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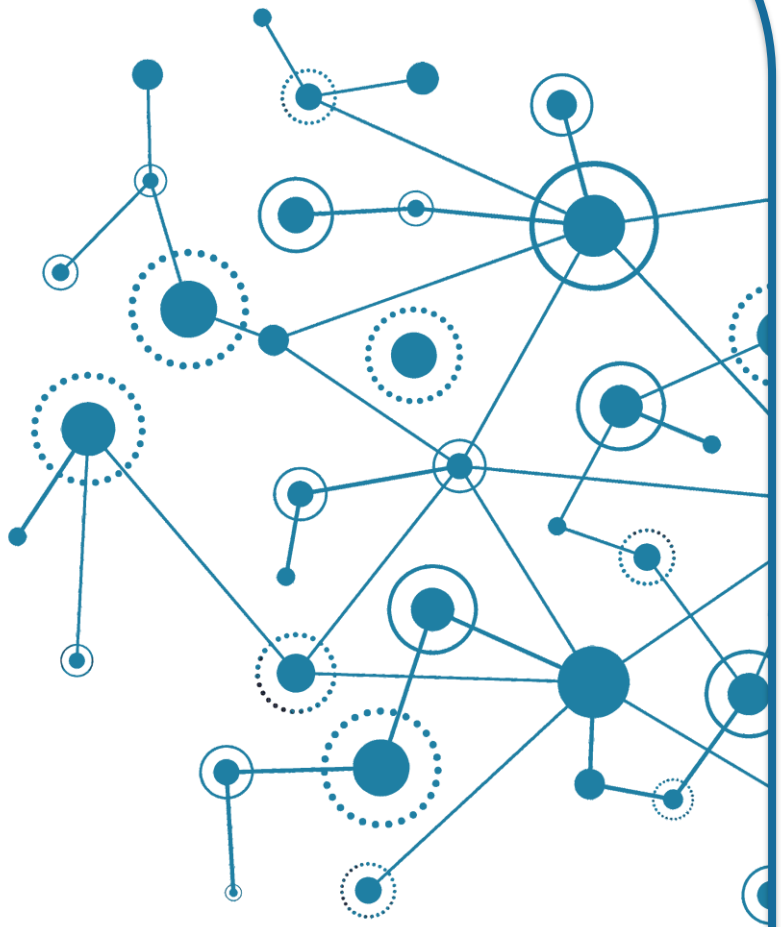
CornCon

Manifest your inner Cyber Superhero



Zen and the Art (and Science) of AI Security

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Warning!

- These are my thoughts based on my studies and experiences and NOT necessarily those of my employers or anyone else
- Ethical uses only /
  NOT a presentation on breaking AI
- Use at your own risk / Normal caveats apply
- There is homework!

PARENTS STRONGLY CAUTIONED
PG-13
SOME THEMATIC ELEMENTS, AND LANGUAGE
Some Material May Be Inappropriate for Children Under 13 ®

Whoami

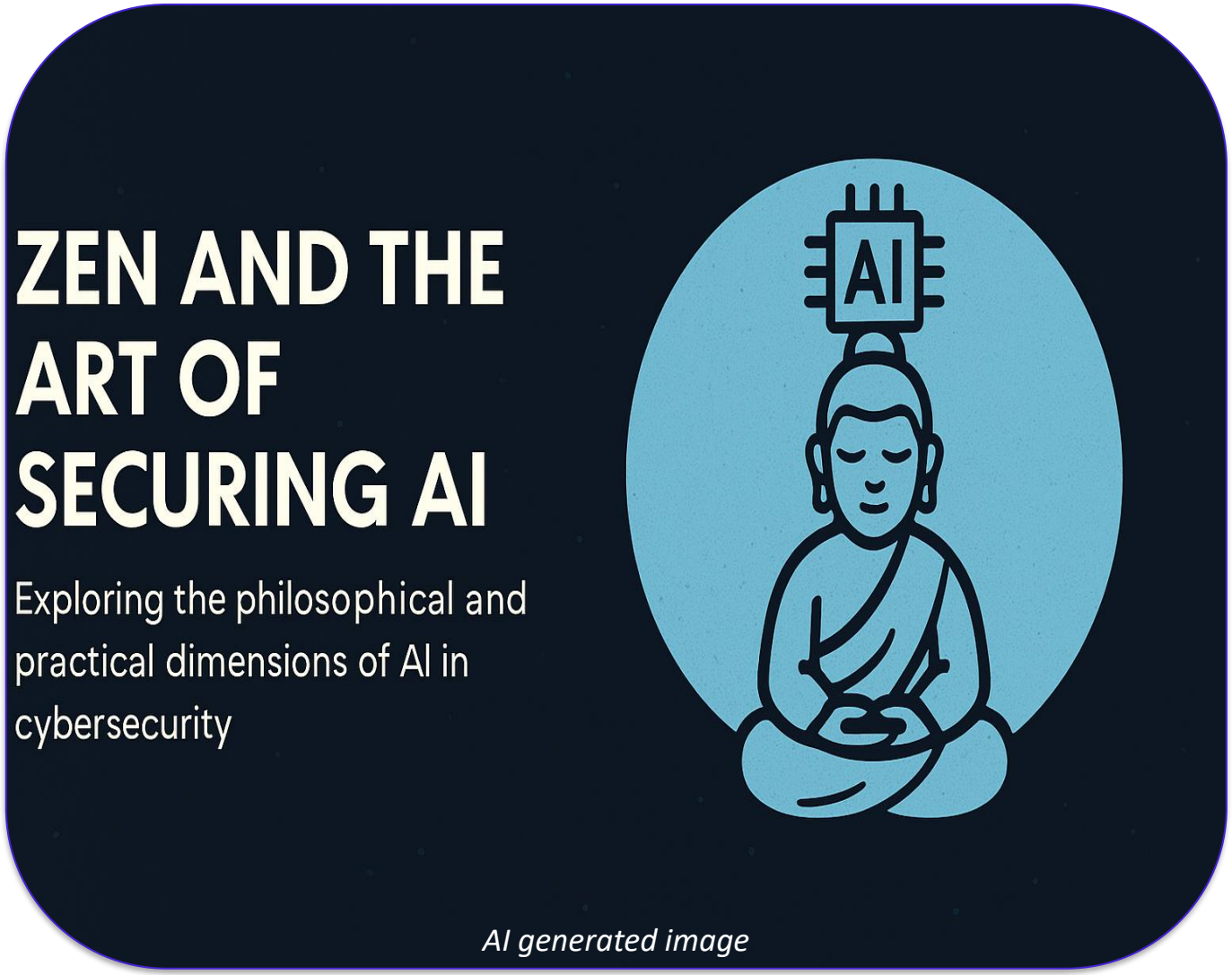
Ron Woerner

- Hacker
- Cybersecurity Consultant / Trusted Advisor
- Professor, Bellevue University
- 25+ years experience in IT / Security
- Blogger, writer, and podcaster

TEDx Omaha, 2019, Hackers Wanted

Websites & Social Media:
https://linktr.ee/cyberron

LinkedIn:
https://www.linkedin.com/in/ronwoerner/



Learning objectives:

1. **Explore the dual nature of AI in cybersecurity**, inspired by Zen principles – balancing innovation with introspection to understand both its risks and rewards.

