Harnessing the Power of AI

Unleashing the Defensive and Offensive Capabilities in Cybersecurity

May 16th, 2024

Overview and History of Artificial Intelligence Usage

Iowa Communications Alliance

VantagePoint EMPLOYEE OWNED

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About the Presenter

Jerad Glore – IT Security Specialist

- Started at VPS in 2023
- Areas of Focus (Telecommunications)
  - Penetration Testing
  - Social Engineering
  - IT Audit
- Missouri State University
  - BS Information Technology (Emphasis in Cybersecurity)
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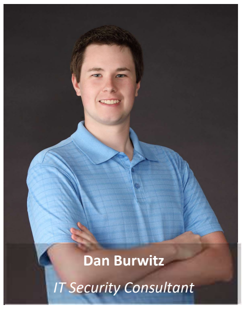
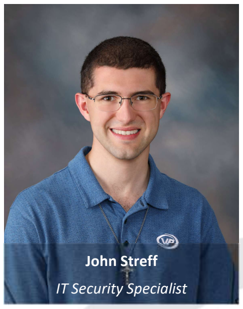
Meet the Security Team

James Taylor
Sr. IT Security Consultant


Dan Burwitz
IT Security Consultant


John Streff
IT Security Specialist

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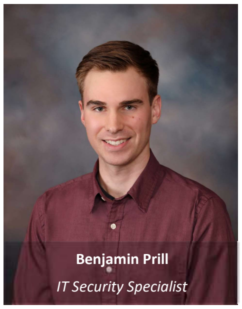
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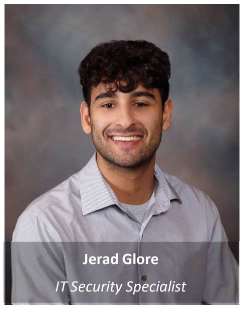
Jerad Glore
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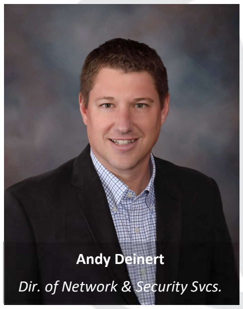
Andy Deinert
Dir. of Network & Security Svcs.

Josh Tollefson
Sr. IT Audit Consultant

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Vantage Point Solutions, Mitchell, SD.

www.vantagepnt.com

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VPS serves **hundreds of clients**, large and small, across the country and internationally.

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Here for all your questions

- ENTERPRISE RISK MANAGEMENT
- AUDIT
- REGULATORY COMPLIANCE
- INDEPENDENT CREDIT REVIEW
- CYBERSECURITY
- NETWORK MONITORING
- SERVER VIRTUALIZATION
- DATA NETWORKING

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Today's Objectives

- Define Artificial Intelligence (AI)
- History
- Examples
- Challenges

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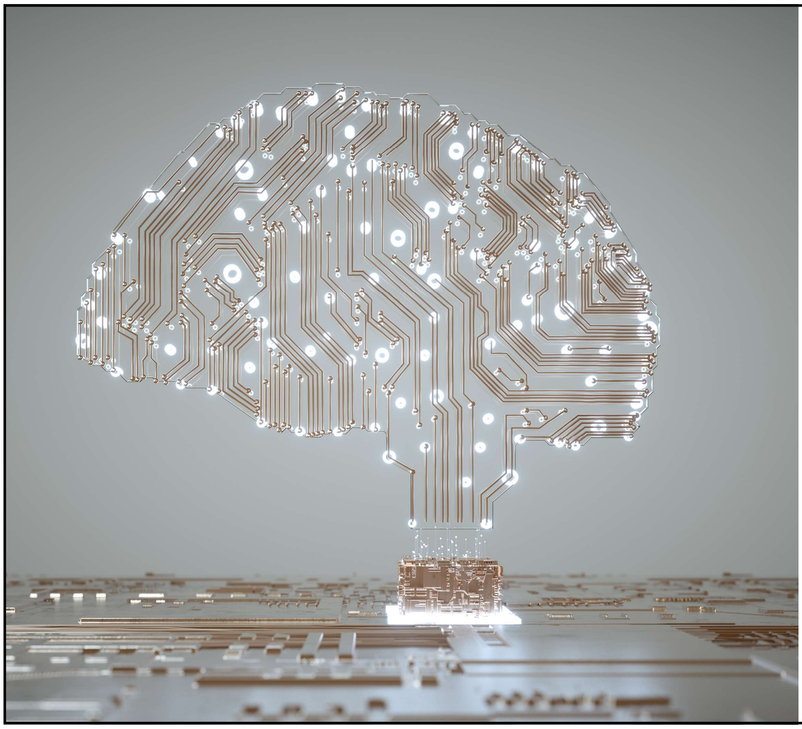

What is Artificial Intelligence?

- "A branch of computer science dealing with the simulation of intelligent behavior in computers."
- "The capability of a machine to imitate intelligent human behavior."

-Merriam-Webster

Notice that it is only a "simulation" or an "imitation" of intelligent behavior.

