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# US CYBER CHALLENGE RESEARCH

CENTER FOR INTERNET SECURITY, INC

*FEBRUARY 2012*

FINAL TECHNICAL REPORT

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**13. SUPPLEMENTARY NOTES**

**14. ABSTRACT**

The goal of this research project is to develop, test, analyze and assess cybersecurity tactical and strategic gaming competitions to determine the ability to defend the nation's critical infrastructure; ability to mitigate damage; and success in implementing defensive tactics to prevent future attacks. This project will develop, test, evaluate and assess alternative methods for identifying computer security talent that will be able to identify threats and improve our country's ability to anticipate, avoid, detect and defeat cyber threats.

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## 1.0 SUMMARY

Meeting the demand for top technical cybersecurity talent is one of the difficult challenges facing military and civilian government leaders. Competitions have demonstrated promising avenues for identification of future talent, for ranking candidates on cyber skills, and for motivating candidates to become fully committed to advancing their skills in cybersecurity. The US Cyber Challenge (USCC) is helping to develop the next generation of cyber experts through education and hands-on defense gaming strategies. By creating excitement and highlighting competitors' successes, the USCC attempts to:

- Demonstrate there are cool jobs in technology;
- Provide recognition for achievements;
- Create a hierarchy of talent challenges;
- Organize highly selective summer camps;
- Ensure the public knows how impressive it is to be selected to participate; and
- Analyze what works and what does not work in each of these areas.

During this past period of performance, September 2010 through October 2011, the USCC held several competitions and challenges and also developed the initial assessment framework to measure the performance outcomes of the program. The impact of the USCC is being measured against this assessment framework and is being measured by the increasing number of participants in the USCC activities. For example, for summer camps held in 2010, our initial pilot effort involving three universities and 55 participants to this summer camps which involved 6 universities and 230 participants.

In summary, there are two key data points to highlight from this past year's data collection and assessment effort:

- For student vetting, "Simply identifying students who were likely to engage increased the overall value of the experience." This statement illustrates the use of competitions such as the on-line competitions of Cyber Quests for the 18 years and older participants and the Cyber Foundations for the high school participants are reaching the targeted population and addressing the short-term objectives of identify, engage and challenge.
- For better data and data quality for the assessment framework, "some interviewees noted that it was particularly important to ask students to take the surveys daily and not wait until the end of the week to have them all completed." Additionally, the questions included the surveys will need to be further evaluated to ensure they are a measurement of the quality of the experience.

The USCC will continue to use the social media capabilities and other communications capabilities as well the resources of the Center for Internet Security to include the Multi-State ISAC community to increase the overall numbers of participations while working with other competitions to broaden the information and data for the assessment framework.

## 2.0 INTRODUCTION

The critical infrastructure of this nation is highly dependent on cyber infrastructure, but it does not enjoy the benefit of a sufficiently skilled workforce to protect and guard against system failures and attacks. According to the Center for Strategic and International Studies (CSIS), "we not only have a shortage of the highly technically skilled people required to operate and support

systems already deployed, but also an even more desperate shortage of people who can design secure systems, write safe computer code, and create the ever more sophisticated tools needed to prevent, detect, mitigate and reconstitute from damage due to system failures and malicious acts."[1]

Experts claim there are only 1,000 people in the country currently who possess the requisite skills, but in reality, we need as many as 10,000 to 30,000.[2] The CSIS Commission on Cybersecurity for the 44th Presidency set forth several recommendations to address this critical issue in its report.

For the federal government, the recent General Accountability Office (GAO) report references several Inspectors General's reports highlighting the need and/or the difficulties in filling vacant positions at the studied departments and agencies including a reference to the March 2011 testimony by General Keith Alexander that the military did not have enough highly skilled personnel to address the current and future cyber threats to your infrastructure.[3]

Technology has become an integral part of our daily lives, and educators start introducing the benefits of technology as early as pre-school. As a result, children develop technical skills at a very early age. Couple this access to technology with the natural curiosity of a child or young adult and innocent exploration of the Internet or networks (i.e. to "see how things work") could lead to disaster. According to a 2009 Panda Security study, this is exactly how it starts for a vast majority of young hackers. Panda studied 4,000 teens from 15 to 18 years of age, and discovered that "17 percent of adolescent users claim to have advanced technical knowledge and are able to find hacking tools on the Internet. Of these, 30 percent claim to have used them on at least one occasion. When asked why, 86 percent said that curiosity had led them to investigate these public tools."[4] If left unguided, without legitimate avenues to test their skills and satisfy their curiosity, these numbers will only grow.

The above-published statistics regarding the activity of adolescents and young adults show the need to intervene at an early age and to channel their curiosity and technical proficiency for a better purpose.

The Center for Internet Security (CIS), U.S. Cyber Challenge (USCC), is well positioned to ensure there is a career path for the high-level technical skills required. USCC believes the path must be available at an early age. Finally, the USCC believes performance metrics should be developed in order to measure the progress being made towards to reduce the risk for the national critical infrastructure regarding cyber threats.

The USCC is looking for 10,000 Americans with the skills to fill the ranks for the cybersecurity practitioners, researchers, hunters and warriors. Specifically, USCC objectives are to:

1. **Identify:** increase cybersecurity knowledge and talent self-awareness among high school students, college age students, current professionals and other interested persons who are looking to enter into the cyber security professional ranks and/or further their existing careers;

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[1] *A Human Capital Crisis in Cybersecurity,* Center for Strategic and International Studies, July 2010, pg. 6.
[2] Id. Pg. 1; *Cyberwarrior Shortage Threatens U.S. Security,* Tom Gjelten, July 19, 2010
[3] GAO, Cybersecurity Human Capital: Initiatives Need Better Planning and Coordination, GAO-12-8 (Washington, DC: November 2011
[4] Panda Security, http://www.pitchengine.com/preview-release.php?id=11537

2. **Engage:** engage individuals in order to increase the talent pool for cybersecurity professionals, in both the public and private sectors. This objective includes engaging individuals across various demographics, including women and minorities; and
3. **Challenge:** provide opportunities for skill development through cybersecurity competitions and pathways to provide increasingly difficult challenges and competitions as well as provide access to educations, resources, mentoring, scholarships, internships and job opportunities.

To ensure the USCC and other cybersecurity professional development activities are meeting and continually improving on these objectives, the methodology has initially been developed to provide an assessment and feedback loop to serve as the foundation mechanism for identifying success criteria, collecting the necessary data as well as establishing the data elements, conducting appropriate collection activities and analysis, and addressing the challenges through the short; mid and long term of our efforts.

## 3.0 METHODS, ASSUMPTIONS, AND PROCEDURES

### 3.1 Assumptions

In order to provide context for the initial assessment framework developed under this research proposal, there are a number of important assumptions. These assumptions are as follows:

- A more cybersecurity aware populous will mitigate against the Nation's cyber risks and improve the Nation's cybersecurity posture.
- Individuals with the right skills and education in cybersecurity, in the appropriate federal and industry roles and positions, will improve the cyber security posture of the Nation/National critical information technology (IT) infrastructure.

Given these assumptions, the initial assessment framework does not focus on assessing or quantifying the Nation's cyber risk profile or cyber risk posture as this is done at the national level and outlined in reports such as the recently released report by the Office of the National Counterintelligence Executive.[5] This initial assessment framework is designed to assess and improve the activities of the USCC and the cybersecurity professional activities in-line with the objectives of *identify, engage* and *challenge*.

Furthermore, the initial assessment framework is designed to support the underlying USCC's "pathway" construct. In this construct, the field of cybersecurity is viewed as a pathway with multiple entry and exit points, as well as, various paths to differing destinations for education and eventual job entry or if you are already in the job market, re-entry for developmental purposes to become more cyber-enhanced and/or a cybersecurity professional. This analogy allows the USCC to represent that many may be entering the field at different points of time in their career, they may be coming from differing locations or career backgrounds, and ultimately, they may choose differing paths or specialties within the cybersecurity field. In contrast, the "pipeline" analogy is unfitting the USCC approach because it implies one single point of entry and highly structure, linear path to a single destination. As

[5] "Foreign Spies Stealing US Economic Secrets in Cyberspace: Report to Congress in Foreign Economic Espionage 2009-2011," October 2011

such, the initial assessment framework looks at the information on a participant's background, experience, skills, and successes to help assist and map a pathway through to their choice.

## 3.2 Methods

The initial assessment framework is geared towards measuring the success of the USCC and cybersecurity professional development activities in achieving the USCC's objectives. These successes and associated challenges are addressed over three distinct time horizons; short-term, mid-term; and long-term. Each of these time horizons presents a distinct set of challenges, relevant data and questions, as well as, a discrete set of tools for conducting data collection and facilitating assessment activities. Although the specific data elements and collection tools will change over the varying time horizons, a number of underlying questions being addressed by the assessment framework remain the same. These underlying questions are as follows:

- Does participation in structured cyber security activities increase individual self-awareness of talent and/ or interest in cyber security disciplines and issues?
- What activities help individuals identify their talent in cyber security and which with subsequently encourage participation?
- What cyber security activities provide the most incentive to continue on the pathway?
- What incentives (e.g., prize money, prize software, scholarships, etc.) provide the most incentive to continue on the pathway?
- Does participation in cyber security activities at the high school and college level encourage a career in cyber security?
- Does a structured and well-articulated path to a career in cyber security increase considerations for a career in cyber security?
- Does a 'pathway' using discrete levels of achievement that include possible college admission, access to financial aid, and/ or employment opportunities create a strong motivator for participation?

In addition to these underlying questions the assessment framework addresses three overarching focus areas as follows:

***Adoption/ Participation*** – This focus area specifically addresses the degree to which individuals are participating and continue to participate in USCC and related activities.

***Usage*** – This focus area specifically addresses participant use of the various USCC tools and systems.

***Customer Satisfaction*** – This focus area specifically addresses the level of benefit, knowledge, enjoyment and value an individual takes from USCC and related activities.

In order to answer these underlying questions, address the overarching focus areas, and validate the USCC objectives, there must be quantifiable mechanisms to enable the capture of data across each time horizon. Feedback from the analysis and study of this data will enable USCC to validate the success or failure of the objectives, as well as, provide data to better enable adjustments to better align to USCC Objectives.

**3.2.1 Short-Term Methodology.** The objectives of the assessment framework in short-term are geared toward identifying the key data elements, deriving assessment baselines and establishing the processes by which data will be collected over the mid and long terms.

The table below provides an overview of the key objectives, data and collection methods for each of the overarching focus areas in the short-term as outlined in Table 1, below:

**Table 1, Short-Term Methodology**

| | Adoption/ Participation | **Usage** | Customer Satisfaction |
|---|---|---|---|
| Questions/ Objectives | • Are individuals engaging USCC and related events? | • **What capabilities/tools are participants using?**<br>• **What are the capabilities and requirements for inclusion as a USCC recognized system, activity, initiative?** | • Are participants interested in continued participation?<br>• Do participants perceive value from participating?<br>• Do participants gain knowledge from participating? |
| Data | • Number of Registrants<br>• Number of Participants<br>• Participant Gender<br>• Participant Ethnicity<br>• Participant Age<br>• Participant GPA/ Education<br>• Participant Career Interests<br>• Participant Proficiencies<br>• Participant Extracurricular<br>o Clubs, Sports, etc. | • **Tool, feature and usage analysis** | • Participant likelihood of future participation<br>• Participant assessment of<br>o Event value<br>o Event effectiveness<br>o Knowledge acquired |
| Proposed Metrics | • % of new users attending USCC events<br>• % of returning users attending USCC events<br>• # of High Schools participating in USCC activities<br>• # of Universities participating in USCC activities<br>• # of women attending USCC events<br>• # of minorities attending USCC events | • **% of monthly unique visitors to the USCC website**<br>• **% of users downloading free web tutorials**<br>• **% of users using toolkits**<br>• **# of users participating in USCC web games**<br>• **# of users participating in 'in-person' competition** | • % of users who want to continue with other USCC activities<br>• % of users who feel they gained knowledge<br>• % of users who would recommend USCC activities to others |
| Collection Tools | • Registration forms<br>• Participant profiles<br>o Ex: Facebook, Twitter | • **N/A** | • Surveys/ Interviews<br>• Blogs<br>• Pre and post event knowledge assessments |

***Adoption/ Participation***

In the short-term, adoption/ participation is predominantly about assessing how many people are engaging USCC events and activities and developing an initial understanding of the characteristics of these participants. Data should be collected and analyzed to develop a baseline of participation. This baseline can then be used in subsequent analysis to assess the effectiveness of changes to the activities as well as identify demographics for targeted engagement, such as women or individuals with traditionally no cyber security associated interests.

To augment the initial data collected from USCC events in the short-term, identifying and incorporating structured data from schools, universities and other data aggregation groups will be effective in developing a more in-depth understanding, as well as, developing more comprehensive baselines for future assessments. This structured information may include student enrollment, graduation and success rates as well as employment and trends.

***Usage***

In the short-term much of the data collection and feedback mechanisms will be reliant on existing ubiquitous technologies such as Facebook, Twitter, blogs, survey tools and others. Although these tools lack the sophisticated analytic capabilities necessary in the long-term, they provide an accelerated avenue for the immediate collection of data. As such, usage in the short-term is an assessment of the collection mechanisms to develop requirements for a USCC sponsored system which is added to the framework in the mid-term time horizon.

***Customer Satisfaction***

Short-term customer satisfaction is essentially assessing 'Are participants interested in continued participation?' as well as developing a baseline of satisfaction. Similar to the adoption/ participation baseline, the satisfaction baseline serves as a preliminary point for assessing the effectiveness of changes to the activities and events. This baseline will describe how effective and successful participants judge USCC events to be.

However, the most critical component of the short-term is assessing each participant interested in future participation. Since collecting information on participants and providing linkages and analysis to the USCC Objectives requires access to significant amounts of data over time- it is critical to ensure interest in future participation. If participants are not interested in continuing their participation then there is no need to conduct assessments in later phases and the ability to track improvements and long terms results will be compromised.

**3.2.2 Mid-Term Methodology.** The objectives of the initial assessment framework in mid-term are geared toward developing the feedback loop to implement and assess improvements to the process. Moreover, the mid-term is the transition point to develop a more robust infrastructure for data collection, user management and the development of a cybersecurity social network. The mid-term effort is collectively a transition and refining period to establish the "in-house" and on-going infrastructure to support this effort's long term objectives as well as to refine the baseline, questions and assessment mechanisms.

The Table 2 below provides an overview of the key objectives, data and collection methods for each of the overarching focus areas in the mid-term.

**Table 2, Mid-Term Methodology**

| | Adoption/ Participation | Usage | Customer Satisfaction |
|---|---|---|---|
| Questions/ Objectives | • Is the baseline established in the short-term effective?<br>• Is participation limited to specific participants (age, gender, interests, etc.)?<br>• Are participants continuing to enter the 'highway'? If so, at what entry points? | • Does the USCC sponsored platform incorporate the necessary features and capabilities?<br>• Is there an effective interface for the USCC sponsored platform? | • Are individuals previously not engaged in cyber security discovering interest in the field?<br>• Do users like the tool?<br>• Are users retaining skills/ knowledge?<br>• Are users incorporating USCC knowledge in their daily activities? |

| | | | |
|---|---|---|---|
| Data | • Short-term baseline gap analysis<br>• Short-term demographic representation analysis | • Beta test participant group feedback<br>• Initial deployment user feedback | • Participant experience stories (blog)<br>• Focused participant capability and skill assessment<br>• Participant habits and awareness |
| Proposed Metrics | • % of new users attending USCC events<br>• % of returning users attending USCC events<br>• # of High Schools participating in USCC activities<br>• # of Universities participating in USCC activities<br>• # of other Cyber competitions promoting USCC events | • % of monthly unique visitors to the USCC website<br>• % of users downloading free web tutorials<br>• % of users using toolkits<br>• # of users participating in USCC web games<br>• # of users participating in 'in-person' competition<br>• # of users signed up for USCC sponsored platform<br>• # of users actively using the USCC sponsored site | • % of users who want to continue with other USCC activities<br>• % of users who feel they gained knowledge<br>• % of users who would recommend USCC activities to others<br>• % satisfied with USCC sponsored site |
| Collection Tools | • Participant/ Registrant Rates | • Structured testing feedback process<br>• User interviews and surveys | • Periodic proficiency and retention assessments<br>• Habit and practices (activity) assessments |

***Adoption/ Participation***

In the mid-term, adoption/ participation is focused on refining the participation baseline and assessing underrepresented demographics. Before changing the adoption/ participation baseline, a gap analysis would be conducted on the data elements being captured from the short-term. Areas or elements of information which are not collected or which are collected but at an unusable quality can be revised to ensure comprehensiveness and completeness. Following each update to the framework, the modified results would be compared to the short-term baseline results over a 3, 6, 12 month window to ensure the effectiveness of each modification.

Additionally in the mid-term, analysis on key demographics can provide insights about who is and who is not participating. This can be used to both refine data collection efforts and to inform targeted demographic engagement efforts in the long-term.

Lastly, participation in the mid-term includes continued analysis of new participants. Because USCC has adopted the 'pathway' model there is the expectation that participants will continually be entering and/or re-entering and the data elements identified in the short-term will continue to be collected from these individuals as they enter the cybersecurity pathway.

***Usage***

Although systems like Facebook, Twitter and other social media outlets provide a tremendous starting point, the long term needs of this project require more administrative access to the underlying framework. Specifically, the ability to tailor user profiles, manage user interactions and control specific data elements for each user to maximize the effectiveness and efficiency of data collection and analysis. The mid-term usage focus is on the transition from quick collection tools to a more robust, USCC sponsored platform which the USCC calls the "community gym" or the "teaching hospital" depending on the skills levels and participation of the individual competitor.

This USCC sponsored platform will provide the participant management, event registration, event engagement and social network components for the USCC participant community. In the mid-term, the utility will be monitored with feedback, provided by focus groups, about the interface, capabilities, usability, user experience and overall effectiveness of the USCC sponsored platform. Additionally, as the platform is finalized and moved into production during the mid-term, usage will incorporate user feedback and provide a structured requirements management process.

***Customer Satisfaction***

In the mid-term, customer satisfaction is focused on assessing participant's discovery of previously unknown cyber security talent or interest as well as participant's retention and incorporation of skills and knowledge into their daily lives. Assessing a success rate for helping individuals discover a previously unknown interest or ability in the cyber security field directly informs one of the objectives. Moreover, if by the mid-term this is not effectively happening, a deeper assessment of demographics and participant experience would be evaluated to ensure the proper breadth of individuals is being engaged in USCC activities.

Additionally in the mid-term, the framework is looking to assess participant's implementation and retention of skills and knowledge gained as a result of USCC activities. Collecting and assessing retention will help in the modification of USCC material and events to better facilitate the delivery of core concepts to participants. This will also provide insight into which elements of USCC events are most effective in immediately impacting participant habits.

**3.2.3 Long-Term Methodology.** The objectives of the assessment framework in the long-term are geared toward the deployment of sponsored collection platforms, continual refinement of data collection and analysis, and participant tracking.

Table 3 below provides an overview of the key objectives, and data and collection methods for each of the overarching focus areas in the long-term.

**Table 3, Long-Term Methodology**

| | Adoption/ Participation | Usage | Customer Satisfaction |
|---|---|---|---|
| Questions/ Objectives | • Are participants continuing to careers in the field?<br>• Are users continuing participation in USCC activities?<br>• Engage underrepresented demographics.<br>• Are underrepresented demographics participating in USCC activities?<br>• Are participants continuing to enter the 'highway'? | • Is the data entered in the USCC sponsored platform of sufficient quality and completeness<br>• Do the features and capabilities of the system effectively encourage and support the USCC cyber security community? | • Are individuals previously not engage in cyber security discovering interest in the field?<br>• Are users retaining skills/ knowledge?<br>• Are users incorporating USCC knowledge in their daily activities? |
| Data | • Participant career information<br>• Participant activity in USCC and associated activities<br>• Marketing and outreach analysis | • Platform data analysis<br>• User feedback | • Participant experience stories (blog)<br>• Focused participant capability and skill assessment<br>• Participant habits and awareness |

| | | | |
|---|---|---|---|
| Proposed Metrics | • % of new users attending USCC events<br>• % of returning users attending USCC events<br>• # of High Schools participating in USCC activities<br>• # of Universities participating in USCC activities<br>• # of users obtaining cyber security jobs in the civilian sector<br>• # of users obtaining cyber security jobs in the federal sector | • % of monthly unique visitors to the USCC website<br>• % of users downloading free web tutorials<br>• % of users using toolkits<br>• # of users participating in USCC web games<br>• # of users participating in 'in-person' competition<br>• # of users signed up for USCC sponsored Platform<br>• # of users actively using the USCC sponsored site | • % of users who want to continue with other USCC activities<br>• % of users who feel they gained knowledge<br>• % of users who would recommend USCC activities to others<br>• % satisfied with USCC Sponsored site<br>• % satisfied with their Cyber Career |
| Collection Tools | • Mango and other USCC sponsored participant platforms | • Surveys/ Interviews | • Periodic proficiency and retention assessments<br>• Habit and practices (activity) assessments |

***Adoption/ Participation***

In the long-term, adoption/ participation is concerned with the continued entry of individuals into the USCC cybersecurity pathway, encouraging underrepresented demographics to enter the pathway as well as continued participation in USCC events and the transition of individuals from USCC to cybersecurity careers. Utilizing the USCC sponsored platform developed in the mid-term, trends and analysis can be conducted following individuals through and following their USCC engagement.

***Usage***

Usage in this time horizon is focused on the implementation and effectiveness of the USCC sponsored platform. In particular, long-term will incorporate the continual assessment of the data, features and capacities within the "community gym," as well as, provide the process for the continual improvement and feedback of the system.

***Customer Satisfaction***

In the long-term, customer satisfaction is the continuation of participants skill and knowledge retention and application.

## 3.3 Procedures

The initial assessment framework is designed to address the three time horizons as outlined above. The following procedures discussed are addressing the work completed within the period of performance of this effort which is specifically focused on the short-term horizon. Specifically, the data collection took place prior to a planned event, during the event and following an event. Events measured by the USCC will include competitions, trainings, camps and other structured cybersecurity professional development activities. Additionally, the USCC employed the expertise of the team from Louisiana Tech University to validate the data collection procedures and the initial assessment framework in order to ensure performance metrics and activities would address and/or highlight potential gaps to address going forward.

**3.3.1 Pre-Event.** The data collected in this time period revolves around participant demographics, professional or educational background and personal interest in the material. One objective during the pre-event collection period is to assess participant expectations and perceived value. Participant expectation is a measure of a participant's anticipation of the quality and rigor of each event. This includes elements of both an individual's personal experience with other similar events, as well as an assessment of each individual's evaluation of the reputation of the event. Within the USCC framework, perceived value represents an assessment of the perceived or expected benefit prior to a participant's engagement in the activity, the value (trade off of participant's time investment versus perceived benefit), and the event's objectives (the applicability of the specific event to the perceived needs of the participant).

**3.3.2 In-Event.** The data collected in this time period revolves around participant engagement, capability to process information and participate in event activities, and each participant's enjoyment of the material. One objective during this period is to assess the rigor, quality and understandability of the materials and activities incorporated into the event as well as assessing participant satisfaction through participant input and feedback (both positive and negative). Within the USCC framework, satisfaction is a measure of each participant's level of personal benefit, knowledge acquisition, and the enjoyment an individual takes from USCC and related activities. Feedback includes an assessment of a participant's expectations (perceived value) versus activity outcomes (satisfaction) as well as indicators from the individual on how these two elements differ. Furthermore, developing and implementing data collection during this time period also provides for feedback specific to individual components of the event and prevents inadvertent averaging of feedback in a summary collection after the event.

**3.3.3 Post-Event.** The data collected in this time period revolves heavily around participant satisfaction, knowledge acquisition and retention, and continued engagement in the field of cyber security. One objective during this period is to assess adoption and participation as well as usage and application of cyber security skills, capabilities and techniques. Adoption and participation are similar to the concept of customer loyalty. This includes an assessment of a participant's likelihood to incorporate USCC elements into their daily lives, to pursue a career in USCC related disciplines, and to continue participating in future security and USCC events. Furthermore, another objective during this period is assessing usage and application, which is focused on assessing each participant's use of USCC provided toolkits, systems, infrastructure and connections.

Appendix A, "Assessment Techniques," provides a brief overview of the types of activities to take place within each time horizon at each proposed assessment period. The Appendix also includes initial specific objectives, questions, data, methodologies, technologies utilized or to be utilized within each time horizon.

Appendix B, "Assessment Database Structure," provides an underlying database structure of participant and survey data to facilitate data collection and reporting. In the short-term time horizon, the database will be a subset of these elements leveraging a third-party tool (SurveyMonkey) for the short-term effort. In the mid and long terms, USCC will migrate toward a customized participant management platform that will allow users and instructors to maintain profiles, participants to register for competitions, to deliver data to all USCC stakeholders, and to facilitate surveys and feedback. The long-term section discusses the database structure for maintaining data within that platform.

## 4.0 RESULTS AND DISCUSSION

In July and August of 2011, the USCC hosted cyber security camps in Virginia, Maryland, Missouri, California, and Delaware. These invitation only camps provided high school, college and young professionals with one week of specialized cyber security training presented by college faculty, cyber security experts and included activities such as a job fair, ethics workshop, a capture-the-flag competition, industry roundtable and an awards ceremony on the last day. The Table 4 below provides an overview of the 2011 camps.

**Table 4, Summary of Summer Camp 2011 Information**

| State | Dates | Location | Information |
|---|---|---|---|
| California | July 11 - July 15 | California State Polytechnic University, Pomona<br>3801 West Temple Avenue<br>Pomona, CA 91768 | Overnight camp open to eligible participants from CA, AZ, NV, OR |
| Maryland | July 11 - July 15 | Community College of Baltimore County, Essex<br>7201 Rossville Boulevard<br>Baltimore, MD 21237 | Day camp open to high school students only from this state |
| Missouri | July 25 - July 29 | University of Missouri, Columbia<br>Jesse Hall<br>Columbia, MO 65201 | Overnight camp open to eligible participants from all states west of the Mississippi (except those attending the California Camp) |
| Virginia | August 1 – August 5 | J. Sargeant Reynolds Community College, Richmond<br>Parham Road Campus<br>1651 East Parham Road<br>Richmond, Virginia, 23228 | Overnight camp open to eligible participants from all states east of the Mississippi (except Delaware) |
| Delaware | August 8 - August 12 | Delaware Technical and Community College, Dover<br>Terry Campus<br>100 Campus Drive<br>Dover, DE 19904 | Day camp open to eligible participants from Delaware |

The Cyber Camps provide crucial skills development and enable USCC to tap into the tremendous talent across our nation to identify those with a passion for security and a desire to put their skills to good use in addressing our Nation's cyber security workforce challenges. In addition to providing expert training for participants to improve their skills and marketability, the Cyber Camps provided attendees the opportunity to engage with major technology companies and government agencies at onsite job fairs for scholarship, internship and employment opportunities as well as engage industry professionals in an ethics panel.

The 2011 camps are "invitation only" after students initially completed the on-line competition, Cyber Quest. Furthermore, the camps were provided as either day camps or in-residence overnight camps. For the overnight camps, there was a minimum age requirement of 18 years and older.

During the 2011 camps, USCC utilized an automated survey tool, SurveyMonkey, to capture participant demographic and event feedback information from each event. In the 2010 pilot camps this data collection was done with hardcopy surveys.

This report provides an overview of the data collection methods in both the 2011 camps and the 2010 pilot camps, an analysis of the data collected in each year, a comparison of the data from the 2010 pilot and 2011 camp surveys, a summary of findings from interviews with camp instructors and administrators, a summary of overarching observations derived from the data, analysis and interviews as well as next steps for camps in 2012.

## 4.1 2011 Camp Administrator Interview Summary

Following the completion of the 2011 Camps, a number of key individuals involved in the administration, execution and setup of the Camps were interviewed to capture their thoughts, experiences, concerns, issues and recommendations. The Table 5 below summarizes the individuals interviewed:

**Table 5, 2011 Camp Administrator Call Summary**

| Interview | Date/ Time | Individuals in Attendance |
|---|---|---|
| Missouri Camp Debrief | September 1, 2011 – 10:30a | Beth Fisher, Karen Evans, Renee Mclaughlin, Patrick Ansaldi, Douglas C Houghton |
| Maryland Camp Debrief | September 1, 2011 – 11:30a | Casey O'Brien, Davina Pruitt, Randy Marchany, Karen Evans, Renee Mclaughlin, Patrick Ansaldi, Douglas C Houghton |
| Delaware Camp Debrief | September 2, 2011 – 10:30a | Elaine Starkey, Chase Cotton, Jared Bates, Karen Evans, Renee Mclaughlin, Patrick Ansaldi, Douglas C Houghton |
| California Camp Debrief | September 2, 2011 – 5:00p | Dan Manson, Anna Carlin, Karen Evans, Renee Mclaughlin, Patrick Ansaldi, Douglas C Houghton |
| General Camp Debrief | September 6, 2011 – 10:30a | Rudy Pamintuan, Karen Evans, Patrick Ansaldi, Douglas C Houghton |
| Virginia Camp Debrief | September 6, 2011 – 12:30p | Kristopher Cox, Karen Evans, Renee Mclaughlin, Patrick Ansaldi, Douglas C Houghton |
| General Camp Debrief | September 23, 2011 – 3:00p | Sonny Sandelius, Douglas C Houghton |
| General Camp Debrief | September 26, 2011 – 4:00p | Randy Marchany, Patrick Ansaldi, Douglas C Houghton |
| General Camp Debrief | September 30, 2011 – 10:30a | Karen Evans, Patrick Ansaldi, Douglas C Houghton |

**4.1.1 Common Interview Findings.** Across all the interviews a number of common themes were captured regarding the 2011 Cyber Camps. The list below explains each of these common elements. Listed numerically for ease of reference, but they are not in a particular order. Appendix C, "2011 Competition Data Collection Analysis," includes the survey structures and the data collection results from the camp participants.