2. **Identify and mitigate malicious uses of AI**, including social engineering, deepfakes, and adversarial attacks, through threat modeling and secure development practices.

3. **Apply philosophical and technical insights** from cybersecurity history to foster resilience, ethical awareness, and proactive defense in AI-driven environments

Exploring the philosophical and practical dimensions of AI in cybersecurity.

The 7 Habits of Highly Effective People – Stephen Covey

The Maturity Continuum®

Each habit is based on universal principles and paradigms of effectiveness, with practices that move learners from dependence and independence to interdependence.

Private Victory® | Habits 1–3

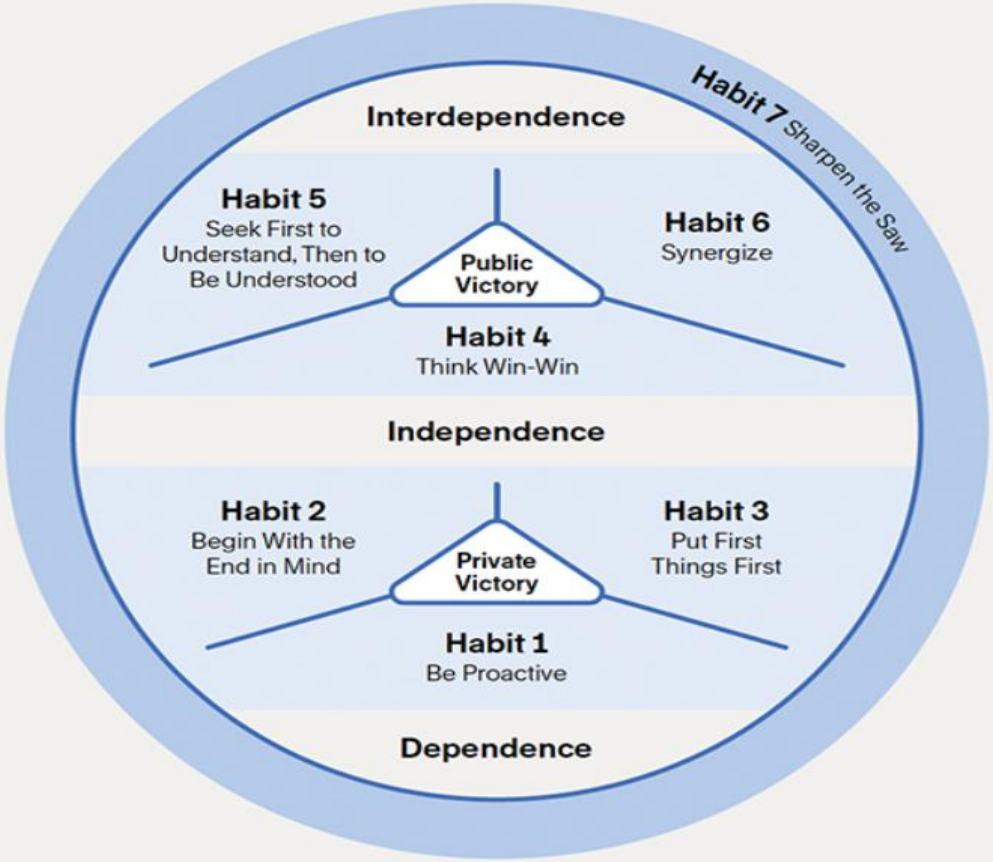
Emphasizes personal mastery, defining desired outcomes and focusing efforts to lay the internal groundwork for success.

Public Victory® | Habits 4–6

Fosters collaboration and synergy with others, building strong relationships that allow us to accomplish more together than we could alone.

Renewal | Habit 7

Emphasizes the need for self-renewal and continuous improvement to succeed in and sustain the other habits.



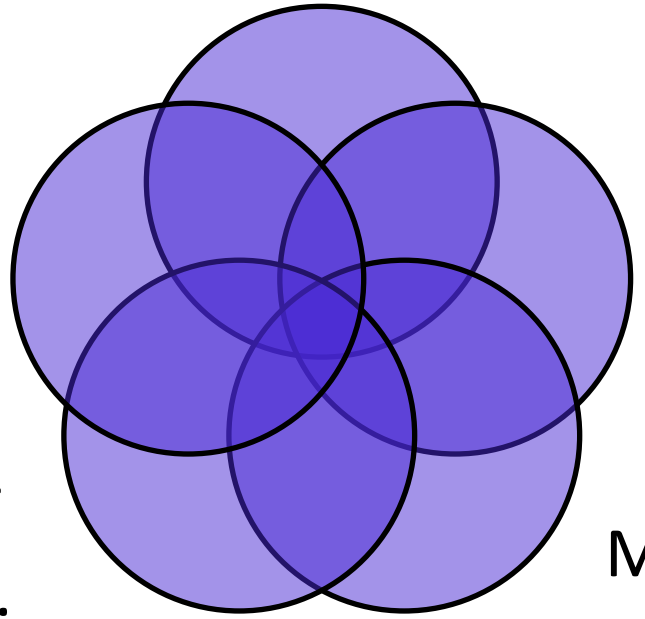
Source: https://www.franklincovey.com/courses/the-7-habits/