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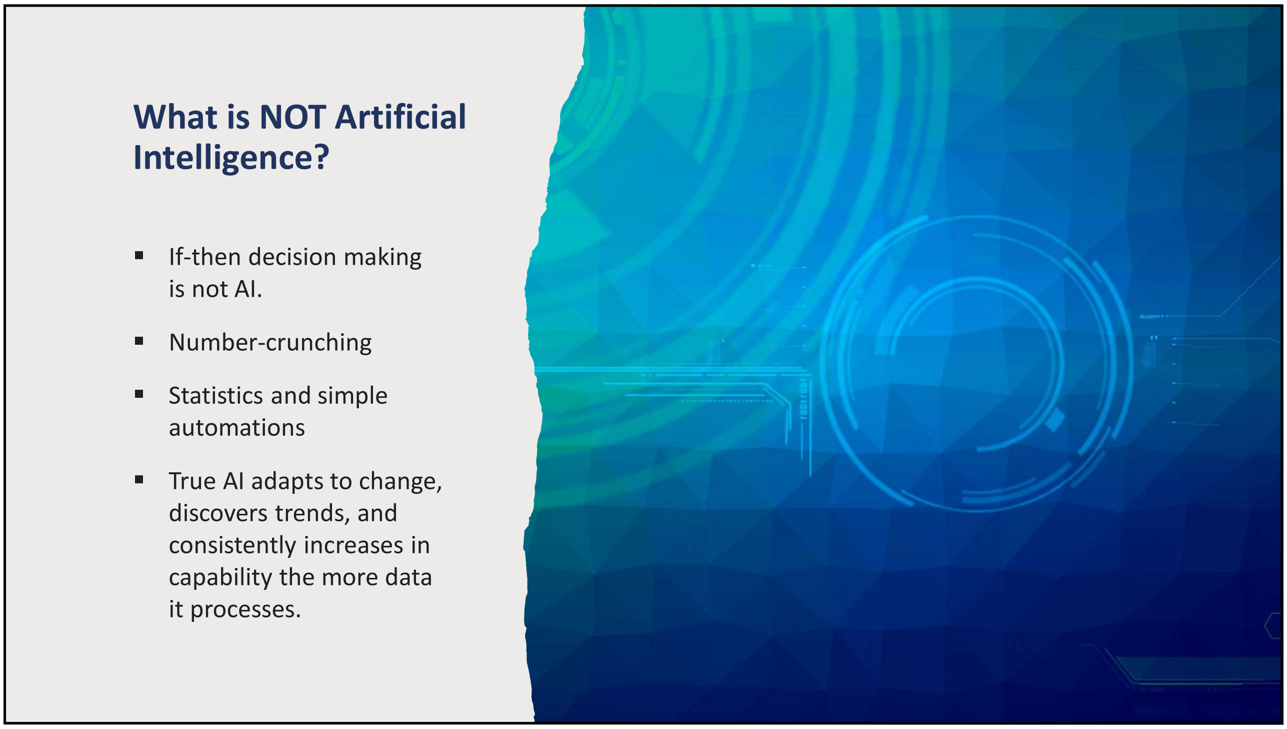

What is NOT Artificial Intelligence?

- If-then decision making is not AI.
- Number-crunching
- Statistics and simple automations
- True AI adapts to change, discovers trends, and consistently increases in capability the more data it processes.

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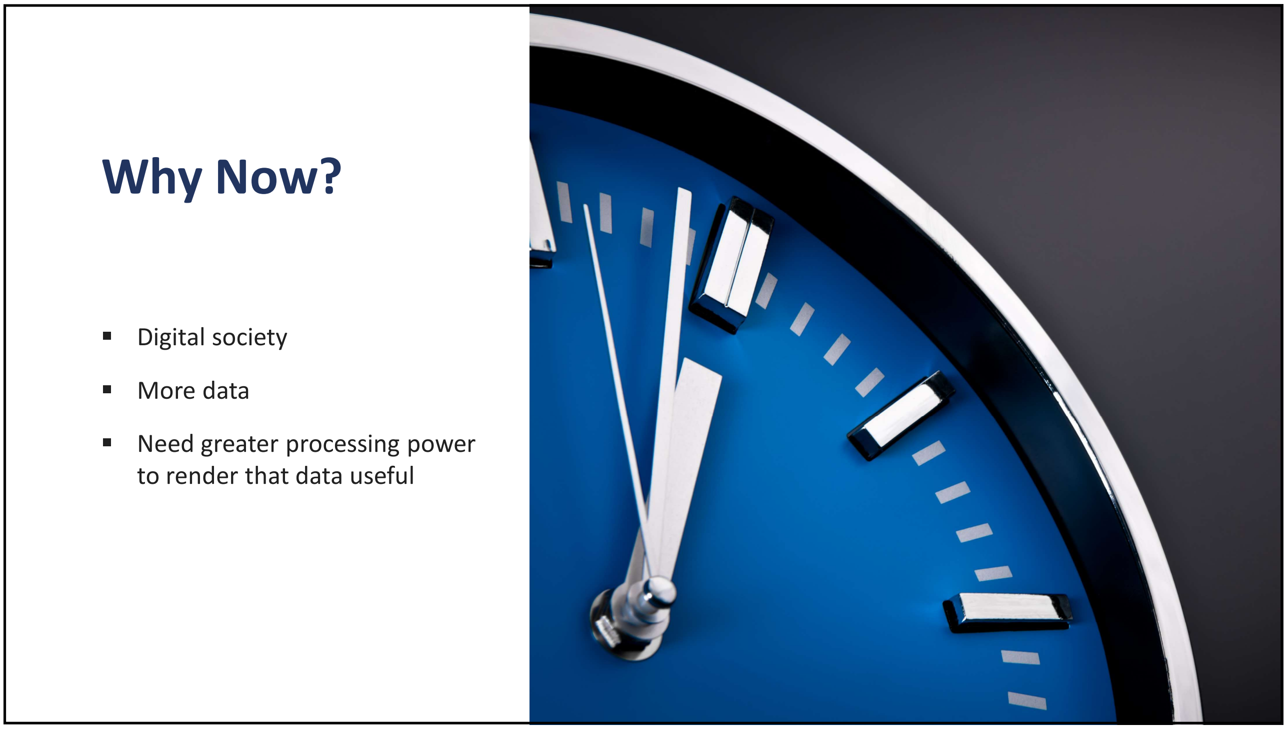

Why Now?