1. **Logistics.** Nearly all of the interviewees acknowledged that logistics played a significant role in the success or complication of their particular camp. The two primary logistical difficulties were transportation from the nearest airport to the camp and from the overnight residency to the daily camp location. Camps who's location was a significant distance from the nearest airport, in excess an hour, noted

2. **Facilities.** Nearly every interviewee noted some issue with the setup or layout of the facility. Common issues included the lack of adequate power outlets for student laptops, the lack of network bandwidth for student connectivity and the lack of tabletop space for students to work. Some camps also noted complications with the rooms, specifically that auditoriums worked well for lectures but failed to provide space for hands-on and team activities. Alternatively, camps that used tables noted that small tables (8 people) worked well for team activities but presented complications during lectures since it was easy for students to get distracted.
3. **Teaching Assistants (TAs).** Many of the participants sighted the quality of TAs as either a major contributor to the success of the camp or as a major problem at the camp. From the interviews it appears that TAs who underwent more vetting scrutiny, had more training, and were provided materials outlining their specific roles and responsibilities provided significantly more impact and benefit to the quality of the camp. Alternatively, in some cases those without structured guidance or vetting became a distraction to the students and a disruption to the camp.
4. **Career fair expectations.** Across the different camps the job fair had different setups and contained different elements. Some fairs provided resume development, career panels to discuss the field, rotating speed-date style interviews with corporate representatives, and some incorporated professional associations and government representatives alongside hiring companies. Generally all the interviewees agreed the career fair needed to be given more time, that students generally considered the career fair a central component of the camp, and that a structured resume development element would highly benefit the students and attending companies. In some camps, the administrator collected resumes in advance and provided them to attending companies which received good feedback from the attending companies. Some interviewees did not difficulty in identifying companies to attend the career fair, particularly if the scheduling and coordination of those companies didn't begin very early.
5. **Skill Granularity.** The mix of students with different skill levels within the camp raised both positive and negative feedback. The suggestion to divide camps into introduction, intermediate and expert level courses was equally mixed in response. Many felt the students benefited from engaging other students with more or less skill, allowing them to learn from them and/ or teach them. On the other hand, interviewees noted the more proficient students tended to lose interest in the introductory material.
6. **Camp preparation manual.** Many of the interviewees expressed the desire for a comprehensive camp administrator's manual. There was a general sense that many of the camp materials, setup issues, and logistic considerations could have been brought to the administrator's attention and resolved had they had a manual. Furthermore, a number of the interviewees noted a disconnection between USCC, camp administrator and host facility roles and expectations. Most felt a manual which clearly outlined expectations of all the involved organizations would be greatly beneficial.
7. **Read ahead materials.** Nearly all the interviewees agreed that more informational material provided to both students and TAs prior to the camp would be helpful. Information for students on the logistics of the camp and the area, the layout of the host campus, meal plans, local transportation, and daily course outlines would help ensure they arrive informed and reduce time lost to coordinating students. Information for TAs on their role, responsibilities, acceptable and unacceptable behavior, daily schedules, key

personnel and contact information would help ensure TAs better understand their role within the camps.

8. **Camp location applications.** In addition to the manual, a number of the interviewees suggested an application for camp locations to ensure the host had the appropriate resources, facilities, accommodations, and capability to effectively setup and execute the camp. Some of the camp administration activities, such as coordinating the career fair and reserving accommodations, required significant preplanning, time and effort. Having an application would help to ensure the host is aware of the level of effort as well as ensure they can adequately support the camp.
9. **Group size.** The size of the student group varied across each of the camps. However, the feedback from most of the interviewees indicated that students preferred larger camps (100+) that were divided into smaller team groups (20-25). This allowed for a larger networking opportunity but also allowed for smaller classes and more teambuilding within the smaller work groups. Groups that were significantly larger noted difficulties in maintaining the attention of the group whereas smaller groups noted difficulty managing the students as different levels of skill and pace. Moreover, many of the interviewees noted that larger camps broken into smaller working groups which attended the various courses each day, meaning each of the camp courses would be offered to a different student group each day of the week, would provide both a better learning environment and a better teaching environment.
10. **Student vetting.** The MD camp, which hosted many High School students, strongly recommended using basic filtering for identifying students for camp attendance. Students for the MD Camp were recruited from high school AP CS and robotics courses, the CISCO Academy, and Cyber Foundations. The MD interviewees noted that managing the selection of students and utilizing a structured vetting process for accepting students greatly increased the quality and caliber of those in attendance. However, the MD interviewees did note that vetting based on skills, such as head hunting computer science students, didn't necessarily make better students. Simply, identifying students who were likely to engage increased the overall value of the experience.
11. **Teachers as students.** The MD camp allowed a number of teachers into the classes to participate as students and found that to be a great success. Allowing teachers to participate alongside students helped increase student interaction and engagement and hopefully maximized the value of the content teachers could take back to their classrooms.
12. **Camp footprint.** Many of the interviewees noted that opening the enrollment to regional applicants would help ensure the highest quality of participant possible.
13. **Field Trips.** Some of the 2011 camps hosted field trips and many who did not suggested the idea for 2012. However, field trips were met with mixed reviews. On the positive side it gave students the opportunity to visit interesting locations and real world security operation centers. On the negative side, if the location didn't interest all the students it was significant overhead for an activity which may not have added significant value. Furthermore, the additional of the field trip results in a lost day of education, which many interviewees felt was more important for the camp.
14. **Centralized online system.** Many of the interviewees noted that a centralized system for registering students, coordinating course materials, delivering read ahead materials and logistic information, configuring CTF, and providing a virtual community space for

students to collaborate and network after the camp concludes would be of tremendous benefit to all the stakeholders of the camp. Some interviewees also expressed value in linking course instructor profiles, specific course materials and outlines, as well as student developed work products into the online system as well.

15. **Press & Publicity.** Each of the camps had varying levels of success in obtaining publicity for their camp. Most noted difficulties in publicizing the event with local media and in reaching key government officials to attend. However, the CA camp for example was successful in getting CNN television coverage as well as articles in the LA Times.
16. **Day camp versus overnight.** The 2011 camps were a mix of day camps and overnight camps. The general consensus among interviewees was that the day camps helped reduce the burden of logistics and helped manage camp cost, however some felt that having students 'in residence' increased the impact of the material, increased the level of team building, and maximized the students time at the camps.
17. **Evening hangout.** For the camps which were overnight camps the importance of a common area for students to congregate after camp hours was highly important. The interviewees sighted this as a time when students worked together on course issues, planned for team activities and generally networked with each other. In nearly all cases where this space was not available pre-camp, during the camp there was a push to make it available.
18. **Ethics panel.** Nearly every interviewee mentioned the success of the ethics panel and the student's satisfaction with that particular element of the week. However, many interviewees noted the ethics panel should be given more time, particularly because of the positive student reaction to the activity. Students in many of the camps enjoyed speaking directly with law enforcement in a safe environment, which provided an opportunity to ask questions about activities which fall into the 'gray area'.
19. **Surveys.** In general, the feedback on the survey collection was positive. However, some interviewees noted that it was particularly important to ask students to take surveys daily and not wait until the end of the week to have them all completed. Furthermore, there were some concerns about the repetitive nature of some of the data in the surveys, particularly for students that completed the surveys on a daily basis.
20. **Poster session.** The CA camp suggested the possibility of a poster session or other venue for students to highlight their work and activities.
21. **Name tags.** One interviewee who attended multiple camps noted that coordination activities as simple as providing all TAs, instructions and students with name tags improved the interaction of camp participants significantly.
22. **CPE.** A number of interviewees mentioned the potential value in certifying the camps as Continuing Professional Education credits for varying certifications in the field. This would add another layer of benefit to participants of the camps.
23. **Capture The Flag (CTF).** All the interviewees discussed the CTF portion of the event and how their particular setup worked. Feedback regarding CTF has been included in the CTF Data Collection Analysis document.

## 4.2 2011 Capture the Flag (CTF) Summary

In previous USCC summer camps, Capture the Flag (CTF) environments were built with support of various sponsors which while successful were deemed not to be a scalable CTF

environment. As a result, USCC explored the question 'which virtual environment should be used for the "Capture the Flag (CTF)" for the camps? And what should be the partnership(s) for the future?" Appendix D, "2011 CTF Data Collection Analysis," outlines the technical environments tested in the camps and survey results from the summer camp hosts regarding the technical aspects of each solution.

**4.2.1 Common Interview Findings.** Across all the interviews a number of common themes were captured regarding the 2011 Cyber Camps CTF implementations. The list below explains each of these common elements. Listed numerically for ease of reference, but they are not in a particular order.

1. **Infrastructure.** One of the most common comments from interviewees was the need to ensure the hosting facility had the necessary infrastructure to support the camp and the CTF. This includes power outlets for computers, access points and bandwidth for internet connections, as well as system software, operating systems and patches to support the tools being used. Development of a baseline infrastructure requirement checklist would be beneficial for hosts to evaluate their space.
2. **Host and TA familiarity the CTF tool, scenario, and setup.** Most interviewees noted some correlation between the level of the CTF events success and the preparedness of those helping to host the event. Those who had representatives from the tool's team noted significant benefit in executing the event.
3. **CTF preparation time.** It was suggested that the CTF setup team needs adequate time to setup the hardware/ environment, install necessary software as well as test key elements of the configuration with enough time to troubleshoot if any problems arise. Conducting setup the morning of the CTF event may not provide enough troubleshooting time, and it was suggested the CTF be held in a different space from the camp to allow the team to setup the day before the CTF event.
4. **CTF tool documentation.** Many of the interviewees felt there was a lack of adequate, in-depth documentation on the usage, implementation, execution, and configuration of the various CTF tools.
5. **On-site expertise.** A number of the interviewees also expressed some concern about the use of a virtual solution without an on-site subject matter expert to assist in facilitating and troubleshooting the event and tool. Having that on-site resource would help to ensure any technical and connectivity issues were quickly resolved, but would also help in assuring the CTF environment and scenario are correctly setup and relayed to participants.
6. **CTF debrief.** It was recommended that following the CTF event, participants be given the opportunity to debrief regarding the setup, exploits, processes and activities that were included in the scenario. This would help participants understand what elements of the CTF scenario/ setup they may have missed or not fully leveraged. Moreover, providing a time for campers to discuss with each other the techniques they used in the scenario would assist in the networking aspect of the camp.
7. **Physical environment configuration**. It was noted that the physical setup of the room for hosting the CTF may have had an impact on maximizing the benefit of the event. Specifically, those who hosted in the CTF in an auditorium may have had difficulty provided participants with privacy and team space to execute the competition. Those who

offered smaller tables noted that CTF teams were able to work together effectively with some privacy.

8. **CTF logistics.** Interviewees discussed a number of logistical challenges with the CTF. From physical space for CTF equipment to power resources to bandwidth, to physical workspace for participants to sit the logistics of the event presented most camps with some form of complication.
9. **CTF prize.** It was mentioned that some of the camp/ CTF participants were not students or were not at a stage in their academic career where a scholarship was the most effective prize for the CTF event. It was suggested that in addition or in lieu of a scholarship other equally valuable awards, such as professional group memberships, be considered.

## 5.0 CONCLUSIONS

The success of this effort and the assessment framework is dependent on the continual flow of data from user participation. Although there is likely a small population with an innate interest in continued participation over time, long-term analysis benefits from the 'pathway' model of incremental steps to include activities, education, achievement, and ultimately a benefit, which is the continual achievement and success yielding a payout or benefit to the participating individual. The following are specific conclusions resulting from year's specifically involving the research period. Additionally, the USCC has conducted the high school competitions titled, "Cyber Foundations." The results of the first year competitions were included in the quarterly status reports for this research effort.

### 5.1 Next Steps for Cyber Camps 2012

From the pilot camps in 2010 to the 2011 camps, a number of significant improvements were implemented as reflected in both the survey data and interviews. Additionally, the maturing of the camps facilitates better and more extensive feedback to continually refine the camps.

Based on the analysis, interviews and general findings there are a number of recommendations for considerations during the 2012 Cyber Camps.

Listed numerically for ease of reference, but they are not in particular order.

1. Develop a camp host application outlining the responsibilities of the host, the facility and logistic requirements as well as the expectations for host participation.
2. Develop a comprehensive set of instruction manuals and sample materials for hosts, instructors and TAs to ensure all the roles and responsibilities as well as behavior exceptions and expected outcomes.
3. Deploy an online capability to facilitate the administration of camps, registration of participants, coordination of activities, delivery of materials and continuation of relationships through a virtual community.
4. Leverage the online capability, develop a more streamlined feedback and survey mechanism for capturing participant experiences

### 5.2 Next Steps for the CTF for Cyber Camps 2012

The use of a CTF exercise at the conclusion of the Cyber Camp is an important component of each camp as it provides participants with real world, hands on experience in the

field of cyber security. CTF events help take classroom content and put it into practice. While the intent of this report was the evaluation of CTF technical environments, the limited findings resulted in some common CTF issues that going forward USCC will consider resolving as it will increase the overall CTF experience and effectiveness.

### 5.2.1 Common CTF Issues.

1. **Identifying a common CTF philosophy**. Across the CTF exercises there are two general philosophies that have been taken. The first philosophy is to use the CTF exercise as a concluding assessment or exam of the participant's absorption of the week's material. In this approach the CTF focused specifically on the activities, techniques and material taught throughout the week and served as a test of the week's materials. The second philosophy is to develop a CTF exercise that incorporated the elements taught throughout the week, but also provided the ability for students go further and apply skills and techniques they may have learned elsewhere. This approach pushed students beyond the course and the week's materials. Identifying a consistent USCC approach would help better define CTF objectives and help standardize the event across camps.
2. **Develop a CTF infrastructure requirements checklist**. Each of the various setups and tools had its own requirements for infrastructure (power, bandwidth, physical space, operating system, etc.). Having a checklist for each tool would allow hosts to better assess which tools would best operate in their camps physical environment.
3. **CTF documentation and capability assessment**. Each of the various tools had varying levels of documentation and preparation support. Working with vendors to ensure host are provided with enough pre-event instruction and with enough documentation to fully understanding the tool would ensure the CTF event runs smoothly and effectively and that any issues that arose could be effectively remediated.
4. **Debrief and prizes**. Providing a post-CTF debrief to explain the scenario, the applicable exploits, techniques that could have been used and areas participants overlooked would help provide participants with a better understanding of the event. Furthermore, considering alternative prizes for CTF winners might help in incentivizing participants who are not in the position to pursue additional education.

In summary, there are two key data points to highlight:

- For student vetting, "Simply identifying students who were likely to engage increased the overall value of the experience." This statement illustrates the use of competitions such as the on-line competitions of Cyber Quests for the 18 years and older participants and the Cyber Foundations for the high school participants are reaching the targeted population and addressing the short-term objectives of identify, engage and challenge.
- For better data and data quality for the assessment framework, "some interviewees noted that it was particularly important to ask students to take the surveys daily and not wait until the end of the week to have them all completed." Additionally, the questions included in the surveys will need to be further evaluated to ensure they are a measurement of the quality of the experience.

The USCC will continue to use the social media capabilities and other communications capabilities as well the resources of the Center for Internet Security to include the Multi-State

ISAC community to increase the overall numbers of participations while working with other competitions to broaden the information and data for the assessment framework.

## 6.0 REFERENCES


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# US Cyber Challenge (USCC)
# Assessment Framework Methodology (AFM)
# Appendix A: Assessment Techniques

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The table below provides a brief overview of the types of activities taking place within each time horizon at each assessment period.

| | Short-Term | Mid-Term | Long-Term |
|---|---|---|---|
| **Pre-Event** | In the short-term, pre-event data collection will only occur using previously established registration processes for each event | In the mid-term, the assessment framework calls for working with events to incorporate the baseline data elements for each participant into the existing registration process. | Long term, the USCC participant platform will provide a consolidated platform for event registration, user data collection and a roaming profile of user information and activity. |
| **In-Event** | In the short-term, in-event data collection will only occur using previously established processes for each event, if such a collection mechanism already exists for that event. | In the mid-term in-event data collection will only occur using previously established processes for each event. This may be supplemented by capabilities incorporated into the basic toolkit provided by USCC. | Long-term, a collection of tools and technologies will be provided by the USCC participant platform to aid in the real time collection of data during events. These tools will assist events in collecting data and participant feedback as it happens to hone in on specific components of events that need improvement. |
| **Post-Event** | In the short-term, the assessment framework calls for working with specific events to coordinate and baseline the questions and data being collected about participant satisfaction and future plans with respect to the event. This will be supplemented by the use of an existing third-party data collection and analysis platform. | In the mid-term, post-event data collection will include tools and technologies provided by USCC tool kits for the collection, compilation and analysis of participant feedback. This will allow for basic event outcome analysis and provide feedback to event coordinators. In the mid-term this may also be supplemented by the use of an existing third-party data collection and analysis platform. | Long-term, the USCC participant platform will provide the capability to automate post-event follow up at varying intervals (3, 6, 9 months after) to provide persistent monitoring of participants. Further, this platform will assist in conducting analysis of a variety of events across USCC purview. |

The following sections layout some of the specific objectives, questions, data, methodologies, technologies utilized within each time horizon.

# Short-Term Assessment Methodology

The objectives of the assessment framework in the short-term are geared toward identifying the key data elements, deriving assessment baselines and establishing the processes by which data will be collected over the mid- and long-terms. The table below provides an overview of the key objectives, data and collection methods for each of the overarching focus areas in the short-term.

| | Pre-Event | In-Event | Post-Event |
|---|---|---|---|
| Assessment Objectives (Metrics) | • % of new users attending USCC events (as a percent of total participants)<br>• % of returning users attending USCC events (as a percent of total participants)<br>• # of High Schools participating in USCC activities (including institution information)<br>• # of Universities participating in USCC activities (including institution information)<br>• # of women attending USCC events<br>• # of minorities attending USCC events<br>• Geographical information on participants | • | • % of monthly unique visitors to the USCC website (unique hits versus total hits)<br>• % of monthly repeat visitors to the USCC website (repeat hits as percent of total)<br>• % of users downloading free web tutorials<br>• % of users using toolkits<br>• # of users participating in USCC web games<br>• # of users participating in 'in-person' competition |
| Questions to be Answered | • Are individuals engaging USCC and related cyber security events?<br>• What types of individuals are engaging these events? | • What forms of in-event data collection are non-intrusive yet effective? | • What capabilities/ tools are participants using?<br>• What are the capabilities and requirements for inclusion as a USCC recognized system, activity, initiative? |
| Data Elements | • Number of Registrants<br>• Number of Participants<br>• Participant Gender<br>• Participant Ethnicity<br>• Participant Age<br>• Participant GPA/ Education<br>• Participant Career Interests<br>• Participant Proficiencies<br>• Participant Extracurricular activities<br>o Clubs, Sports, etc | • | • Tool, feature and usage analysis |

| | | | |
|---|---|---|---|
| **Collection Methods** | • Demographics surveys | • Rudy's Survey<br>• Galen's Test Group | • |
| **Success Metrics** | • Development of baseline demographic participation metrics | • | • (immediate post-event assessments) |
| **Technologies (Toolkit)** | • Registration forms<br>• Participant profiles<br>o Ex: Facebook, Twitter | • | • SurveyMonkey |

In the short term, some of the pre-event data may only be collectable in post-event surveys.

# Mid-Term Assessment Methodology

The objectives of the assessment framework in the mid-term are geared toward developing the feedback loop to implement and assess improvements to the process. Moreover, the mid-term is the transition point to develop a more robust infrastructure for data collection, user management and the development of a cyber security social network. The mid-term effort is collectively a transition and honing period to establish the in-house infrastructure to support this effort's long term objectives as well as to refine the baseline, questions and assessment mechanisms. The table below provides an overview of the key objectives, data and collection methods for each of the areas in the mid-term.

| | **Pre-Event** | **In-Event** | **Post-Event** |
|---|---|---|---|
| Assessment Objectives (Metrics) | • Participant goals<br>• Participant evaluation of the event quality | • Likert-scale ratings of task absorption<br>• Likert-scale ratings of perceived task utility<br>• Participant engagement assessment | • |
| Questions to be Answered | • What are participant expectations for the event?<br>• What are participant expectations regarding the rigor, reputation and value of the event? | • How engaged are participants during the event<br>• | • Did the event meet or exceed participant expectations?<br>• Do participants utilize and continue to leverage USCC provided toolkits, systems, infrastructure, etc? |
| Data Elements | • | • | • |
| **Collection Methods** | • | • Rudy's Survey<br>• Galen's Test Group<br>• USCC Participant Platform | • Automated periodic surveys<br>• Automated periodic knowledge assessments (test or games) |
| **Success Metrics** | • Participant pre-event perception of events (marketing and outreach feedback) | • | • Baseline of post-event usage and retention (~3 month post-event assessment) |
| **Technologies (Toolkit)** | • | • | • |

# Long-Term Assessment Methodology

The objectives of the assessment framework in the long-term are geared toward the deployment of sponsored collection platforms, continual refinement of data collection and analysis, participant tracking,

| | Pre-Event | In-Event | Post-Event |
|---|---|---|---|
| Assessment Objectives (Metrics) | • | • Participant in-event material comprehension<br>• Participant in-event, real-time feedback | • % of participants engaged in future activities |
| Questions to be Answered | • What is the participant's assessment of the events reputation and quality? | • Do participants understand the material?<br>• Is the level of the material challenging and appropriate? | • Are participants retaining knowledge and skills acquired at each event?<br>• Do participants engage in other USCC or similar cyber security events?<br>• Do participants pursue careers in cyber security fields? |
| Data Elements | • Participant's history with USCC and similar cyber security events<br>• Participant's maximum time investment | • | • |
| **Collection Methods** | • | • | • Automated periodic surveys<br>• Automated periodic knowledge assessments (test or games)<br>• Periodic participant interviews |
| **Success Metrics** | • Understanding of participant expectations based on background and experience<br>• Baseline for assessing event marketing and research | • | • Baseline of post-event usage and retention (3, 6, 12 month post-event assessments) |
| **Technologies (Toolkit)** | • | • | • |


# US Cyber Challenge (USCC)
# Assessment Framework Methodology (AFM)
# Appendix B: Assessment Database Structure

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# *Short-Term*

In the short-term phase of the of USCC assessment methodology, USCC will utilize an online survey and data management platform, SurveyMonkey (www.surveymonkey.com), to conduct post-event surveys and data collection. Using this platform USCC will be able to inform the objectives and collect the data elements called out in the Assessment Framework Methodology including those in Appendix A.

***2011 Participant Survey Question Outline***

1. Participant Information
   - 1.1. What is your first and last name? [**required,* free form text field]
   - 1.2. What is your email address? [**required,* free form text field w/ email format validation]
2. Instructor & Event Evaluation
   - 2.1. What USCC event did you attend? [**required,* drop down menu w/ other option]
     - 2.1.1. Course/ event list specific to each USCC event
   - 2.2. Is this your first USCC event? [yes/ no selection]
   - 2.3. Where did you first hear about this event? [drop down menu w/ other option]
     - 2.3.1. Email/ Newsletter
     - 2.3.2. Facebook
     - 2.3.3. Family or Friend
     - 2.3.4. Magazine Article
     - 2.3.5. Newspaper Story
     - 2.3.6. Professor
     - 2.3.7. TV News
     - 2.3.8. Twitter
     - 2.3.9. University Publication
     - 2.3.10. Website/ Search Engine
     - 2.3.11. YouTube
   - 2.4. On a scale of 1-10, what is your overall evaluation of this course/ event? [drop down menu]
     - 2.4.1. 1, Bad
     - 2.4.2. 2,
     - 2.4.3. 3, Poor
     - 2.4.4. 4,
     - 2.4.5. 5, Marginal
     - 2.4.6. 6,
     - 2.4.7. 7, Good
     - 2.4.8. 8,
     - 2.4.9. 9, Great
     - 2.4.10. 10, Excellent
   - 2.5. On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill? [drop down menu]
     - 2.5.1. 1, Bad
     - 2.5.2. 2,
     - 2.5.3. 3, Poor
     - 2.5.4. 4,
     - 2.5.5. 5, Marginal
     - 2.5.6. 6,

2.5.7.7, Good
2.5.8.8,
2.5.9.9, Great
2.5.10. 10, Excellent

2.6. On a scale of 1-10, what is your overall evaluation of the value of the course content? [drop down menu]
2.6.1.1, Bad
2.6.2.2,
2.6.3.3, Poor
2.6.4.4,
2.6.5.5, Marginal
2.6.6.6,
2.6.7.7, Good
2.6.8.8,
2.6.9.9, Great
2.6.10. 10, Excellent

2.7. What encouraged you to participate in this event? [free form memo field]

3. Participant Demographics
3.1. What is your age? [free form text field w/ numeric format validation]
3.2. What is your gender? [male/ female selection]
3.3. What is your primary city of residence? [free form text field]
3.4. What is your primary state of residence? [drop down menu of US States]
3.5. Which best describes your ethnicity? [drop down menu]
3.5.1. American Indian or Alaska Native
3.5.2. Asian
3.5.3. Black or African American
3.5.4. Hispanic or Latino
3.5.5. Native Hawaiian or Other Pacific Islander
3.5.6. White

4. Education Information
4.1. Which option best describes your current level of education? [drop down menu]
4.1.1. Currently in pre-High School
4.1.2. Currently in High School
4.1.3. Completed High School
4.1.4. Currently in Undergrad Program
4.1.5. Completed Undergrad Program
4.1.6. Currently in Graduate Program
4.1.7. Completed Graduate Program
4.1.8. Currently in Doctoral Program
4.1.9. Completed Doctoral Program
4.2. What is the name of your current academic institution? (high school, university, college, etc) [free form text field]
4.3. What is your current grade point average (on a 4.0 scale)? (if unknown, please approximate) [free form text field w/ numeric format validation]
4.4. What is your current major or primary area of study? (if applicable) [free form text field]
4.5. What do you consider to be your two greatest academic strength areas? (e.g., math, science, computers, English, art, etc) [free form memo field]

4.6. What types of extracurricular activities, if any, are you currently engaged in? (e.g., soccer, chess club, student government, computer club, etc) [free form memo field]

5. Cyber Security Proficiency
   5.1. Have you ever had formal training/ coursework on cyber security topics? [yes/ no selection]
   5.2. On a scale of 1-10, what is your level of familiarity/ comfort with the field of cyber security? [drop down menu]
      5.2.1.1, No Familiarity
      5.2.2.2
      5.2.3.3, Novice
      5.2.4.4
      5.2.5.5, Basic Familiarity
      5.2.6.6
      5.2.7.7, Proficient
      5.2.8.8
      5.2.9.9, Highly Proficient
      5.2.10. 10, Expert
   5.3. If you have a background in cyber security, what areas of cyber security do you consider yourself most proficient in? (e.g., system administration, programming, forensics, system penetration, etc.) [free form memo field]
6. Competition/ Event History
   6.1. Where did you first hear about the USCC organization? [drop down menu w/ other option]
      6.1.1.Email/ Newsletter
      6.1.2.Facebook
      6.1.3.Family or Friend
      6.1.4.Magazine Article
      6.1.5.Newspaper Story
      6.1.6.Professor
      6.1.7.TV News
      6.1.8.Twitter
      6.1.9.University Publication
      6.1.10. Website/ Search Engine
      6.1.11. YouTube
   6.2. Have you engaged in cyber/ security activities, events, or competitions in the past? [yes/ no selection]
   6.3. If you have engaged in similar events in the past, briefly list these previous events and activities. [free form memo field]
7. Professional Interests
   7.1. What is your desired/ planned career field? [free form text field]
   7.2. Have you previously considered a career in cyber security? [yes/ no selection]
   7.3. On a scale of 1-5, after your participation in this event is what is the likelihood you will to explore cyber security as a career path? [drop down menu]
      7.3.1.1, Not At All
      7.3.2.2, Unlikely
      7.3.3.3, Likely
      7.3.4.4, Very Likely
      7.3.5.5, Certainly

8. Closing
   8.1. If you have any additional comments or feedback, please provide it here. [free form memo field]

***2011 CTF Survey Question Outline***

1. Event Setup
   1.1. Was the vendor helpful in explaining the set up for this event? [yes/ no selection w/ detail memo field option]
   1.2. On a scale of 1-5, how would you rate the quality of the technical documentation provided by the vendor? [drop down menu w/ detail memo field option]
      1.2.1.1, Inadequate
      1.2.2.2, Poor
      1.2.3.3, Acceptable
      1.2.4.4, Good
      1.2.5.5, Excellent
   1.3. Did the competition appear to provide the technical challenge for the class? [yes/ no selection w/ detail memo field option]
   1.4. Do you feel the technical set up was easy to achieve? [yes/ no selection]
   1.5. Did the technical performance meet your expectations? [yes/ no selection]
2. Evaluation
   2.1. On a scale of 1-10, what is your overall evaluation of this course/ event? [drop down menu]
      2.1.1.1, Bad
      2.1.2.2,
      2.1.3.3, Poor
      2.1.4.4,
      2.1.5.5, Marginal
      2.1.6.6,
      2.1.7.7, Good
      2.1.8.8,
      2.1.9.9, Great
      2.1.10. 10, Excellent
   2.2. On a scale of 1-10, what is your evaluation of the scoreboard display? [drop down menu]
      2.2.1.1, Bad
      2.2.2.2,
      2.2.3.3, Poor
      2.2.4.4,
      2.2.5.5, Marginal
      2.2.6.6,
      2.2.7.7, Good
      2.2.8.8,
      2.2.9.9, Great
      2.2.10. 10, Excellent
   2.3. On a scale of 1-10, what is your evaluation of the network display for the TAs? [drop down menu]
      2.3.1.1, Bad
      2.3.2.2,
      2.3.3.3, Poor
      2.3.4.4,

2.3.5.5, Marginal
2.3.6.6,
2.3.7.7, Good
2.3.8.8,
2.3.9.9, Great
2.3.10. 10, Excellent

2.4. On a scale of 1-10, what is your evaluation of the ease of use for the technical solution? [drop down menu]
2.4.1.1, Bad
2.4.2.2,
2.4.3.3, Poor
2.4.4.4,
2.4.5.5, Marginal
2.4.6.6,
2.4.7.7, Good
2.4.8.8,
2.4.9.9, Great
2.4.10. 10, Excellent

3. Event Assessment
   3.1. Would you use this solution for your upcoming activities? [free form memo field]
   3.2. What are the strengths of this competition? [free form memo field]
   3.3. What are the areas for improvements for this event/ competition? [free form memo field]
   3.4. Would you recommend this event/ competition to your peers? [yes/ no selection]
4. Closing
   4.1. If you have any additional comments or feedback, please provide it here. [free form memo field]

***Survey Data Structure***

Data collected via the SurveyMonkey tool, for both the participant survey and the CTF survey, is maintained in raw data format as provided by SurveyMonkey. The data headers for these data sets are explained below.

*Note; Raw data is provided by SurveyMonkey in both .csv and .xls formats for easy use and ingest into database and statistics tools. SurveyMonkey also provides a data summary which provides a quick graphical view of the collected data. This summary report has also included in both .html and .pdf formats.*

***2011 Participant Survey Data Structure***

1. *RespondentID*, numeric, this is a unique identifier for each survey completion automatically generated by SurveyMonkey for each completed survey.
2. *CollectorID*, numeric, collectors are a feature of SurveyMonkey which facilitate the completion of the same survey though different entry points. This feature is not applicable to the 2011 camp data and each camp data set should have the same CollectorID.
3. *StartDate*, date time, represents the date the participant began taking the survey.
4. *EndDate*, date time, represents the date the participant completed taking the survey.
5. *IP Address*, text, represents the computer address from which a participant completed the survey.
6. *Email Address*, text, this is a standard SurveyMonkey field which is not used in this survey. Participant email information is collected in 11 below.

7. *First Name*, text, this is a standard SurveyMonkey field which is not used in this survey. First name information is collected in 10 below.
8. *LastName*, text, this is a standard SurveyMonkey field which is not used in this survey. Last name information is collected in 10 below.
9. *Custom Data*, text,
10. *What is your first and last name?*, text, is the provided, combined first and last name of the participant who completed the survey.
11. *What is your email address?*, text, is the provided email address of the participant who completed the survey.

The remainder of the data headings in this data set map directly to the questions outlined in *2011 Participant Survey Question Outline* above. All fields except GPA and age, both numerics, are collected as text.

