

Stepping into Cybersecurity: A Comprehensive Roadmap

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About Me

- Research Associate
- Ph.D. Fellow
- Metaverse Security Practitioner
- Security Researcher - Industry & Academia
- Poet




Agenda

- Cybersecurity: Core Concepts
- The Beginners' Way
- Roadmap for Engineering Students
- Hands-on Exploration & Tools
- Getting Future Ready



Cybersecurity: Core Concepts



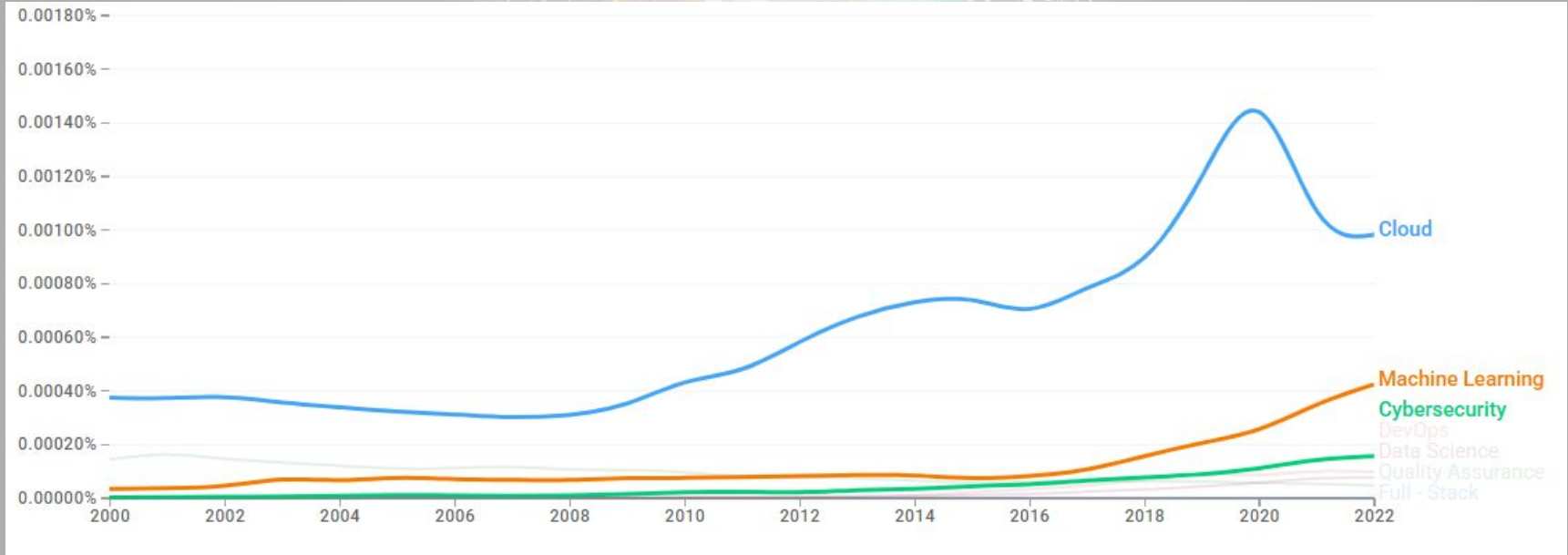
A portrait of Leonardo DiCaprio as Frank Abagnale Jr. from the movie 'Catch Me If You Can'. He is wearing a white pilot's cap with a gold emblem, gold epaulettes, and dark aviator sunglasses. The background is a light blue with several curved blue lines and arrows pointing downwards and to the right, suggesting a flight path or a sequence of events. The entire image is framed by a film strip border at the top and bottom.

"It always ends up that somebody at the job **did something** that they weren't supposed to do; or they **didn't do something** they were supposed to."

- *Frank Abagnale*

Leonardo DiCaprio in "Catch Me If You Can"
(2002)

Shift towards cybersecurity...