- Digital society
- More data
- Need greater processing power to render that data useful

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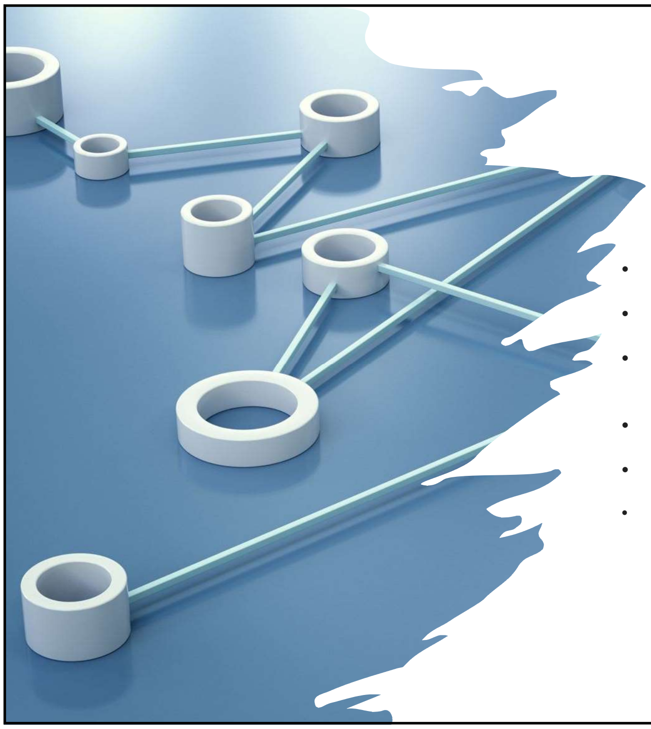

Face the Facts

- The global AI market value is expected to reach $267 billion by 2027
- 37% of businesses and organizations already employ AI
- The rise of AI will eliminate 85 million jobs and create 97 million new ones by 2025
- 25 countries are now working on designing autonomous vehicles
- 8 Billion devices use voice assistants (phone, IoT, smart devices, etc.)
- https://dataprot.net/statistics/ai-statistics/#:~:text=Key%20AI%20statistics,billion%20a%20year%20by%202025

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Examples of AI

- Face ID to unlock a device
- YouTube, Netflix and other recommendation engines
- OpenAI’s ChatGPT. Not a 2023 technology, but a 2023 product.
- ChatGPT made the news because of how accessible it made AI to EVERYONE.

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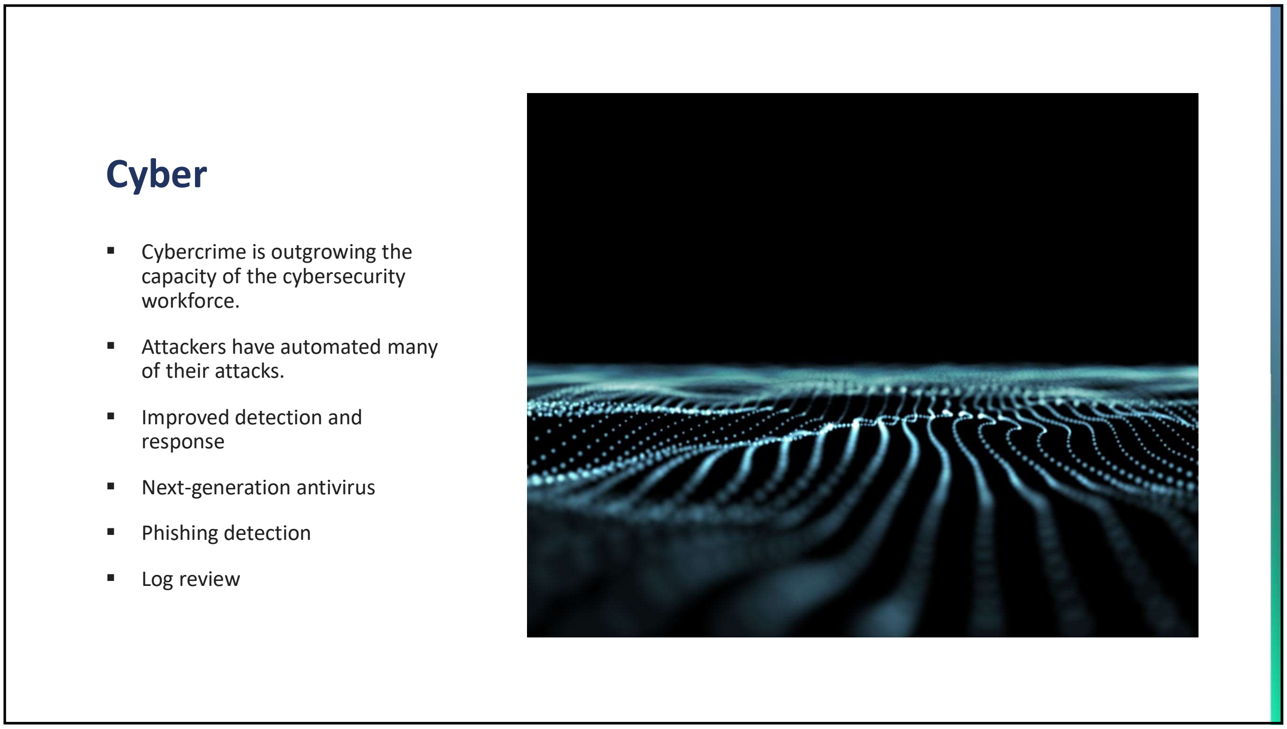

Cyber

- Cybercrime is outgrowing the capacity of the cybersecurity workforce.
- Attackers have automated many of their attacks.
- Improved detection and response
- Next-generation antivirus
- Phishing detection
- Log review