***2011 CTF Survey Data Structure***

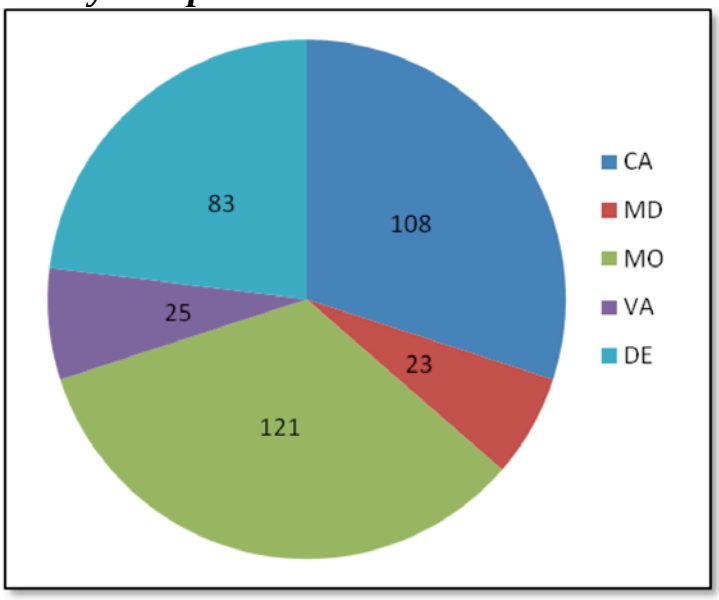
12. *RespondentID*, numeric, this is a unique identifier for each survey completion automatically generated by SurveyMonkey for each completed survey.
13. *CollectorID*, numeric, collectors are a feature of SurveyMonkey which facilitate the completion of the same survey though different entry points. This feature is not applicable to the 2011 camp data and each camp data set should have the same CollectorID.
14. *StartDate*, date time, represents the date the participant began taking the survey.
15. *EndDate*, date time, represents the date the participant completed taking the survey.
16. *IP Address*, text, represents the computer address from which a participant completed the survey.
17. *Email Address*, text, this is a standard SurveyMonkey field which is not used in this survey. Participant email information is collected in
18. *First Name*, text,
19. *LastName*, text,
20. *Custom Data*, text,

The remainder of the data headings in this data set map directly to the questions outlined in *2011 CTF Survey Question Outline* above. All fields are collected as text.

# *2011 Sample Analysis*

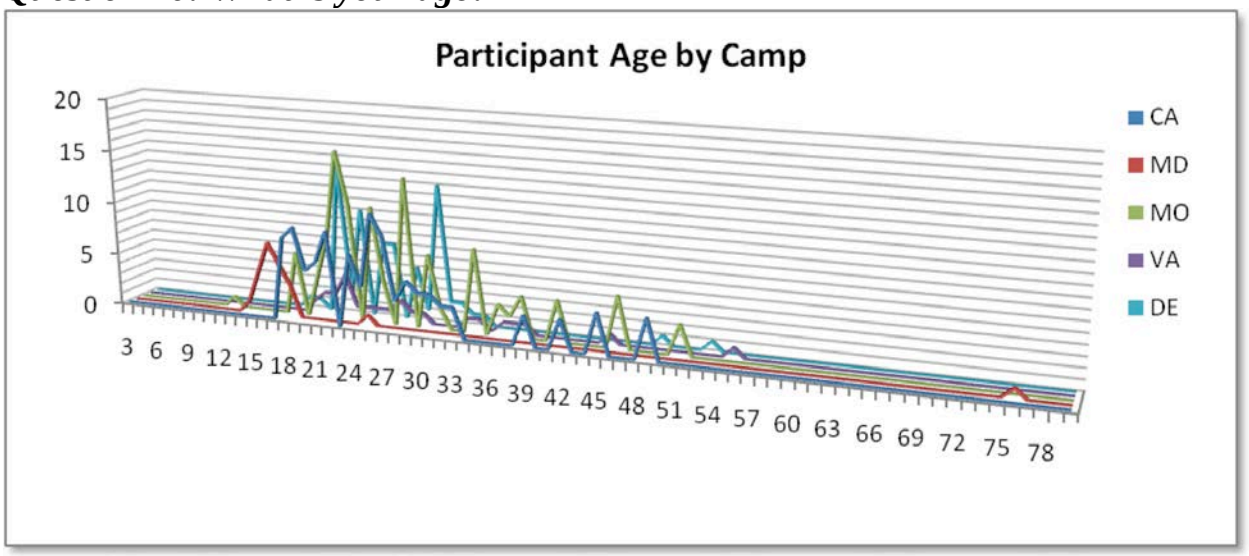
Utilizing the short-term collection methodology the summer 2011 camps, USCC was able to collect 360 survey results records. The data in these records, as outlined above, allows USCC to conduct analysis on camp participant demographics, background, professional interests and camp experiences. This analysis will conclude with the *2011 Competition Data Collection Analysis*. Below is a brief sample of the data collected and the actual analysis completed as part of the summary report.

## *Summary: Total Survey Completions*



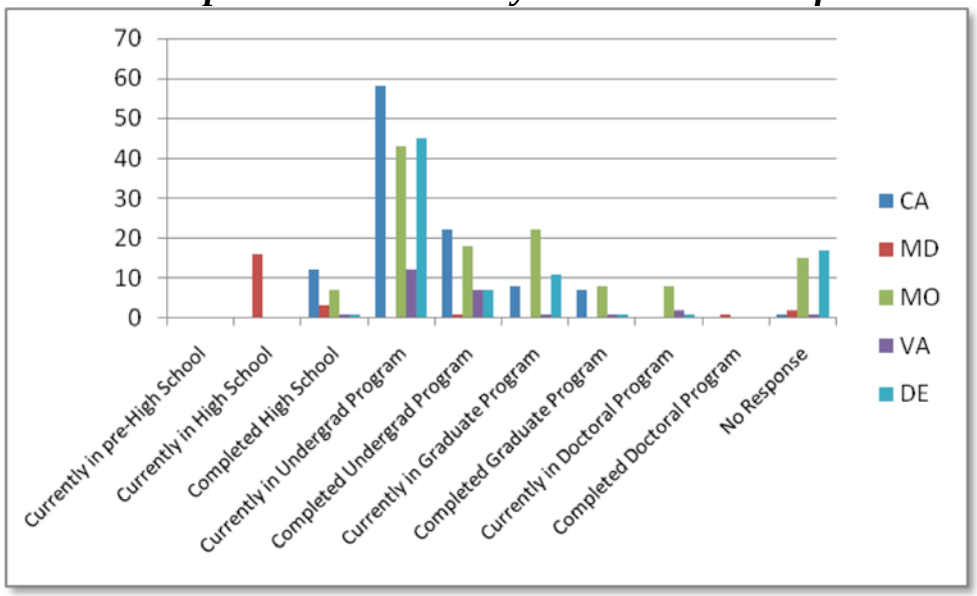

| | CA | MD | MO | VA | DE | TOT |
|---|---|---|---|---|---|---|
| **Number** | 108 | 23 | 121 | 25 | 83 | 360 |
| **Percent** | 30.0% | 6.4% | 33.6% | 6.9% | 23.1% | 100% |

## *Question 10: What is your age?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Less than 15** | 0 | 1 | 1 | 0 | 0 | 2 | 0.56% |
| **15** | 0 | 4 | 0 | 0 | 0 | 4 | 1.11% |
| **16** | 0 | 7 | 0 | 0 | 0 | 7 | 1.94% |
| **17** | 0 | 5 | 0 | 0 | 0 | 5 | 1.39% |
| **18** | 8 | 3 | 6 | 0 | 1 | 18 | 5.00% |
| **19** | 9 | 0 | 0 | 1 | 1 | 11 | 3.06% |
| **20** | 5 | 0 | 4 | 2 | 0 | 11 | 3.06% |
| **21** | 6 | 0 | 8 | 2 | 14 | 30 | 8.33% |
| **22** | 9 | 0 | 16 | 4 | 2 | 31 | 8.61% |
| **23** | 0 | 0 | 11 | 1 | 10 | 22 | 6.11% |
| **24** | 7 | 0 | 0 | 1 | 0 | 8 | 2.22% |
| **25** | 4 | 1 | 11 | 1 | 7 | 24 | 6.67% |
| **26** | 11 | 0 | 4 | 1 | 7 | 23 | 6.39% |
| **27** | 9 | 0 | 0 | 2 | 0 | 11 | 3.06% |
| **28** | 3 | 0 | 14 | 1 | 5 | 23 | 6.39% |
| **29** | 5 | 0 | 0 | 1 | 1 | 7 | 1.94% |
| **30** | 4 | 0 | 7 | 0 | 13 | 24 | 6.67% |
| **31** | 4 | 0 | 2 | 0 | 2 | 8 | 2.22% |
| **32** | 3 | 0 | 0 | 0 | 2 | 5 | 1.39% |
| **33** | 3 | 0 | 0 | 1 | 1 | 5 | 1.39% |
| **34** | 0 | 0 | 8 | 1 | 1 | 10 | 2.78% |
| **35** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **36** | 0 | 0 | 3 | 1 | 0 | 4 | 1.11% |
| **37** | 0 | 0 | 2 | 1 | 0 | 3 | 0.83% |
| **38** | 0 | 0 | 4 | 1 | 0 | 5 | 1.39% |
| **39** | 3 | 0 | 0 | 0 | 0 | 3 | 0.83% |
| **40** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **Greater than 40** | 11 | 1 | 12 | 2 | 2 | 28 | 7.78% |
| **No Response** | 4 | 1 | 8 | 1 | 14 | 28 | 7.78% |

## *Question 15: Which option best describes your current level of education?*



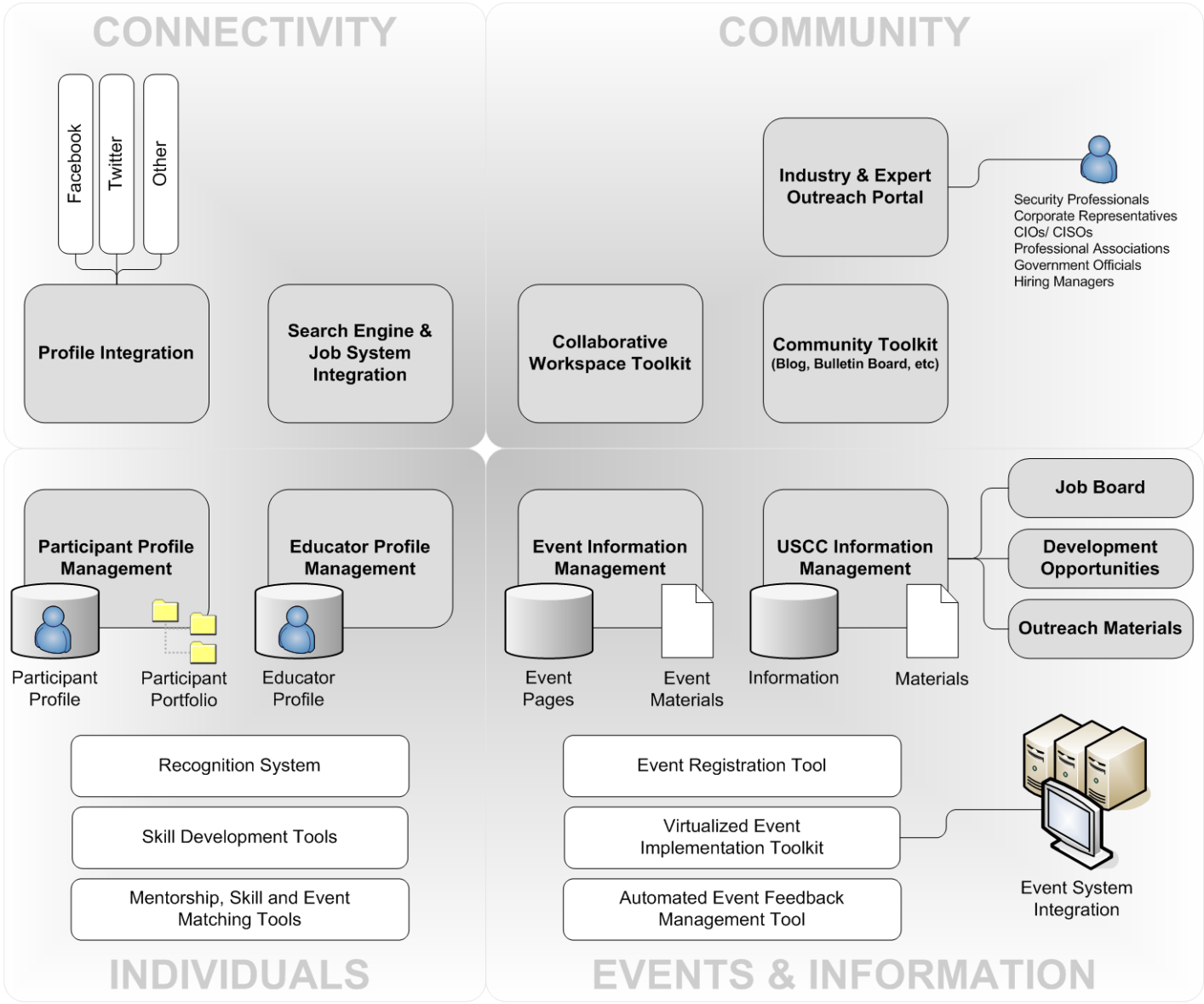

| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Currently in pre-High School** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **Currently in High School** | 0 | 16 | 0 | 0 | 0 | 16 | 6.15% |
| **Completed High School** | 12 | 3 | 7 | 1 | 1 | 24 | 9.23% |
| **Currently in Undergrad Program** | 58 | 0 | 43 | 12 | 45 | 158 | 60.77% |
| **Completed Undergrad Program** | 22 | 1 | 18 | 7 | 7 | 55 | 21.15% |
| **Currently in Graduate Program** | 8 | 0 | 22 | 1 | 11 | 42 | 16.15% |
| **Completed Graduate Program** | 7 | 0 | 8 | 1 | 1 | 17 | 6.54% |
| **Currently in Doctoral Program** | 0 | 0 | 8 | 2 | 1 | 11 | 4.23% |
| **Completed Doctoral Program** | 0 | 1 | 0 | 0 | 0 | 1 | 0.38% |

# *Long-Term Database Structure*

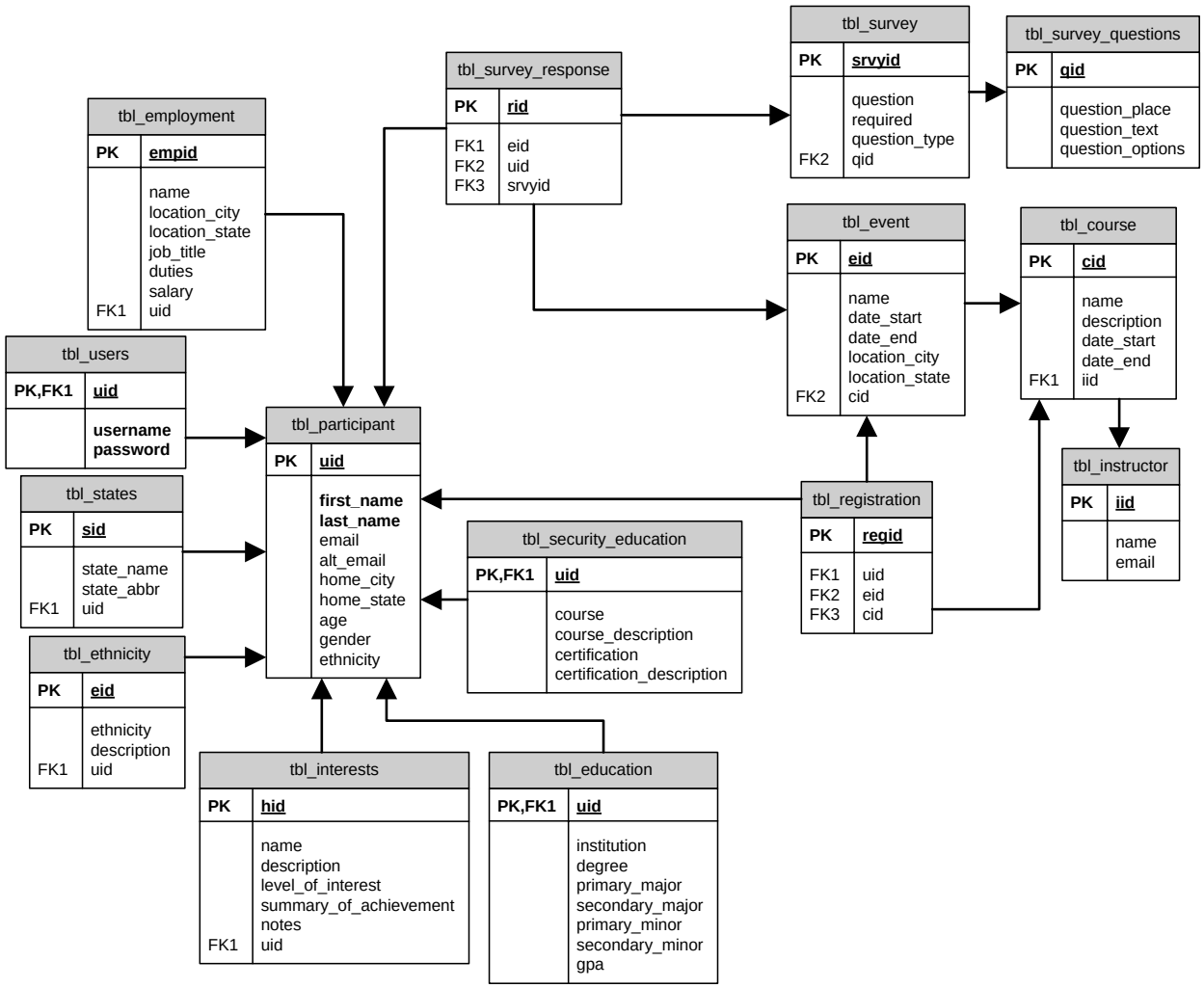
Transitioning through the mid-term and into the long-term USCC will develop a more sophisticated participant management platform to maintain participant profiles, event registration data, competition performance metric, and feedback data among other key elements. The USCC participant portal objectives include;

1. Establishment of a virtual community workspace for USCC participants to encourage continued engagement and allow participants to develop a virtual portfolio of work.
2. Development of a 'roaming' profile to allow participants to track their involvement and engagements in the USCC community. Utilizing the profile information, the platform will be able to recommend events to attend or skill areas participants should work to develop as well as match participants with potential mentors.
3. Establishment of a consistent participant management toolkit for hosting events and supporting user registration. Organizers can create pages for their competitions and administrate their events through the participant portal, allowing seamless interaction with participant profiles and portal information.
4. Consolidation of USCC materials such as event descriptions, course outlines, educator profiles, event pages, recognition systems (badges, titles, achievements, etc), job postings, skill development activities, and other USCC information.
5. Establishment of an integrated feedback mechanism which will collect participant data throughout the time horizons of each event. This component will help track participants into the professional world and provide critical feedback data to USCC.
6. Integration with external systems such as Facebook, Twitter and competition specific systems to allow participants to easily access and update their profiles.

These goals will be achieved by developing a system which includes the general elements outlined in the diagram below.


CONNECTIVITY
COMMUNITY
Facebook
Twitter
Other
Industry & Expert Outreach Portal
Security Professionals
Corporate Representatives
CIOs/ CISOs
Professional Associations
Government Officials
Hiring Managers
Profile Integration
Search Engine & Job System Integration
Collaborative Workspace Toolkit
Community Toolkit (Blog, Bulletin Board, etc)
Participant Profile Management
Educator Profile Management
Event Information Management
USCC Information Management
Job Board
Development Opportunities
Outreach Materials
Participant Profile
Participant Portfolio
Educator Profile
Event Pages
Event Materials
Information
Materials
Recognition System
Skill Development Tools
Mentorship, Skill and Event Matching Tools
Event Registration Tool
Virtualized Event Implementation Toolkit
Automated Event Feedback Management Tool
Event System Integration
INDIVIDUALS
EVENTS & INFORMATION

Underlying the participant management platform will be a database which encompasses the data elements from the short-term as well as accommodates data from the capabilities added to the system during the mid and long-term phases. Below is a representative diagram illustrating the core data structure which will contain the short-term data and provide the basis for the participant management platform's database into the mid and long-terms phases.




# US Cyber Challenge (USCC)
# 2011 Competition Data Collection Analysis
# Appendix C

*www.uscyberchallenge.org*


Version 1.0
13 Oct 2011

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# Table of Contents

# *Survey Structures*

## *2011 Survey Structures*

In 2011 two surveys were used to collect the necessary feedback from participants and hosts. The first, *2011 Participant Survey*, was given to individuals who participated in the event. The second, *2011 CTF Survey*, was given to administrators who participated in the administration of the Capture the Flag component of each camp.

## *2011 Participant Survey Structure*

**9. Participant Information**

9.1. What is your first and last name? [**required,* free form text field]

9.2. What is your email address? [**required,* free form text field w/ email format validation]

**10. Instructor & Event Evaluation**

10.1. What USCC event did you attend? [**required,* drop down menu w/ other option]

10.1.1. Course/ event list specific to each USCC event

10.2. Is this your first USCC event? [yes/ no selection]

10.3. Where did you first hear about this event? [drop down menu w/ other option]

10.3.1. Email/ Newsletter
10.3.2. Facebook
10.3.3. Family or Friend
10.3.4. Magazine Article
10.3.5. Newspaper Story
10.3.6. Professor
10.3.7. TV News
10.3.8. Twitter
10.3.9. University Publication
10.3.10. Website/ Search Engine
10.3.11. YouTube

10.4. On a scale of 1-10, what is your overall evaluation of this course/ event? [drop down menu]

10.4.1. 1, Bad
10.4.2. 2,
10.4.3. 3, Poor
10.4.4. 4,
10.4.5. 5, Marginal
10.4.6. 6,
10.4.7. 7, Good
10.4.8. 8,
10.4.9. 9, Great
10.4.10. 10, Excellent

10.5. On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill? [drop down menu]

10.5.1. 1, Bad
10.5.2. 2,
10.5.3. 3, Poor
10.5.4. 4,

10.5.5. 5, Marginal
10.5.6. 6,
10.5.7. 7, Good
10.5.8. 8,
10.5.9. 9, Great
10.5.10.10, Excellent

10.6. On a scale of 1-10, what is your overall evaluation of the value of the course content? [drop down menu]
10.6.1. 1, Bad
10.6.2. 2,
10.6.3. 3, Poor
10.6.4. 4,
10.6.5. 5, Marginal
10.6.6. 6,
10.6.7. 7, Good
10.6.8. 8,
10.6.9. 9, Great
10.6.10.10, Excellent

10.7. What encouraged you to participate in this event? [free form memo field]

**11. Participant Demographics**

11.1. What is your age? [free form text field w/ numeric format validation]
11.2. What is your gender? [male/ female selection]
11.3. What is your primary city of residence? [free form text field]
11.4. What is your primary state of residence? [drop down menu of US States]
11.5. Which best describes your ethnicity? [drop down menu]
11.5.1. American Indian or Alaska Native
11.5.2. Asian
11.5.3. Black or African American
11.5.4. Hispanic or Latino
11.5.5. Native Hawaiian or Other Pacific Islander
11.5.6. White

**12. Education Information**

12.1. Which option best describes your current level of education? [drop down menu]
12.1.1. Currently in pre-High School
12.1.2. Currently in High School
12.1.3. Completed High School
12.1.4. Currently in Undergrad Program
12.1.5. Completed Undergrad Program
12.1.6. Currently in Graduate Program
12.1.7. Completed Graduate Program
12.1.8. Currently in Doctoral Program
12.1.9. Completed Doctoral Program

12.2. What is the name of your current academic institution? (high school, university, college, etc.) [free form text field]
12.3. What is your current grade point average (on a 4.0 scale)? (if unknown, please approximate) [free form text field w/ numeric format validation]

12.4. What is your current major or primary area of study? (if applicable) [free form text field]
12.5. What do you consider to be your two greatest academic strength areas? (e.g., math, science, computers, English, art, etc.) [free form memo field]
12.6. What types of extracurricular activities, if any, are you currently engaged in? (e.g., soccer, chess club, student government, computer club, etc.) [free form memo field]

**13. Cyber Security Proficiency**

13.1. Have you ever had formal training/ coursework on cyber security topics? [yes/ no selection]
13.2. On a scale of 1-10, what is your level of familiarity/ comfort with the field of cyber security? [drop down menu]
13.2.1. 1, No Familiarity
13.2.2. 2
13.2.3. 3, Novice
13.2.4. 4
13.2.5. 5, Basic Familiarity
13.2.6. 6
13.2.7. 7, Proficient
13.2.8. 8
13.2.9. 9, Highly Proficient
13.2.10. 10, Expert
13.3. If you have a background in cyber security, what areas of cyber security do you consider yourself most proficient in? (e.g., system administration, programming, forensics, system penetration, etc.) [free form memo field]

**14. Competition/ Event History**

14.1. Where did you first hear about the USCC organization? [drop down menu w/ other option]
14.1.1. Email/ Newsletter
14.1.2. Facebook
14.1.3. Family or Friend
14.1.4. Magazine Article
14.1.5. Newspaper Story
14.1.6. Professor
14.1.7. TV News
14.1.8. Twitter
14.1.9. University Publication
14.1.10. Website/ Search Engine
14.1.11. YouTube
14.2. Have you engaged in cyber/ security activities, events, or competitions in the past? [yes/ no selection]
14.3. If you have engaged in similar events in the past, briefly list these previous events and activities. [free form memo field]

**15. Professional Interests**

15.1. What is your desired/ planned career field? [free form text field]
15.2. Have you previously considered a career in cyber security? [yes/ no selection]
15.3. On a scale of 1-5, after your participation in this event is what is the likelihood you will to explore cyber security as a career path? [drop down menu]
15.3.1. 1, Not At All
15.3.2. 2, Unlikely

15.3.3. 3, Likely
15.3.4. 4, Very Likely
15.3.5. 5, Certainly

**16. Closing**

16.1. If you have any additional comments or feedback, please provide it here. [free form memo field]

Each day of each camp used a new instance of the same electronic survey for collection which was differentiated by the course selected in 2.1 above. The table below provides an overview of the day specific survey options for the 2011 camps. The 2011 camps included;

- California State Polytechnic University, Ponoma (California) Camp from July 11 to July 15, 2011
- Community College of Baltimore County, Essex (Maryland) Camp from July 11 to July 15, 2011
- University of Missouri, Columbia (Missouri) Camp from July 25 to July 29, 2011
- J. Sargeant Reynolds Community College, Richmond (Virginia) Camp from August 1 to August 5, 2011
- Delaware Technical and Community College, Dover (Delaware) Camp from August 8 to August 12, 2010

| Location | Day | Date | Course | Instructor |
|---|---|---|---|---|
| California | One | August 11 | Web Application Penetration Testing | Kevin Johnson |
| California | Two | August 12 | System Hardening & Detection | Frank DiMaggio |
| California | Three | August 13 | Forensics | Mike Murr |
| California | Four | August 14 | Reverse Engineering Malware | Hal Pomeranz |
| California | Five | August 15 | Capture the Flag | |
| Maryland | | | Operating Systems | |
| Maryland | | | System Administration | |
| Maryland | | | Networking | |
| Maryland | | | Programming | |
| Maryland | | | Site Visit | |
| Maryland | Five | July 15 | Cyber Defense Exercise | |
| Missouri | One | July 25 | Web Application Penetration Testing | Justin Searle |
| Missouri | Two | July 26 | System Hardening & Detection | Justin Searle |
| Missouri | Three | July 27 | Packet Crafting with Scapy | Troy Jordan |
| Missouri | Four | July 28 | Wireless & Bluetooth Security | John Paul Dunning |
| Missouri | Five | July 29 | Capture the Flag | |
| Virginia | One | August 1 | Packet Crafting with Scapy | Judy Novak |
| Virginia | Two | August 2 | Wireless & Bluetooth Security | John Paul Dunning |
| Virginia | Three | August 3 | Forensics | Mike Murr |
| Virginia | Four | August 4 | Reverse Engineering Malware | Hal Pomeranz |
| Virginia | Five | August 5 | Capture the Flag | |
| Delaware | One | August 8 | General Penetration Testing | Eric Arnoth |
| Delaware | Two | August 9 | Web Application Penetration Testing | Justin Searle |
| Delaware | Three | August 10 | System Hardening & Detection | Justin Searle |
| Delaware | Four | August 11 | Forensics | Mike Murr |
| Delaware | Five | August 12 | Capture the Flag | |

## *2011 CTF Survey Structure*

**1. Event Setup**

1.1. Was the vendor helpful in explaining the set up for this event? [yes/ no selection w/ detail memo field option]

1.2. On a scale of 1-5, how would you rate the quality of the technical documentation provided by the vendor? [drop down menu w/ detail memo field option]

1.2.1.1, Inadequate
1.2.2.2, Poor
1.2.3.3, Acceptable
1.2.4.4, Good
1.2.5.5, Excellent

1.3. Did the competition appear to provide the technical challenge for the class? [yes/ no selection w/ detail memo field option]

1.4. Do you feel the technical set up was easy to achieve? [yes/ no selection]

1.5. Did the technical performance meet your expectations? [yes/ no selection]

**2. Evaluation**

2.1. On a scale of 1-10, what is your overall evaluation of this course/ event? [drop down menu]

2.1.1.1, Bad
2.1.2.2,
2.1.3.3, Poor
2.1.4.4,
2.1.5.5, Marginal
2.1.6.6,
2.1.7.7, Good
2.1.8.8,
2.1.9.9, Great
2.1.10. 10, Excellent

2.2. On a scale of 1-10, what is your evaluation of the scoreboard display? [drop down menu]

2.2.1.1, Bad
2.2.2.2,
2.2.3.3, Poor
2.2.4.4,
2.2.5.5, Marginal
2.2.6.6,
2.2.7.7, Good
2.2.8.8,
2.2.9.9, Great
2.2.10. 10, Excellent

2.3. On a scale of 1-10, what is your evaluation of the network display for the TAs? [drop down menu]

2.3.1.1, Bad
2.3.2.2,
2.3.3.3, Poor
2.3.4.4,
2.3.5.5, Marginal
2.3.6.6,

2.3.7.7, Good
2.3.8.8,
2.3.9.9, Great
2.3.10. 10, Excellent

2.4. On a scale of 1-10, what is your evaluation of the ease of use for the technical solution? [drop down menu]
2.4.1.1, Bad
2.4.2.2,
2.4.3.3, Poor
2.4.4.4,
2.4.5.5, Marginal
2.4.6.6,
2.4.7.7, Good
2.4.8.8,
2.4.9.9, Great
2.4.10. 10, Excellent

**3. Event Assessment**

3.1. Would you use this solution for your upcoming activities? [free form memo field]
3.2. What are the strengths of this competition? [free form memo field]
3.3. What are the areas for improvements for this event/ competition? [free form memo field]
3.4. Would you recommend this event/ competition to your peers? [yes/ no selection]

**4. Closing**

4.1. If you have any additional comments or feedback, please provide it here. [free form memo field]

## *2010 Pilot Survey Structures*

In 2010 the pilot camps utilized hardcopy surveys specific to each day of the camp to collect the necessary feedback from participants.