Google Ngram Viewer

Equifax

Data Breach

2017



Software: Apache Struts



Vulnerability: CVE-2017-5638

People Affected

160+ million



Settlement & Loss

\$425 million



Attack

Remote Code Execution

Warm-up Quiz



CIA Triad of Cybersecurity

- Confidentiality
- Integrity
- Availability



Offensive Security



Red Teams

Defensive Security

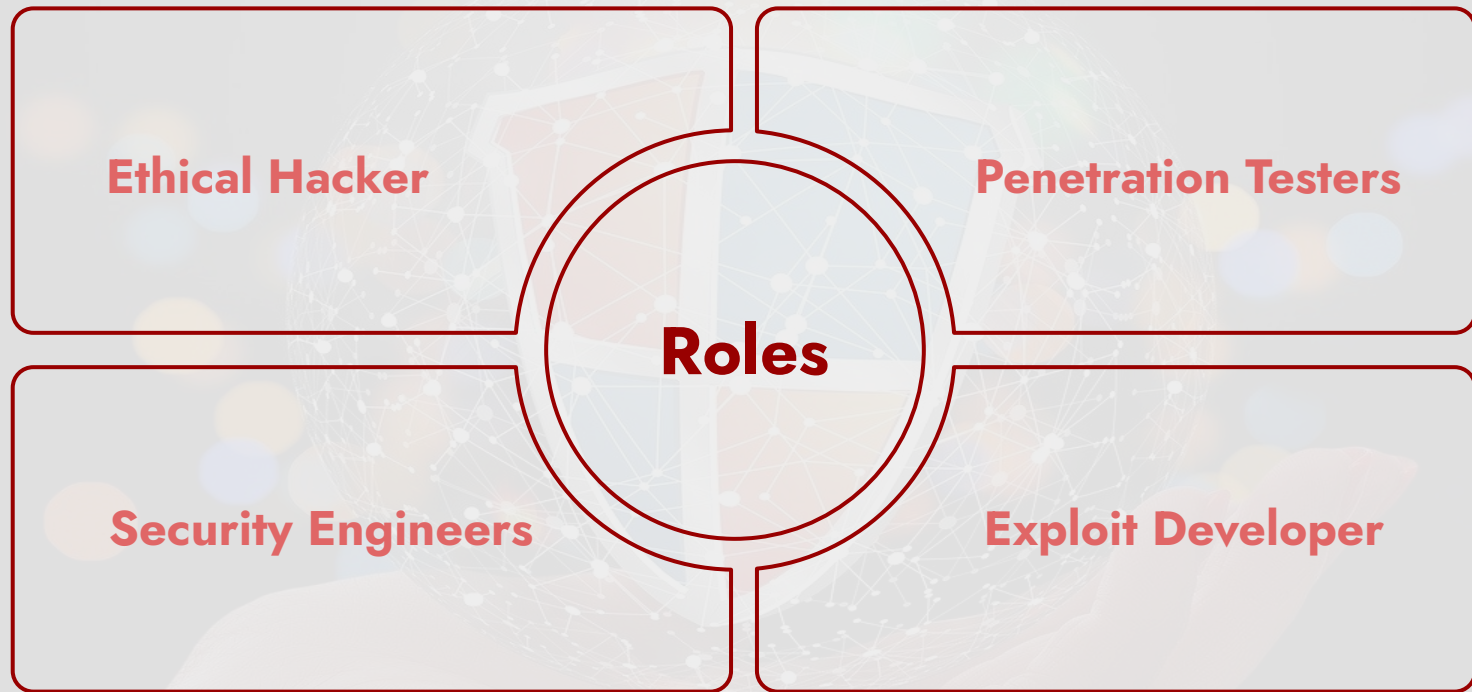


Blue Teams

Red Team

- **Attack Simulation**
- **Penetration Testing**
- **Vulnerability Discovery**
- **Exploit Development**

