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| Capstone ExperienceIST 894 |
| Cyber Range Evaluation Report |

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# Introduction

In this report I’ll compare three commercially available cyber-ranges. According to Aries Security, a cyber range is a platform that provides hands-on cybersecurity practice to teams of professionals. Cyber ranges provide a secure, legal environment for cybersecurity education, practice, and cyber warfare training (What Is a Cyber Range?, 2020). An organization can host their own cyber range, but they would need to manage the hardware, software, and networking components themselves which can be costly to purcase, license, and maintain. Adding this to the previous definition, it’s evident that the concept of cyber ranges is wide-reaching and incredibly complex to implement in a way that suits the learning styles of your team and is relevant to real-world scenarios that the team will likely face sooner or later. I’ve come up with a rubric to grade various cyber ranges to compare them and see what one is the best overall fit. In this paper I will take a look at some of the most comprehensive cyber ranges in the market today. I’ll be comparing Netwars from SANS, the Infosec Skills Cyber Range, and Rangeforce to see which of these three appears to be the best fit overall.

# Evaluation Rubric

I will be using the below rubric to score the three cyber ranges. For each category they’ll get 5 points for an excellent rank, 3 points for a good rank, and 1 points for a poor rank.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Excellent | Good | Poor |
| Cost  | The cost per user per month is less than $20, or there is a site license available where the equivalent is $20 or less per user | The cost per user per month is between $20 and $50, or there is a site license available where the equivalent is between $20 and $50 per user | The cost per user per month is greater than $50, or there is a site license available where the equivalent is $50 or more per user |
| Capabilities | The environment is able to simulate many interactive events including attacking and defending networks and endpoints in real time and are fully customizable | The environment is able to simulate different events, attacking and defending are based on pre-recorded sessions | The environment has videos and lessons on how to attack and defend but is not interactive |
| Cooperation | Able to take on simulations in teams working together across accounts or environments | Able to work together in a team but on shared infrastructure | Individual events only |
| Training / support | Facilitated sessions either virtual or on-premises | There are support personnel to answer any questions as they arise | There is thorough documentation for walkthroughs in each simulation |
| Accredited / verified | Range is certified or used by large standards or government organization | Range is used by and vouched for by large companies | Range doesn’t have any documented information about any current customers |

# Cyber Range Evaluations

## **SANS NetWars**

The SANS Institute was launched in 1989 as a cooperative for information security thought leadership, it is SANS’ ongoing mission to empower cyber security professionals with the practical skills and knowledge they need to make our world a safer place (About Us | SANS Institute, n.d.).

SANS is traditionally know for it’s week long bootcamp style certificate courses, they certifications are issued through GIAC which is the Global Information Assurance Certification, but they run an independent subsidiary called the SANS Technology Institute which is an accredited institute of higher education by the Middle States Commission on Higher Education and is authorized by the state of Maryland to grant undergraduate and graduate degrees in cyber security. For the undergraduate degrees, students attend a community college to complete their general education requirements, or 70 credits at a 4-year college or university and then bring those credits to SANS where they focus on specific cybersecurity skills. The masters program basically expects students to take a certain number of SANS certification programs, and add on an additional ‘Gold’ requirement where the student writes a white paper showing that they fully understand the content.

SANS NetWars has a large variety of specialties and formats. The two formats are NetWars Tournament and NetWars Continuous. NetWars Tournament runs over a 2-3 day period, generally coinciding with a SANS in-person training event, while NetWars Continuous is a self-paced but much more in-depth set of challenges that are available for a four month period. The different specialties are the following: Core NetWars offers a unique and broad range of cyber security challenges meant for all individuals, Cyber Defense NetWars is a defense-focused competition aimed at testing the students ability to secure systems from compromise, DFIR NetWars focuses on Digital Forensics, Incident Response, and Threat Hunting incident simulators that are designed to simulate real-world scenarios without the risk of compromising an investigation while you’re learning, Grid NetWars is themed for the electricity industry but can be played by all individuals, ICS NetWars is designed for Operational Technology security professionals to provide a hands on experience to prepare them to defend real-time systems, finally NetWars CyberCity is the most in-depth and comprehensive offering from SANS that is designed to show that cyber actions can have kinetic impact in the physical world and utilizes a 1:87 scale mini-city that features a SCADA-controlled electrical system, as well as water, transit, hospital, bank, retail, and residential infrastructures.

