University and Police Partnership in Cybersecurity

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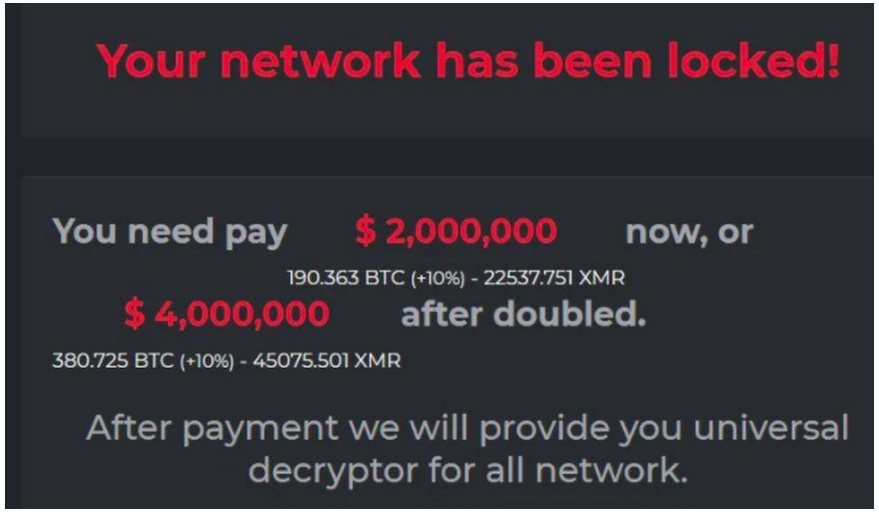
Introduction

- I will talk about –
  - ‘How partnership in ethical hacking and cybersecurity research are helping small and medium businesses?’

Introduction

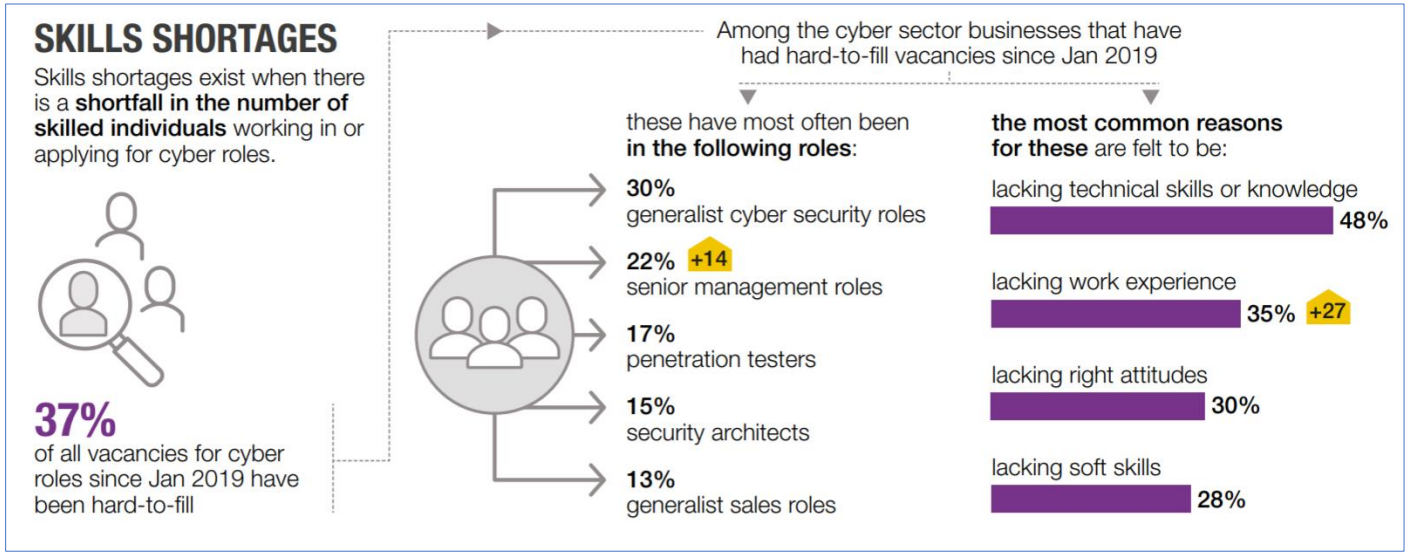
- Recent news of cyberattacks in May 2021:
  - BBC News (10 May) – Colonial Pipeline hack
    - A cyber-criminal gang took a major US fuel pipeline offline through a ransomware cyber-attack.
  - BBC News (20 May) - Cyber-attack on Irish health service
    - Health Service Executive (HSE) chief Paul Reid called the ransomware attack as a "callous act".
  - BBC News (22 May) - Air India cyber-attack
    - Attack on its data servers affected about 4.5 million customers
    - Passport, ticket information and credit-card data were compromised



Introduction

- With increasing cybersecurity attacks and cyber skills shortage, there is clearly a need for cybersecurity experts ☺!