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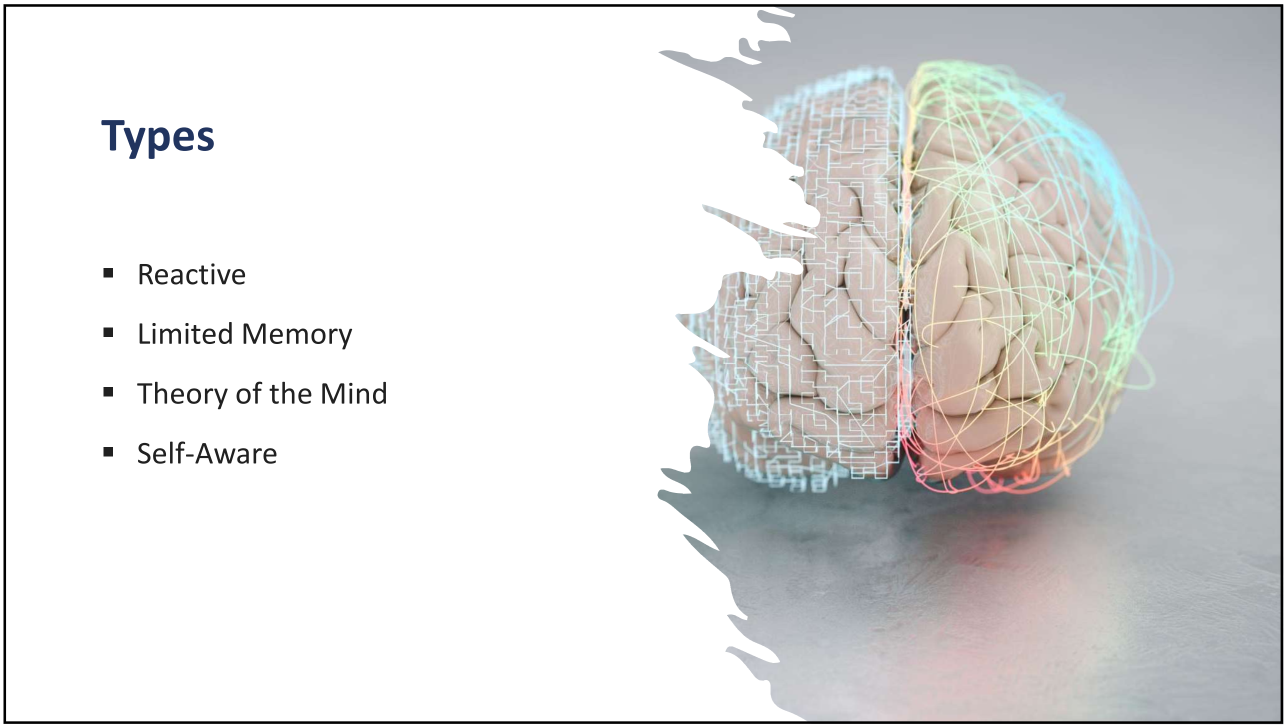

Types

- Reactive
- Limited Memory
- Theory of the Mind
- Self-Aware

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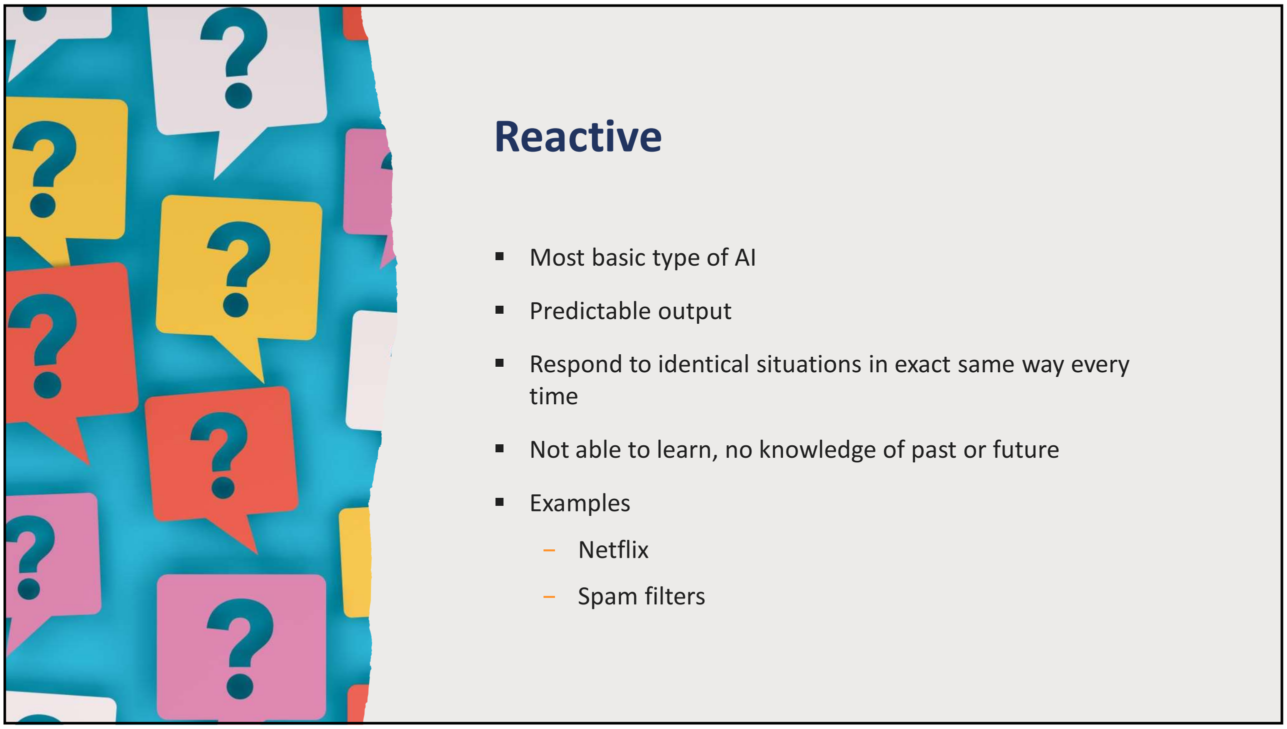

Reactive

- Most basic type of AI
- Predictable output
- Respond to identical situations in exact same way every time
- Not able to learn, no knowledge of past or future
- Examples
  - Netflix
  - Spam filters