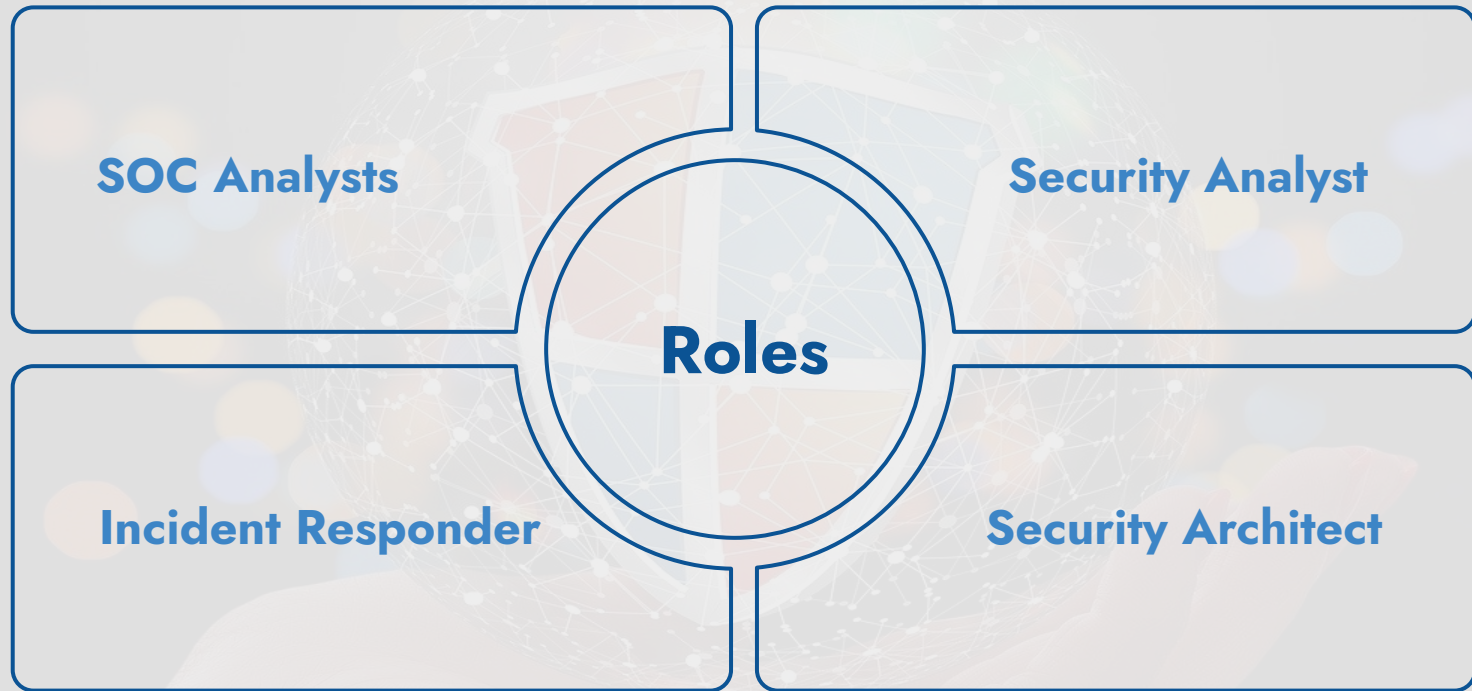




Blue Team

- Security Monitoring
- Patch Management
- Incident Response
- Threat Mitigation





The Beginners' Way



Myths in Cybersecurity



and many more...

Requirements

As a science graduate, you require two basic attributes to start with cybersecurity...

- **Curiosity**
- **Knowledge of:**
 - Computer Networks
 - Operating System



Computer Networks

Common concepts:

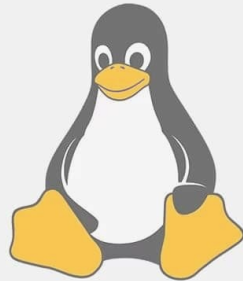
- Ports and IP
- DNS
- Firewalls
- Routing and Protocols



Operating System

Common concepts:

- File systems
- User access
- System logs
- Linux commands
- Root/admin privileges



Story of the **Morris Worm**



The

Morris worm

1988

"With great code comes great responsibility."



Robert Tappan Morris

23 Years

- Created by a student to map the internet
- Accidentally infected 10% of systems online
- Compromised communication using TCP/IP

Vulnerability: Buffer Overflow (unix)

Outcomes!!