- **Cyber Security Breaches Survey 2021** (Published: 24 March 2021)
  - Four in ten businesses (39%) and a quarter of charities (26%) report having cyber security breaches or attacks in the last 12 months.
  - Like previous years, this is higher among medium businesses (65%), large businesses (64%) and high-income charities (51%)



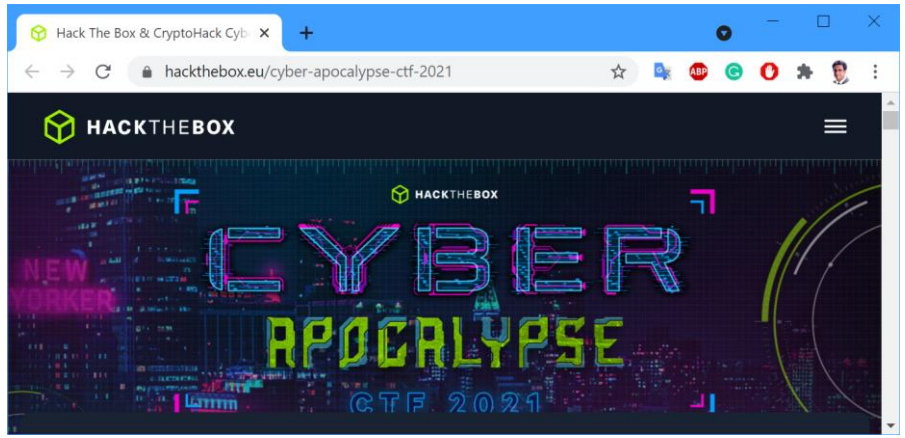
Source (1): https://www.gov.uk/government/statistics/cyber-security-breaches-survey-2021/cyber-security-breaches-survey-2021
Source (2): https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975773/20-012025-01_cyber_skills_2021_UK_cyber_sector_infographic_310321.pdf

Cybersecurity at Northumbria University

- Two great programmes/courses – ‘Computer Networks and Cyber Security’ & ‘Computer and Digital Forensics’
- Around 275 to 300 students in all the years
- Great opportunity, with a pool of talented students ☺!

Cyber Clinic

- Launched in 2018, when I joined Northumbria – seeing the great opportunity
- An informal forum to teach students ethical hacking skills every week (using Kali Linux, CTF etc)
- Student led and run (under my oversight), with guest speakers once in a while – IoC and CIS dept funds the running
- <u>Achievements:</u>
  - Finalists (in top 10 teams) in Cyber Crime Cup 2019 by BCS out of 35 university teams
  - 90th out of 4.7k in Cyber Apocalypse 2021 competition (3 student team competing with 10 member teams)