Zen Principals in AI & Cybersecurity

Finding peace in volatility

Think like a hacker

Reflection as a security practice



Balancing priorities

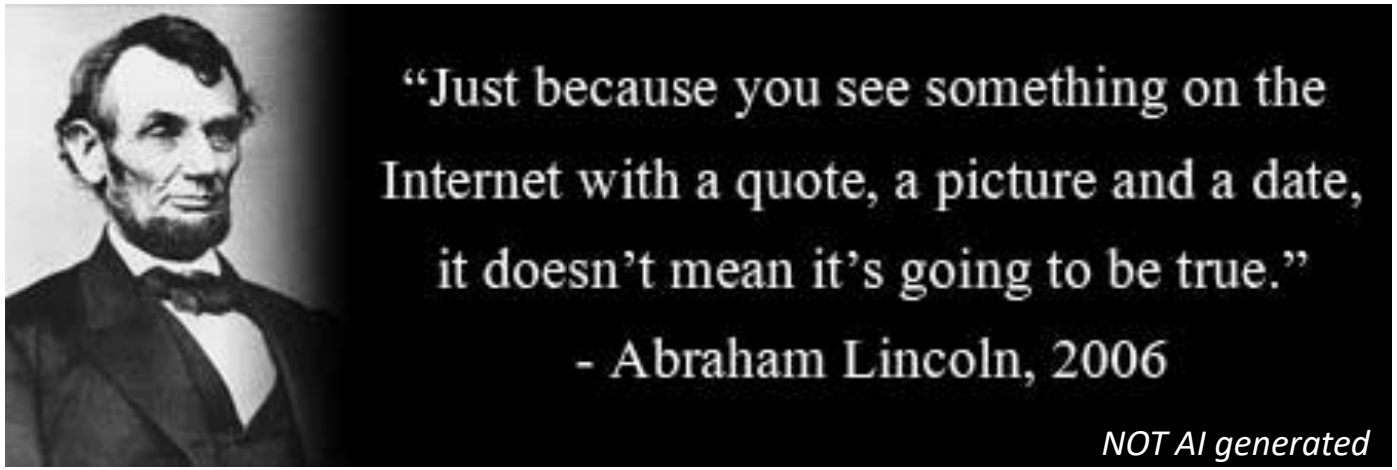
Duality of AI: tool vs. threat

Mindfulness in design

Zen Principals in AI & Cybersecurity

Trust, AND *Verify*

"*Never trust a single data point*."
from my life as a military intelligence officer



Philosophical Reflection

- How do you know what's "true?"
- Explore ethical dilemmas
  - What bias may be introduced?
  - What does it mean to "trust" a machine?
  - Can AI be "self-aware" of its misuse?
- Balancing automation with human involvement
- Embrace continuous learning and interdisciplinary fluency

NIST AI Risk Management Framework

AI Risks & Trustworthiness

1. Valid and Reliable
2. Safe
3. Secure and Resilient
4. Accountable and Transparent
5. Explainable and Interpretable
6. Privacy-Enhanced
7. Fair – with Harmful Bias Managed

https://www.nist.gov/itl/ai-risk-management-framework

Mastering Fundamentals

Cybersecurity:

- Computer Science, Math, Economics, Marketing, Psychology
- GRC
- Design Principles / Zero Trust
- Threat Modeling

AI:

- SDLC / Coding Best Practices
- Core Algorithms: Decision trees, neural networks, clustering
- Prompt Engineering

Understanding the "why" behind the model helps you spot challenges and design more resilient systems.

AI Conversations: Prompting Fundamentals

Asking good questions

- **Clarity & Conciseness:** Always key.
- **Context is Key**: Emphasize why context matters.
- **Activity:** Vague vs. specific prompts.
- **Specifying Format:** How you want the output (list, email, table, etc.).
- **Persona & Tone:** Telling Gemini who it is and how to respond.
- **Constraints:** What to avoid or include (e.g., "Keep it under 100 words," "Do not include personal names").
- **Iterate & Refine:** AI is a dialogue; refine prompts for better results.

What are your prompting tips?

AI generated image

1. Prompt fundamentals
2. Ask it:

- “Be direct, objective, expose blind spots, challenge assumptions”
- Play “Devil’s Advocate.” Critique ideas from multiple personas & angles
- For credible citations and flag weak evidence - Include source links
- Show its work / “thought process”
- For clarity and conciseness

3. Start over. Try a different tact

Building Skills: Experiment with Adversarial Techniques*

- *Ethically & safely*.
  Set up a home lab.
- Learn through doing
- Ask questions
- Sun Tzu's The Art of War:
  "*Know the enemy and know yourself; in a hundred battles you will never be in peril*.“

AI Risks & Threats

Prompt: I'm building a presentation on cybersecurity and AI for a technical audience. Provide 5 ways ChatGPT and AI can be used maliciously.

- Enhanced cyber reconnaissance
- Automated social engineering
- Supercharged phishing
- Deepfakes and disinformation
- Malware automation & mutation
- Adversarial machine learning and data poisoning