## *2010 Pilot Camp Survey Structure*

**1. Feedback**

1.1. Overall Course Evaluation [numeric scale, single selection]
1.1.1.Scale 1 – 10, 1 poor and 10 excellent
1.2. [*Teachers Name*] Teaching Skill [numeric scale, single selection]
1.2.1.Scale 1 – 10, 1 poor and 10 excellent
1.3. Value of Course Content [numeric scale, single selection]
1.3.1.Scale 1 – 10, 1 poor and 10 excellent
1.4. If you liked the course and wouldn't mind sharing your comments with others who might consider taking this course in the future, please write a sentence about why you feel this course was valuable. [free form essay field]
1.5. What specific recommendations would you offer to make this course more valuable to you? [free form essay field]
1.6. Name [free form text field]
1.7. College [free form text field]

Each day of each camp had a separate hardcopy survey for collection which varied only in the Teacher's Name used in 1.2 above. The table below provides an overview of the day specific survey information for the 2010 camps. The 2010 camps included;

- California State Polytechnic University, Ponoma (California) Camp from July 19 to July 23, 2010
- Polytechnic Institute of NYU (New York) Camp from July 26 to July 29, 2010
- Wilmington University (Delaware) Camp from August 9 to August 12, 2010

| Location | Day | Date | Course | Instructor |
|---|---|---|---|---|
| California | One | July 19 | Developing Exploits for Penetration Testers and Security | Stephen Sims |
| California | Two | July 20 | Linux/ Unix Security | Hal Pomeranz |
| California | Three | July 21 | Incident Handling/ Hacking Techniques | James Shewmaker |
| California | Four | July 22 | Forensic Intensive | Mike Murr |
| New York | One | July 26 | Reverse Engineering Malware: Malware Analysis and Techniques | Lenny Zeltser |
| New York | Two | July 27 | Windows Forensics | Rob Lee |
| New York | Three | July 28 | Incident Handling/ Hacking Techniques | Dr Johannes Ullrich |
| New York | Four | July 29 | Power Packet Crafting with Scapy | Judy Novak |
| Delaware | One | August 9 | Windows Forensics | Rob Lee |
| Delaware | Two | August 10 | Incident Handling/ Hacking Techniques | Marcus Sachs |
| Delaware | Three | August 11 | Network Penetration Testing and Ethical Hacking | Ed Skoudis |
| Delaware | Four | August 12 | Power Packet Crafting with Scapy | Judy Novak |

# Comprehensive 2011 Participant Survey Results Analysis

## *Data Preparation*

The data from each camp was collected separately via camp specific SurveyMonkey surveys, managed in Excel format, and reviewed for completeness and accuracy. Records in the data which had any of the following errors or inconsistencies were removed from the dataset prior to analysis.

1. Out of scope start date or end date. Surveys taken significantly prior to or significantly after the camp were discarded.
2. Invalid data. Surveys with unrealistic names, invalid email format or filled with garbage data (e.g., all fields with 'ddddd') were discarded.
3. Incomplete surveys. Surveys in which the participant only answered name and email questions, or less, but did not answer any of the material survey questions were discarded.

In the majority of cases, removed records had more than one of the above data quality and/ or completeness issues and in some cases the removed surveys were clearly test runs or partial completions by camp staff and administrators.

Below is a summary of the records removed prior to analysis.

1. CA Camp Records Removed (1 Total Record Removed)
   1.1. Respondent ID: 1481534734 removed due to incompleteness.
2. MD Camp Records Removed (1 Total Record Removed)
   2.1. Respondent ID: 1479603532 removed due to invalid name and email.
3. MO Camp Records Removed (3 Total Records Removed)
   3.1. Respondent ID: 1496098208 removed due to incompleteness.
   3.2. Respondent ID: 1494073843 removed due to incompleteness.
   3.3. Respondent ID: 1493653669 removed due to incompleteness.
4. VA Camp Records Removed (6 Total Records Removed)
   4.1. Respondent ID: 1499000816 removed due to out of scope start date.
   4.2. Respondent ID: 1509326291 removed due to incompleteness.
   4.3. Respondent ID: 1502520927 removed due to incompleteness.
   4.4. Respondent ID: 1502151801 removed due to invalid name and email.
   4.5. Respondent ID: 1502275647 removed due to incompleteness.
   4.6. Respondent ID: 1502153554 removed due to incompleteness.
5. DE Camp Records Removed (2 Total Records Removed)
   5.1. Respondent ID: 1509976005 removed due to out of scope start date.
   5.2. Respondent ID: 1513799112 removed due to incompleteness.

Following the removal of the above records, the remaining data was divided into three separate data sets for each camp. These data sets included course specific questions, individual participant specific questions and questions not conducive to analysis.

The first data set contained responses to questions specific to the courses within the camp. This data was separated out by camp and then further divided out by specific day of the camp. These responses provide insight into the specific instructors, courses and curriculum for each day of the camps. This first data set included responses for the following questions;

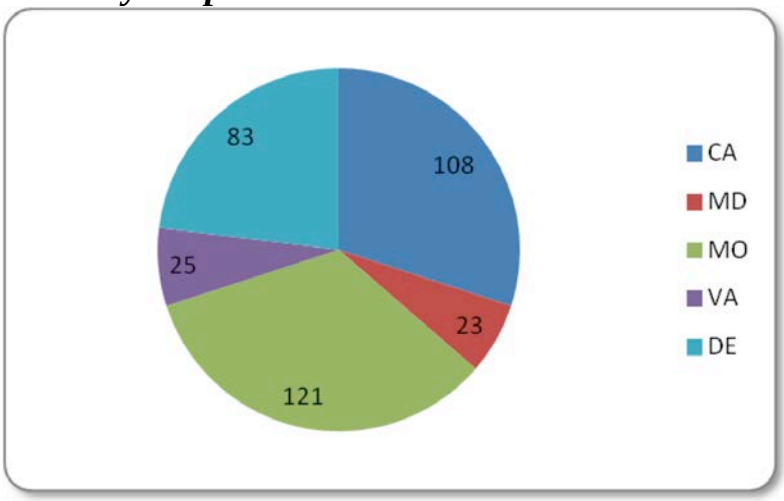
- Question 3: What USCC event did you attend?
- Question 6: On a scale of 1-10, what is your overall evaluation of this course/ event?
- Question 7: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?
- Question 8: On a scale of 1-10, what is your overall evaluation of the value of the course content?

The second data set included the questions to which responses could not effectively be analyzed or summarized. These responses were not conducive to significant analysis and are not included in this document.

- Question 1: What is your first and last name?
- Question 2: What is your email address?
- Question 12: What is your primary city of residence?
- Question 20: What types of extracurricular activities, if any, are you currently engaged in? (e.g., soccer, chess club, student government, computer club, etc.)
- Question 30: If you have any additional comments or feedback, please provide it here.

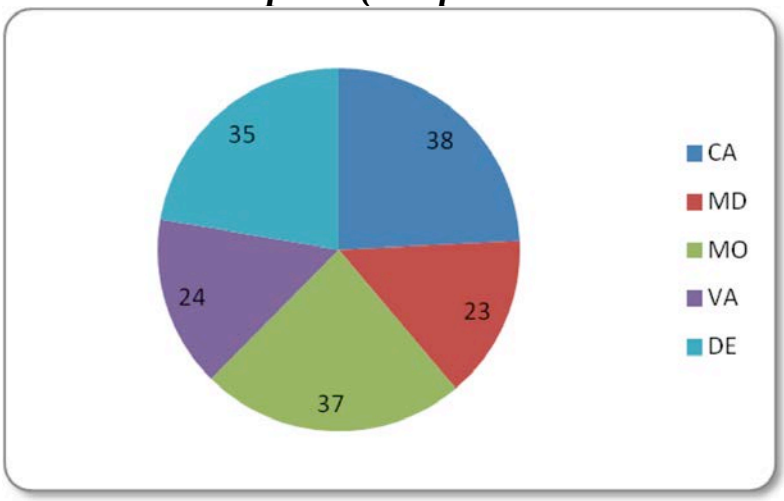
The final data set included responses which provided insight on the individual participant. This included all the questions not in the above two data sets. The data for this data set was filtered to ensure each participant was counted only one time. Specifically, many participants completed multiple instances of the survey, one for each day of the camp. For example, if a participant completed five instances of the CA survey, one for each day of the camp, then all five responses would be included in the first data set to reflect the specific responses for each individual course/ day of the camp. However, those records (identified by a name and/ or email match) would be consolidated into a single record for the remaining analysis in this final data set. This consolidation of records for analysis in this final data set ensures numbers are not artificially inflated in the analysis of these questions. For example, without consolidation but accounting for participants completing multiple instances of the survey for multiple days, the analysis results could show 82 male responses and 36 female responses for a camp which only had 30 total participants. For discrepancies in data provided by individuals across multiple responses, e.g., different age entries with the same name and/ or email, the first response provided (as determined by the 'Start Date' field) was used for analysis.

## *Summary: Total Survey Responses*



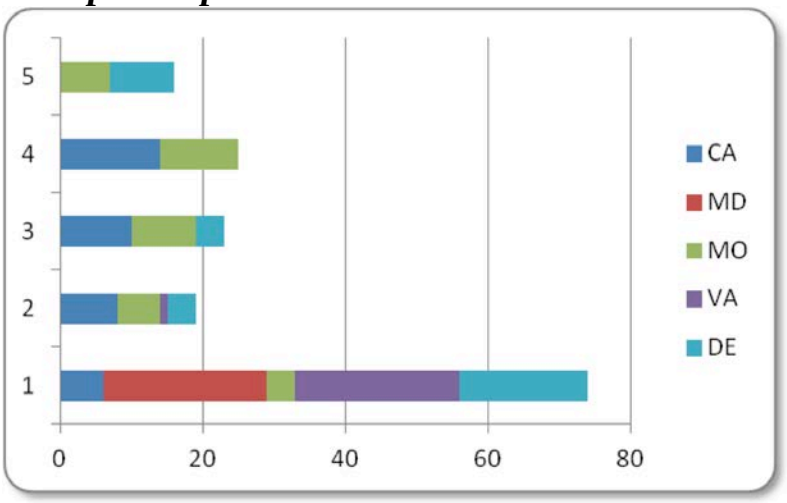

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Number** | 108 | 23 | 121 | 25 | 83 | 360 |
| **Percent** | 30.0% | 6.4% | 33.6% | 6.9% | 23.1% | 100% |

## *Summary: Total Distinct Participants (Unique Name and/ or Email Address)*




| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Number** | 38 | 23 | 37 | 24 | 35 | 157 |
| **Percent** | 24.20% | 14.65% | 23.57% | 15.29% | 22.29% | 100.00% |

## *Summary: Total Responses per Individual*

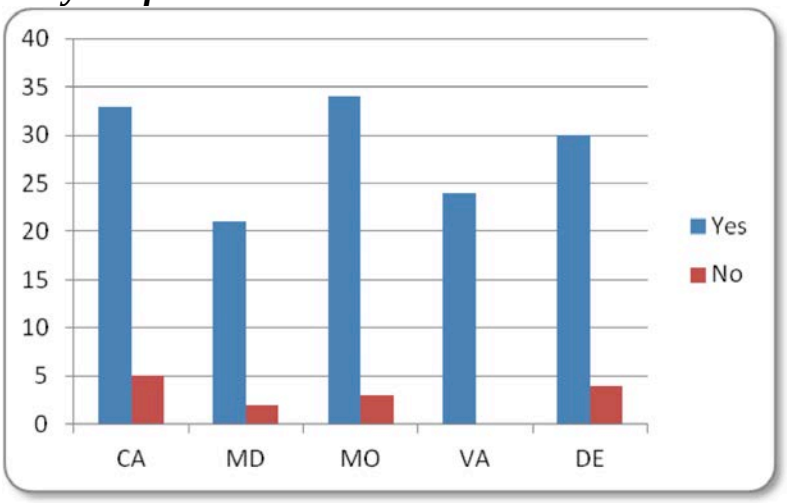



| | CA | MD | MO | VA | DE |
|---|---|---|---|---|---|
| **Completed 1 Survey** | 6 | 23 | 4 | 23 | 18 |
| **Completed 2 Survey** | 8 | 0 | 6 | 1 | 4 |
| **Completed 3 Survey** | 10 | 0 | 9 | 0 | 4 |
| **Completed 4 Survey** | 14 | 0 | 11 | 0 | 0 |
| **Completed 5 Survey** | 0 | 0 | 7 | 0 | 9 |

## *Question 3: What USCC event did you attend?*

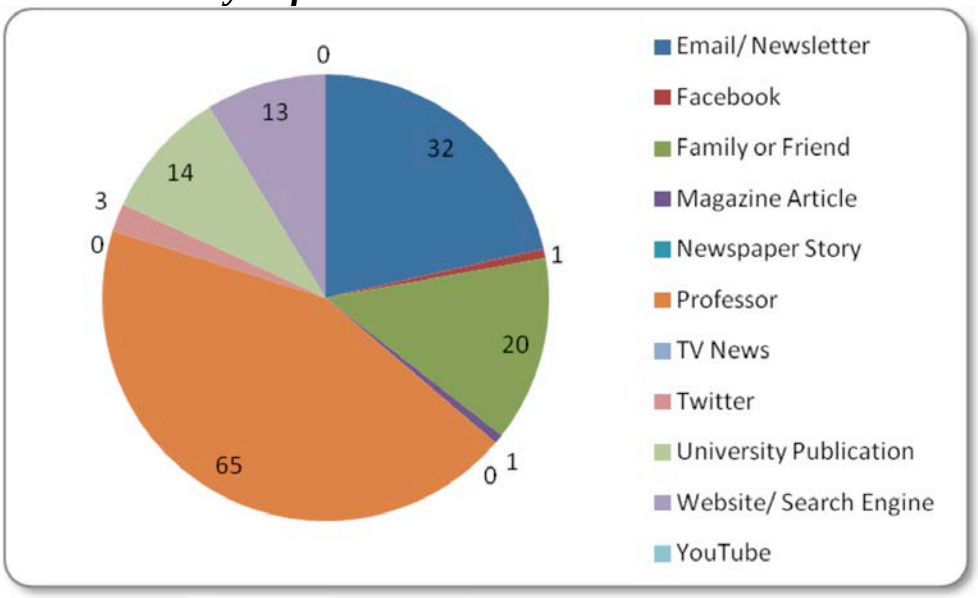
| Camp - Course | Responses | As Percentage of Camp Total | As Percentage of All Responses |
|---|---|---|---|
| CA - Capture the Flag (CTF) | 1 | 0.93% | 0.28% |
| CA - 7/11/2011, Kevin Johnson, WebAppPenTest | 33 | 30.56% | 9.17% |
| CA - 7/12/2011, Frank DiMaggio, SystemHardening & Detection | 27 | 25.00% | 7.50% |
| CA - 7/13/2011, Mike Murr, Forensics | 19 | 17.59% | 5.28% |
| CA - 7/14/2011, Hal Pomeranz, Reverse Engineering Malware | 28 | 25.93% | 7.78% |
| MD - Operating Systems | 4 | 17.39% | 1.11% |
| MD - System Administration | 2 | 8.70% | 0.56% |
| MD - Networking | 3 | 13.04% | 0.83% |
| MD - Programming | 0 | 0.00% | 0.00% |
| MD - Guest speakers | 0 | 0.00% | 0.00% |
| MD - Site visit | 0 | 0.00% | 0.00% |
| MD - Cyber Defense Exercise | 14 | 60.87% | 3.89% |
| MO - 7/25 - Wep App Pen Test - Justin Searle | 32 | 26.45% | 8.89% |
| MO - 7/26 - System Hardening & Detection - Justin Searle | 26 | 21.49% | 7.22% |
| MO - 7/27 - Packet Crafting with Scapy - Troy Jordan | 28 | 23.14% | 7.78% |
| MO - 7/28 - Wireless & Bluetooth Security - John Paul Dunning | 9 | 7.44% | 2.50% |
| MO - 7/29 - Capture the Flag | 26 | 21.49% | 7.22% |
| VA - 8/1 - Packet Crafting with Scapy - Judy Novak | 21 | 84.00% | 5.83% |
| VA - 8/2 - Wireless and Bluetooth Security - John Paul Dunning | 1 | 4.00% | 0.28% |
| VA - 8/3 - Forensics - Mike Murr - also taught at the CA Camp | 3 | 12.00% | 0.83% |
| VA - 8/4 - Reverse Engineering Malware - Hal Pomeranz | 0 | 0.00% | 0.00% |
| DE - Monday - General Penetration Testing - Eric Arnoth | 23 | 27.71% | 6.39% |
| DE - Tuesday - Web App Pen Testing - Justin Searles | 15 | 18.07% | 4.17% |
| DE - Wednesday - System Hardening and Detection - Justin Searles | 9 | 10.84% | 2.50% |
| DE - Thursday - Forensics - Mike Murr | 12 | 14.46% | 3.33% |
| DE - Capture the Flag | 24 | 28.92% | 6.67% |

## *Question 4: Is this your first USCC event?*



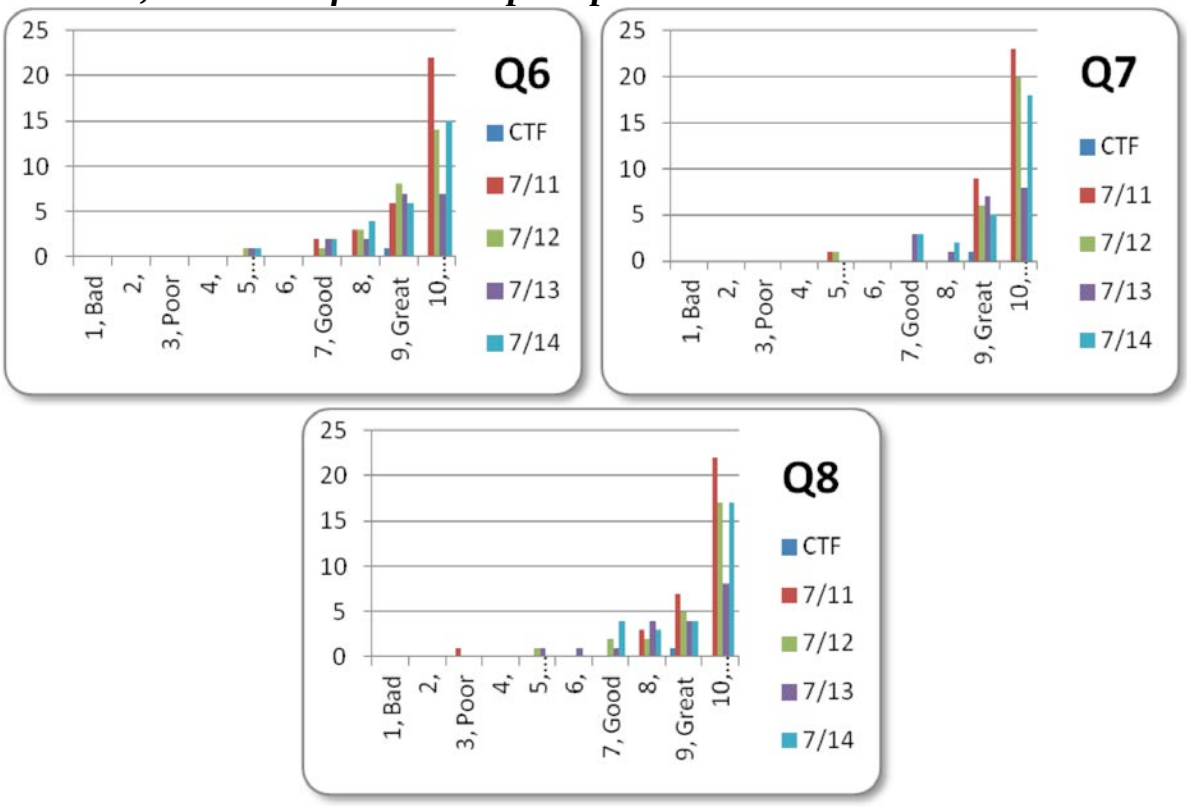

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Yes Responses** | 33 | 21 | 34 | 24 | 30 | 142 |
| **Yes Percentage** | 86.84% | 91.30% | 91.89% | 100.00% | 88.24% | 91.03% |
| **No Responses** | 5 | 2 | 3 | 0 | 4 | 14 |
| **No Percentage** | 13.16% | 8.70% | 8.11% | 0.00% | 11.76% | 8.97% |
| **No (Blank) Response** | 0 | 0 | 0 | 0 | 1 | 1 |

## *Question 5: Where did you first hear about this event?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Email/ Newsletter** | 6 | 2 | 12 | 7 | 5 | 32 | 21.48% |
| **Facebook** | 0 | 1 | 0 | 0 | 0 | 1 | 0.67% |
| **Family or Friend** | 6 | 4 | 3 | 3 | 4 | 20 | 13.42% |
| **Magazine Article** | 0 | 0 | 0 | 1 | 0 | 1 | 0.67% |
| **Newspaper Story** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **Professor** | 22 | 10 | 14 | 2 | 17 | 65 | 43.62% |
| **TV News** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **Twitter** | 0 | 0 | 1 | 2 | 0 | 3 | 2.01% |
| **University Publication** | 1 | 3 | 2 | 1 | 7 | 14 | 9.40% |
| **Website/ Search Engine** | 2 | 1 | 3 | 6 | 1 | 13 | 8.72% |
| **YouTube** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **No Response or Other** | 6 | 2 | 12 | 7 | 5 | 32 | 21.48% |

## *Question 6, 7 & 8: California Camp Responses*




***Question6: On a scale of 1-10, what is your overall evaluation of this course/ event?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CA - Capture the Flag (CTF) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| CA - 7/11/2011, Kevin Johnson, WebAppPenTest | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 6 | 22 | 33 |
| CA - 7/12/2011, Frank DiMaggio, SystemHardening & Detection | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 8 | 14 | 27 |
| CA - 7/13/2011, Mike Murr, Forensics | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 7 | 7 | 19 |
| CA - 7/14/2011, Hal Pomeranz, Reverse Engineering Malware | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 4 | 6 | 15 | 28 |

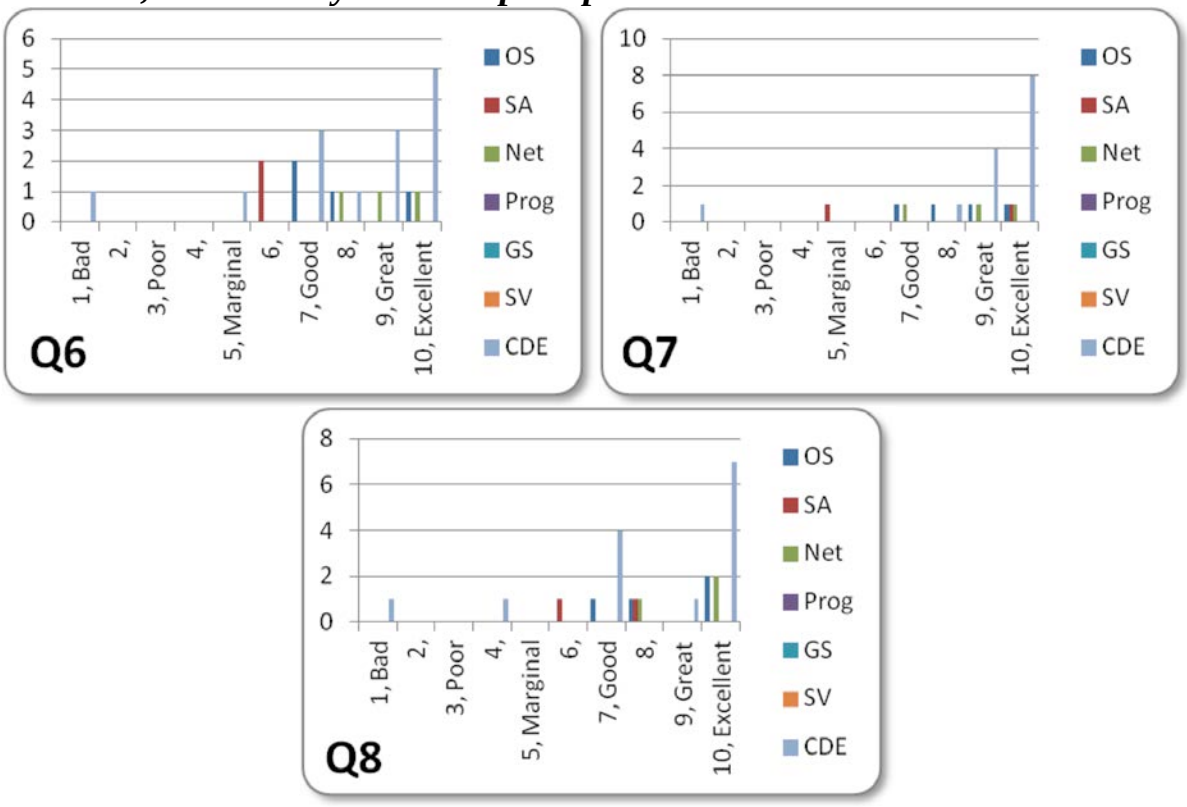
***Question 7: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

| *Camp - Course* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* | *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CA - Capture the Flag (CTF) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| CA - 7/11/2011, Kevin Johnson, WebAppPenTest | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 9 | 23 | 33 |
| CA - 7/12/2011, Frank DiMaggio, SystemHardening & Detection | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 6 | 20 | 27 |
| CA - 7/13/2011, Mike Murr, Forensics | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 7 | 8 | 19 |
| CA - 7/14/2011, Hal Pomeranz, Reverse Engineering Malware | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 5 | 18 | 28 |

***Question8: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CA - Capture the Flag (CTF) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| CA - 7/11/2011, Kevin Johnson, WebAppPenTest | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 7 | 22 | 33 |
| CA - 7/12/2011, Frank DiMaggio, SystemHardening & Detection | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 2 | 5 | 17 | 27 |
| CA - 7/13/2011, Mike Murr, Forensics | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 4 | 4 | 8 | 19 |
| CA - 7/14/2011, Hal Pomeranz, Reverse Engineering Malware | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 4 | 17 | 28 |

## *Question 6, 7 & 8: Maryland Camp Responses*




***Question6: On a scale of 1-10, what is your overall evaluation of this course/ event?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MD - Operating Systems | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 1 | 4 |
| MD - System Administration | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| MD - Networking | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 |
| MD - Programming | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MD - Cyber Defense Exercise | 1 | 0 | 0 | 0 | 1 | 0 | 3 | 1 | 3 | 5 | 14 |

***Question 7: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

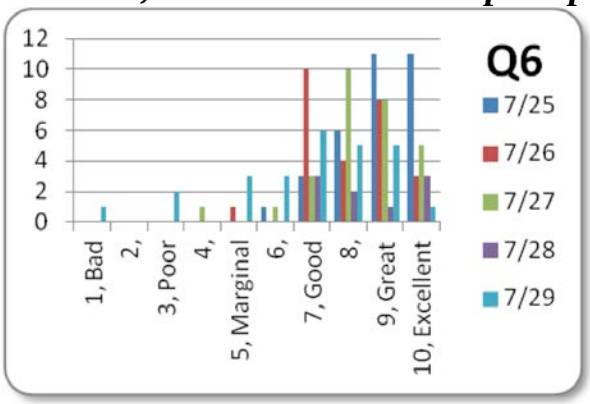
| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MD - Operating Systems | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| MD - System Administration | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| MD - Networking | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 3 |
| MD - Programming | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MD - Cyber Defense Exercise | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 8 | 14 |

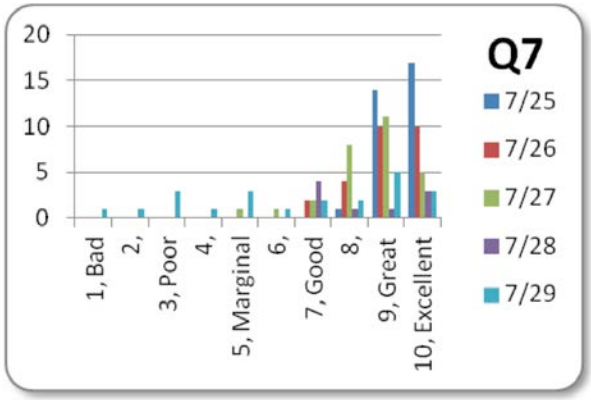
***Question8: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

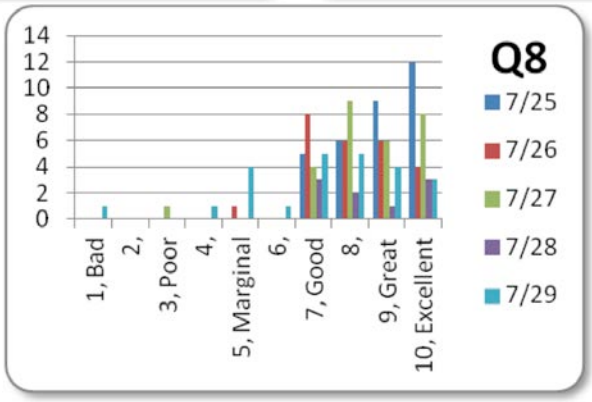
| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MD - Operating Systems | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 4 |
| MD - System Administration | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 2 |
| MD - Networking | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 3 |
| MD - Programming | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MD - Cyber Defense Exercise | 1 | 0 | 0 | 1 | 0 | 0 | 4 | 0 | 1 | 7 | 14 |

**MD – Site Visit and MD – Guest Speaker result rows removed because there was no response.*

## *Question 6, 7 & 8: Missouri Camp Responses*




***Question6: On a scale of 1-10, what is your overall evaluation of this course/ event?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MO - 7/25 - Wep App Pen Test - Justin Searle | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 6 | 11 | 11 | 32 |
| MO - 7/26 - System Hardening & Detection - Justin Searle | 0 | 0 | 0 | 0 | 1 | 0 | 10 | 4 | 8 | 3 | 26 |
| MO - 7/27 - Packet Crafting with Scapy - Troy Jordan | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 10 | 8 | 5 | 28 |
| MO - 7/28 - Wireless & Bluetooth Security - John Paul Dunning | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 3 | 9 |
| MO - 7/29 - Capture the Flag | 1 | 0 | 2 | 0 | 3 | 3 | 6 | 5 | 5 | 1 | 26 |

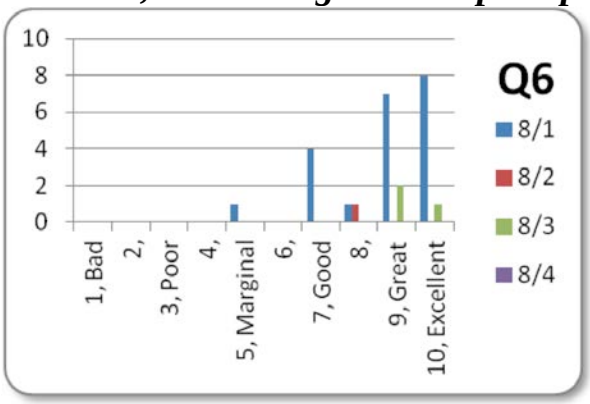
***Question 7: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

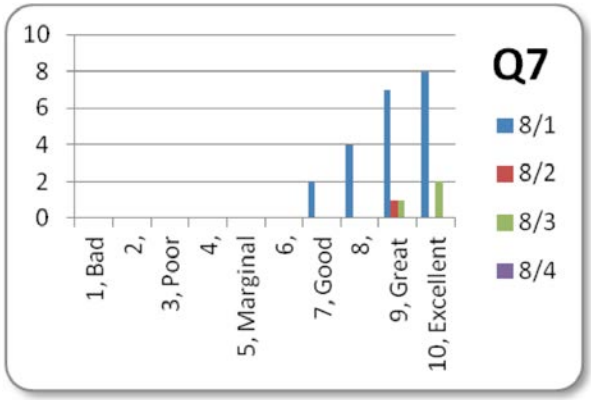
| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MO - 7/25 - Wep App Pen Test - Justin Searle | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 14 | 17 | 32 |
| MO - 7/26 - System Hardening & Detection - Justin Searle | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 10 | 10 | 26 |
| MO - 7/27 - Packet Crafting with Scapy - Troy Jordan | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 8 | 11 | 5 | 28 |
| MO - 7/28 - Wireless & Bluetooth Security - John Paul Dunning | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 1 | 3 | 9 |
| MO - 7/29 - Capture the Flag | 1 | 1 | 3 | 1 | 3 | 1 | 2 | 2 | 5 | 3 | 22 |