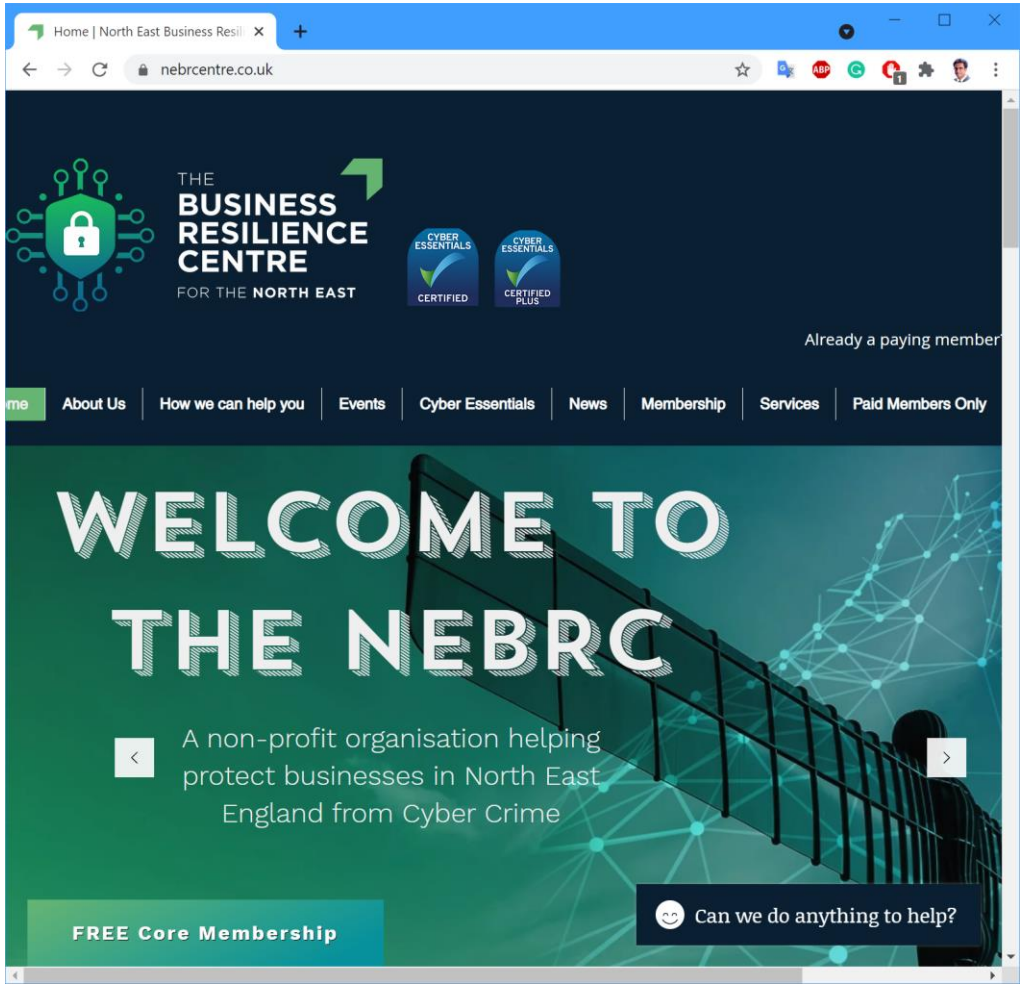


Partnership with NEBRC

- Hearing about Cyber Clinic, we were contacted by the police (from Durham Constabulary) in 2019 for collaboration

- NEBRC is unique in that it uses students to work as ethical hackers, which is a win-win situation

- Currently nine students are employed by NEBRC as part-time paid cybersecurity consultants and further five students have been newly appointed.



Experience of Students

- Three questions were asked to nine NEBRC students

  - What you have done for NEBRC?
  - What you have learned?
  - How has it benefited you?

Experience of Students – (1)

- What you have done for NEBRC?
  - For the most part a lot of work has involved providing essential information to SMEs through the form of infographics.
  - Webinar on ransomware behaviours, risk factors and meaningful mitigation
  - PDF condensed version of the NCSC security advisory guide for board members
  - Two web app vulnerability tests for the NEBRC, as well as created an infographic on general web app testing.

Experience of Students – (2)

- What you have learned?
  - It’s quite difficult to summarise what I have learnt because it has been a constant learning journey.
  - My collaboration with various members and associates of NEBRC has provided me with a lot of insight into how important digital safeguarding and cyber hygiene is for a lot of businesses out there and how fundamental we are to helping bridge the gap between cyber essential strategies and SMEs.
  - Best practise for security
  - Presentation skills
  - Key OSINT (Open Source Intelligence) areas
  - Translating technical details to the layperson
  - Commodity threat landscape awareness
  - Introduction to industry behaviour (meetings and the like were quite alien before this point, still getting used to it)
  - The vulnerability tests were my first introduction to writing reports for vulnerability assessments and have taught me a great deal on what goes into these, including how to phrase findings for different audiences (no technical knowledge vs moderate technical knowledge.)

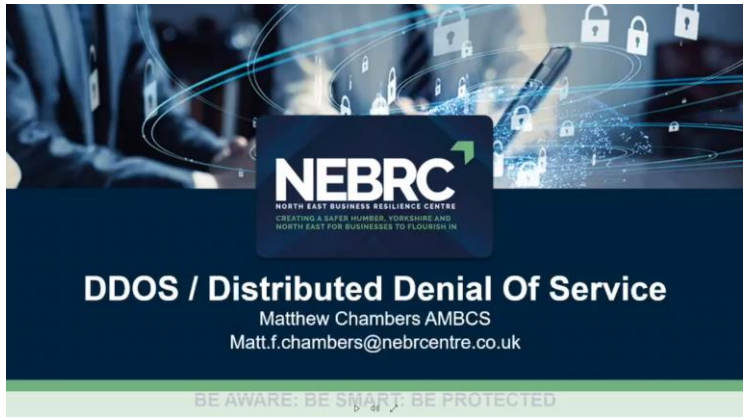
Experience of Students – (3)