✓ Gave rise to **CERT** (Cyber Emergency Response Team)

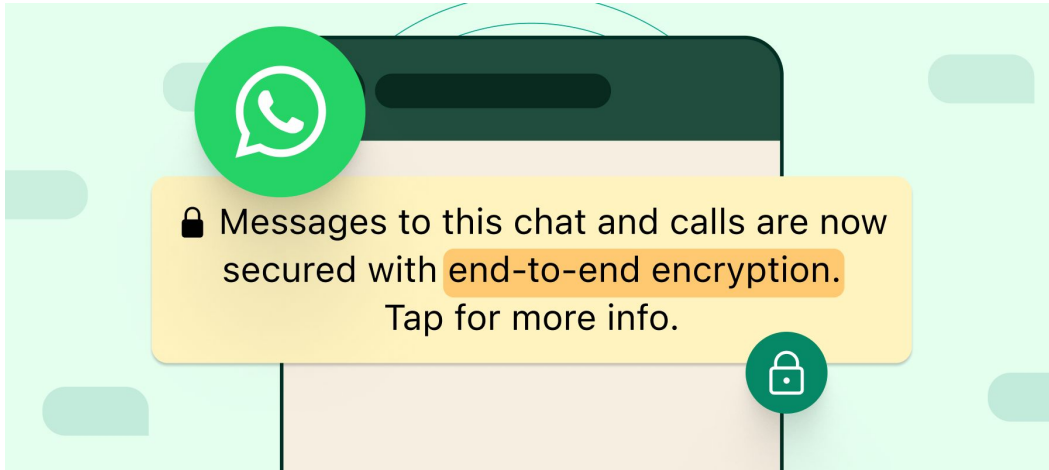
⚖️ First person convicted under cybercrime law

💡 Network knowledge = power + responsibility

Roadmap for Engineering Students



Data Protection



https://

<https://www.interakt.shop/blog/end-to-end-encryption-whatsapp/>
<https://www.globalsign.com/en/blog/the-difference-between-http-and-https>

Stepping Up

Coding: Behaviour and working of bug

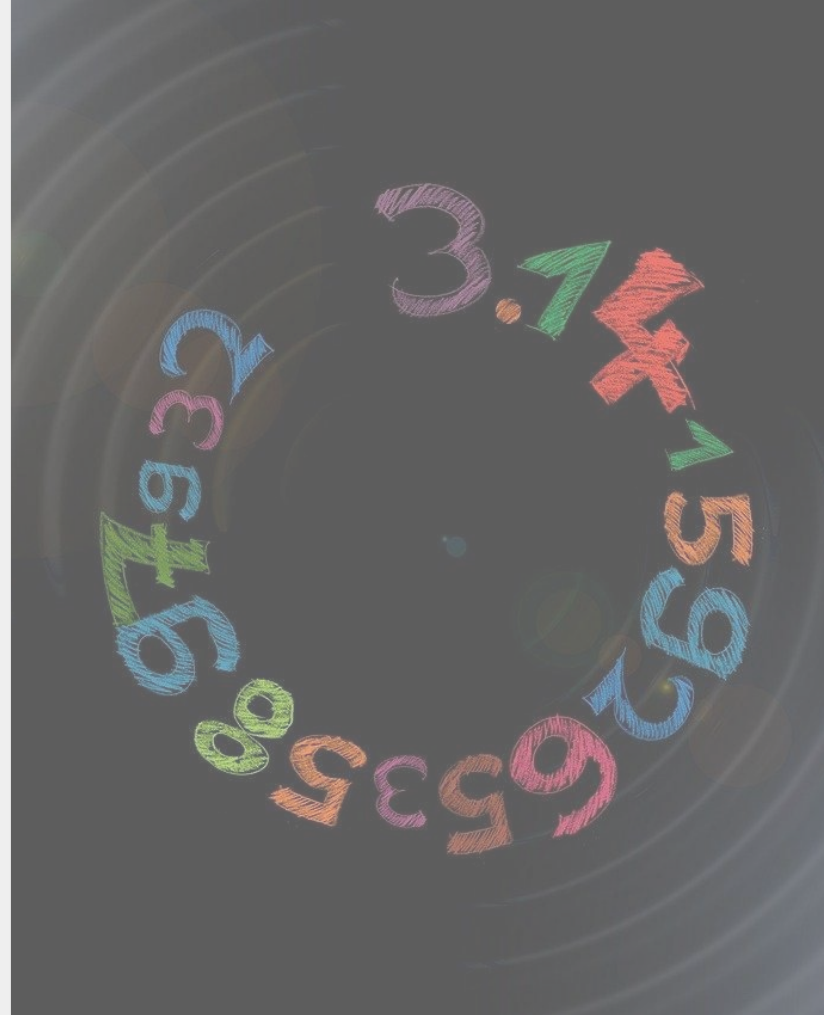
- Exploit Development
- Reverse Engineering
- Automation



cont...