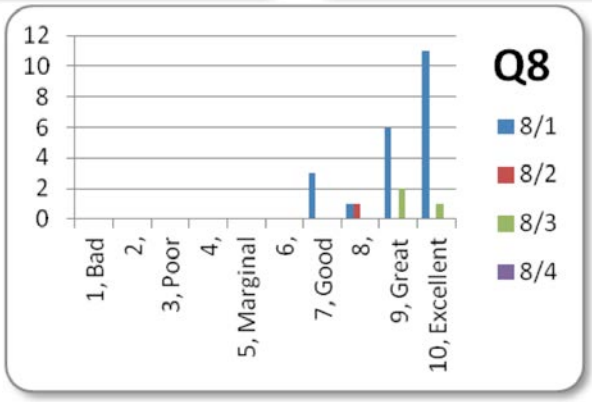
***Question8: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MO - 7/25 - Wep App Pen Test - Justin Searle | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 6 | 9 | 12 | 32 |
| MO - 7/26 - System Hardening & Detection - Justin Searle | 0 | 0 | 0 | 0 | 1 | 0 | 8 | 6 | 6 | 4 | 25 |
| MO - 7/27 - Packet Crafting with Scapy - Troy Jordan | 0 | 0 | 1 | 0 | 0 | 0 | 4 | 9 | 6 | 8 | 28 |
| MO - 7/28 - Wireless & Bluetooth Security - John Paul Dunning | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 3 | 9 |
| MO - 7/29 - Capture the Flag | 1 | 0 | 0 | 1 | 4 | 1 | 5 | 5 | 4 | 3 | 24 |

## *Question 6, 7 & 8: Virginia Camp Responses*




***Question6: On a scale of 1-10, what is your overall evaluation of this course/ event?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VA - 8/1 - Packet Crafting with Scapy - Judy Novak | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 1 | 7 | 8 | 21 |
| VA - 8/2 - Wireless and Bluetooth Security - John Paul Dunning | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| VA - 8/3 - Forensics - Mike Murr - also taught at the CA Camp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 3 |
| VA - 8/4 - Reverse Engineering Malware - Hal Pomeranz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

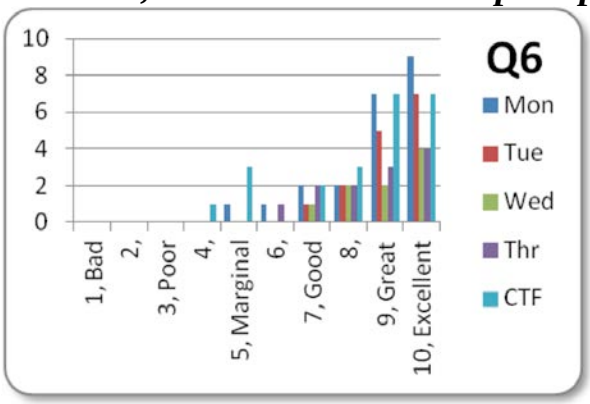
***Question 7: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

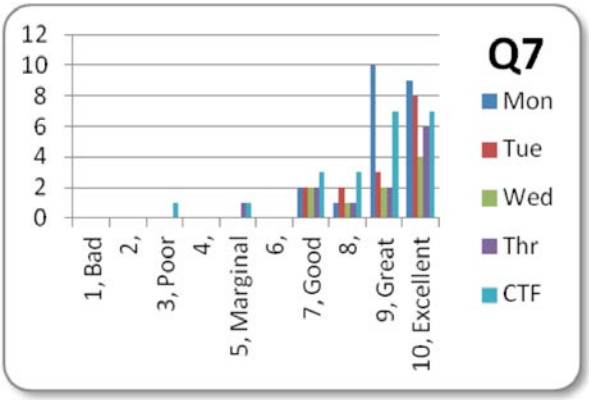
| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VA - 8/1 - Packet Crafting with Scapy - Judy Novak | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 7 | 8 | 21 |
| VA - 8/2 - Wireless and Bluetooth Security - John Paul Dunning | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| VA - 8/3 - Forensics - Mike Murr - also taught at the CA Camp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 3 |
| VA - 8/4 - Reverse Engineering Malware - Hal Pomeranz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

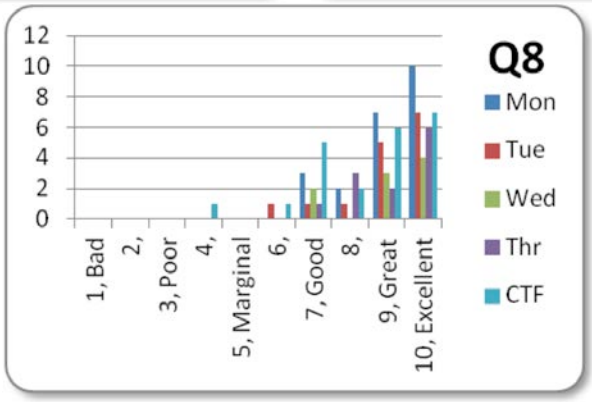
***Question8: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VA - 8/1 - Packet Crafting with Scapy - Judy Novak | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 6 | 11 | 21 |
| VA - 8/2 - Wireless and Bluetooth Security - John Paul Dunning | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| VA - 8/3 - Forensics - Mike Murr - also taught at the CA Camp | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 3 |
| VA - 8/4 - Reverse Engineering Malware - Hal Pomeranz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## *Question 6, 7 & 8: Delaware Camp Responses*




***Question6: On a scale of 1-10, what is your overall evaluation of this course/ event?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DE - Monday - General Penetration Testing - Eric Arnoth | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 2 | 7 | 9 | 22 |
| DE - Tuesday - Web App Pen Testing - Justin Searles | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 5 | 7 | 15 |
| DE - Wednesday - System Hardening and Detection - Justin Searles | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 4 | 9 |
| DE - Thursday - Forensics - Mike Murr | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 3 | 4 | 12 |
| DE - Capture the Flag | 0 | 0 | 0 | 1 | 3 | 0 | 2 | 3 | 7 | 7 | 23 |

***Question 7: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DE - Monday - General Penetration Testing - Eric Arnoth | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 10 | 9 | 22 |
| DE - Tuesday - Web App Pen Testing - Justin Searles | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 3 | 8 | 15 |
| DE - Wednesday - System Hardening and Detection - Justin Searles | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 4 | 9 |
| DE - Thursday - Forensics - Mike Murr | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 1 | 2 | 6 | 12 |
| DE - Capture the Flag | 0 | 0 | 1 | 0 | 1 | 0 | 3 | 3 | 7 | 7 | 22 |

***Question8: On a scale of 1-10, what is your overall evaluation of the instructor's teaching skill?***

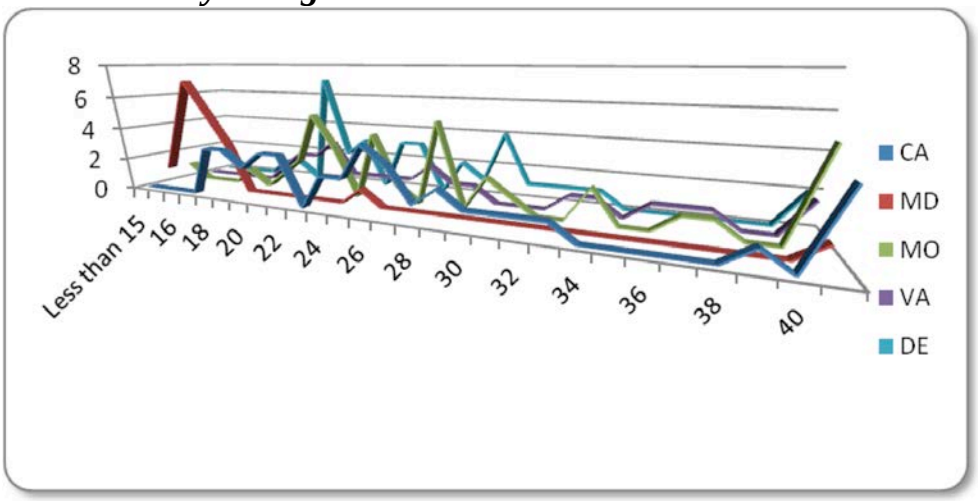
| Camp - Course | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DE - Monday - General Penetration Testing - Eric Arnoth | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 7 | 10 | 22 |
| DE - Tuesday - Web App Pen Testing - Justin Searles | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 5 | 7 | 15 |
| DE - Wednesday - System Hardening and Detection - Justin Searles | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 4 | 9 |
| DE - Thursday - Forensics - Mike Murr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 6 | 12 |
| DE - Capture the Flag | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 2 | 6 | 7 | 22 |

## *Question 9: What encouraged you to participate in this event?*

| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Being invited/ exclusivity** | 0 | 0 | 0 | 1 | 3 | 4 | 2.41% |
| **Camp cost (free)** | 2 | 2 | 5 | 4 | 0 | 13 | 7.83% |
| **Camp location** | 1 | 0 | 0 | 0 | 0 | 1 | 0.60% |
| **Camp, sponsor and organization reputations** | 1 | 0 | 1 | 7 | 2 | 11 | 6.63% |
| **Career opportunities** | 7 | 1 | 3 | 1 | 4 | 16 | 9.64% |
| **Competition preparation/ CTF** | 0 | 1 | 0 | 1 | 2 | 4 | 2.41% |
| **Event coverage and publicity** | 0 | 0 | 0 | 1 | | 1 | 0.60% |
| **Experience in related events/ activities** | 2 | 0 | 0 | 0 | 0 | 2 | 1.20% |
| **Exploring something new** | 0 | 2 | 1 | 0 | 1 | 4 | 2.41% |
| **External pressure to attend** | 0 | 2 | 0 | 0 | 0 | 2 | 1.20% |
| **Interest in the cyber security field** | 7 | 1 | 1 | 3 | 3 | 15 | 9.04% |
| **Opportunity to leverage course material** | 0 | 1 | 0 | 0 | 0 | 1 | 0.60% |
| **Opportunity to learn new things and/ or develop skills** | 10 | 9 | 13 | 7 | 8 | 47 | 28.31% |
| **Personal or academic challenge** | 0 | 0 | 3 | 0 | 0 | 3 | 1.81% |
| **Personal passion for computers** | 3 | 1 | 0 | 0 | 4 | 8 | 4.82% |
| **Professional networking** | 3 | 0 | 2 | 3 | 0 | 8 | 4.82% |
| **Recommendation of a professor** | 2 | 2 | 1 | 1 | 5 | 11 | 6.63% |
| **Recommendation of a friend or family** | 2 | 3 | 0 | 1 | 2 | 8 | 4.82% |
| **Reputation of the instructors** | 4 | 0 | 1 | 2 | 0 | 7 | 4.22% |
| **Scholarship opportunities** | 0 | 1 | 0 | 0 | 0 | 1 | 0.60% |

*Numbers for like terms have been consolidated. *All terms* in responses with multiple terms are included.

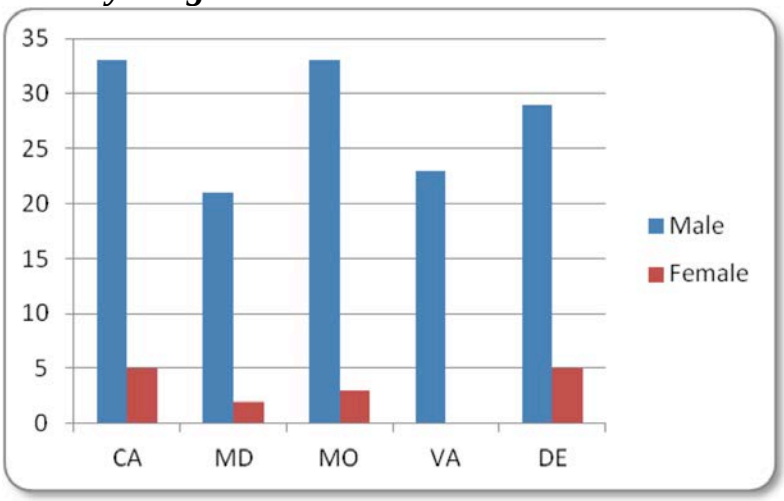
## *Question 10: What is your age?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Less than 15** | 0 | 1 | 1 | 0 | 0 | 2 | 1.27% |
| **15** | 0 | 4 | 0 | 0 | 0 | 4 | 2.55% |
| **16** | 0 | 7 | 0 | 0 | 0 | 7 | 4.46% |
| **17** | 0 | 5 | 0 | 0 | 0 | 5 | 3.18% |
| **18** | 3 | 3 | 1 | 0 | 1 | 8 | 5.10% |
| **19** | 3 | 0 | 0 | 1 | 1 | 5 | 3.18% |
| **20** | 2 | 0 | 1 | 2 | 0 | 5 | 3.18% |
| **21** | 3 | 0 | 2 | 2 | 7 | 14 | 8.92% |
| **22** | 3 | 0 | 5 | 3 | 2 | 13 | 8.28% |
| **23** | 0 | 0 | 3 | 1 | 3 | 7 | 4.46% |
| **24** | 2 | 0 | 0 | 1 | 0 | 3 | 1.91% |
| **25** | 2 | 1 | 4 | 1 | 3 | 11 | 7.01% |
| **26** | 4 | 0 | 1 | 1 | 3 | 9 | 5.73% |
| **27** | 3 | 0 | 0 | 2 | 0 | 5 | 3.18% |
| **28** | 1 | 0 | 5 | 1 | 2 | 9 | 5.73% |
| **29** | 2 | 0 | 0 | 1 | 1 | 4 | 2.55% |
| **30** | 1 | 0 | 2 | 0 | 4 | 7 | 4.46% |
| **31** | 1 | 0 | 1 | 0 | 1 | 3 | 1.91% |
| **32** | 1 | 0 | 0 | 0 | 1 | 2 | 1.27% |
| **33** | 1 | 0 | 0 | 1 | 1 | 3 | 1.91% |
| **34** | 0 | 0 | 2 | 1 | 1 | 4 | 2.55% |
| **35** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **36** | 0 | 0 | 0 | 1 | 0 | 1 | 0.64% |
| **37** | 0 | 0 | 1 | 1 | 0 | 2 | 1.27% |
| **38** | 0 | 0 | 1 | 1 | 0 | 2 | 1.27% |
| **39** | 1 | 0 | 0 | 0 | 0 | 1 | 0.64% |
| **40** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **Greater than 40** | 4 | 1 | 5 | 2 | 2 | 14 | 8.92% |
| **No Response** | 1 | 1 | 2 | 1 | 2 | 7 | 4.46% |

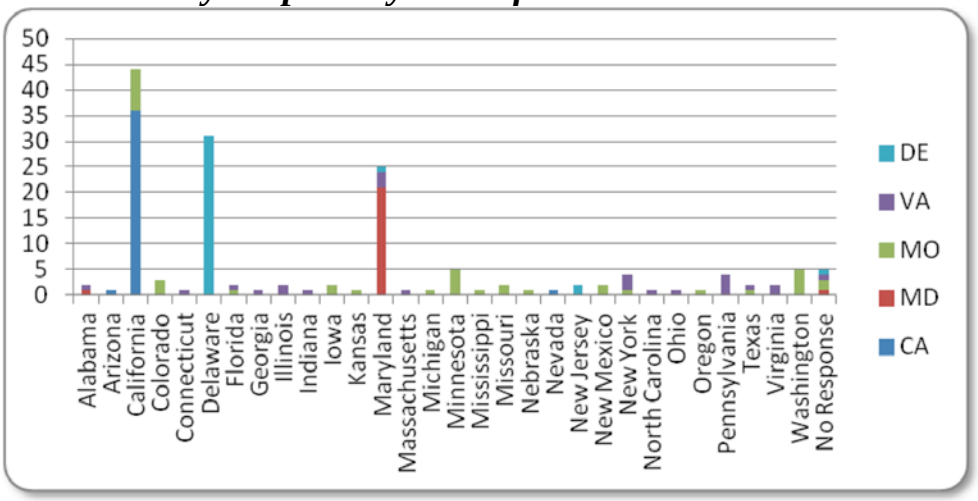
*Minimum age for overnight camps was 18.*

## *Question 11: What is your gender?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Male Responses** | 33 | 21 | 33 | 23 | 29 | 139 | 88.54% |
| **Male Percentage** | 86.84% | 91.30% | 89.19% | 95.83% | 82.86% | 88.54% | --- |
| **Female Responses** | 5 | 2 | 3 | 0 | 5 | 15 | 9.55% |
| **Female Percentage** | 13.16% | 8.70% | 8.11% | 0.00% | 14.29% | 9.55% | --- |
| **No Response** | 0 | 0 | 1 | 1 | 1 | 3 | 1.91% |

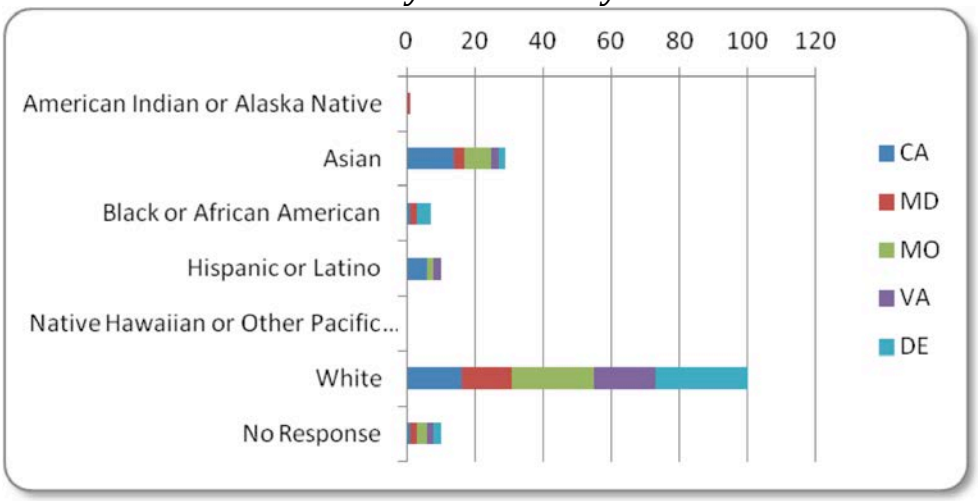
## *Question 13: What is your primary state of residence?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Alabama** | 0 | 1 | 0 | 1 | 0 | 2 | 1.27% |
| **Arizona** | 1 | 0 | 0 | 0 | 0 | 1 | 0.64% |
| **California** | 36 | 0 | 8 | 0 | 0 | 44 | 28.03% |
| **Colorado** | 0 | 0 | 3 | 0 | 0 | 3 | 1.91% |
| **Connecticut** | 0 | 0 | 0 | 1 | 0 | 1 | 0.64% |
| **Delaware** | 0 | 0 | 0 | 0 | 31 | 31 | 19.75% |
| **Florida** | 0 | 0 | 1 | 1 | 0 | 2 | 1.27% |
| **Georgia** | 0 | 0 | 0 | 1 | 0 | 1 | 0.64% |
| **Illinois** | 0 | 0 | 0 | 2 | 0 | 2 | 1.27% |
| **Indiana** | 0 | 0 | 0 | 1 | 0 | 1 | 0.64% |
| **Iowa** | 0 | 0 | 2 | 0 | 0 | 2 | 1.27% |
| **Kansas** | 0 | 0 | 1 | 0 | 0 | 1 | 0.64% |
| **Maryland** | 0 | 21 | 0 | 3 | 1 | 25 | 15.92% |
| **Massachusetts** | 0 | 0 | 0 | 1 | 0 | 1 | 0.64% |
| **Michigan** | 0 | 0 | 1 | 0 | 0 | 1 | 0.64% |
| **Minnesota** | 0 | 0 | 5 | 0 | 0 | 5 | 3.18% |
| **Mississippi** | 0 | 0 | 1 | 0 | 0 | 1 | 0.64% |
| **Missouri** | 0 | 0 | 2 | 0 | 0 | 2 | 1.27% |
| **Nebraska** | 0 | 0 | 1 | 0 | 0 | 1 | 0.64% |
| **Nevada** | 1 | 0 | 0 | 0 | 0 | 1 | 0.64% |
| **New Jersey** | 0 | 0 | 0 | 0 | 2 | 2 | 1.27% |
| **New Mexico** | 0 | 0 | 2 | 0 | 0 | 2 | 1.27% |
| **New York** | 0 | 0 | 1 | 3 | 0 | 4 | 2.55% |
| **North Carolina** | 0 | 0 | 0 | 1 | 0 | 1 | 0.64% |
| **Ohio** | 0 | 0 | 0 | 1 | 0 | 1 | 0.64% |
| **Oregon** | 0 | 0 | 1 | 0 | 0 | 1 | 0.64% |
| **Pennsylvania** | 0 | 0 | 0 | 4 | 0 | 4 | 2.55% |
| **Texas** | 0 | 0 | 1 | 1 | 0 | 2 | 1.27% |
| **Virginia** | 0 | 0 | 0 | 2 | 0 | 2 | 1.27% |
| **Washington** | 0 | 0 | 5 | 0 | 0 | 5 | 3.18% |
| **No Response** | 0 | 1 | 2 | 1 | 1 | 5 | 3.18% |

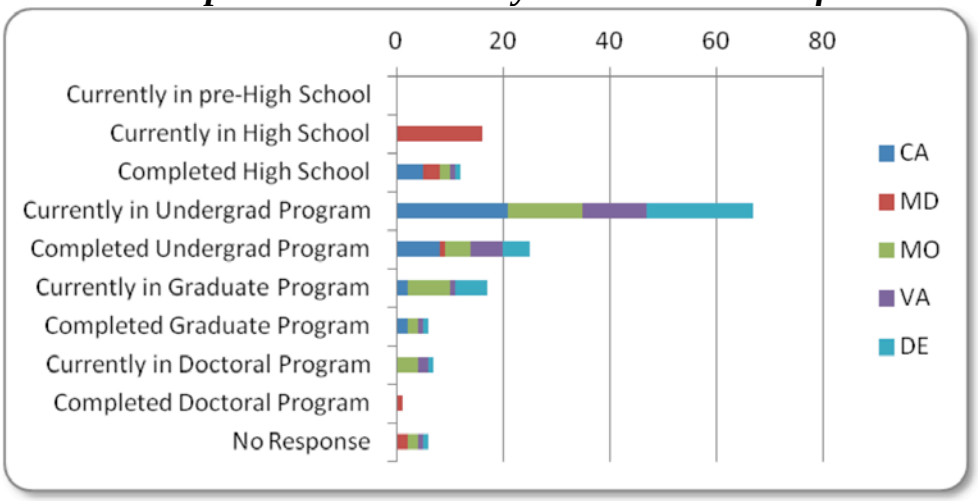
* States not listed had zero responses.

## *Question 14: Which best describes your ethnicity?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **American Indian or Alaska Native** | 0 | 1 | 0 | 0 | 0 | 1 | 0.64% |
| **Asian** | 14 | 3 | 8 | 2 | 2 | 29 | 18.47% |
| **Black or African American** | 1 | 2 | 0 | 0 | 4 | 7 | 4.46% |
| **Hispanic or Latino** | 6 | 0 | 2 | 2 | 0 | 10 | 6.37% |
| **Native Hawaiian or Other Pacific Islander** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **White** | 16 | 15 | 24 | 18 | 27 | 100 | 63.69% |
| **No Response** | 1 | 2 | 3 | 2 | 2 | 10 | 6.37% |

## *Question 15: Which option best describes your current level of education?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Currently in pre-High School** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **Currently in High School** | 0 | 16 | 0 | 0 | 0 | 16 | 10.19% |
| **Completed High School** | 5 | 3 | 2 | 1 | 1 | 12 | 7.64% |
| **Currently in Undergrad Program** | 21 | 0 | 14 | 12 | 20 | 67 | 42.68% |
| **Completed Undergrad Program** | 8 | 1 | 5 | 6 | 5 | 25 | 15.92% |
| **Currently in Graduate Program** | 2 | 0 | 8 | 1 | 6 | 17 | 10.83% |
| **Completed Graduate Program** | 2 | 0 | 2 | 1 | 1 | 6 | 3.82% |
| **Currently in Doctoral Program** | 0 | 0 | 4 | 2 | 1 | 7 | 4.46% |
| **Completed Doctoral Program** | 0 | 1 | 0 | 0 | 0 | 1 | 0.64% |
| **No Response** | 0 | 2 | 2 | 1 | 1 | 6 | 3.82% |

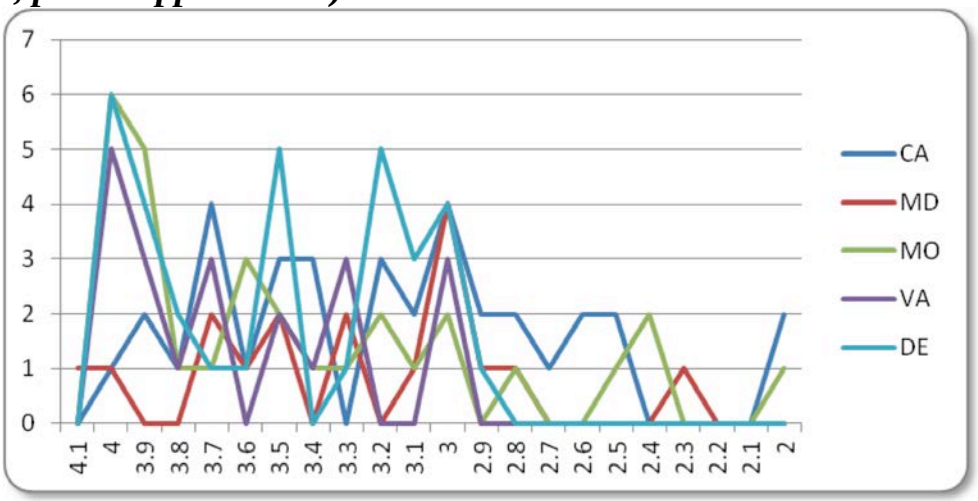
## *Question 16: What is the name of your current academic institution? (high school, university, college, etc.)*

| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| Albertus Magnus College | | | | 1 | | 1 | 0.65% |
| Auburn University | | | | 1 | | 1 | 0.65% |
| Brigham Young University | 1 | | | | | 1 | 0.65% |
| California State Polytechnic University, Pomona | 18 | | | | | 18 | 11.61% |
| California State University, Sacramento | 1 | | | | | 1 | 0.65% |
| Capella University | 1 | | 1 | | | 2 | 1.29% |
| Carnegie Mellon University | | | 1 | | | 1 | 0.65% |
| Catawba Valley Community College | | | | 1 | | 1 | 0.65% |
| Cenntenial High School | | 4 | | | | 4 | 2.58% |
| Chesapeake High School | | 1 | | | | 1 | 0.65% |
| City College of San Francisco | 1 | | | | | 1 | 0.65% |
| Community College of Baltimore County | | 1 | | | | 1 | 0.65% |
| Dakota State University | | | 1 | | | 1 | 0.65% |
| Delaware Technical and Community College | | | | | 7 | 7 | 4.52% |
| Delone Catholic High School | | 1 | | | | 1 | 0.65% |
| Depaul University | | | | 2 | | 2 | 1.29% |
| Devry University | | | 1 | | | 1 | 0.65% |
| Drexel University | | | | 1 | | 1 | 0.65% |
| Dulaney High School | | 1 | | | | 1 | 0.65% |
| Florida International University | | | | 1 | | 1 | 0.65% |
| Glenelg High School | | 1 | | | | 1 | 0.65% |
| Great Basin College | 1 | | | | | 1 | 0.65% |
| Harford Technical High School | | 1 | | | | 1 | 0.65% |
| Hawaii Pacific University | | | | 1 | | 1 | 0.65% |
| Howard Community College | | 1 | | | | 1 | 0.65% |
| Indiana University-Purdue University Indianapolis | | | | 1 | | 1 | 0.65% |
| Inver Hills Community College | | | 1 | | | 1 | 0.65% |
| Iowa State University | | | 2 | | | 2 | 1.29% |
| ITT Technical Institute | 1 | | | | | 1 | 0.65% |
| John Jay College | | | | 1 | | 1 | 0.65% |
| Los Angeles Southwest College | 1 | | | | | 1 | 0.65% |
| Minnesota State University, Mankato | | | 2 | | | 2 | 1.29% |
| Mission San Jose High School | 1 | | | | | 1 | 0.65% |
| Mississippi State University | | | 1 | | | 1 | 0.65% |
| Mt. Hebron high School | | 1 | | | | 1 | 0.65% |
| New Mexico Institute of Mining and Technology | | | 1 | | | 1 | 0.65% |
| No Response | 6 | | 5 | 5 | 2 | 18 | 11.61% |
| Oakland University | | | 1 | | | 1 | 0.65% |
| Oregon State University | | | 1 | | | 1 | 0.65% |
| Parkville High School | | 1 | | | | 1 | 0.65% |
| Regis University | | | 1 | | | 1 | 0.65% |
| Rochester Institute of | | | 1 | 5 | | 6 | 3.87% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Technology** | | | | | | | |
| **Saint Cloud State University** | | | 2 | | | 2 | 1.29% |
| **San Diego State University** | 3 | | | | | 3 | 1.94% |
| **San Diego State University** | | | 4 | | | 4 | 2.58% |
| **Santa Clara University** | 1 | | | | | 1 | 0.65% |
| **Self Study** | | | | 1 | | 1 | 0.65% |
| **Towson University** | | | | 1 | | 1 | 0.65% |
| **Unidentifiable or vague term or acronym** | 1 | 2 | 5 | | | 8 | 5.16% |
| **University of Akron** | | | | 1 | | 1 | 0.65% |
| **University of Arizona** | 1 | | | | | 1 | 0.65% |
| **University of Delaware** | | | | | 10 | 10 | 6.45% |
| **University of Maryland University College** | | | | 1 | | 1 | 0.65% |
| **University of Missouri** | | | 1 | | | 1 | 0.65% |
| **University of New Mexico** | | | 1 | | | 1 | 0.65% |
| **University of Texas at San Antonio** | | | 1 | | | 1 | 0.65% |
| **University of Washington** | | | 2 | | | 2 | 1.29% |
| **Virginia Tech** | | | | | 1 | 1 | 0.65% |
| **Western School of Technology and Environmental Science** | | 5 | | | | 5 | 3.23% |
| **Whatcom Community College** | | | 1 | | | 1 | 0.65% |
| **Wildelake High school** | | 1 | | | | 1 | 0.65% |
| **Wilmington University** | | | | | 15 | 15 | 9.68% |

*Numbers for like terms have been consolidated. *All terms* in responses with multiple terms are included.