Top Questions about AI in Cybersecurity

FORRESTER®

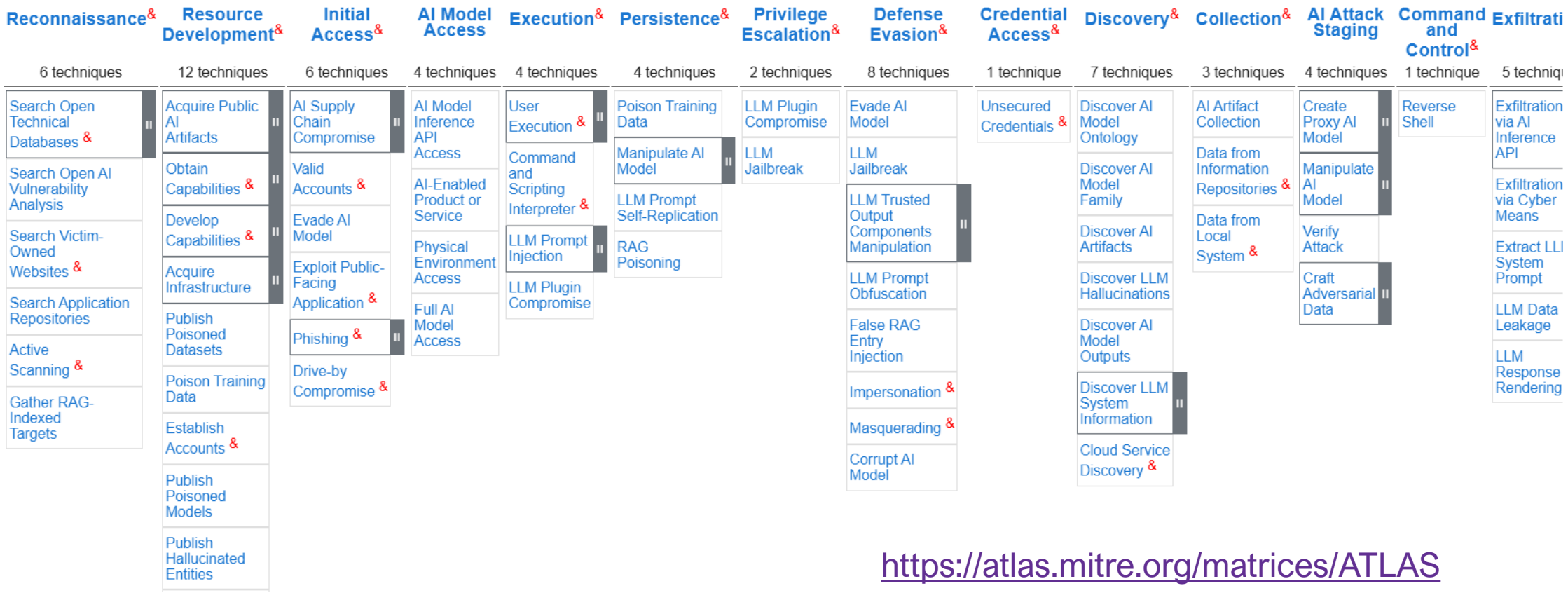
- **GenAI in Security Tools**: Common use cases include incident summarization, threat research chatbots, and behavior modeling for triage and investigation.
- **AI Agents**: Task-specific agents (e.g., phishing triage) automate discrete security functions with high accuracy through focused training and prompts.
- **Agentic Systems**: Emerging concept where multiple AI agents collaborate to handle complex workflows (e.g., full incident response), but still in early stages.
- **Chatbot Use**: Helpful for documentation and threat research, but underutilized by practitioners due to workflow disruption.
- **Caution on Hype**: Many capabilities are not yet broadly available or reliable; rigorous evaluation is needed before adoption.

Source: https://www.forrester.com/blogs/your-top-questions-on-generative-ai-ai-agents-and-agentic-systems-for-security-tools-answered/

Experiment with Adversarial Techniques

ATLAS Matrix

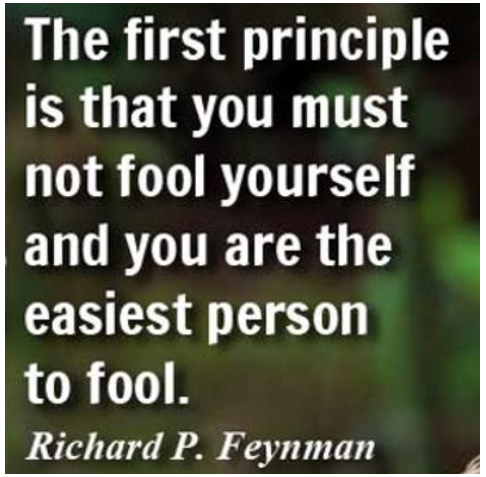
The ATLAS Matrix below shows the progression of tactics used in attacks as columns from left to right, with ML techniques belonging to each tactic below. & indicates an adaption from ATT&CK. Click on the blue links to learn more about each item, or search and view ATLAS tactics and techniques using the links at the top navigation bar. View the ATLAS matrix highlighted alongside ATT&CK Enterprise techniques on the ATLAS Navigator.