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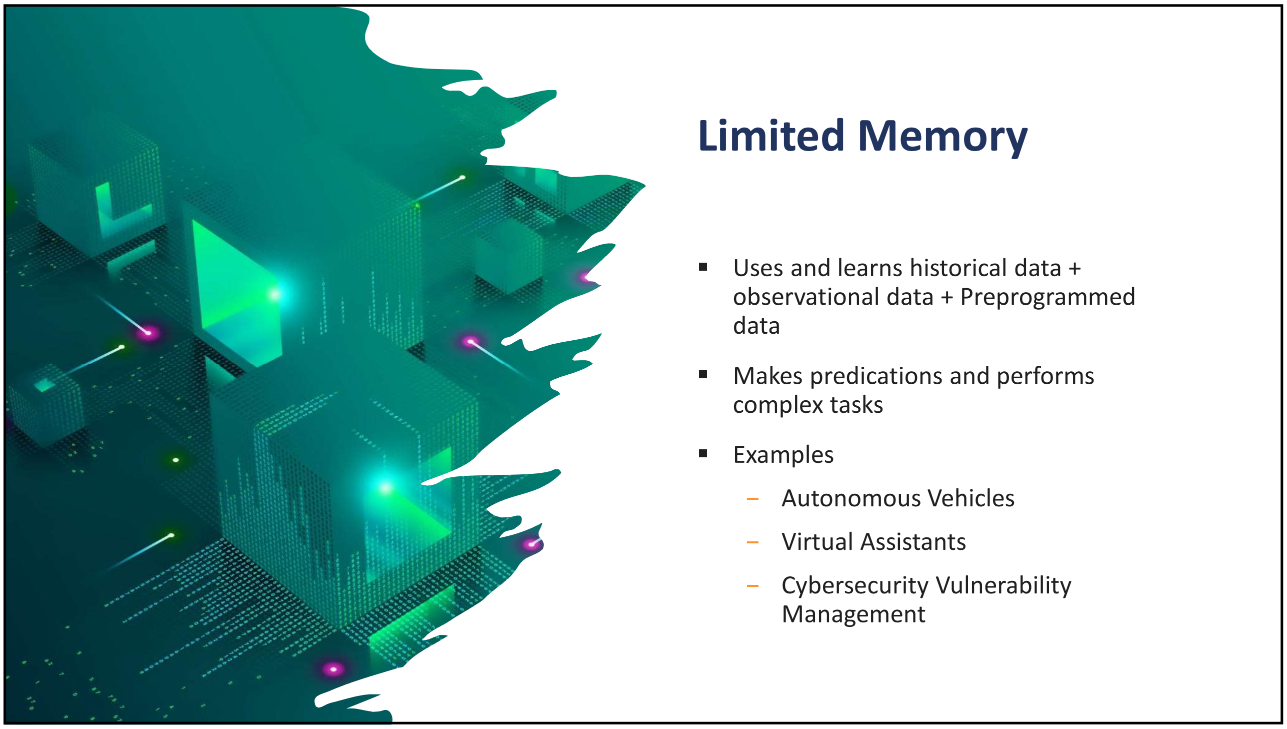

Limited Memory

- Uses and learns historical data + observational data + Preprogrammed data
- Makes predications and performs complex tasks
- Examples
  - Autonomous Vehicles
  - Virtual Assistants
  - Cybersecurity Vulnerability Management

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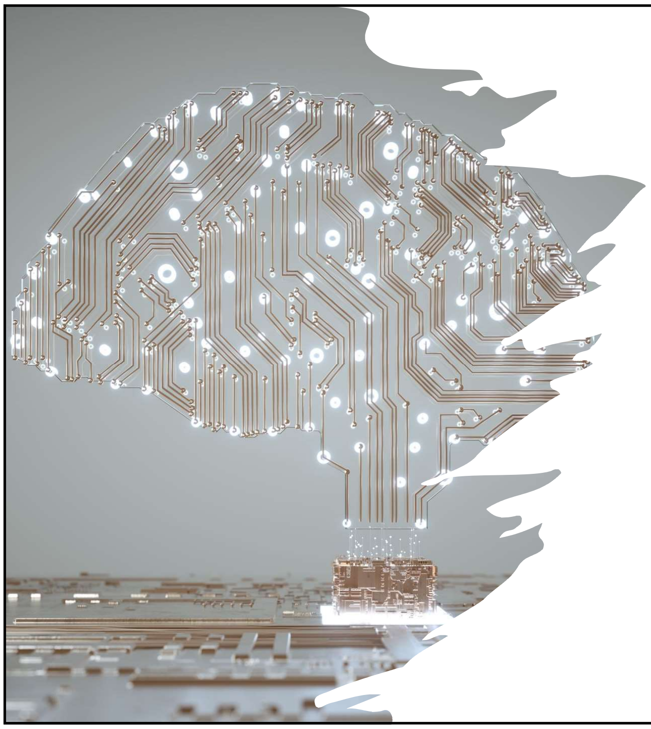

Theory of the Mind

- Machine will understand and remember emotions and needs of others
- Complex, emotionally intelligent
- Still under heavy research and development
- Next generation of AI
- Include Artificial Neural Networks (ANNs, an attempt to mimic human brain neural networks)

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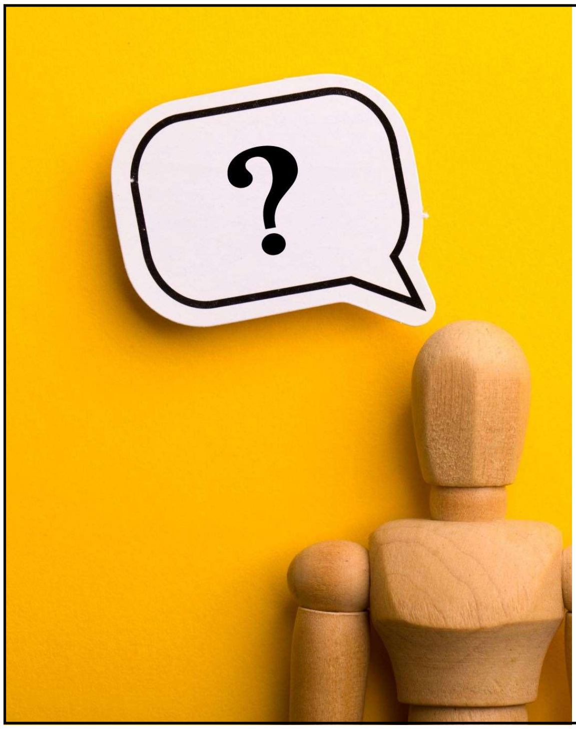