## *Question 17: What is your current grade point average (on a 4.0 scale)? (If unknown, please approximate)*




| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **4.1** | 0 | 1 | 0 | 0 | 0 | 1 |
| **4** | 1 | 1 | 6 | 5 | 6 | 19 |
| **3.9** | 2 | 0 | 5 | 3 | 4 | 14 |
| **3.8** | 1 | 0 | 1 | 1 | 2 | 5 |
| **3.7** | 4 | 2 | 1 | 3 | 1 | 11 |
| **3.6** | 1 | 1 | 3 | 0 | 1 | 6 |
| **3.5** | 3 | 2 | 2 | 2 | 5 | 14 |
| **3.4** | 3 | 0 | 1 | 1 | 0 | 5 |
| **3.3** | 0 | 2 | 1 | 3 | 1 | 7 |
| **3.2** | 3 | 0 | 2 | 0 | 5 | 10 |
| **3.1** | 2 | 1 | 1 | 0 | 3 | 7 |
| **3** | 4 | 4 | 2 | 3 | 4 | 17 |
| **2.9** | 2 | 1 | 0 | 0 | 1 | 4 |
| **2.8** | 2 | 1 | 1 | 0 | 0 | 4 |
| **2.7** | 1 | 0 | 0 | 0 | 0 | 1 |
| **2.6** | 2 | 0 | 0 | 0 | 0 | 2 |
| **2.5** | 2 | 0 | 1 | 0 | 0 | 3 |
| **2.4** | 0 | 0 | 2 | 0 | 0 | 2 |
| **2.3** | 0 | 1 | 0 | 0 | 0 | 1 |
| **2.2** | 0 | 0 | 0 | 0 | 0 | 0 |
| **2.1** | 0 | 0 | 0 | 0 | 0 | 0 |
| **2** | 2 | 0 | 1 | 0 | 0 | 3 |
| **No Response** | 3 | 6 | 7 | 3 | 2 | 21 |
| | | | | | | |
| **Average** | 3.16 | 3.28 | 3.43 | 3.61 | 3.50 | 3.40 |
| **Min** | 2.0 | 2.3 | 2.0 | 3.0 | 2.9 | 2.0 |
| **Mode** | 3 | 3 | 4 | 4 | 3.5 | 3 |
| **Max** | 4.0 | 4.1 | 4.0 | 4.0 | 4.0 | 4.1 |

*Numbers are rounded to the nearest significant digit.

## *Question 18: What is your current major or primary area of study? (If applicable)*

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Aerospace** | 0 | 1 | 0 | 0 | 1 | 2 |
| **Biochemistry** | 0 | 0 | 0 | 0 | 1 | 1 |
| **Business Administration** | 0 | 0 | 0 | 1 | 0 | 1 |
| **Computer Engineering or CPE** | 1 | 1 | 3 | 0 | 1 | 6 |
| **Computer Information Systems or CIS** | 13 | 0 | 2 | 3 | 5 | 23 |
| **Computer Science** | 7 | 2 | 8 | 4 | 4 | 25 |
| **Computer Security, Information Security or Information Assurance** | 5 | 1 | 8 | 11 | 2 | 27 |
| **Computers (General Term), Information Systems or Information Technology** | 0 | 6 | 5 | 1 | 1 | 13 |
| **Criminal Justice** | 0 | 0 | 0 | 1 | 0 | 1 |
| **Economics** | 0 | 0 | 1 | 0 | 0 | 1 |
| **Electrical Engineering** | 1 | 0 | 1 | 0 | 2 | 4 |
| **Forensics** | 0 | 0 | 0 | 3 | 0 | 3 |
| **Graphic Design** | 0 | 0 | 0 | 0 | 1 | 1 |
| **Information System Auditing** | 1 | 0 | 0 | 0 | 0 | 1 |
| **Management Information Systems or MIS** | 0 | 0 | 1 | 0 | 0 | 1 |
| **Mathematics** | 0 | 0 | 0 | 0 | 1 | 1 |
| **Music Theory** | 0 | 1 | 0 | 0 | 0 | 1 |
| **Networking or Network Security** | 1 | 3 | 3 | 3 | 18 | 28 |
| **None or N/A** | 0 | 1 | 1 | 1 | 0 | 3 |
| **Programming** | 1 | 1 | 0 | 0 | 0 | 2 |

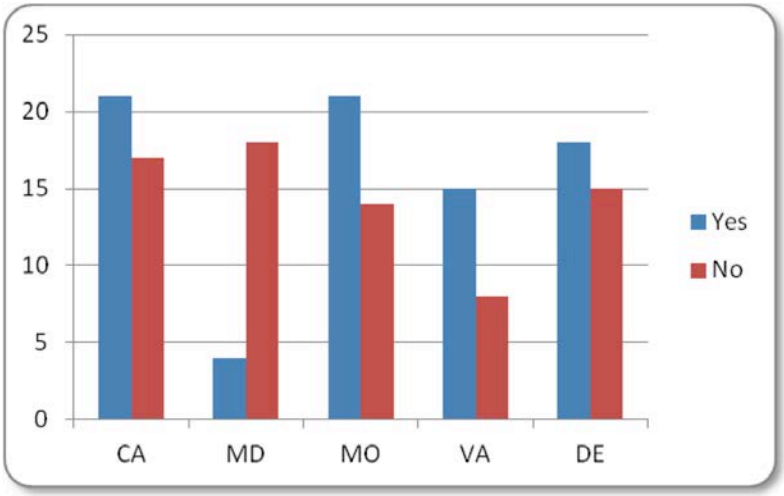
*Numbers for like terms have been consolidated. *All terms* in responses with multiple terms are included.

## *Question 19: What do you consider to be your two greatest academic strength areas? (e.g., math, science, computers, English, art, etc.)*

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Art** | 2 | 0 | 0 | 1 | 0 | 3 |
| **Biology** | 1 | 0 | 0 | 0 | 0 | 1 |
| **Business or Management** | 1 | 0 | 6 | 0 | 0 | 7 |
| **Computers** | 29 | 11 | 29 | 20 | 27 | 116 |
| **Criminal Justice** | 0 | 0 | 0 | 0 | 1 | 1 |
| **Engineering** | 1 | 1 | 0 | 0 | 0 | 2 |
| **English** | 5 | 1 | 4 | 6 | 7 | 23 |
| **Exercise or Sports** | 1 | 0 | 0 | 0 | 0 | 1 |
| **Foreign Language** | 0 | 1 | 1 | 0 | 1 | 3 |
| **History** | 0 | 1 | 0 | 1 | 1 | 3 |
| **Math** | 8 | 15 | 7 | 7 | 13 | 50 |
| **Music** | 1 | 0 | 1 | 0 | 0 | 2 |
| **Networking** | 1 | 0 | 1 | 0 | 0 | 2 |
| **Philosophy** | 1 | 0 | 0 | 0 | 0 | 1 |
| **Physics** | 1 | 1 | 0 | 0 | 0 | 2 |
| **Programming** | 1 | 0 | 1 | 0 | 0 | 2 |
| **Psychology** | 1 | 0 | 0 | 0 | 0 | 1 |
| **Science** | 8 | 8 | 8 | 8 | 10 | 42 |
| **Security** | 1 | 0 | 2 | 0 | 0 | 3 |

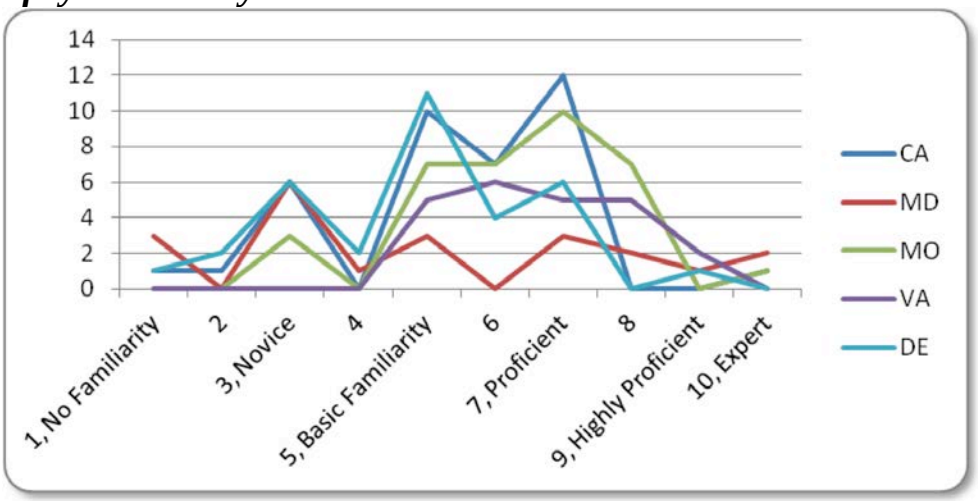
*Numbers for like terms have been consolidated. *All terms* in responses with multiple terms are included.

## *Question 21: Have you ever had formal training/ coursework on cyber security topics?*




| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Yes Responses** | 21 | 4 | 21 | 15 | 18 | 79 |
| **Yes Percentage** | 55.26% | 17.39% | 56.76% | 62.50% | 51.43% | 50.32% |
| **No Responses** | 17 | 18 | 14 | 8 | 15 | 72 |
| **No Percentage** | 44.74% | 78.26% | 37.84% | 33.33% | 42.86% | 45.86% |
| **No (Blank) Response** | 0 | 1 | 2 | 1 | 2 | 6 |

## *Question 22: On a scale of 1-10, what is your level of familiarity/ comfort with the field of cyber security?*



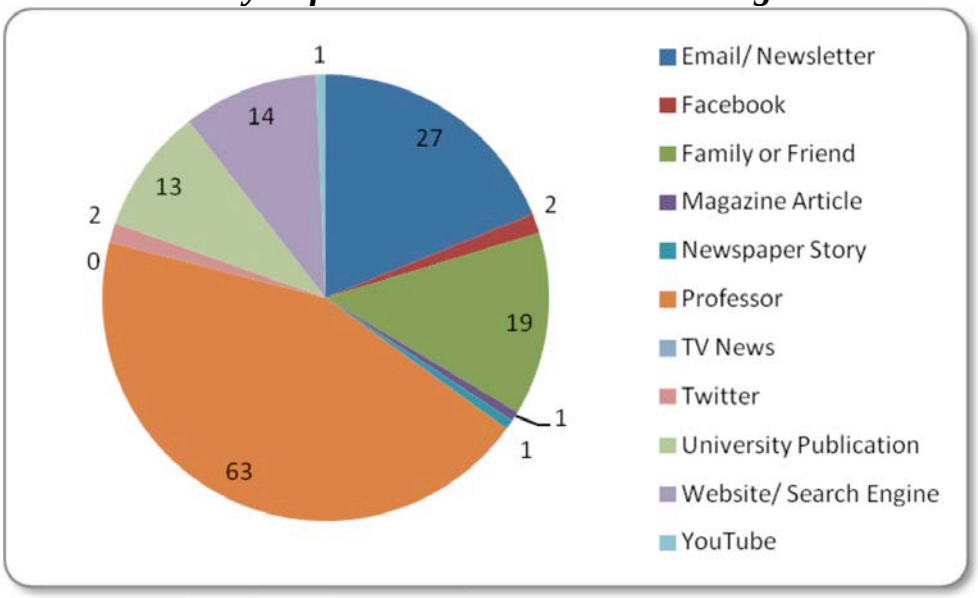

| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **1, No Familiarity** | 1 | 3 | 0 | 0 | 1 | 5 | 3.18% |
| **2** | 1 | 0 | 0 | 0 | 2 | 3 | 1.91% |
| **3, Novice** | 6 | 6 | 3 | 0 | 6 | 21 | 13.38% |
| **4** | 0 | 1 | 0 | 0 | 2 | 3 | 1.91% |
| **5, Basic Familiarity** | 10 | 3 | 7 | 5 | 11 | 36 | 22.93% |
| **6** | 7 | 0 | 7 | 6 | 4 | 24 | 15.29% |
| **7, Proficient** | 12 | 3 | 10 | 5 | 6 | 36 | 22.93% |
| **8** | 0 | 2 | 7 | 5 | 0 | 14 | 8.92% |
| **9, Highly Proficient** | 0 | 1 | 0 | 2 | 1 | 4 | 2.55% |
| **10, Expert** | 1 | 2 | 1 | 0 | 0 | 4 | 2.55% |
| **No Response** | 0 | 2 | 2 | 1 | 2 | 7 | 4.46% |

## *Question 23: If you have a background in cyber security, what areas of cyber security do you consider yourself most proficient in? (e.g., system administration, programming, forensics, system penetration, etc.)*

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Binary Analysis** | 1 | 0 | 0 | 0 | 0 | 1 |
| **Cryptography** | 0 | 0 | 1 | 0 | 0 | 1 |
| **Forensics** | 7 | 1 | 2 | 3 | 2 | 15 |
| **Information Assurance** | 0 | 0 | 1 | 1 | 0 | 2 |
| **Intrusion Detection** | 1 | 0 | 0 | 2 | 0 | 3 |
| **Networking** | 1 | 1 | 3 | 4 | 1 | 10 |
| **Operating Systems** | 0 | 1 | 0 | 0 | 0 | 1 |
| **Operations Management** | 0 | 0 | 3 | 0 | 0 | 3 |
| **Penetration Testing** | 3 | 1 | 3 | 4 | 3 | 14 |
| **Programming** | 3 | 2 | 6 | 3 | 5 | 19 |
| **System Administration** | 10 | 5 | 4 | 8 | 7 | 34 |
| **System Hardening** | 2 | 1 | 2 | 0 | 0 | 5 |
| **System Hardware** | 0 | 1 | 0 | 0 | 0 | 1 |
| **Traffic Analysis** | 1 | 0 | 0 | 1 | 0 | 2 |
| **User Training** | 0 | 0 | 1 | 0 | 0 | 1 |
| **Vulnerability Assessment** | 1 | 0 | 1 | 1 | 0 | 3 |
| **Web Application Security** | 3 | 0 | 0 | 0 | 1 | 4 |

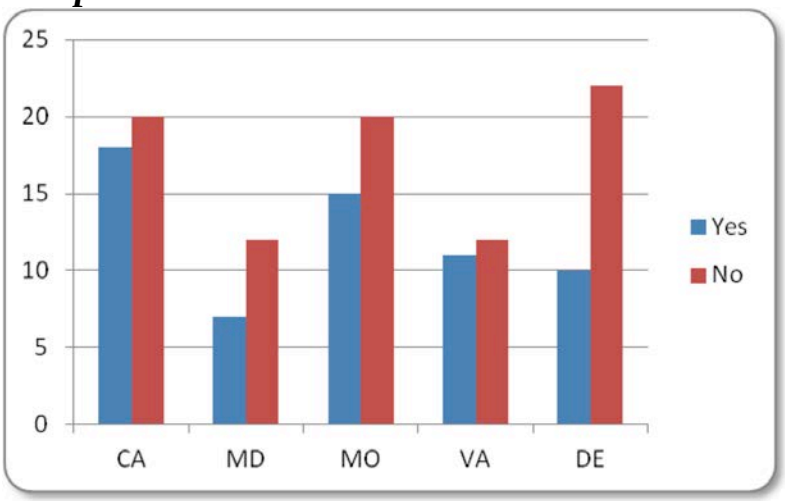
*Numbers for like terms have been consolidated. *All terms* in responses with multiple terms are included.

## *Question 24: Where did you first hear about the USCC organization?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **Email/ Newsletter** | 3 | 3 | 12 | 5 | 4 | 27 | 17.20% |
| **Facebook** | 0 | 1 | 0 | 0 | 1 | 2 | 1.27% |
| **Family or Friend** | 6 | 4 | 2 | 4 | 3 | 19 | 12.10% |
| **Magazine Article** | 1 | 0 | 0 | 0 | 0 | 1 | 0.64% |
| **Newspaper Story** | 0 | 0 | 0 | 1 | 0 | 1 | 0.64% |
| **Professor** | 21 | 9 | 14 | 2 | 17 | 63 | 40.13% |
| **TV News** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **Twitter** | 0 | 0 | 0 | 2 | 0 | 2 | 1.27% |
| **University Publication** | 1 | 2 | 2 | 2 | 6 | 13 | 8.28% |
| **Website/ Search Engine** | 4 | 1 | 2 | 6 | 1 | 14 | 8.92% |
| **YouTube** | 1 | 0 | 0 | 0 | 0 | 1 | 0.64% |
| **No Response or Other** | 1 | 3 | 5 | 2 | 3 | 14 | 8.92% |

## *Question 25: Have you engaged in cyber/ security activities, events, or competitions in the past?*




| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Yes Responses** | 18 | 7 | 15 | 11 | 10 | 61 |
| **Yes Percentage** | 47.37% | 30.43% | 40.54% | 45.83% | 28.57% | 38.85% |
| **No Responses** | 20 | 12 | 20 | 12 | 22 | 86 |
| **No Percentage** | 52.63% | 52.17% | 54.05% | 50.00% | 62.86% | 54.78% |
| **No (Blank) Response** | 0 | 4 | 2 | 1 | 3 | 10 |

## *Question 26: If you have engaged in similar events in the past, briefly list these previous events and activities.*

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Access Data Forensic Boot Camp** | 0 | 0 | 0 | 0 | 1 | 1 |
| **Cal Poly Cyber Security Fair** | 1 | 0 | 0 | 0 | 0 | 1 |
| **Cal Poly I.T. Competition** | 2 | 0 | 0 | 0 | 0 | 2 |
| **CCDC** | 3 | 1 | 4 | 2 | 1 | 11 |
| **CSC Cyber Battleground** | 0 | 0 | 0 | 1 | 0 | 1 |
| **Cyber Watch Challenge** | 0 | 1 | 0 | 0 | 0 | 1 |
| **CyberFoundations** | 1 | 0 | 0 | 0 | 0 | 1 |
| **CyberPatriot** | 2 | 0 | 0 | 0 | 0 | 2 |
| **CyberQuest** | 0 | 0 | 1 | 0 | 0 | 1 |
| **DC3 Challenge** | 1 | 0 | 0 | 2 | 1 | 4 |
| **Defcon** | 2 | 0 | 2 | 1 | 0 | 5 |
| **Hackerspace** | 0 | 0 | 1 | 0 | 0 | 1 |
| **Hackid** | 0 | 0 | 1 | 0 | 0 | 1 |
| **HIMMS** | 0 | 0 | 1 | 0 | 0 | 1 |
| **How Strong Is Your Fu 2 - Online CTF** | 0 | 0 | 0 | 1 | 0 | 1 |
| **InfraGard** | 0 | 0 | 1 | 0 | 0 | 1 |
| **Iowa State University Cyber Defense Competition** | 0 | 0 | 1 | 0 | 0 | 1 |
| **ISACA** | 0 | 0 | 1 | 0 | 0 | 1 |
| **ISSA** | 0 | 0 | 1 | 0 | 0 | 1 |
| **ISTS Hack and Defend** | 0 | 0 | 0 | 2 | 0 | 2 |
| **MACCDC** | 0 | 0 | 0 | 0 | 2 | 2 |
| **Maryland Cyber Challenge & Conference** | 0 | 1 | 0 | 0 | 0 | 1 |
| **Miami Electronic Crimes Task Force** | 0 | 0 | 1 | 0 | 0 | 1 |
| **MITRE STEM CTF** | 0 | 0 | 2 | 0 | 0 | 2 |
| **Moraine Valley High School Cyber Competition** | 0 | 2 | 0 | 0 | 0 | 2 |
| **NCCDC** | 2 | 0 | 1 | 0 | 0 | 3 |
| **Notacon** | 0 | 0 | 1 | 0 | 0 | 1 |
| **NYU Poly CSAW 2010** | 0 | 0 | 0 | 0 | 1 | 1 |
| **OWASP** | 0 | 0 | 1 | 0 | 0 | 1 |
| **PRCCDC** | 0 | 0 | 0 | 0 | 0 | 0 |
| **SANS** | 0 | 0 | 1 | 0 | 0 | 1 |
| **SANS NetWars** | 1 | 0 | 0 | 5 | 0 | 6 |
| **Sewcure360** | 0 | 0 | 1 | 0 | 0 | 1 |
| **Shmoocon** | 0 | 0 | 0 | 1 | 0 | 1 |
| **Shmoocon Hack or Halo** | 0 | 0 | 0 | 0 | 1 | 1 |
| **SkillsUSA** | 0 | 1 | 0 | 0 | 0 | 1 |
| **TracerFIRE** | 0 | 0 | 2 | 0 | 0 | 2 |
| **USCC Cyber Camp 2010** | 3 | 0 | 0 | 0 | 2 | 5 |
| **WRCCDC** | 4 | 0 | 0 | 0 | 0 | 4 |

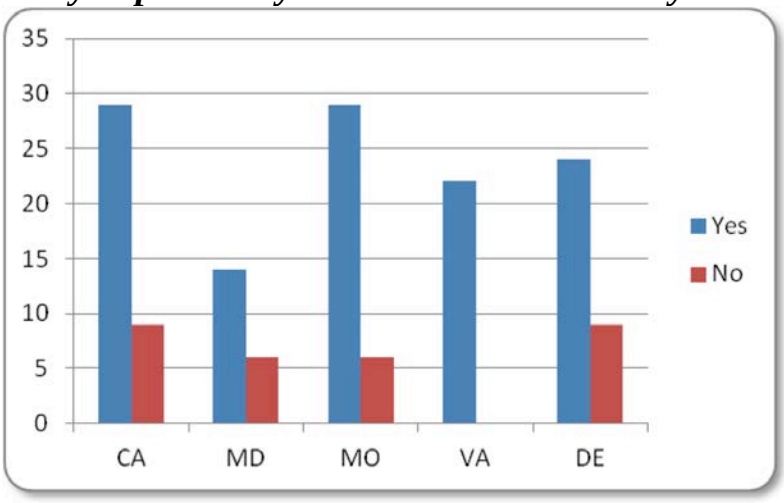
*Numbers for like terms have been consolidated. *All terms* in responses with multiple terms are included.

## *Question 27: What is your desired/ planned career field?*

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Aerospace Engineering** | 0 | 0 | 0 | 0 | 1 | 1 |
| **Business or Management** | 1 | 0 | 2 | 0 | 0 | 3 |
| **Computer Engineering** | 1 | 3 | 0 | 0 | 0 | 4 |
| **Computer Science** | 0 | 2 | 1 | 0 | 0 | 3 |
| **Electrical Engineering** | 0 | 0 | 0 | 0 | 2 | 2 |
| **Embedded System Desing** | 0 | 0 | 0 | 0 | 1 | 1 |
| **Forensics** | 3 | 1 | 0 | 1 | 0 | 5 |
| **Game Development** | 0 | 1 | 0 | 0 | 0 | 1 |
| **Government or Intelligence** | 0 | 0 | 3 | 1 | 0 | 4 |
| **Incident Response or Cyber Crime Prevention** | 1 | 0 | 1 | 3 | 0 | 5 |
| **Information Assurance or Computer Security** | 8 | 6 | 15 | 10 | 7 | 46 |
| **Information Technology** | 4 | 1 | 9 | 1 | 4 | 19 |
| **Nanotechnology** | 0 | 1 | 0 | 0 | 0 | 1 |
| **Networking or Network Security** | 7 | 1 | 2 | 2 | 4 | 16 |
| **Penetration Testing** | 6 | 0 | 2 | 2 | 4 | 14 |
| **Programming or Software Engineering** | 2 | 1 | 1 | 2 | 2 | 8 |
| **Robotics** | 1 | 0 | 0 | 0 | 0 | 1 |

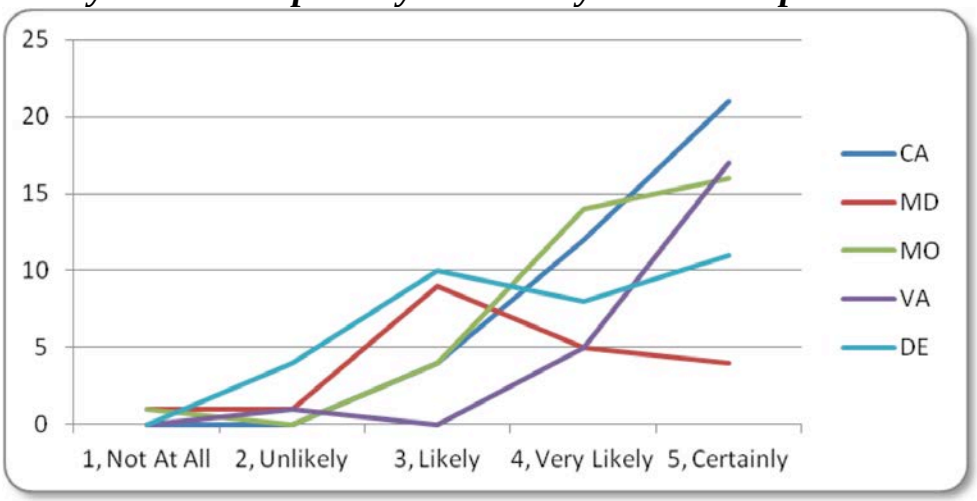
*Numbers for like terms have been consolidated. *All terms* in responses with multiple terms are included.

## *Question 28: Have you previously considered a career in cyber security?*




| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Yes Responses** | 29 | 14 | 29 | 22 | 24 | 118 |
| **Yes Percentage** | 76.32% | 60.87% | 78.38% | 91.67% | 68.57% | 75.16% |
| **No Responses** | 9 | 6 | 6 | 0 | 9 | 30 |
| **No Percentage** | 23.68% | 26.09% | 16.22% | 0.00% | 25.71% | 19.11% |
| **No (Blank) Response** | 0 | 3 | 2 | 2 | 2 | 9 |

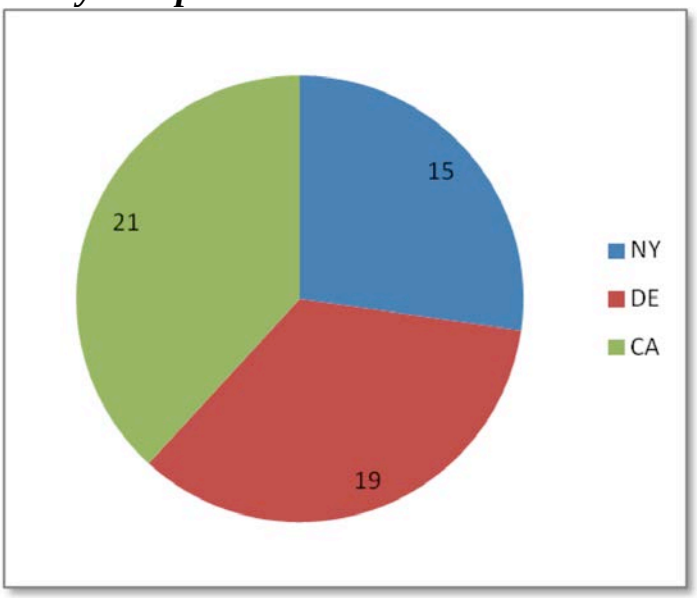
***Question 29: On a scale of 1-5, after your participation in this event is what is the likelihood you will to explore cyber security as a career path?***




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **1, Not At All** | 0 | 1 | 1 | 0 | 0 | 2 | 1.27% |
| **2, Unlikely** | 0 | 1 | 0 | 1 | 4 | 6 | 3.82% |
| **3, Likely** | 4 | 9 | 4 | 0 | 10 | 27 | 17.20% |
| **4, Very Likely** | 12 | 5 | 14 | 5 | 8 | 44 | 28.03% |
| **5, Certainly** | 21 | 4 | 16 | 17 | 11 | 69 | 43.95% |
| **No Response** | 1 | 3 | 2 | 1 | 2 | 9 | 5.73% |

# *Summary 2010 Pilot Participant Survey Results Analysis*

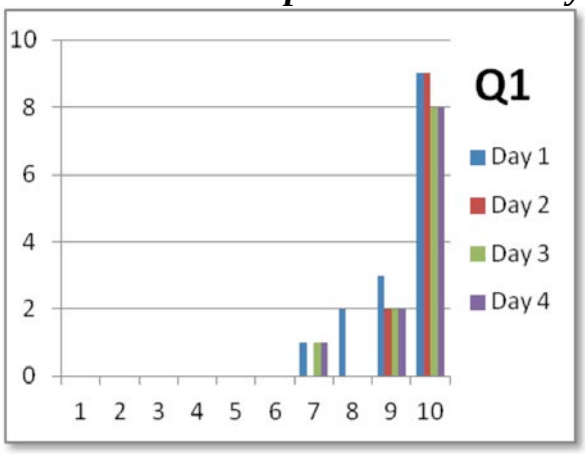
## *Summary: Total Survey Completions*

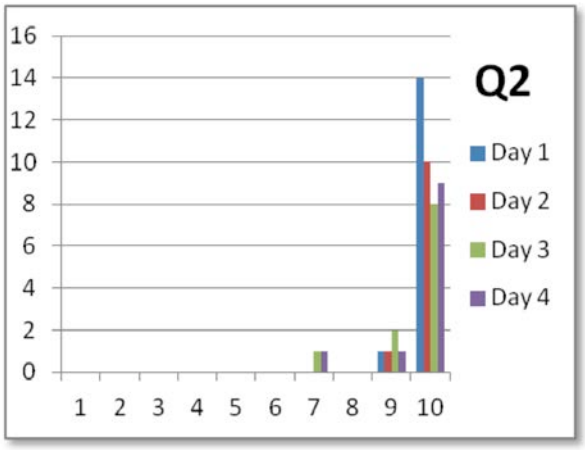


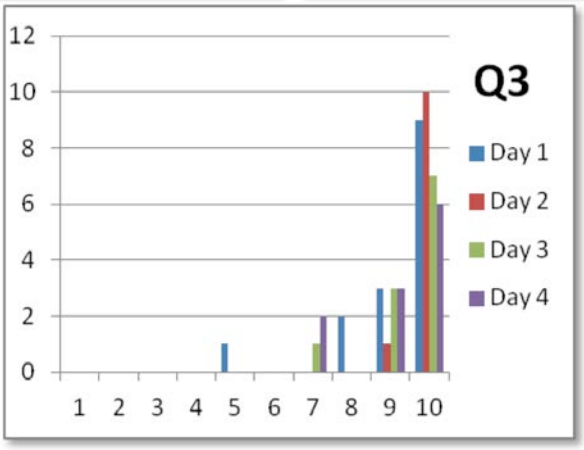

| | NY | DE | CA | TOT |
|---|---|---|---|---|
| **Number*** | 15 | 19 | 21 | 55 |
| **Percent** | 27.27% | 34.55% | 38.18% | 100.00% |