https://atlas.mitre.org/matrices/ATLAS

Experiment with Adversarial Techniques

OSINT



ChatGPT

Gemini

perplexity

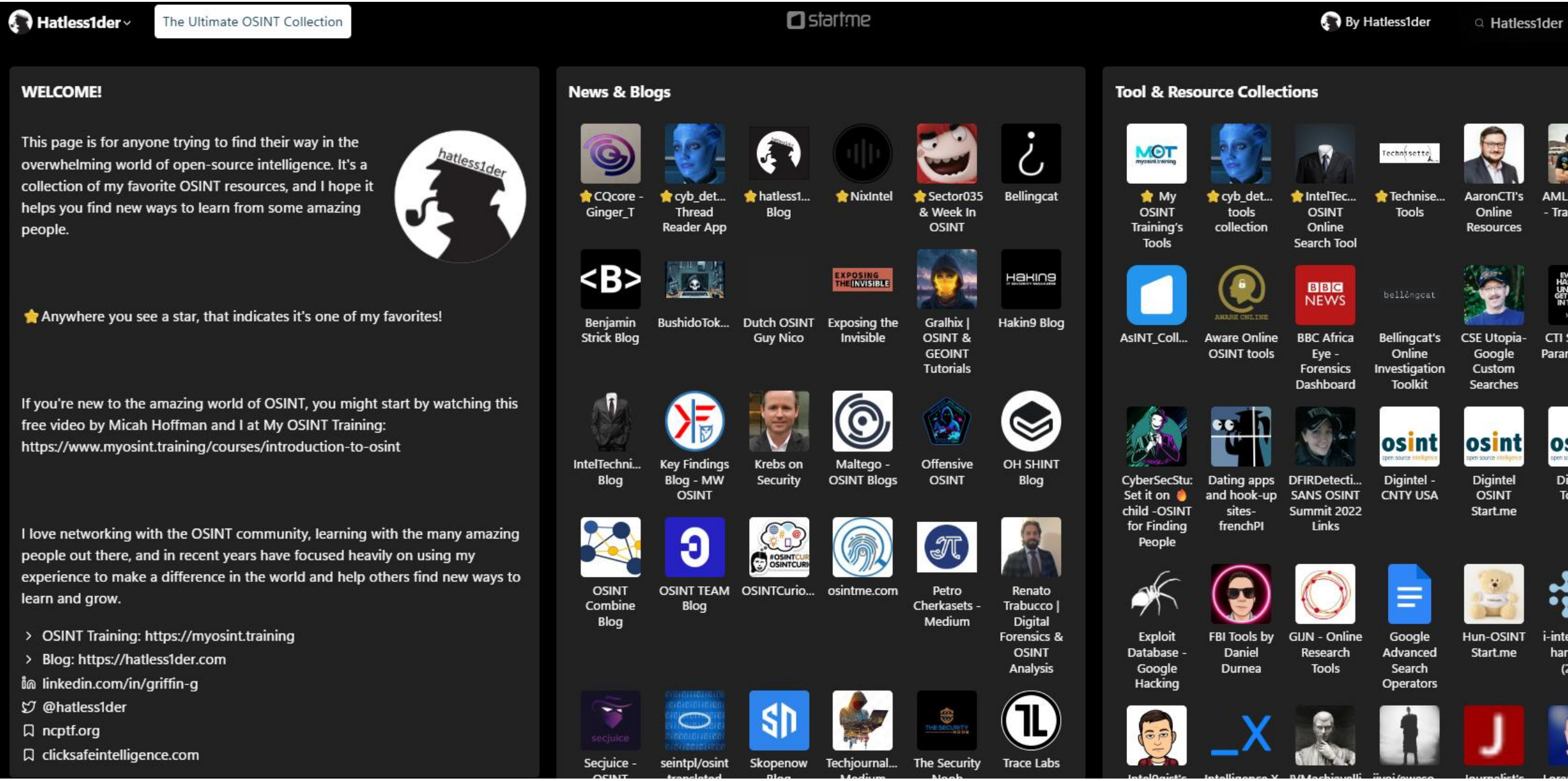
hunter

Hunter is your all-in-one email outreach platform. Find and connect with the people that matter to your business.

theHarvester

theHarvester is a simple to use, yet powerful tool designed to be used during the reconnaissance stage of a red team assessment or penetration test. It performs open source intelligence (OSINT) gathering to help determine a domain's external threat landscape. The tool gathers names, emails, IPs, subdomains, and URLs by using multiple public resources that include:

Hatless1der – Ultimate OSINT Collection



https://start.me/p/DPYPMz/the-ultimate-osint-collection

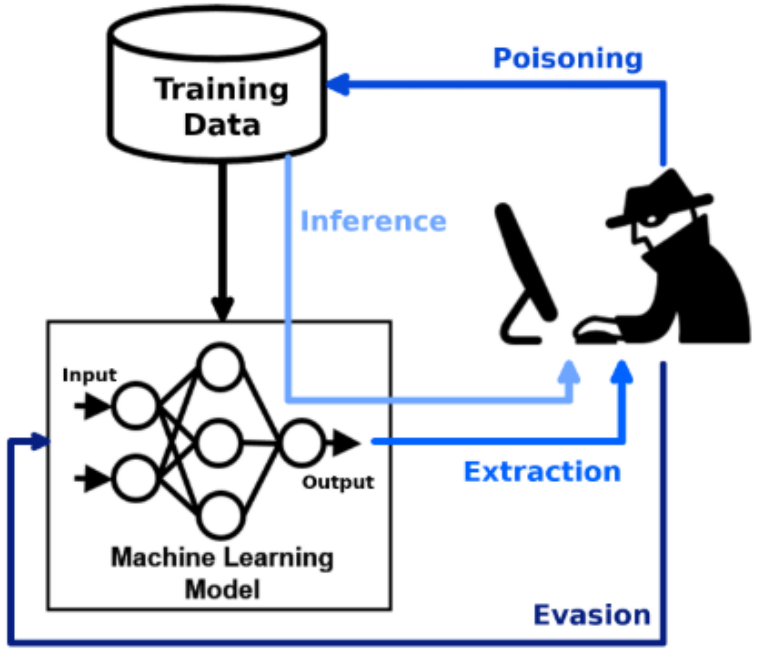
Experiment with Adversarial Techniques*

Adversarial Robustness Toolbox

Adversarial Robustness Toolbox (ART) is a Python library for Machine Learning Security. ART provides tools that enable developers and researchers to evaluate, defend, certify and verify Machine Learning models and applications against the adversarial threats of Evasion, Poisoning, Extraction, and Inference. ART supports all popular machine learning frameworks (TensorFlow, Keras, PyTorch, MXNet, scikit-learn, XGBoost, LightGBM, CatBoost, GPy, etc.), all data types (images, tables, audio, video, etc.) and machine learning tasks (classification, object detection, generation, certification, etc.).

The code of ART is on GitHub and the Wiki contains overviews of implemented attacks, defences and metrics.