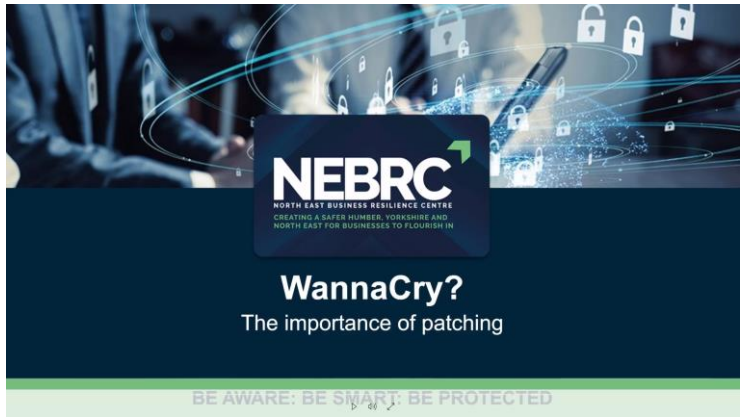
- How has it benefited you?
  - I’ve learnt a lot about the ways different tools and techniques can be used against SMEs and various mitigation factors from more knowledgeable senior members of NEBRC as well as the other students
  - Free training on top of Uni is helpful
  - Eventual exposure to industry will be nice, and controlled to our comfort level
  - A nice first job that is supporting of cyber preference and skillset
  - I have had many workplaces point it out as a notable part of my CV
  - The vulnerability tests themselves have also allowed me to gain experience in this area which will be very useful for my future.
  - I also recently took on a more supervisory role in a web app test, which involved me meeting with the client, scoping the test, and helping, working with, and supervising other students on the test. This again will provide me with a great deal of valuable experience when I eventually graduate from university.

Infographics by NEBRC students

Infographics by NEBRC students

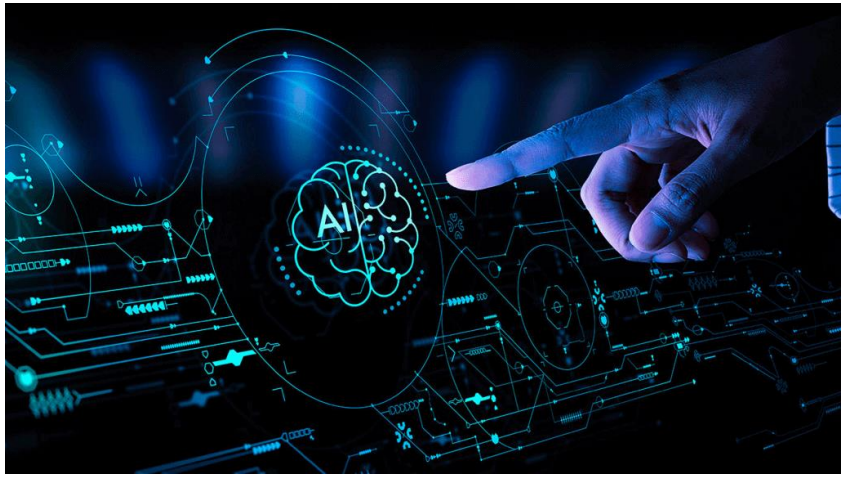
Videos by NEBRC students





Cybersecurity Research (UG and PG students)

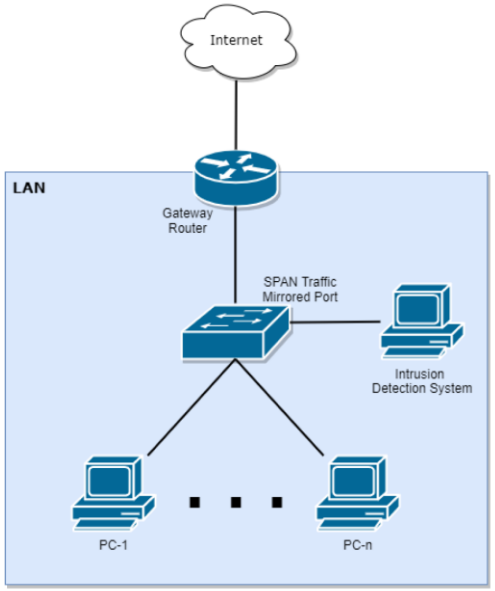
- Some of the current cybersecurity projects which uses AI are as follows:
  - Online Hate Speech Detection through Optimized ML/DL
  - Application and Optimization of Deep Learning in the Anomaly-based Detection of Botnets
  - Implementation of Optimized Machine Learning algorithms to Detect Data Exfiltration via Covert Channels
  - Phishing Detection Using Deep learning and Bio-inspired Algorithms
  - Spam Email Detection using Machine Learning Optimized with Bio-Inspired Meta-Heuristic Algorithms
  - Android Malware Detection using Optimized Machine Learning



Cybersecurity Research (UG and PG students)

- We are working with a police force to create an intelligent intrusion detection system using AI/machine learning to create alerts

- A software product is being developed through students which can be installed in business/SME premises.



Conclusion

- Cyber attacks are too complex to deal with and no one party can solve them – it needs partnership.
  - Ideally between Government, Police and Universities (which is what CRCs/BRCs are)

- The partnership between Northumbria University and NEBRC (police) is a good example and win-win partnership, where everyone wins ☺!

  - It gives great work experience opportunity for students to get real-world experience
  - It gives NEBRC the ability to work with businesses to secure them against cyber attack
  - Ultimately the businesses are benefited with a great service