Self Aware

- Human like intelligence and self-aware
- Aware of own and others mental states and emotions
- No longer “tools” to be used by humans
- Conscious and feels purpose

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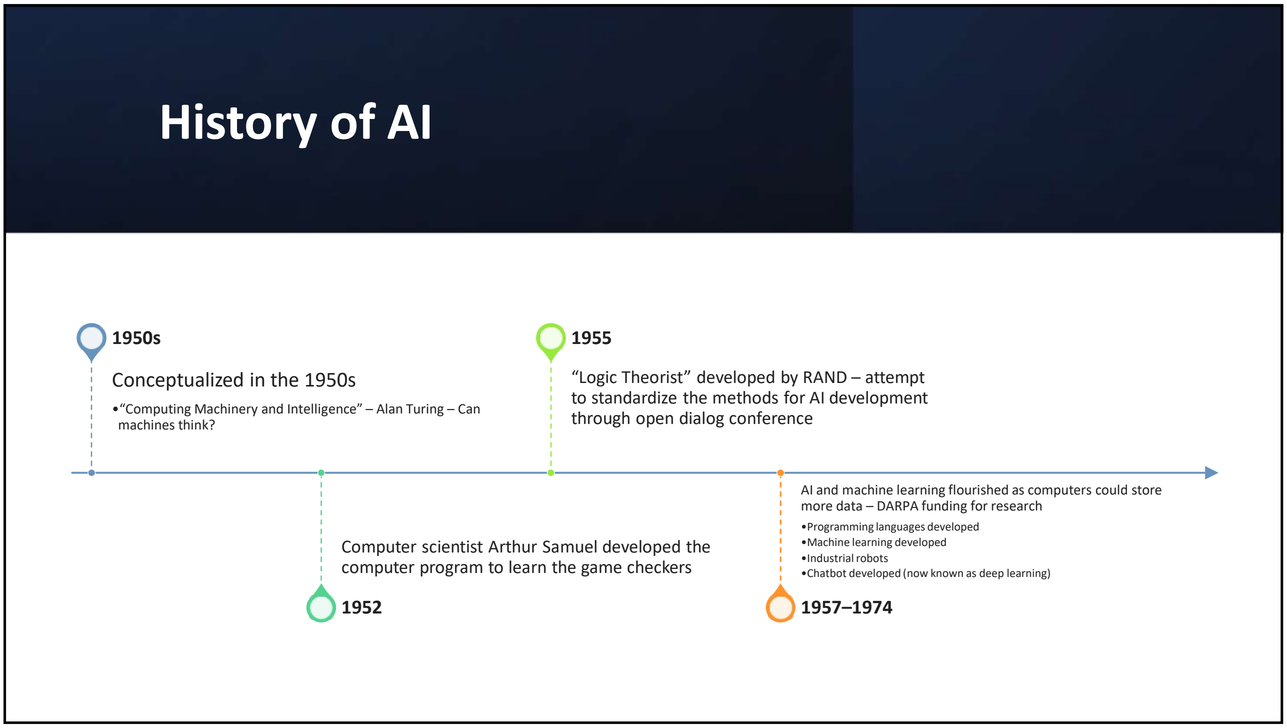

History of AI

1950s

Conceptualized in the 1950s

- "Computing Machinery and Intelligence" – Alan Turing – Can machines think?

1952

Computer scientist Arthur Samuel developed the computer program to learn the game checkers

1955

"Logic Theorist" developed by RAND – attempt to standardize the methods for AI development through open dialog conference

1957–1974

AI and machine learning flourished as computers could store more data – DARPA funding for research

- Programming languages developed
- Machine learning developed
- Industrial robots
- Chatbot developed (now known as deep learning)

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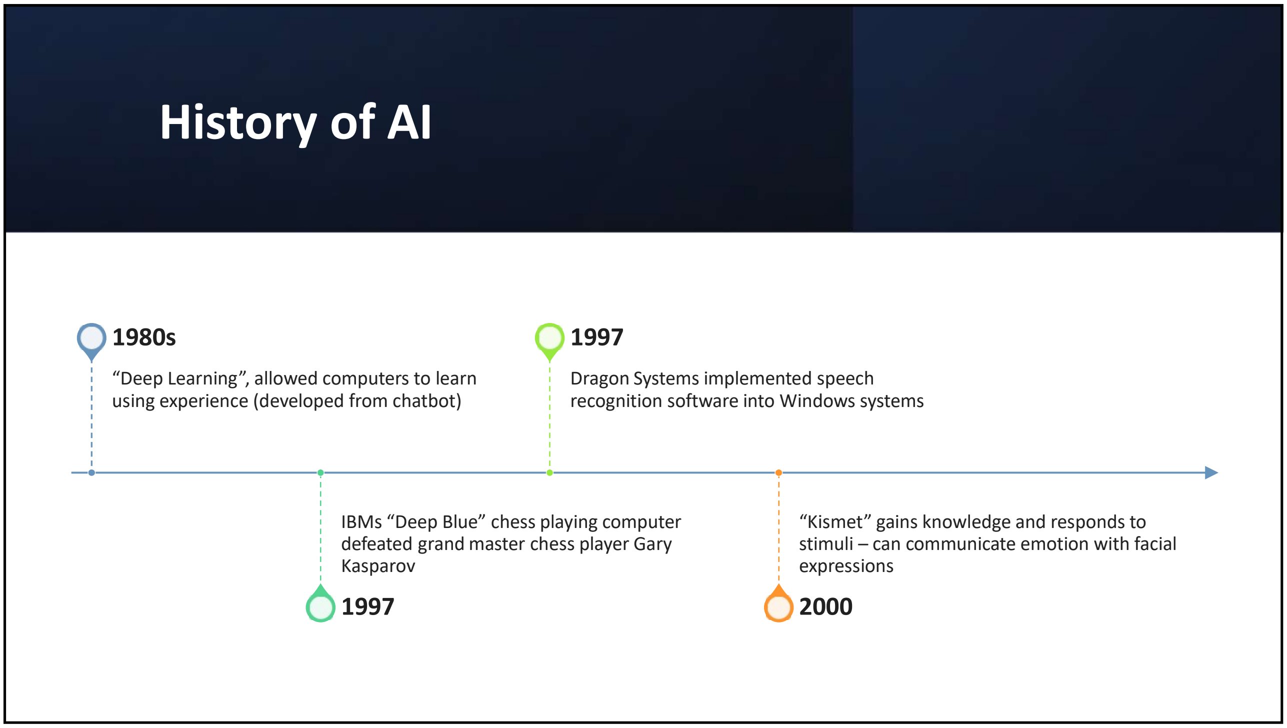