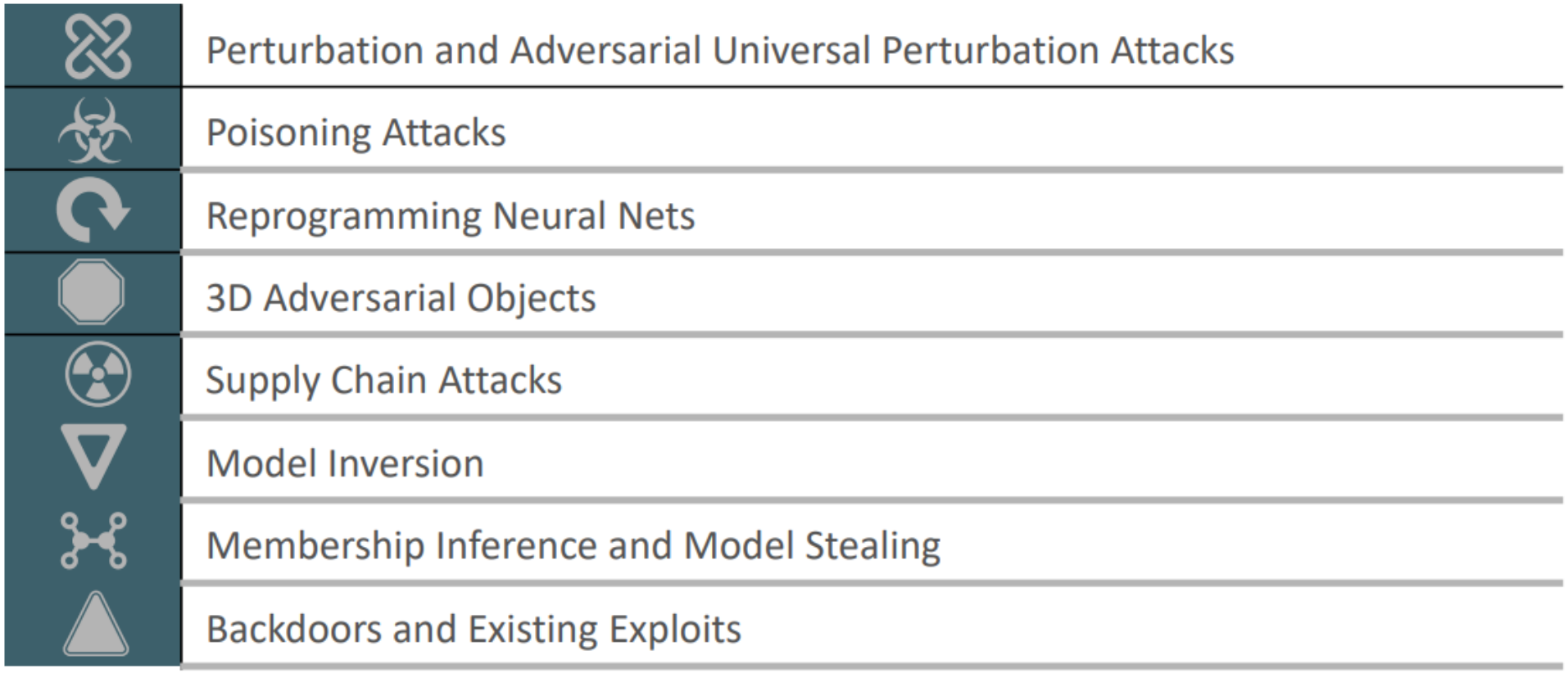
https://atlas.mitre.org/matrices/ATLAS



ML Failure Modes – Unintentional Failure

Kumar, et.al. (2022, November 2). *Failure modes in machine learning*. Microsoft Learn. https://learn.microsoft.com/en-us/security/engineering/failure-modes-in-machine-learning

ML Failure Modes – Intentional Failure



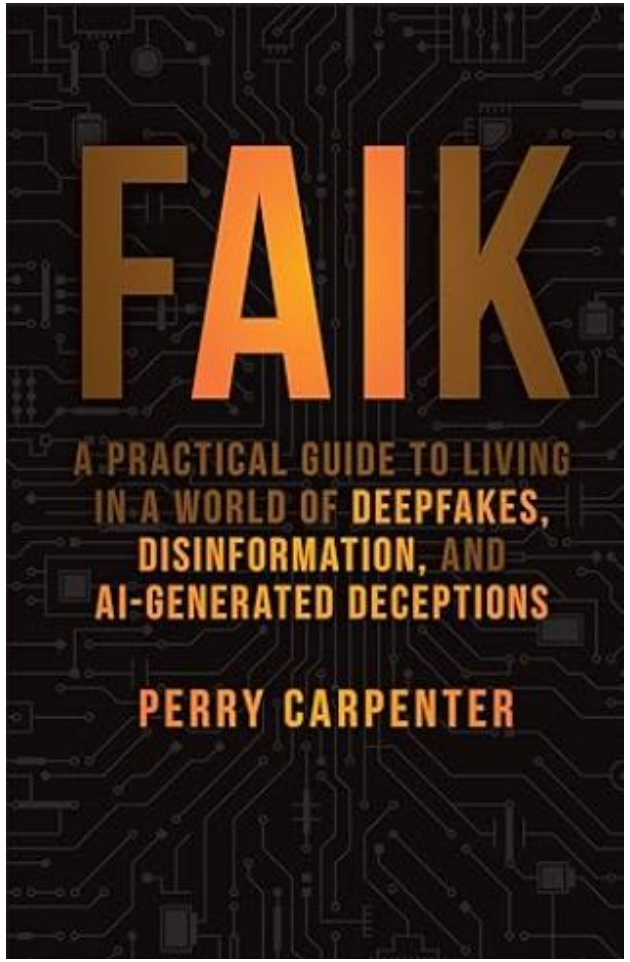
Kumar, et.al. (2022, November 2). *Failure modes in machine learning*. Microsoft Learn. https://learn.microsoft.com/en-us/security/engineering/failure-modes-in-machine-learning

Adversarial Machine Learning (AML)

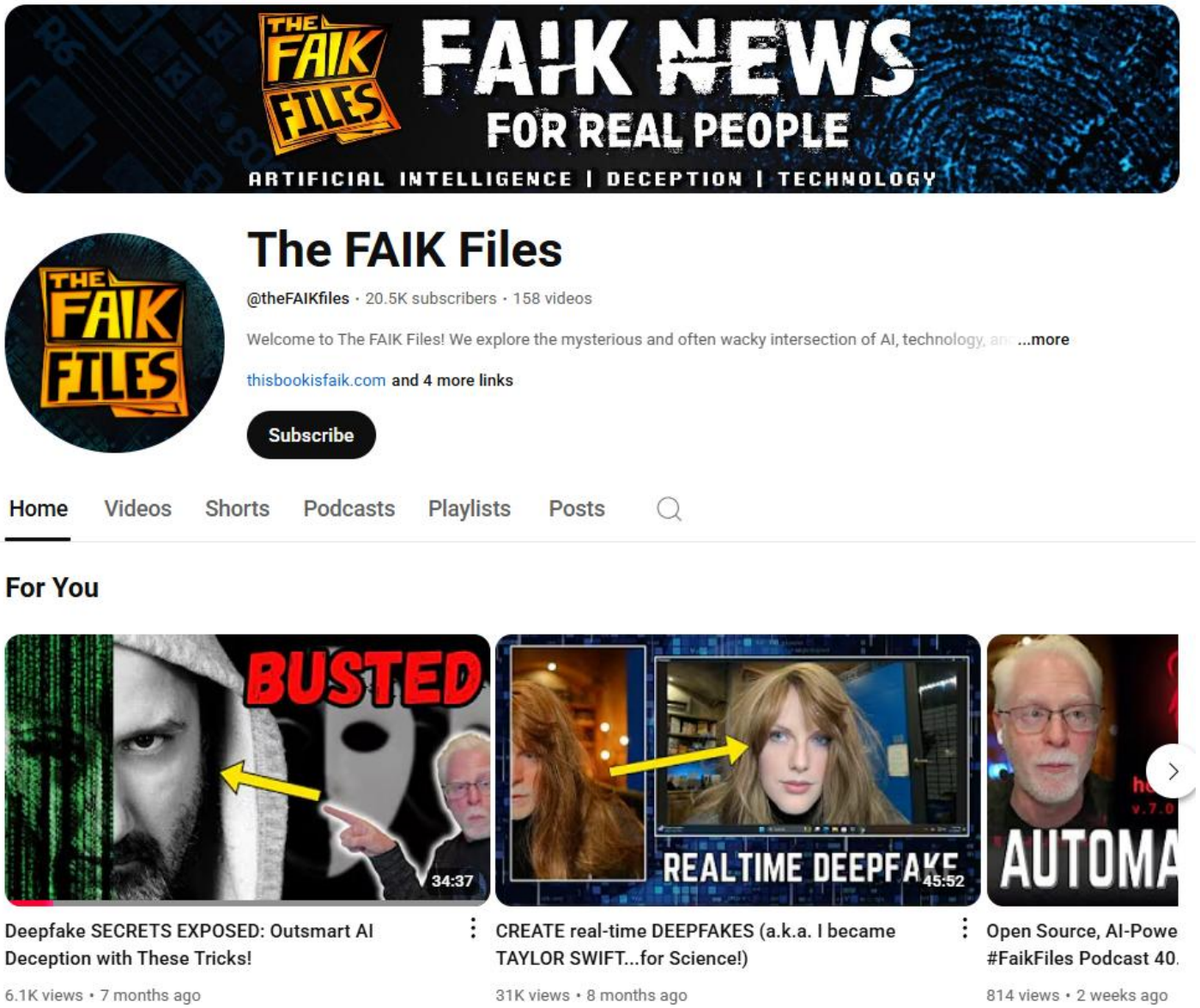
- AML is used to describe the exploitation of fundamental vulnerabilities in ML components, including hardware, software, workflows and supply chains.
- AML enables attackers to cause unintended behaviours in ML systems which can include:
  - Affecting the model's classification or regression performance
  - Allowing users to perform unauthorised actions
  - Extracting sensitive model information
- Examples: prompt injection attacks in the large language model (LLM) domain, or deliberately corrupting the training data or user feedback (known as 'data poisoning').

