six NSA cyber professionals. https://www.nsadayofcyber.com/

[19] CyberPatriot Program Office. 2017. "CyberPatriot Impact Report."

Badge Design Ideas

The letters and numbers on these badge designs are a hexadecimal representation of "Boy Scouts of America" in ASCII.

Sponsoring Organizations

(ISC)²

(ISC)² is an international non-profit 501(c)(6) membership association focused on inspiring a safe and secure cyber world. Best known for the acclaimed Certified Information Systems Security Professional (CISSP®) certification, (ISC)² offers a portfolio of credentials that are part of a holistic, programmatic approach to security. Our membership, over 130,000 strong, is made up of certified cyber, information, software and infrastructure security professionals who are making a difference and helping to advance the industry. You can learn more by going to www.isc2.org.

Center for Cyber Safety and Education

The **Center for Cyber Safety and Education** (Center), is a non-profit 501(c)(3) charitable trust committed to making the cyber world a safer place for everyone. We work to ensure that people across the globe have a positive and safe experience online through our educational programs, scholarships, and research. We are the charitable trust of (ISC)², whose dedication to our mission has been an inspiring example to the cybersecurity industry.

ISSA Education Foundation

The **Information Systems Security Association Education Foundation** (ISSAEF), is a non-profit 501(c)(3) charitable foundation which fosters, supports, develops and provides education and training in matters involving information security and its applications. A main focus of the foundation is to provide scholarships to students seeking a career in cyber security. ISSAEF is associated with the international Information Systems Security Association (ISSA), with over 10,000 members and chapters worldwide. You can learn more by visiting issaef.org.

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