History of AI

1980s

"Deep Learning", allowed computers to learn using experience (developed from chatbot)

1997

IBMs "Deep Blue" chess playing computer defeated grand master chess player Gary Kasparov

1997

Dragon Systems implemented speech recognition software into Windows systems

2000

"Kismet" gains knowledge and responds to stimuli – can communicate emotion with facial expressions

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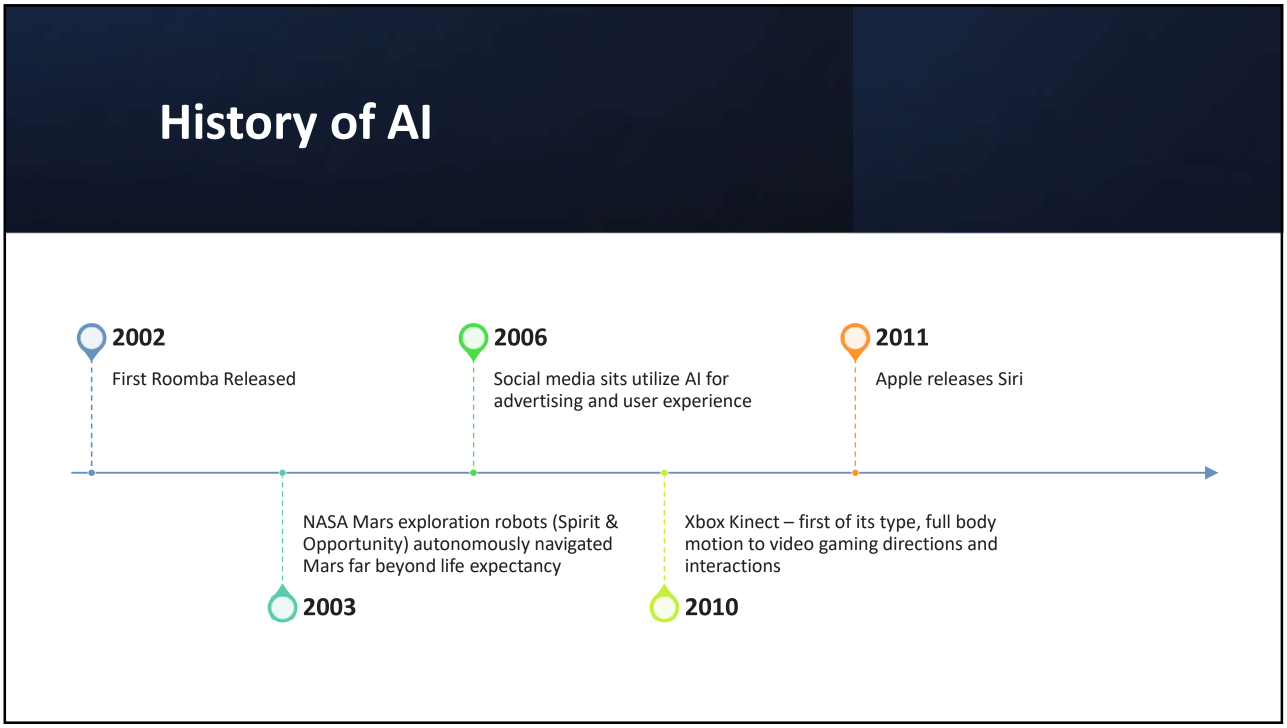

History of AI

2002

First Roomba Released

2003

NASA Mars exploration robots (Spirit & Opportunity) autonomously navigated Mars far beyond life expectancy

2006

Social media sits utilize AI for advertising and user experience

2010

Xbox Kinect – first of its type, full body motion to video gaming directions and interactions

2011

Apple releases Siri

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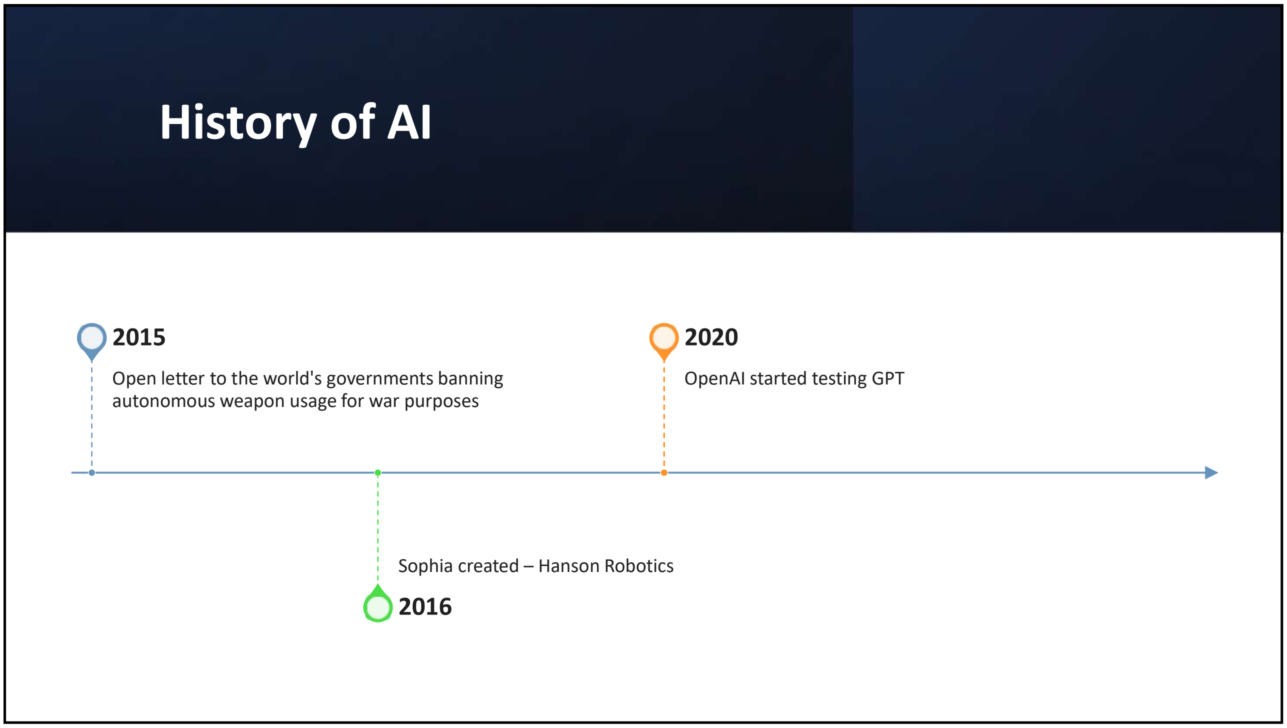