Guidelines for Secure AI Development, p. 6, https://www.ncsc.gov.uk/files/Guidelines-for-secure-AI-system-development.pdf, NCSC (UK) & CISA (US)

Deep Fakes



https://www.amazon.com/FAIK-Practical-Disinformation-AI-Generated-Deceptions/dp/1394299885



https://www.youtube.com/@theFAIKfiles

What You Can (Should) Do

Only You can Protect Yourself and Others

- A-B-C = Always Be Curious
- Secure by Design / Build Security In
- Threat Modeling
- DevSecOps
- Zero Trust

A-B-C = Always Be Curious

AI generated image

Core Competencies for AI + Cybersecurity Professionals

Technical Skills to Cultivate:

- **AI Fundamentals:** Machine learning, deep learning, NLP, and model evaluation
- **AI-Specific Threats:** Deepfakes, automated phishing, model inversion, data poisoning
- **Secure Development Practices:** Threat modeling, secure coding, and adversarial robustness
- **Data Handling & Privacy:** Encryption, anonymization, and compliance (GDPR, CCPA)
- **Security Architecture:** Identity management, container security, and zero trust architecture

NIST | NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

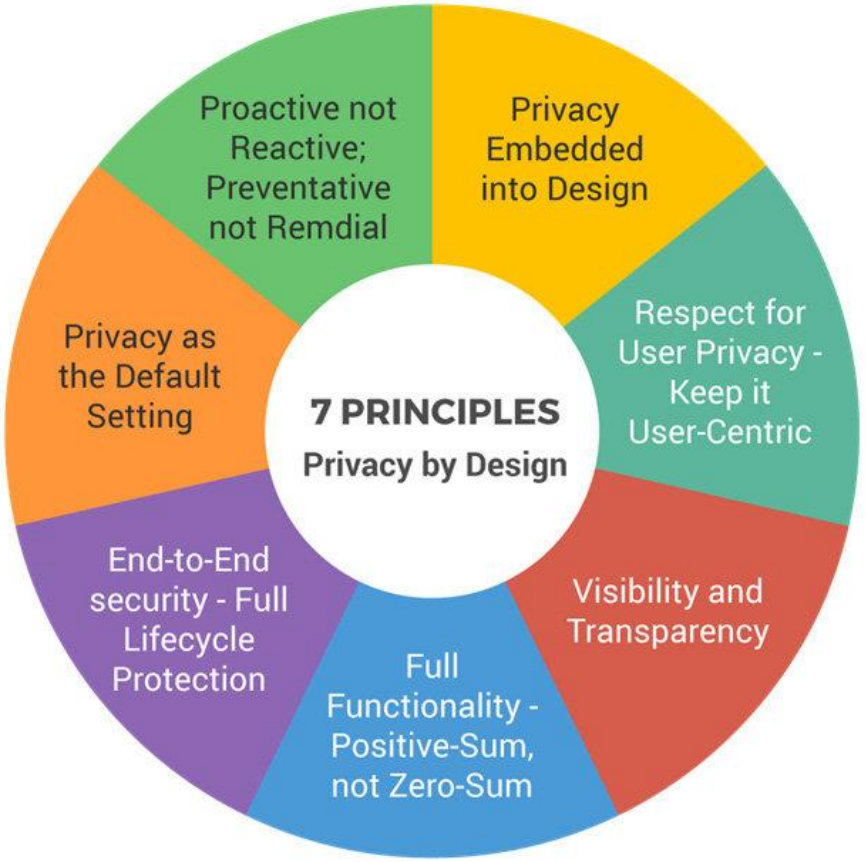
Trustworthy & Responsible AI Resource Center

NIST AI Risk Management Framework

AI Risks & Trustworthiness

1. Valid and Reliable
2. Safe
3. Secure and Resilient
4. Accountable and Transparent
5. Explainable and Interpretable
6. Privacy-Enhanced
7. Fair – with Harmful Bias Managed

https://nvlpubs.nist.gov/nistpubs/ai/NIST.AI.100-1.pdf
https://www.nist.gov/itl/ai-risk-management-framework



Cavoukian, A., ***Privacy by Design, The 7 Foundational Principles, Implementation and Mapping of Fair Information Practices***, https://privacy.ucsc.edu/resources/privacy-by-design---foundational-principles.pdf

Secure By Design / Build Security In

Discussions of artificial intelligence (AI) often swirl with mysticism regarding how an AI system functions. The reality is far more simple:

AI is a type of software system.