Mathematics: Data and identity security

- Cryptography
- Blockchain
- Security through AI



./ Modern Cryptography

Practicals for M.Sc. CS students | (M3022201)



Practicals for M.Sc. CS students | (M3022201)

<https://ravi-prakash1907.github.io/Modern-Cryptography/>

Hands-on Exploration & Tools



Gamified Learning Solutions

Some beginner friendly gamified learning tools are:

- **DVWA** (Damn Vulnerable Web Application)
- **PicoCTF**

** Detailed write-ups are also provided for the challenges.*



Practical Learning and Challenges

Some platforms provide more realistic experience.

Here's why to choose them?



cont...

Advanced Platforms

Try Hack Me



Hack The Box



CTF - Capture the Flag

Real-time hacking challenges!



Hands-on Learning Platform



Builds Critical Skills



Perfect for Beginners



Ethical & Safe



Boost Your Cybersecurity Career



CTFtime



Cherry on Top

Not mandatory, but beneficial!

Master's degree

- Cybersecurity
- Digital Forensics

Certification

- EC-Council (*CEH, Cpent, CHFI, etc..*)
- CompTIA (*A+, CASP+, etc..*)
- ISC2 (*CC, CCSP, etc..*)



Getting Future Ready





"What I did in my youth is
hundreds of times easier today.
Technology breeds crime!"

- *Frank Abagnale*

Networking and Colab

CTF Teams



- Bios (#1)
- Team Shakti
(Woman-only)



Communities and Meetups

- DefCon
- NullCon
- BSides

Establish Yourself

Research:

- IEEE Student Body
- Technical societies and toastmaster clubs

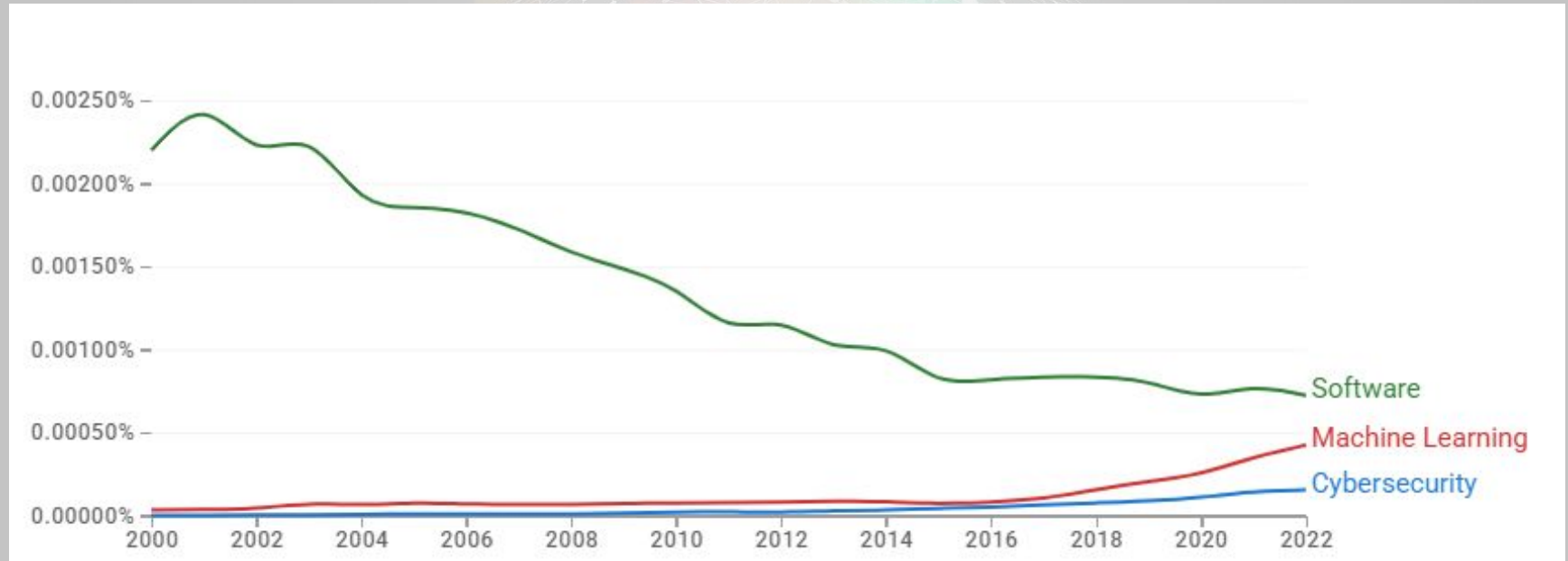
Bug-Bounty Programs:

- BugCrowd
- Hackerone



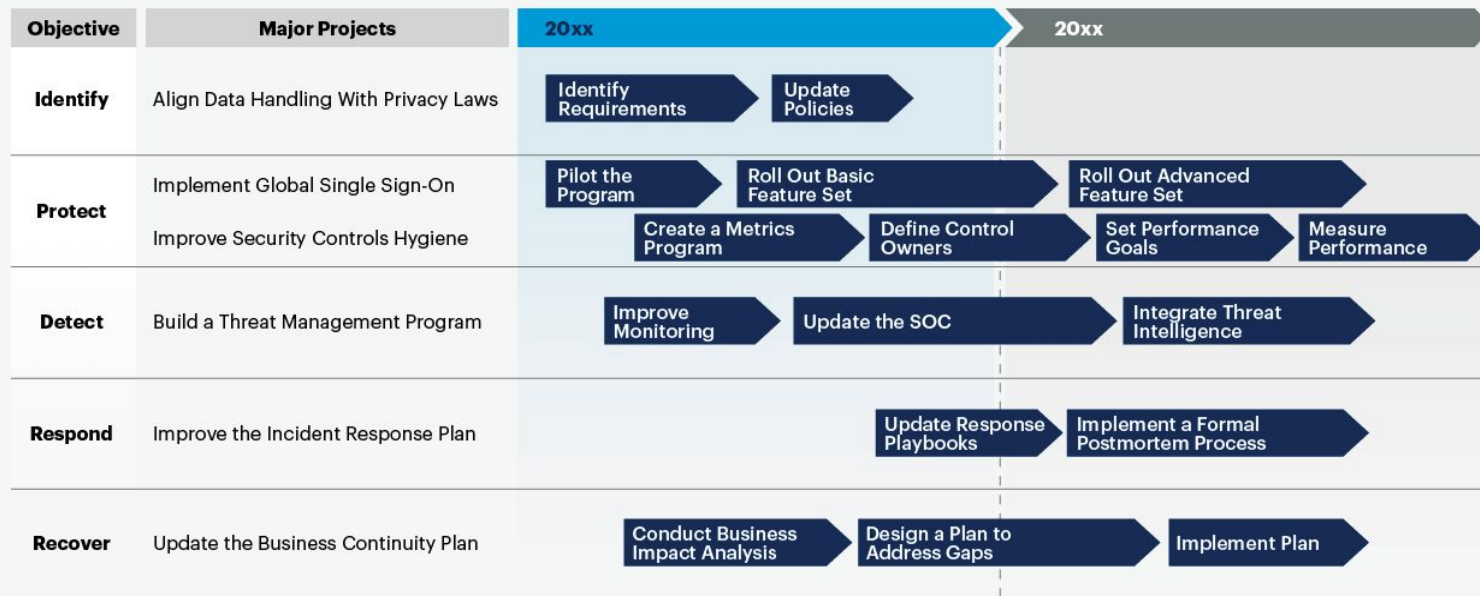
<https://www.zoho.com/>

Shift towards cybersecurity...



Google Ngram Viewer

Future of Cybersecurity



Source: Gartner
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Gartner

cont...



Post Quantum Cryptography

Securing systems with advanced cryptographic methods. This ensures protection against future quantum computing threats.



Gen-AI Attack Mitigation

Using generative AI to identify and neutralize cyber threats. This enhances proactive security measures.



Digital Twins Security

Employing digital twins for remote security monitoring and management. This allows for real-time threat detection.

Thanks!

Do you have any questions?



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