For the scoring:

Cost is poor – 1 points

* NetWars Continous is quite expensive by itself at $3,405 or $851 a month, or if bundled with a 4-6 day training it’s $1500 or $375 a month. NetWars Tournaments are generally bundled in with other courses which are quite expensive on their own.

Capabilities are excellent – 5 points

* The environments are incredible interactive and connected. You cannot switch between the different offerings, so if you choose Core or DFIR or something else, that is the scenario you’ll be with the whole time.

Cooperation is excellent – 5 points

* Able to play solo or in a team of up to five players. A scorecard is provided when finished showing the various skills that were utilized or learned.

Training and Support is excellent – 5 points

* There is a very thorough hints system to help you if you get stuck anywhere, you can choose instructor led sessions for an additional cost.

Accredited or Verified is excellent – 5 points

* SANS has an accredited technology institute, but NetWars is utilized by many very large organizations and government units.

## **Infosec Skills Cyber Range**

Infosec Skills is a another company that’s purely focused around cyber security training much like SANS. However, unlike SANS there isn’t as much information readily available about the company. Their website shows that they’ve been in business for the last 16 years, and in that time have trained staff in over 70% of fortune 500 companies, and train over 10,000 security professionals every year and have reached over 5 million learners over the lifetime of the company (Learn Cybersecurity Hands-on with Infosec Skills, n.d.).

Infosec Skills Cyber Range has a nice interactive dashboard and easy to use interface. It allows you to search and take on specific range or get of topics like Secure Coding, Advanced Adversary Tactics, Networking, or Privilege Escalation. Infosec Skills is substantially lower priced than SANS at $599 for a year, but it doesn’t have the same team interaction while going through the lab scenarios. The cyber ranges provide an interactive shell where you’re walked through a scenario, but you’re more or less told what to do for each step and not a lot of thinking power is required for most events. It’s somewhat inconvenient that it expects you to type a specific thing into the window before you’re able to move on to the next step, and if you go backwards to revisit something, it wants you to re-complete every step, it doesn’t remember that it’s been completed previously and just let you skip back forward without challenge. Infosec Labs isn’t accredited, but they have several awards listed on their website for their content, platform, and training, but the awards are from organizations that I’ve never heard of before.

For the scoring:

Cost is good – 3 points

* Infosec Skills Cyber range is $599 a year per person, which is just under $50 a month per user.

Capabilities are good – 3 points

* The environment is able to simulate different events, situations, and scenarios, but it’s not real-time, each step is pre-recorded in a sense and expects you to type in a specific command or phrase to be allowed to pass to the next level.

Cooperation is poor – 1 points

* Infosec Skills range does not support team cooperation in events.

Training and Support is excellent – 5 points

* Most of the events don’t require much assistance as there is a walkthrough on the side that guides you along the way, but for some of the more challenging events hints are provided if needed, but you can upgrade to a list instructor led bootcamp style training.

Accredited or Verified is good – 3 points

* Infosec Skills has awards listed, but not from well known companies. They appear to be used by a good number of companies though.

## **Rangeforce**

Rangeforce is a cyber range that was founded in 2015 after the founders built the NATO Cooperative Cyber Defense Center of Excellence. They saw value in interactive cybersecurity training, and set out to build a scalable, on-demand platform that can train teams and individuals anywhere at any time. The board of directors on Rangeforce include many well known names in the cyber security field, and also several people who previously held very high positions in various government agencies (Cybersecurity Training for Companies | Cybersecurity Training, n.d.).