https://www.cisa.gov/news-events/news/software-must-be-secure-design-and-artificial-intelligence-no-exception

https://www.cisa.gov/securebydesign

OWASP AI Projects

https://owaspai.org/

AI Exchange

> *Welcome to the go-to resource for broad AI security & privacy - over 200 pages of practical advice and references on protecting AI and data-centric systems from threats. This content serves as key bookmark for practitioners, and is contributing actively and substantially to international standards such as ISO/IEC and the AI Act through official standard partnerships. Through broad collaboration with key institutes and SDOs, the Exchange represents the consensus on AI security and privacy.*
> *See the overview of AI projects at OWASP.*

Ways to start

- If you want to **protect your AI system**, start with risk analysis which will guide you through a number of questions, resulting in the attacks that apply. And when you click on those attacks you'll find the controls to select and implement.
- If you want to get an overview of the **attacks** from different angles, check the AI threat model or the AI security matrix. In case you know the attack you need to protect against, find it in the overview of your choice and click to get more information and how to protect against it.
- To understand how **controls** link to the attacks, check the controls overview or the periodic table.
- If you want to **test** the security of AI systems with tools, go to the testing page.
- To learn about **privacy** of AI systems, check the privacy section.
- Looking for more information, or training material: see the references.

OWASP AI Projects

https://genai.owasp.org/

Guidelines for secure AI system development

National Cyber Security Centre
a part of GCHQ

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3. Secure deployment.....14
4. Secure operation and maintenance.....16
Further reading.....17

Guidelines for Secure AI Development,
https://www.ncsc.gov.uk/files/Guidelines-for-secure-AI-system-development.pdf,
NCSC (UK) & CISA (US)

AI Use in Cybersecurity

Prompt: Provide 5 ways AI can help cybersecurity and technical professionals reduce risks of malicious use of AI.

Threat Intelligence and Prediction:

- ***Problem***: Staying ahead of evolving attacker tactics and emerging threats is a constant challenge for security teams.
- ***Solution***: AI-powered threat intelligence platforms aggregate data from various sources, analyze attack trends, and predict future threats. This proactive approach allows security teams to prioritize defenses, allocate resources effectively, and anticipate new attack vectors before they materialize.

Automated Threat Detection and Response:

- ***Problem***: Traditional security approaches rely on manual analysis of alerts and incident response, causing delays and potential breaches.
- ***Solution***: AI-powered tools analyze network traffic, system logs, and user behavior in real-time, identifying anomalies and triggering automated responses like quarantining suspicious files, blocking malicious IP addresses, or notifying security teams for immediate action. This significantly reduces response times and minimizes damage from potential attacks.

Phishing and Social Engineering Detection:

- ***Problem***: Sophisticated phishing attacks and social engineering tactics can bypass traditional filters and deceive users.
- ***Solution***: AI-powered analysis can assess the linguistic style, content, and sender information of emails to identify suspicious patterns and predict phishing attempts. Additionally, AI can analyze chatbots and user interactions to detect suspicious behaviors and prevent social engineering attacks.

AI Use in Cybersecurity

Prompt: Provide 5 ways AI can help cybersecurity and technical professionals reduce risks of malicious use of AI.

Proactive Vulnerability Management:

- ***Problem***: Unpatched vulnerabilities and misconfigurations offer easy entry points for attackers.
- ***Solution***: AI-powered scanning tools can analyze vast codebases and system configurations to identify vulnerabilities and misconfigurations before they're exploited. This proactive approach prioritizes critical vulnerabilities and automates patch deployment, minimizing attack surfaces and strengthening overall security posture.

Endpoint Security with Behavioral Analysis:

- ***Problem***: Traditional endpoint security relies on signature-based detection, missing zero-day attacks and other novel threats.
- ***Solution***: AI-powered endpoint protection establishes baselines of normal endpoint behavior and continuously monitors deviations. This allows for real-time anomaly detection, even for unknown threats, and targeted interventions to prevent malware execution and data breaches.

Cultivating AI Security Awareness

Culture

🔐 1. Emphasize Human-Centric Risk Awareness

AI threats often exploit human vulnerabilities — phishing, social engineering, and deepfake manipulation are increasingly AI-powered. Awareness programs must go beyond compliance and focus on behavioral change.

Why it matters: 82% of breaches involve the human element.

🧠 2. Upskill Teams in AI Competencies

AI threats often exploit human vulnerabilities — phishing, social engineering, and deepfake manipulation are increasingly AI-powered. Awareness programs must go beyond compliance and focus on behavioral change.

Why it matters: 82% of breaches involve the human element.

🛡️ 3. Implement AI Governance and Ethical Oversight

AI systems can introduce bias, amplify vulnerabilities, or be misused. Establish clear policies for responsible AI use, including transparency, accountability, and ethical safeguards.

Why it matters: AI is already being used across organizations — often without formal oversight.

🧩 4. Foster Cross-Functional Collaboration

AI risk awareness isn't just for technical teams. Legal, HR, and leadership must be involved in understanding AI's implications for data privacy, compliance, and workforce impact.

Why it matters: AI affects every layer of the organization, from hiring to data governance.

Zen Principals in AI & Cybersecurity

Last thought:

“Apply” Slide – Summary

Immediate (the next week):

- Follow Zen-inspired thoughtfulness, fundamentals, & balance
- Review and try 2-3 resources from this presentation
- Set a calendar reminder for 1 month…

Long-term (the next 1-2 months):

- Review the deck and Experiment with 2-3 new resources
- Share with others
- Lead with curiosity, defend with wisdom

2025 CORNCON CYBERSECURITY CONFERENCE

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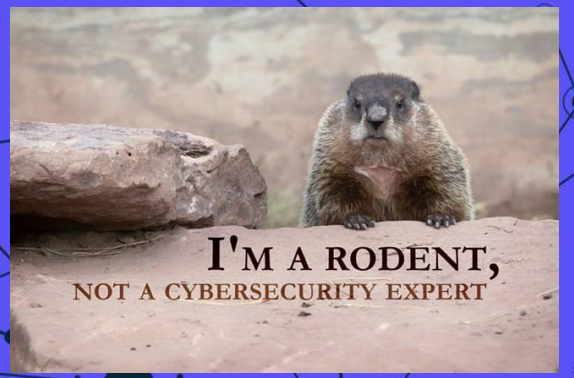
https://linktr.ee/cyberron



MANIFEST YOUR INNER CYBER SUPERHERO!