**Number based on largest single day survey count.*

## *2010 New York Camp Results Summary*



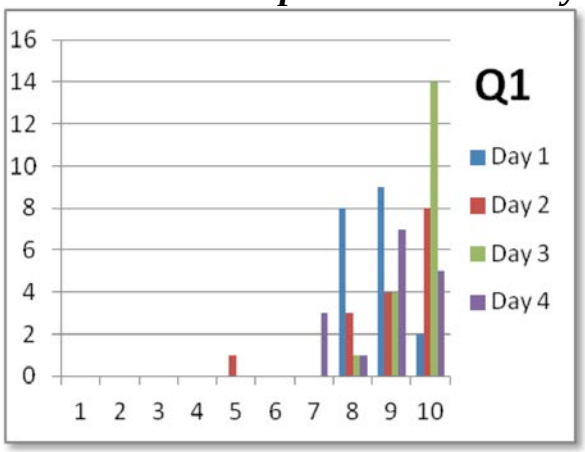



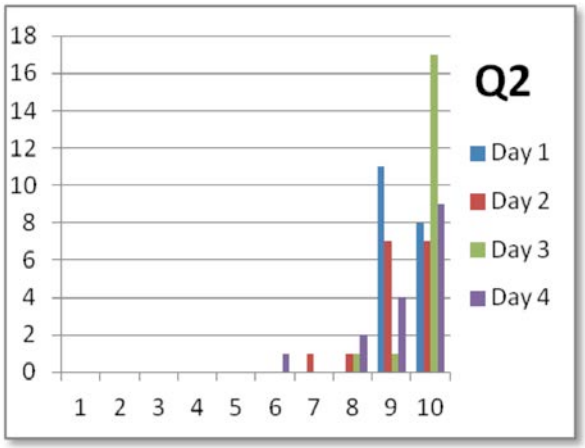



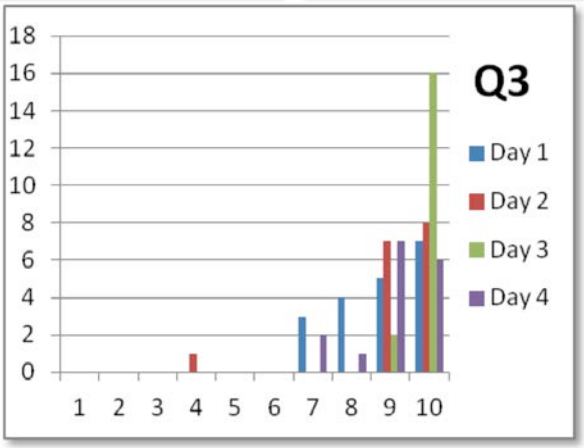

| 2010 New York Camp | Q1 - Overall | Q2 – Teaching Skill | Q3 – Value of Course |
|---|---|---|---|
| Day 1 AVG | 9.33 | 9.93 | 9.20 |
| Day 1 MIN | 7.00 | 9.00 | 5.00 |
| Day 1 MAX | 10.00 | 10.00 | 10.00 |
| Day 1 MODE | 10.00 | 10.00 | 10.00 |
| Day 2 AVG | 9.82 | 9.91 | 9.91 |
| Day 2 MIN | 9.00 | 9.00 | 9.00 |
| Day 2 MAX | 10.00 | 10.00 | 10.00 |
| Day 2 MODE | 10.00 | 10.00 | 10.00 |
| Day 3 AVG | 9.55 | 9.55 | 9.45 |
| Day 3 MIN | 7.00 | 7.00 | 7.00 |
| Day 3 MAX | 10.00 | 10.00 | 10.00 |
| Day 3 MODE | 10.00 | 10.00 | 10.00 |
| Day 4 AVG | 9.55 | 9.64 | 9.18 |
| Day 4 MIN | 7.00 | 7.00 | 7.00 |
| Day 4 MAX | 10.00 | 10.00 | 10.00 |
| Day 4 MODE | 10.00 | 10.00 | 10.00 |

**Graphs display score (1 – poor to 10 – excellent) on the x-axis and number of responses at that score on the y-axis.*

## *2010 Delaware Camp Results Summary*



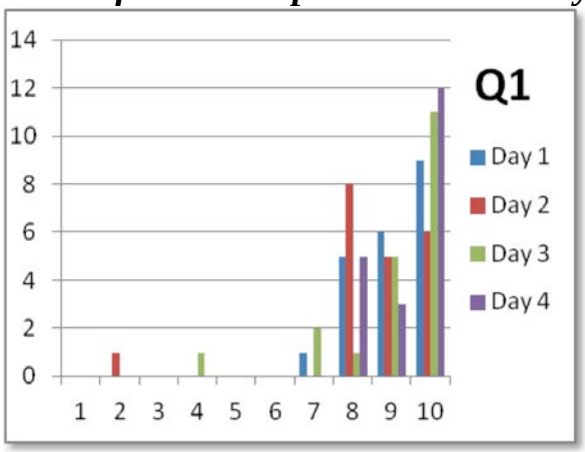



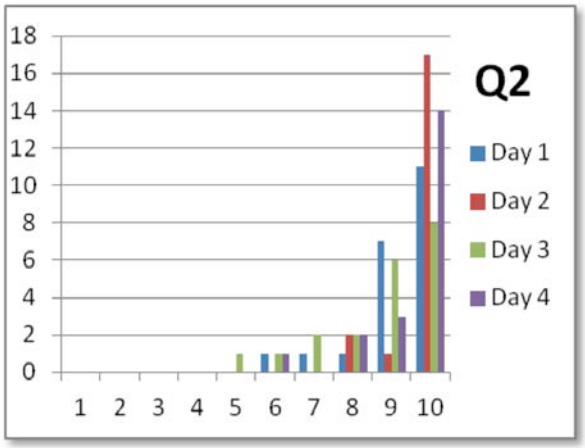



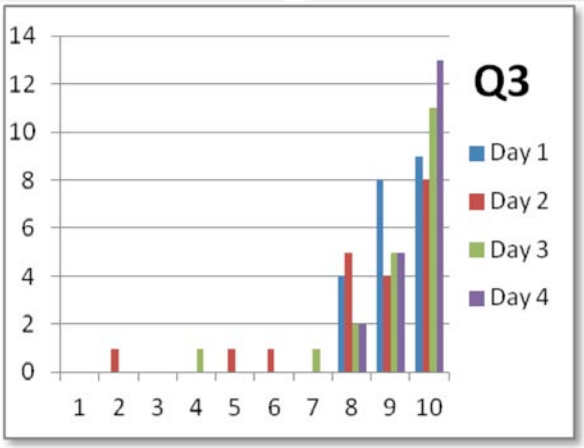

| 2010 Delaware Camp | Q1 - Overall | Q2 – Teaching Skill | Q3 – Value of Course |
|---|---|---|---|
| Day 1 AVG | 8.68 | 9.42 | 8.84 |
| Day 1 MIN | 8.00 | 9.00 | 7.00 |
| Day 1 MAX | 10.00 | 10.00 | 10.00 |
| Day 1 MODE | 9.00 | 9.00 | 10.00 |
| Day 2 AVG | 9.06 | 9.25 | 9.19 |
| Day 2 MIN | 5.00 | 7.00 | 4.00 |
| Day 2 MAX | 10.00 | 10.00 | 10.00 |
| Day 2 MODE | 10.00 | 9.00 | 10.00 |
| Day 3 AVG | 9.68 | 9.84 | 9.89 |
| Day 3 MIN | 8.00 | 8.00 | 9.00 |
| Day 3 MAX | 10.00 | 10.00 | 10.00 |
| Day 3 MODE | 10.00 | 10.00 | 10.00 |
| Day 4 AVG | 8.88 | 9.25 | 9.06 |
| Day 4 MIN | 7.00 | 6.00 | 7.00 |
| Day 4 MAX | 10.00 | 10.00 | 10.00 |
| Day 4 MODE | 9.00 | 10.00 | 9.00 |

**Graphs display score (1 – poor to 10 – excellent) on the x-axis and number of responses at that score on the y-axis.*

## *2010 California Camp Results Summary*




| 2010 California Camp | Q1 - Overall | Q2 – Teaching Skill | Q3 – Value of Course |
|---|---|---|---|
| **Day 1 AVG** | 9.10 | 9.24 | 9.24 |
| **Day 1 MIN** | 7.00 | 6.00 | 8.00 |
| **Day 1 MAX** | 10.00 | 10.00 | 10.00 |
| **Day 1 MODE** | 10.00 | 10.00 | 10.00 |
| **Day 2 AVG** | 8.55 | 9.75 | 8.45 |
| **Day 2 MIN** | 2.00 | 8.00 | 2.00 |
| **Day 2 MAX** | 10.00 | 10.00 | 10.00 |
| **Day 2 MODE** | 8.00 | 10.00 | 10.00 |
| **Day 3 AVG** | 9.05 | 8.75 | 9.10 |
| **Day 3 MIN** | 4.00 | 5.00 | 4.00 |
| **Day 3 MAX** | 10.00 | 10.00 | 10.00 |
| **Day 3 MODE** | 10.00 | 10.00 | 10.00 |
| **Day 4 AVG** | 9.35 | 9.45 | 9.55 |
| **Day 4 MIN** | 8.00 | 6.00 | 8.00 |
| **Day 4 MAX** | 10.00 | 10.00 | 10.00 |
| **Day 4 MODE** | 10.00 | 10.00 | 10.00 |

**Graphs display score (1 – poor to 10 – excellent) on the x-axis and number of responses at that score on the y-axis.*


# US Cyber Challenge (USCC)
# 2011 Capture the Flag (CTF)
# Data Collection Analysis
# Appendix D

*www.uscyberchallenge.org*


Version 1.1
13 Oct 2011

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# *Background*

In previous USCC summer camps, Capture the Flag (CTF) environments were built with support of various sponsors which while successful were deemed not to be a scalable CTF environment. As a result, an "Issue Paper for CTF" was written to explore the question 'which virtual environment should be used for the "Capture the Flag (CTF)" for the camps? And what should be the partnership(s) for the future?" The paper recommended evaluating the following three environments in the USCC 2011 Summer Camps.

- **SAIC's CyberNEXS™:** SAIC's CyberNEXS™ is a third generation cyber training and exercise environment. Using virtualization, CyberNEXS games emulate an information enterprise consisting of live Windows and UNIX operating systems, and network and security devices. Self-contained, it quantifies performance in key cyber skills, including hardening of systems, maintenance of critical services, recognizing and thwarting attacks, forensics, penetration testing and communications. CyberNEXS is highly scalable to hundreds of contestants and can be tailored to meet the training and exercise requirements for High School, Collegiate and Professional levels of game play. Conducted via the Internet, CyberNEXS has been used around the world, providing real-time, high fidelity scoring in support of Defense, Federal and Commercial training and exercise events.

- **iSIGHT Partners:** The iSIGHT Partners solution is the leading technology platform for high end cyber exercises. This proven technology and team have been delivering competitions around the world since 2005. The iSIGHT Partners solution open exercise framework creates a high degree of realism. This realism combined with unique scoring capability provides an excellent evaluation of real world cyber security skills and technology. The open framework supports a wide array of target technologies and attack vectors including IPv4 and IPv6, wireless (802.11, RFID, GSM), VoIP and even SCADA. Over the years the team and technology has delivered exercises for an ever growing array of private and public customers around the world.

- **CSSIA:** The Center for Systems Security and Information Assurance (CSSIA) has a CTF technical environment hosted at Moraine Valley Community College outside of Chicago, IL. This effort is funded by the National Science Foundation.

As a result, the 2011 USCC Summer Camps utilized the following environments for their CTF exercises:

| Camp | 2011 Tool Used |
|---|---|
| California | SAIC CyberNEXS |
| Maryland | CSSIA |
| Missouri | SAIC CyberNEXS |
| Virginia | iSIGHT Partners |
| Delaware | iSIGHT Partners |

# *Survey Structures*

## *2011 CTF Survey Structure*

**5. Event Setup**

5.1. Was the vendor helpful in explaining the set up for this event? [yes/ no selection w/ detail memo field option]

5.2. On a scale of 1-5, how would you rate the quality of the technical documentation provided by the vendor? [drop down menu w/ detail memo field option]

5.2.1.1, Inadequate
5.2.2.2, Poor
5.2.3.3, Acceptable
5.2.4.4, Good
5.2.5.5, Excellent

5.3. Did the competition appear to provide the technical challenge for the class? [yes/ no selection w/ detail memo field option]

5.4. Do you feel the technical set up was easy to achieve? [yes/ no selection]

5.5. Did the technical performance meet your expectations? [yes/ no selection]

**6. Evaluation**

6.1. On a scale of 1-10, what is your overall evaluation of this course/ event? [drop down menu]

6.1.1.1, Bad
6.1.2.2,
6.1.3.3, Poor
6.1.4.4,
6.1.5.5, Marginal
6.1.6.6,
6.1.7.7, Good
6.1.8.8,
6.1.9.9, Great
6.1.10. 10, Excellent

6.2. On a scale of 1-10, what is your evaluation of the scoreboard display? [drop down menu]

6.2.1.1, Bad
6.2.2.2,
6.2.3.3, Poor
6.2.4.4,
6.2.5.5, Marginal
6.2.6.6,
6.2.7.7, Good
6.2.8.8,
6.2.9.9, Great
6.2.10. 10, Excellent

6.3. On a scale of 1-10, what is your evaluation of the network display for the TAs? [drop down menu]

6.3.1.1, Bad
6.3.2.2,
6.3.3.3, Poor

6.3.4.4,
6.3.5.5, Marginal
6.3.6.6,
6.3.7.7, Good
6.3.8.8,
6.3.9.9, Great
6.3.10. 10, Excellent

6.4. On a scale of 1-10, what is your evaluation of the ease of use for the technical solution? [drop down menu]
6.4.1.1, Bad
6.4.2.2,
6.4.3.3, Poor
6.4.4.4,
6.4.5.5, Marginal
6.4.6.6,
6.4.7.7, Good
6.4.8.8,
6.4.9.9, Great
6.4.10. 10, Excellent

**7. Event Assessment**

7.1. Would you use this solution for your upcoming activities? [free form memo field]
7.2. What are the strengths of this competition? [free form memo field]
7.3. What are the areas for improvements for this event/ competition? [free form memo field]
7.4. Would you recommend this event/ competition to your peers? [yes/ no selection]

**8. Closing**

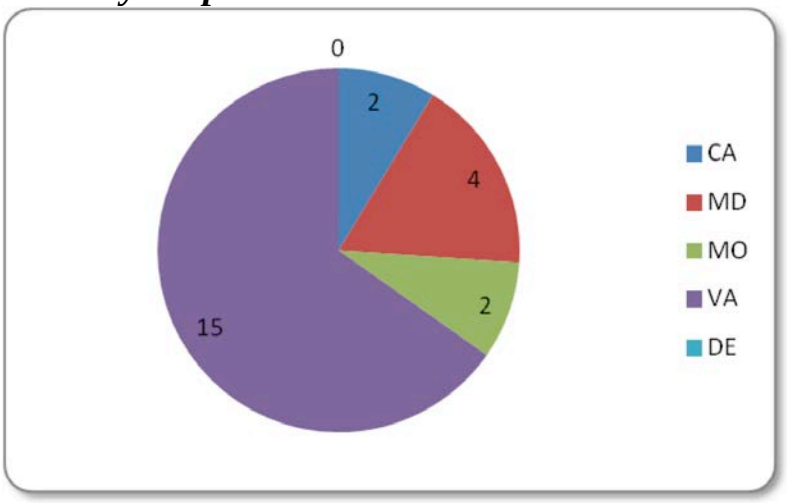
8.1. If you have any additional comments or feedback, please provide it here. [free form memo field]

# *Comprehensive 2011 CTF Survey Results Analysis*

As part of the 2011 Camps, USCC requested that camp hosts complete a technical survey related to the Capture the Flag activity used at their camp. The USCC designed the survey questions to assess the ability of the camp hosts to set up the virtual CTF and how easy it would be to use. In the case of Delaware, the camp did not provide instructions to the TAs or students regarding the surveys, therefore, many of the surveys were completed after the CTF which led to incomplete results

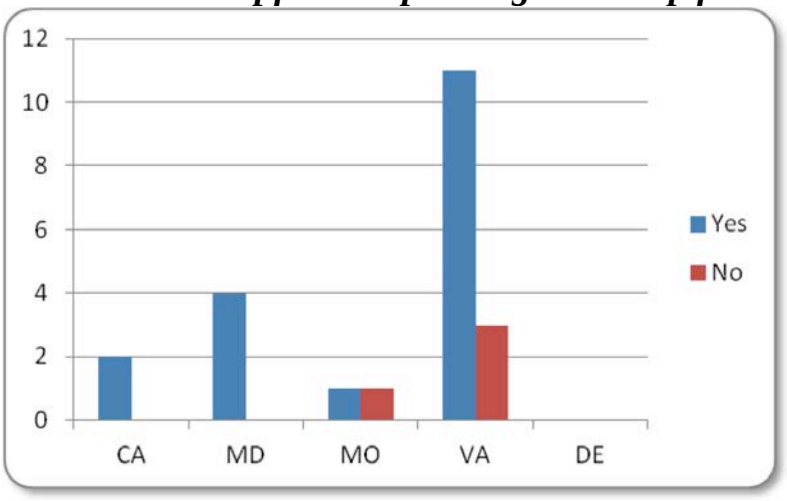
Furthermore, in reviewing the submitted CTF data, a number of important observations should be taken into account regarding the results. The California, Maryland, and Missouri camps requested the CTF Survey responses from camp TA's, hosts and administrators only whereas the Virginia camp had campers complete the CTF survey as well as the TAs, hosts and administrators. There were no responses from the Delaware camp. In reviewing the results the nature of the respondents as well as the specific tool used at each camp should be taken into consideration.

## *Summary: Total Survey Responses*




| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Number** | 2 | 4 | 2 | 15 | 0 | 23 |
| **Percent** | 8.70% | 17.39% | 8.70% | 65.22% | 0.00% | 100.00% |

## *Question 1: Was the vendor helpful in explaining the set up for this event?*



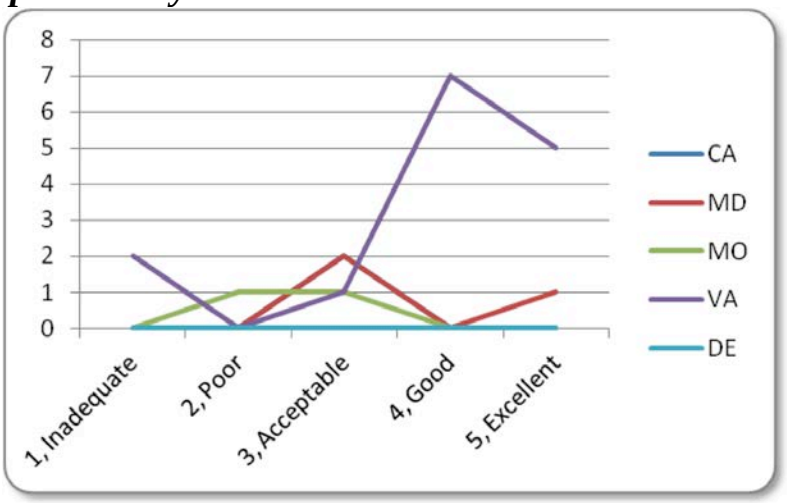

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Yes Responses** | 2 | 4 | 1 | 11 | 0 | 18 |
| **Yes Percentage** | 100.00% | 100.00% | 50.00% | 78.57% | 0.00% | 81.82% |
| **No Responses** | 0 | 0 | 1 | 3 | 0 | 4 |
| **No Percentage** | 0.00% | 0.00% | 50.00% | 21.43% | 0.00% | 18.18% |
| **No (Blank) Response** | 0 | 0 | 0 | 1 | 0 | 1 |

Comments

- (CA) There were some discussions regarding the best methodology. Additionally, they were available for conference calls in preparation for the events.
- (CA) The vendor did provide some documentation. However, we did run into a problem with Win7 64bit. The remote-desktop client in Win7 64bit hosts without Service Pack 1 was incompatible with the competition environment. Installing SP1 corrected the issue. The distributed packet documentation differed from what was given to the teams versus what was available in the game portal, which led to some confusion (the packet documentation was correct, the web portal looked like it was for a different scenario entirely).
- (MD) I was not directly involved in the setup for this event. However, from everything I observed the vendor and the instructor running the event worked together smoothly.
- (MD) The vendor walked me through the technical details of their setup as well as allowed me a hands-on demonstration in addition to observing the competitors.
- (MO) However, when testing the night before, we needed to 'convince" the vendor there was a problem. they said it was the network and we had to provide evidence it was their resources
- (MO) Documentation was too verbose, and lousy. Staff was difficult to get a hold of and stopped returning phone calls until we started including Karen on the e-mail thread.
- (VA) The vendor has premeetings but, this one was done differently with the vendor being on site
- (VA) Just barely though. A handout would have helped greatly.
- (VA) I presume the "vendor" in this instance is the group brought in on Friday to run the CTF event. The team did a good job in explaining the constraints and objectives for the competition. The guidelines were clear, concise, and fairly well planned out. Also, the team remained accessible throughout the competition.
- (VA) They did a great job with presenting the rules and how everything was being recorded.
- (VA) The individual courses were fine but did not provide a framework for thinking about security issues
- (VA) The instructions were clear.

- (VA) Yes the vendor was helpful. The instructions about the range of IPs allowed to attack, about team leaders, scoring, etc., were clear. The set up needed was minimal, almost non-existent, we just connected the cables and everything was up and running.
- (VA) Tim was very succinct and didn't mince his words, as usual. :D
- (VA) The vender explained the scope of the CTF and what was out of bounds.
- (VA) Registration and day one had most people standing in a big group asking each other where we where supposed to go, and what we we're supposed to be doing
- (VA) Everything went very smoothly as well as did a great job keeping to our schedule. SANS did a great job crunching everything into a small time frame while still keeping everything very easy to follow and understand.
- (VA) Yes, the vendor spent a good 45 minutes before the event explaining how things would work and how the scoring worked. In addition he did a PowerPoint presentation explaining the same information to the campers.

## *Question 2: On a scale of 1-5, how would you rate the quality of the technical documentation provided by the vendor?*



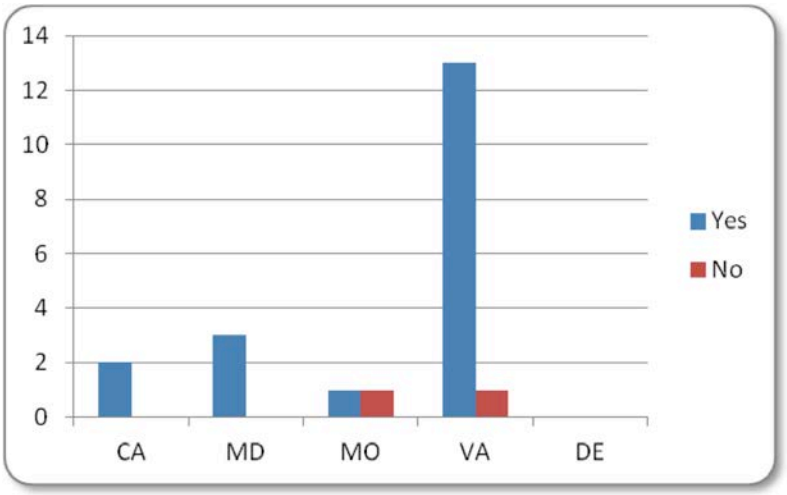

| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **1, Inadequate** | 0 | 0 | 0 | 2 | 0 | 2 | 8.70% |
| **2, Poor** | 0 | 0 | 1 | 0 | 0 | 1 | 4.35% |
| **3, Acceptable** | 2 | 2 | 1 | 1 | 0 | 6 | 26.09% |
| **4, Good** | 0 | 0 | 0 | 7 | 0 | 7 | 30.43% |
| **5, Excellent** | 0 | 1 | 0 | 5 | 0 | 6 | 26.09% |
| **No Response** | 0 | 1 | 0 | 0 | 0 | 1 | 4.35% |

Comments

- (CA) The document for the users is very long. Many of the participants did not read it all. One TA redid the document for ease of use for the campers.
- (CA) The key piece of missing information was related to the Service Pack requirements for Win7 64bit. Otherwise the documentation was relatively accurate and complete. Some confusion was found during the registration for the flag system, and the ticketing system does not specify which set of credentials (registered attacker creds vs VPN creds) to use when logging in, which led to more confusion. Also, SSH on the BackTrack hosts was broken at the beginning of the competition, and required manual intervention from a working RD session to get working after receiving the proper commands from SAIC.
- (MD) Since the vendor sent someone to the site to help run the event there were no notable technical hiccups.
- (MD)There was not much physical documentation, but the usage was straight forward. There was not highly complicated instructions on how to interact with the environment.
- (MO) Note; the comment regarding the TA redoing the documentation is really for the MO camp not the CA camp. The documentation is long.
- (MO) Documentation was 15 pages of mostly useless screenshots. While it provided some details of what was happening, it also left many key questions out from the campers.
- (VA) If you take into account the presentation on Friday morning. The paper documents were not sufficient on their own
- (VA) There was none.
- (VA) There were no documented rules to review prior to the event. The documentation that we did receive had incorrect information in it...
- (VA) They did not provide any technical documentation at all.

- (VA) The vendor did not provide technical documentation, because technical documentation was not needed. The vendor said: here are the IP addresses, this is how you get points.
- (VA) There was a slight lack of documentation on purpose which encouraged students to figure problems out on their own without having someone hold their hands in the process.
- (VA) No documentation was provided, just quick slides. Had to count on hand written notes.
- (VA) Very informative and well prepared. Didn't have too many problems keeping up with the lessons even though they were pretty fast paced, everything was very well laid out and extremely well prepared in advance. Minor bugs during the wireless lab had me behind, TAs did great helping me solve my issue, but they had to shut the lab down, as some students were tampering with the equipment, but I will go back and try the lab at a later date.
- (VA) The simple 4-5 page draft documentation gave a quick overview of how things were going to work so TA's had background information. The PowerPoint on the day of the CTF went through and explained things even better.

## Question 3: Did the competition appear to provide the technical challenge for the class?



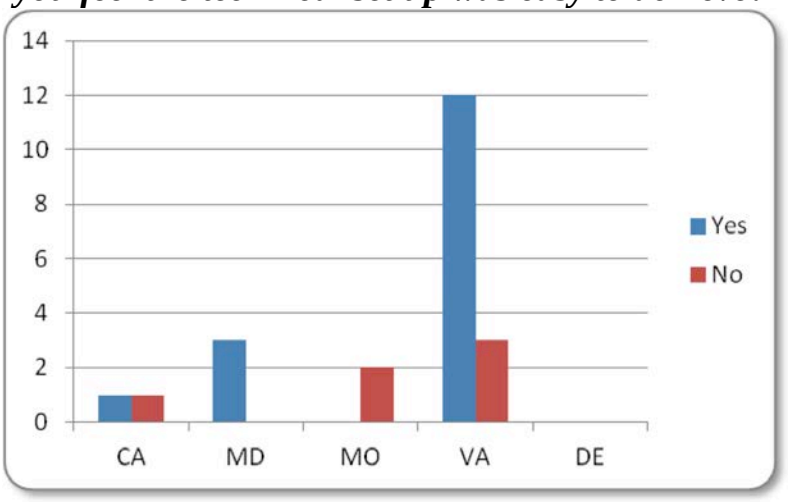

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| Yes Responses | 2 | 3 | 1 | 13 | 0 | 19 |
| Yes Percentage | 100.00% | 100.00% | 50.00% | 92.86% | 0.00% | 90.48% |
| No Responses | 0 | 0 | 1 | 1 | 0 | 2 |
| No Percentage | 0.00% | 0.00% | 50.00% | 7.14% | 0.00% | 9.52% |
| No (Blank) Response | 0 | 0 | 0 | 1 | 0 | 1 |

Comments

- (CA) It was a little hard to understand exactly how/what it is doing but, the classes enjoyed the competition.
- (CA) The more correct answer is yes and no. For those familiar with OS-level exploits, the challenge level was acceptable. The scenario presented had no application level exploits, which left many competitors high and dry with little to do. Note that application-level exploits were covered during the camp for the week, and it would be reasonable to expect that these skills could be utilized during the competition. In my opinion, the attack surface was too small for the scope of the competition. Almost every target required an initial pivot through a single compromised host. If a competitor couldn't determine this fact, or was unable to compromise the initial host, most of the game went unscored.
- (MD) Yes. The students all appeared engaged throughout the competition. Since there was a tie for one of the categories, perhaps slightly more difficult material could be used for some of the challenges.
- (MD) The technical challenge was not given in one all-in-one format, as other solutions might be. This was administered by two people onsite that were communicating with a few people offsite for scoring. These positions were not overtly challenging and would not require highly technical staffing. Some security/networking/sysadmin experience is though - a local community college professor proctored the competition.
- (MO) We made some adjustments on our part therefore the teams seemed evenly distributed in talent
- (MO) The one person who really knew metasploit took half of the boxes in the first 45 minutes. Those that did not know metasploit were very frustrated. There was almost no diversity in the challenge, it was all the same stuff.
- (VA) This done due to the presentation seems to be understandable in how it works
- (VA) Very Challenging. I'd suggest the challenge would be difficult for folks who were not prepared.
- (VA) The challenges were really good.

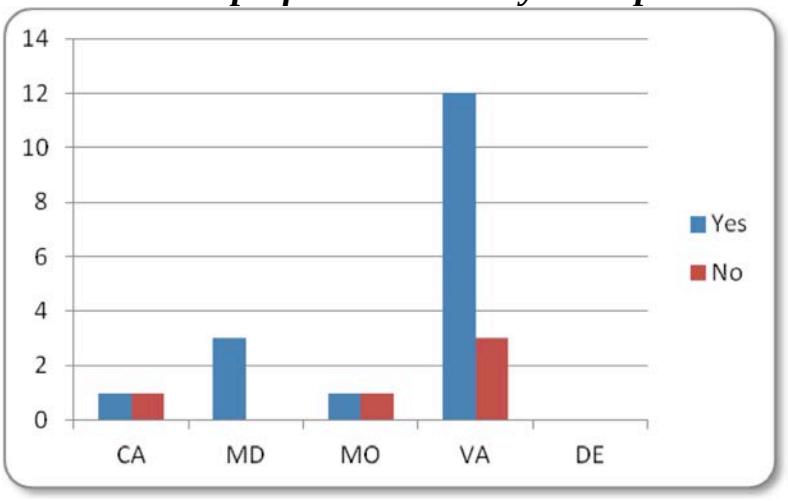
- (VA) There was some confusion as to if it was going to be a net war or capture the flag format and what those would mean.
- (VA) It was a challenge..
- (VA) The CTF was great, but not enough information was disseminated before or at the beginning of the event.
- (VA) Yes, the competition was challenging and the challenges covered a good range of attacks and techniques, from SQL injection to privilege escalation, reverse engineering, and so on. Even the group that got first managed to get only few of the targets.
- (VA) The CTF was great fun. The wide variety of targets gave the ctf diversity for many people. People with no pentesting experience could play with other challenges to score points.
- (VA) Definitely a challenge for me, and from talking to the other participants, no matter the skill level, everyone was learning new and important things.
- (VA) Yes, there were various levels of challenges within the competition. Unlike MO, there were very few frustrated faces throughout the CTF, showing there were challenges that were at least able to be worked on. At the same time there were many more complicated puzzles that were never solved.