Rangeforce has a few different offerings such as the CyberSkills Training Platform and the Battle Fortress Cyber Range. Within the CyberSkills Training Platform, Rangeforce utilized a advanced simulation environment utilizes automated attack bots to provide real-time interaction and reflect real-world environments, there is a virtual teaching assistant built into the environment that provides advice when it’s required, it has a comprehensive reporting dashboard, and a gaming engine built in to add in a competitive spirit for teams. Battle Fortress Cyber Range is a hyper-scalable cloud-based cyber range that enables red/blue team exercises in a realistic environment. Battle Fortress creates an entire IT environment, emulates existing tools, and uses real malware and vulnerabilities, the exercises are pre-built so they can be replayed and reused, it allows security teams to train together while maintaining they organizational roles to build better intercommunication skills. Rangeforce CyberSkills Training platform is more of an educational and training environment for individuals to learn new skills, where the Battle Fortress Cyber Range acts more like a table-top exercise where an organization can develop a specific event and have a team detect and respond accordingly while maintaining their roles and organizational responsibilities.

 RangeForce recently came out with a free community edition which provides you with 20 core modules of various skills and proficiencies, otherwise the it’s somewhat difficult to find pricing without receiving an official quote from them but it appears to be around $2000 a person, or $166 a month per user.

For the scoring:

Cost is good – 3 points

* Community edition is free, but the full features will cost you $166 a month.

Capabilities are excellent – 5 points

* There are different environments and are able to simulate different events, situations, and scenarios, for training and real-time defense.

Cooperation is excellent – 5 points

* RangeForce is built to allow teams to interact and cooperate and maintain their organizational roles.

Training and Support is good – 3 points

* There is a virtual training assistant if you need it.

Accredited or Verified is excellent – 5 points

* RangeForce is based on and built from a NATO prototype, and its targeted towards government agencies, but several large organizations like Oracle and Cisco are listed on the website as users. The people on the advisory board also have significant reputations that they are putting on the line behind this company.

# Comparison

|  |  |  |  |
| --- | --- | --- | --- |
|  | SANS NetWars | Infosec Skills | RangeForce |
| Cost  | Poor1 point~$850 a month per user | Good3 points$50 a month per user | Good3 pointsfree community edition, or $166 a month per user |
| Capabilities | Excellent5 points Full featured environment, real-time capabilities | Good3 pointsMany skill sets offered, but interactivity is lacking | Excellent5 pointsFull featured environment, with real-time capabilities and interactivity. |
| Cooperation | Excellent5 pointsCapable of solo play, or in teams of up to five | Poor1 pointIndividual only | Excellent5 pointsCapable of full team table-top style exercises, and solo skill building |
| Training / support | Excellent5 pointsRobust hints in system, instructor led courses available | Excellent5 pointsWalkthrough for each exercise, but hints available, and instructor led bootcamps offered | Good3Virtual training assistant available if help is needed |
| Accredited / verified | Excellent5 pointsCompany is accredited as a higher education institution, but many companies use SANS | Good3 pointsCompany shows several awards, but from organizations that are largely unknown | Excellent5 pointsCompany is verified by several very large companies and government organizations. |
| Total Points | 21 points | 15 points | 21 points |

# Conclusion

When comparing various cyber ranges, it’s appears to be a concept of you get what you pay for. I hold several SANS certifications, and while I’ve never participated in NetWars due to the cost I have heard great things about the environment and the experience. I used Infosec Skills for our labs in IST 543, it’s significantly cheaper and it does have a very large variety of different skill sets to go through, but it’s experience is not as interactive as I hoped for there aren’t really choices to make or things to discover just one specific path that they walk you down. Rangeforce appears to be somewhat in the middle of NetWars and Infosec Skills in pricing, but offers a free community edition and it’s reported capabilities are very similar to what SANS offers in NetWars. Of these three cyber ranges, I think RangeForce has the slight advantage over NetWars just because of cost alone, in the scoring rubric RangeForce is even with NetWars but it’s less then 1/5 the cost. That said, I’ve signed up for the community edition and am anxious to try it out and see how the user experience actually compares.

# References

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