## *Question 4: Do you feel the technical set up was easy to achieve?*



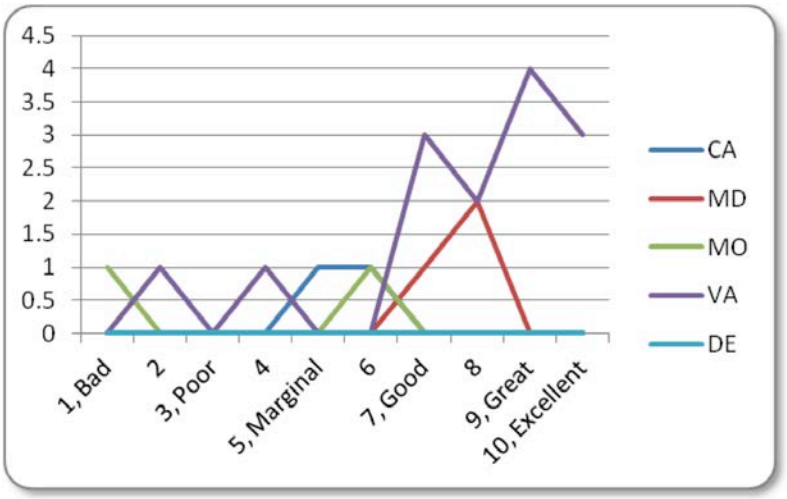

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Yes Responses** | 1 | 3 | 0 | 12 | 0 | 16 |
| **Yes Percentage** | 50.00% | 100.00% | 0.00% | 80.00% | 0.00% | 72.73% |
| **No Responses** | 1 | 0 | 2 | 3 | 0 | 6 |
| **No Percentage** | 50.00% | 0.00% | 100.00% | 20.00% | 0.00% | 27.27% |
| **No (Blank) Response** | 0 | 0 | 0 | 0 | 0 | 0 |

## *Question 5: Did the technical performance meet your expectations?*



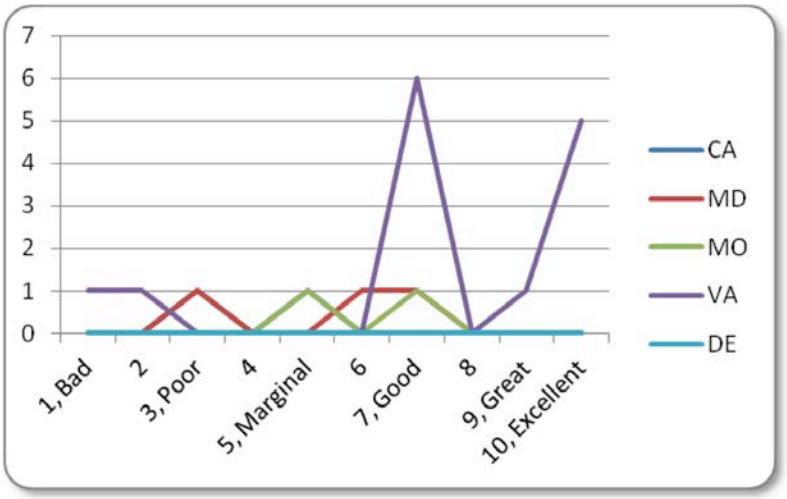

| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Yes Responses** | 1 | 3 | 1 | 12 | 0 | 17 |
| **Yes Percentage** | 50.00% | 100.00% | 50.00% | 80.00% | 0.00% | 77.27% |
| **No Responses** | 1 | 0 | 1 | 3 | 0 | 5 |
| **No Percentage** | 50.00% | 0.00% | 50.00% | 20.00% | 0.00% | 22.73% |
| **No (Blank) Response** | 0 | 1 | 0 | 0 | 0 | 1 |

## *Question 6: On a scale of 1-10, what is your overall evaluation of this course/ event?*



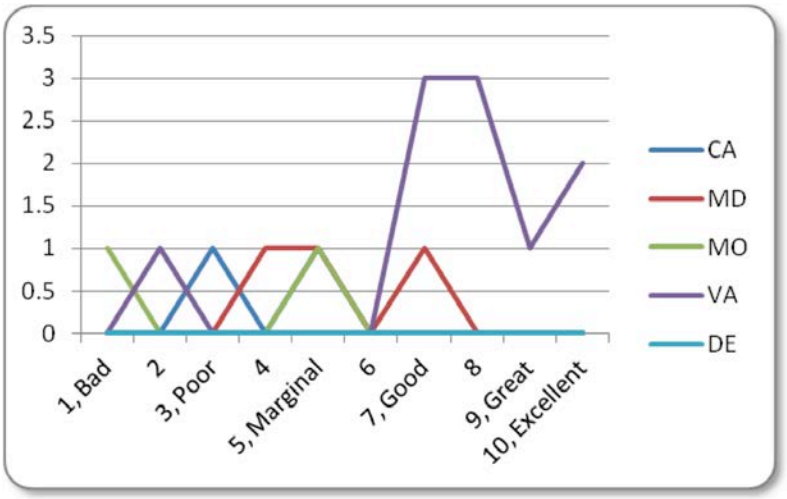

| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **1, Bad** | 0 | 0 | 1 | 0 | 0 | 1 | 4.35% |
| **2** | 0 | 0 | 0 | 1 | 0 | 1 | 4.35% |
| **3, Poor** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **4** | 0 | 0 | 0 | 1 | 0 | 1 | 4.35% |
| **5, Marginal** | 1 | 0 | 0 | 0 | 0 | 1 | 4.35% |
| **6** | 1 | 0 | 1 | 0 | 0 | 2 | 8.70% |
| **7, Good** | 0 | 1 | 0 | 3 | 0 | 4 | 17.39% |
| **8** | 0 | 2 | 0 | 2 | 0 | 4 | 17.39% |
| **9, Great** | 0 | 0 | 0 | 4 | 0 | 4 | 17.39% |
| **10, Excellent** | 0 | 0 | 0 | 3 | 0 | 3 | 13.04% |
| **No Response** | 0 | 1 | 0 | 1 | 0 | 2 | 8.70% |

## *Question 7: On a scale of 1-10, what is your evaluation of the scoreboard display?*



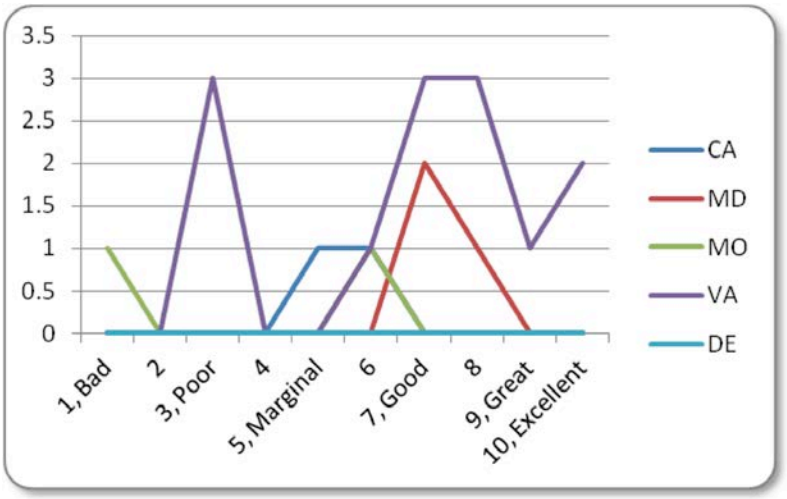

| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **1, Bad** | 0 | 0 | 0 | 1 | 0 | 1 | 4.35% |
| **2** | 0 | 0 | 0 | 1 | 0 | 1 | 4.35% |
| **3, Poor** | 1 | 1 | 0 | 0 | 0 | 2 | 8.70% |
| **4** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **5, Marginal** | 1 | 0 | 1 | 0 | 0 | 2 | 8.70% |
| **6** | 0 | 1 | 0 | 0 | 0 | 1 | 4.35% |
| **7, Good** | 0 | 1 | 1 | 6 | 0 | 8 | 34.78% |
| **8** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **9, Great** | 0 | 0 | 0 | 1 | 0 | 1 | 4.35% |
| **10, Excellent** | 0 | 0 | 0 | 5 | 0 | 5 | 21.74% |
| **No Response** | 0 | 1 | 0 | 1 | 0 | 2 | 8.70% |

## *Question 8: On a scale of 1-10, what is your evaluation of the network display for the TAs?*




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **1, Bad** | 0 | 0 | 1 | 0 | 0 | 1 | 4.35% |
| **2** | 0 | 0 | 0 | 1 | 0 | 1 | 4.35% |
| **3, Poor** | 1 | 0 | 0 | 0 | 0 | 1 | 4.35% |
| **4** | 0 | 1 | 0 | 0 | 0 | 1 | 4.35% |
| **5, Marginal** | 1 | 1 | 1 | 0 | 0 | 3 | 13.04% |
| **6** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **7, Good** | 0 | 1 | 0 | 3 | 0 | 4 | 17.39% |
| **8** | 0 | 0 | 0 | 3 | 0 | 3 | 13.04% |
| **9, Great** | 0 | 0 | 0 | 1 | 0 | 1 | 4.35% |
| **10, Excellent** | 0 | 0 | 0 | 2 | 0 | 2 | 8.70% |
| **No Response** | 0 | 1 | 0 | 5 | 0 | 6 | 26.09% |

***Question 9: On a scale of 1-10, what is your evaluation of the ease of use for the technical solution?***




| | CA | MD | MO | VA | DE | Total | Percent |
|---|---|---|---|---|---|---|---|
| **1, Bad** | 0 | 0 | 1 | 0 | 0 | 1 | 4.35% |
| **2** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **3, Poor** | 0 | 0 | 0 | 3 | 0 | 3 | 13.04% |
| **4** | 0 | 0 | 0 | 0 | 0 | 0 | 0.00% |
| **5, Marginal** | 1 | 0 | 0 | 0 | 0 | 1 | 4.35% |
| **6** | 1 | 0 | 1 | 1 | 0 | 3 | 13.04% |
| **7, Good** | 0 | 2 | 0 | 3 | 0 | 5 | 21.74% |
| **8** | 0 | 1 | 0 | 3 | 0 | 4 | 17.39% |
| **9, Great** | 0 | 0 | 0 | 1 | 0 | 1 | 4.35% |
| **10, Excellent** | 0 | 0 | 0 | 2 | 0 | 2 | 8.70% |
| **No Response** | 0 | 1 | 0 | 2 | 0 | 3 | 13.04% |

## *Question 10: Would you use this solution for your upcoming activities?*

- (CA) I would have to know a little more about the system design. Additionally, I believe the scoring could be improved upon.
- (CA) No. I would use the solution provided for last year's competition deployed in a slightly different way. I also have other solutions that may be useful.
- (MD) I was not the primary person running this competition but I would contact the individuals involved in running this competition in the future if I were in charge of running a similar cyber security event since this event went well.
- (MD) Yes, but not for highly interactive competitions. This is a good environment for beginners, as well as for less formal activities.
- (MD) yes
- (MO) Yes upon further understanding the of the scoring mechanisms
- (MO) I definitely would not use this solution again. The Java Applet VPN was flaky, the scoreboard and other pages kept going down, the scoring method was awful, and there was no diversity of the challenges. There wasn't a single webapp in the challenge!
- (VA) yes but we are testing virutally next.
- (VA) Yes, but I would supply participants with a VMware appliance with tools needed to compete.
- (VA) I would say that the CTF competition is an exciting challenge for the camp participants, and as a participant I enjoyed it quite a bit. Given the chance, yes, I would at least consider using such an option.
- (VA) Yes
- (VA) yes
- (VA) no
- (VA) Yes, I would definitely use it.
- (VA) If I was to arrange a CTF competition, I would absolutely utilize Tim's team.
- (VA) No
- (VA) Yes, something similar could definitely turn into a big activity that could catch on around the world.
- (VA) Yes, and I will continue to learn based off of the information learned this week.
- (VA) Yes, without a doubt I would use this company again.

## *Question 11: What are the strengths of this competition?*

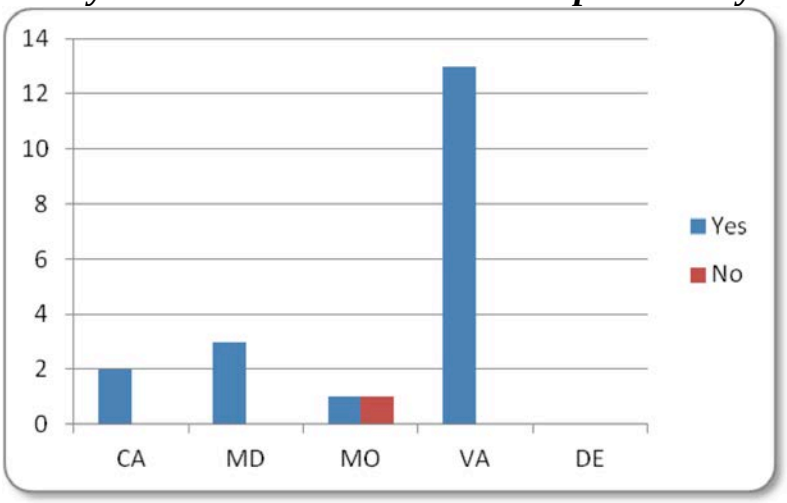
- (CA) We could run the competition virtually and the resources were available throughout the competition.
- (CA) Other than the client VPN installation, there is little setup involved for the hosting site prior to the competition. The automated flag system could use some work in terms of user-friendliness, but it did work.
- (MD) The opportunity for the students to work together and interact with live machines.
- (MD) It was flexible - the competitors were not as skilled as others, so the competition was tailored to meet their needs on the fly. It was not highly competitive either - the competitors appeared to enjoy themselves. The organization also tested on a broad array of topics that are sometimes excluded from other competitive environments.
- (MD) Actually measuring skills covered in preceding days of summer camp
- (MO) It does run virtually and the vendor is supportive of their services
- (MO) None at all. I was greatly disappointed.
- (VA) There are good visuals and the explanations along with the flexibility of scoring seemed to accommodate concerns raised by camp hosts
- (VA) Folks who are experienced, skilled, and, practiced will really stand out.
- (VA) The way the teams were used was done very well. It provided a breadth of skills and skill levels to each team, and the anonymous assignment prevented intentionally stacked teams and encouraged communication and outreach.
- (VA) More realistic and more fun when placed in competitive environment
- (VA) Very challenging, not too hard to accomplish, great music.
- (VA) very challenging
- (VA) the network and challenges were good, but the service providers did not give much information or have anywhere you could re-check would they said if you had any questions about the instructions.
- (VA) The variety of challenges is a strength. It offers more opportunities to score. The team set up is also good, different team members can focus on different objectives.
- (VA) The wide range of challenges in various field of computer security
- (VA) Good structure and organized
- (VA) Range of networks with unknown vulnerabilities that people can exercise theory and have fun on.
- (VA) Great networking skills with peers as well as people in the field. Great learning experience. Great way to find out what others are doing and how they do it.
- (VA) There was a wide diversity in both types of challenges, and complexity of these challenges.

## *Question 12: What are the areas for improvements for this event/ competition?*

- (CA) I think the scoring and visuals could be enhanced
- (CA) Better OS compatibility information. Larger attack surface in the scenario. Application-level exploits should be available in the competition. Testing scenario should better represent the actual competition setup. The problems with Win7 were not realized until the day of the competition because the test environment did not match with the production environment.
- (MD) Ability to scale the difficulty of the different challenges easily to account for different ability levels between different groups of students.
- (MD) There is no realtime scoreboard or displays for the public. If it could improve its automation, that would also be helpful. It also is not scalable for a single event - one that might host 1000 players.
- (MD) More content designed around security
- (MO) visuals. You have to keep updating yourself vs automatically with the updating of the scoring
- (MO) 1) Use a real VPN client like Cisco, rather than a Java client that is flaky even within a uniform environment like a computer lab. 2) Get systems built to handle the expected load of people (30). It was ridiculous how often the scoring system, scoreboard, or the entire VPN went down. 3) The vendor should test their own environment beforhand. A simple NMAP scan of a single host and limited ports should not have taken well over 30 minutes, and the VENDOR should have found this, not us. Its a good thing we insisted on testing on Thursday or the entire event would have been a loss. 4) Put diversity into the environment, of different types of challenges and different levels of challenges. Everything should not be about metasploit on unpatched systems. There should be web apps with SQL Injection, command injection, unprotected admin pages, etc. There should be FTP with vulnerabilities, and various levels of other issues. It shouldn't be all about autopawn. 4) Get rid of the need to know the host name to submit a ticket. Students were extremely frustrated that they couldn't submit anything until they knew which host name went along with the IP they attacked. Add in the fact that reverse DNS was broken in the environment, and no one even had a good way to determine the host name without cheating and looking at the "host status" display, which was never officially told to them existed. 5) Change the scoring system so that getting root gives a lot more points than everything else. Once you have root, you can get the rest of the points. As a result if its not weighted this way, getting root causes you to win the competition. 6) Fix bugs in the scoring system. If you're going to require the host listed on the scoring system, then only items submitted for that host should work to give you points. You shouldn't be able to submit an NMAP scan of Host A, for all hosts A-Z, and get points. People were completely playing the scoring system in this way.
- (VA) The documentation will need to be addressed. it appears they seem to like to run physically on site which may be a problem for the future
- (VA) It should also be tuned to be a fun learning experience rather than pure technical muscle flexing.
- (VA) In the future, the competition space needs to be planned better. In the auditorium, with hard lines snaked around the room and switches balanced on armrests, the hardware was at risk and there were safety concerns. Furthermore, all of the teams were essentially on top of each other and it was difficult to avoid shoulder surfing. I don't think that the switches should necessarily have been accessible to the players, given some of the offensive-type behaviors in use.
- (VA) Network was a little slow
- (VA) Preventing the switches from being attacked.
- (VA) The survey that was used to determine the teams had very little to do with a player's ability to compromise systems (except the SQL injection and XSS questions)
- (VA) give out more information prior to the event. give a print out of the rules, scoring, and expectations at the event.
- (VA) From a technical point of view, I cannot think of anything to improve. Minor things for improvement are related to environment where it can take place. Having tables for example, instead of just seats, one team per table. Also, I would have liked to have a bit more time, maybe one more hour.

- (VA) The auditorium wasn't the best location for the tournament. And, as in most CTFs, there wasn't enough time for the competition. There were several challenges I was really eager to try but didn't have time to.
- (VA) Better gear,  systems were very unstable
- (VA) Longer time frame, more preparation time for teams (announcing of teams earlier).
- (VA) Coffee/Caffeine at all times. Let people know further in advance for the wireless parts, as getting them sent in time cost me 5 times what the part cost.
- (VA) The challenge might need a few more "intermediate" puzzles. The point progression for about half the teams stagnated about 1.5hrs away from the CTF close.

## *Question 13: Would you recommend this event/ competition to your peers?*




| | CA | MD | MO | VA | DE | Total |
|---|---|---|---|---|---|---|
| **Yes Responses** | 2 | 3 | 1 | 13 | 0 | 19 |
| **Yes Percentage** | 100.00% | 100.00% | 50.00% | 100.00% | 0.00% | 95.00% |
| **No Responses** | 0 | 0 | 1 | 0 | 0 | 1 |
| **No Percentage** | 0.00% | 0.00% | 50.00% | 0.00% | 0.00% | 5.00% |
| **No (Blank) Response** | 0 | 1 | 0 | 2 | 0 | 3 |

## *Question 14: If you have any additional comments or feedback, please provide it here.*

- (CA) I do appreciate the commitment of the vendor to make the event successful.
- (MD) I think the camp provided a valuable learning experience for the students and high school technology teachers involved. It taught relevant material in an engaging fashion that kept most students interested throughout the week. Being able to further subdivide between students of different experience and skill levels could help improve the experience for both the students and teachers. Also, more interaction with younger (20s and early 30s) speakers and role models in cyber security throughout the week would be beneficial to help the students better relate to people involved in the field.
- (MD) Good environment for beginners, high school students, and informal things that less technical organizers might want to use.
- (MO) This capture the flag was a real disappointment, and required a lot of work for the TA's as a result. This vendor clearly has not done this very much before.
- (VA) SANS NetWars was a better experience for me.
- (VA) I would, again, like to thank the organizers, teachers, and TAs for contributing the time, effort, and passion to put on an exemplary camp. It was definitely a worthwhile use of my time, and I would do it again if I got the chance.
- (VA) na
- (VA) It was a great week, I learned very much and, most importantly, l learned where to look for the rest of things that I do not know. The contact with both the SANS instructors and other participants who were more knowledgeable than me was a great experience. I really hope this event is repeated and spread in every state and major city of the US. This type of event is in my opinion the best way to get young people interested in security. With respect to more traditional security classes in many universities, it shows practical aspects, tools and some types of attacks, it is a lot of fun. At the same time, seeing how certain types of attacks work in practice, seeing them actually happen in front of your eyes, raises awareness about risks in cybersecurity so much more than just reading about them on the news, or seeing them explained theoretically from 10 miles high in a powerpoint slide. I hope this event will be repeated in the future, I will try to go again and will recommend it to everybody in my university.
- (VA) Another great CTF by Tim's team! Thanks and I look forward to the next one!
- (VA) Great fun, excellent experience. Learned allot of strengths and weaknesses.
- (VA) This CTF was extremely professional and well organized. The members of Insight were easy to get a hold of, and helpful whenever addressed.

| | SAIC CyberNEXS | iSIGHT Partners | CSSIA |
|---|---|---|---|
| **Ease of use** | • Lacked complete documentation<br>• Easy-to-use out of the box solution once setup | • Easy-to-use out of the box solution | • No documentation since the tool was custom<br>• Need technical knowledge to utilize |
| **Technical capabilities** | • Available as a virtual or local hardware capability, only virtual used in 2011<br>• Very specific system requirements to access virtual platform | • Available as a virtual or local hardware capability, virtual and local used in 2011<br>• Local solution with on-site SME provided best CTF implementation experience | • Requires deep knowledge of specific hardware, operating system and configurations used in environment |
| **End User experience** | • Survey data suggests the tool provided a good challenge<br>• Interviews suggest this tool was more complex to use and mange for the CTF event | • Survey data suggests the tool provided a good challenge<br>• Interviews suggest this tool was easier to use and mange for the CTF event | • Highly customizable because the platform is built from the ground up |
| **Scoreboard display** | • Automated scoring capability included<br>• Scoring algorithm was unclear and not very customizable | • Automated scoring capability included<br>• Highly customizable scoring configuration | |
| **Scalability** | • Very scalable<br>• Requires significant preparation time to understand and become proficient in the implementation of the tool | • Very scalable<br>• Requires preparation time to understand and become proficient in the implementation of the tool | • The custom solution was built on donated hardware and suffered from significant scalability issues |
| **Costs** | • Provided free for USCC 2011 use<br>• Undetermined future costs | • Provided at a small fee for USCC 2011 use<br>• Undetermined future costs | • Built on donated hardware for USCC 2010<br>• Undetermined future costs |

# *Appendix: Technical Configurations*

Each of the tools piloted in the 2011 Camp CTFs had differing technical specifications and requirements. Below is a brief summary of estimated costs from the original "Issue Paper for CTF".

1. The CSSIA environment needs to have equipment in place and the estimated cost for the equipment is $6,900.
2. iSight Partners is a virtual environment where you pick the type of the equipment and competitions you want to run. The more complicated the greater the costs. The initial estimate provided was $160,000 (This is their commercial offering price).
3. SAIC CyberNEXS has many options and therefore has many associated costs.

As a specific example of the technical infrastructure required for these solutions, the SAIC solution had the following requirements.

Hardware Minimum Requirements are as follows:

1. Windows/Macintosh/Linux computer that is supported by the SSL VPN server
2. 1 Ghz or higher processor;
3. 1 GB RAM;
4. Keyboard & Mouse;
5. 1024x768 or higher display; and,
6. Network connection from computer(s) to Internet. (As specified in Network Requirements listed below)

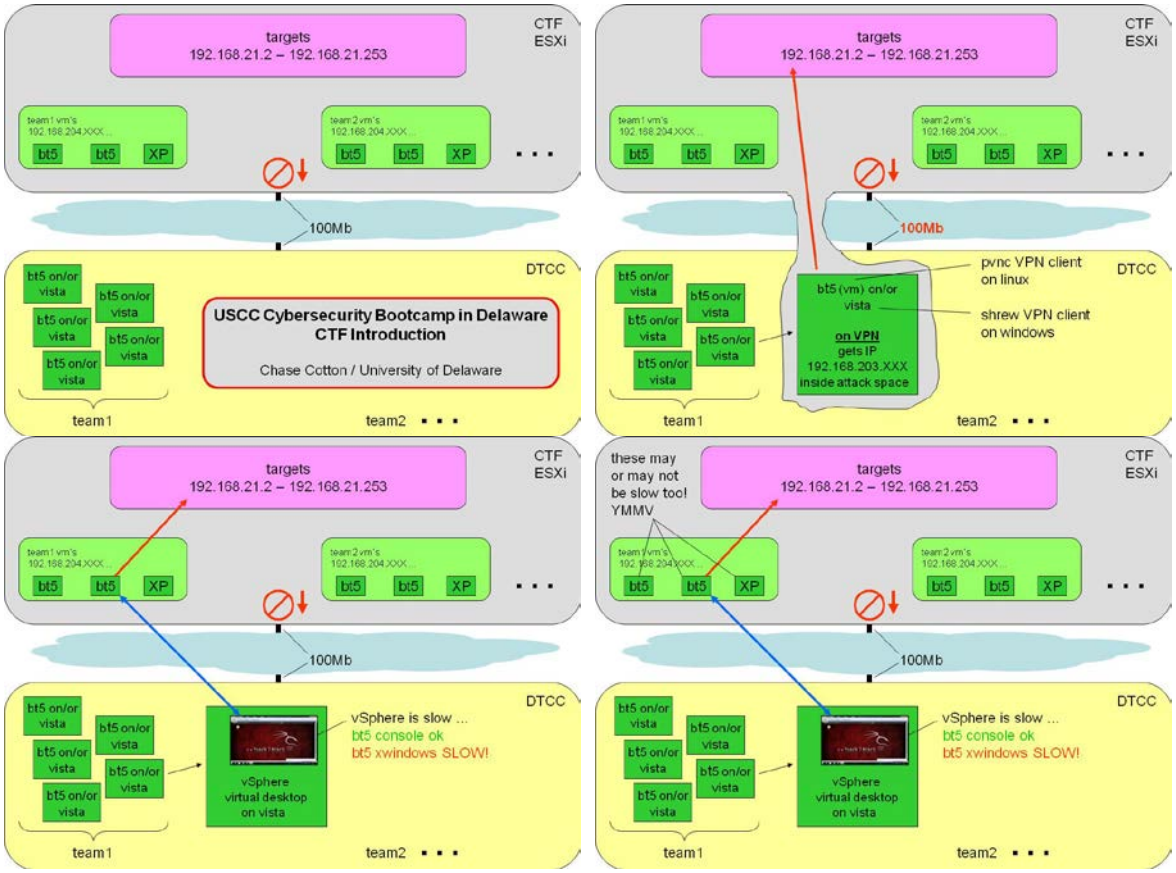
Software Requirements are as follows:

1. Web Browser (JavaScript capable)
2. 2SSH Client (Freeware);
3. VPN Client (Freeware);
4. Telnet;
5. RDC (Remote Desktop Connection); and,
6. VNC (Virtual Network Computing) (Freeware).

Network Requirements are as follows:

A. Each user needs a network connection with a minimum of 256Kbps internet connectivity (uplink and downlink) and under 150 ms response time to SAIC VPN
B. Network firewalls and/or Web Proxies should permit out-bound SSL VPN connections to cybernexs-vpn.saic.com.

For further reference, below are instructional illustrations of the technical configuration for the CTF environment implemented at the 2011 Delaware camp.




An additional component of the CTF platforms was the scoring engine and score board display. Below are illustrations of the score boards from the 2011 Camps.

2011 California CTF Results

Exercise Team Scores

| Team List | ANIMAL | BEARER | FOZZIEBEAR | GONZO | [redacted] | Kermit | MePiggy | Statler | [redacted] | SwedeSki-Chef | Waldorf | Team Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Team Rocket | 125.00 | 0.00 | 0.00 | 0.00 | 4875.00 | 0.00 | 825.00 | 825.00 | 2600.00 | 825.00 | 14100.00 | 24175 |
| mm | 400.00 | 275.00 | 275.00 | 275.00 | 500.00 | 0.00 | 275.00 | 3600.00 | 50.00 | 0.00 | 325.00 | 5975 |
| Team_1 | 0.00 | 25.00 | 0.00 | 0.00 | 75.00 | 0.00 | 25.00 | 0.00 | 3875.00 | 0.00 | 0.00 | 4000 |
| Noble6 | 0.00 | 0.00 | 0.00 | 0.00 | 50.00 | 0.00 | 0.00 | 3450.00 | 75.00 | 0.00 | 0.00 | 3575 |
| Team_2 | 700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25.00 | 0.00 | 125.00 | 850 |
| Noble6_Team | 0.00 | 0.00 | 0.00 | 0.00 | 500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 500 |
| RED_TEAM_5 | 0.00 | 0.00 | 0.00 | 0.00 | 75.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 75.00 | 250 |
| Team_3 | 150.00 | 0.00 | 0.00 | 0.00 | 50.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 200 |
| Team Name | 25.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25 |
| Team_10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| DisturbedMime | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |

Return to Status Display Menu

**Attacker Scores**

| Rank | Attacker Name | Team Name | Flags Planted | Overall Score | Date Accomplished |
|---|---|---|---|---|---|
| 1 | Steve | Team Rocket | 1 | 16100.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 2 | rw | mm | 0 | 4700.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 3 | Kos | Team_1 | 0 | 3800.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 4 | T | Noble6 | 0 | 3450.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 5 | Stacey | Team Rocket | 1 | 2075.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 6 | MisterU | Team Rocket | 1 | 2000.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 7 | EdwardW | Team Rocket | 1 | 2000.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 8 | grayjack | Team Rocket | 1 | 2000.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 9 | CyberNinjaFighterPilot | Team_2 | 0 | 850.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 10 | Noble6 | Noble6_Team | 0 | 500.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 11 | RED_TEAM_5 | RED_TEAM_5 | 0 | 250.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 12 | rockin_mac | Team_1 | 0 | 150.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 13 | Travis | Team_3 | 0 | 125.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 14 | zen8 | mm | 0 | 100.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 15 | Team_3 | Team_3 | 0 | 75.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 16 | Quaz_Wu | Team_1 | 0 | 25.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 17 | gradius | mm | 0 | 0.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 18 | epadmik | Team_3 | 0 | 0.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 19 | penddraig | Team_1 | 0 | 0.0 | Fri Jul 15 14:00:25 PDT 2011 |
| 20 | icarus | Team_2 | 0 | 0.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 21 | HeroJoe | mm | 0 | 0.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 22 | MacNinja | Team_1 | 0 | 0.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 23 | attack | Team_3 | 0 | 0.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 24 | yo | Team_10 | 0 | 0.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 25 | Curtis | Noble6_Team | 0 | 0.0 | Fri Jul 15 14:00:26 PDT 2011 |
| 26 | DisturbedMime | DisturbedMime | 0 | 0.0 | Fri Jul 15 14:00:26 PDT 2011 |

2011 Virginia CTF Attacker Standings from main scoreboard of scoring engine

| | Handle | Phone Homes | | Flags | | Score |
|---|---|---|---|---|---|---|
| 1st | red2 | 250 | + | 1600 | = | 1850 |
| 2nd | red8 | 625 | + | 800 | = | 1425 |
| 3rd | red4 | 500 | + | 800 | = | 1300 |
| 4th | red6 | 300 | + | 800 | = | 1100 |
| 5th | red12 | 250 | + | 800 | = | 1050 |
| 6th | red3 | 0 | + | 800 | = | 800 |
| 7th | red14 | 300 | + | 400 | = | 700 |
| 8th | red13 | 250 | + | 400 | = | 650 |
| 9th | red5 | 250 | + | 400 | = | 650 |

## LIST OF SYMBOLS, ABBREVIATIONS, AND ACRONYMS

| | |
|---|---|
| USCC: | United States Cyber Challenge |
| Multi-State ISAC: | Multi-State Information Sharing and Analysis Center |
| CSIS: | Center for Strategic and International Studies |
| GAO: | General Accountability Office |
| IT: | Information Technology |
| #: | Number |
| %: | Percent |
| TAs: | Teaching Assistants |
| MD: | Maryland |
| CTF: | Capture the Flag |