History of AI

2015

Open letter to the world's governments banning autonomous weapon usage for war purposes

2016

Sophia created – Hanson Robotics

2020

OpenAI started testing GPT

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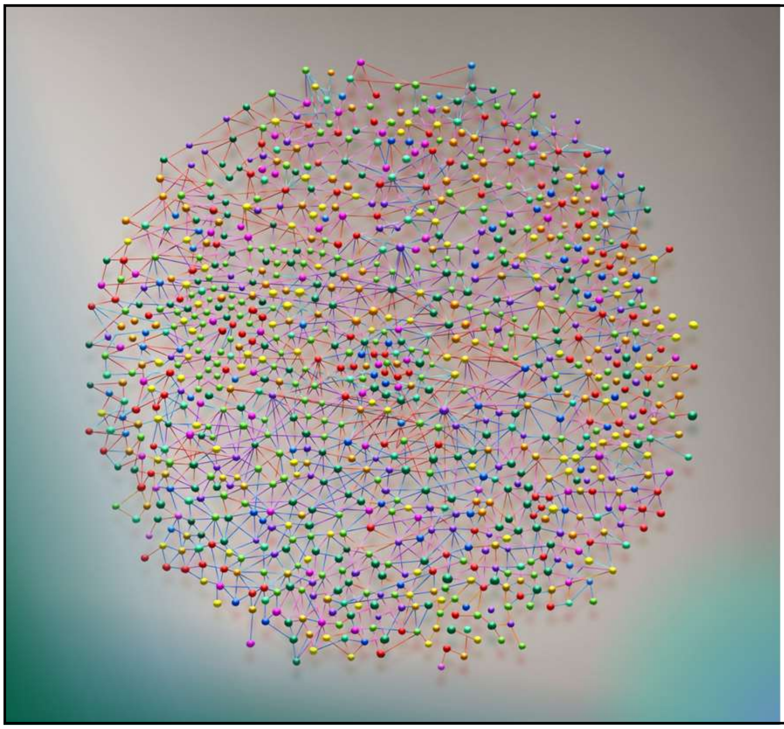

Goals

- Logical Reasoning
- Knowledge Representation
- Planning and Navigation
- Natural Language Processing
- Perception
- Emergent Intelligence

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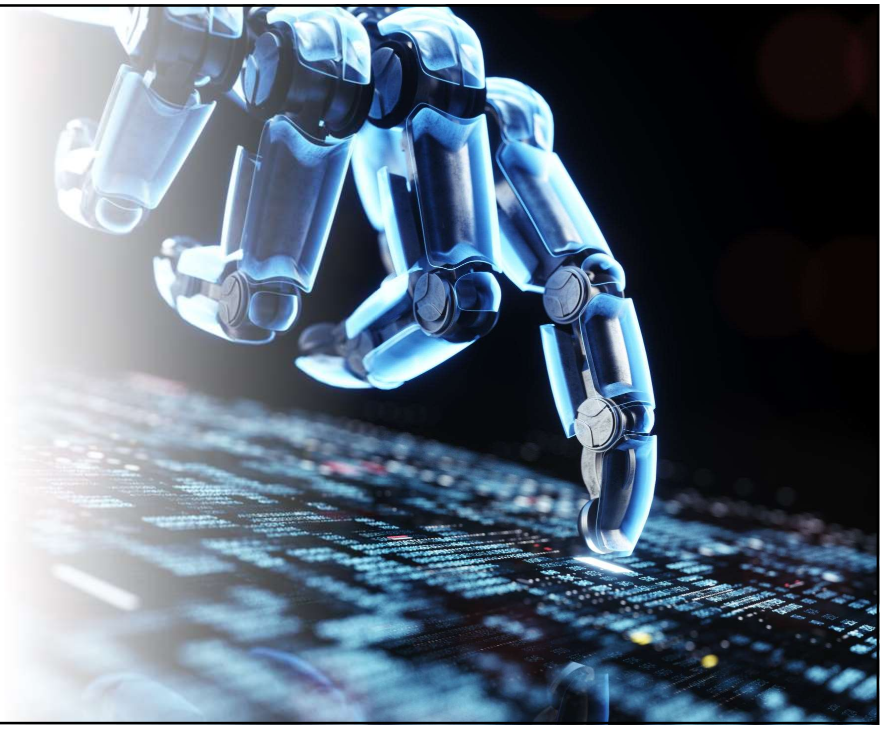
Services

- iRobot
- Hanson Robotics
- Softbank Robotics
- Microsoft
- Apple/Google
- Healthcare
- Self-driving cars
- Social media
  - Slack
  - X
  - Meta



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Irobot

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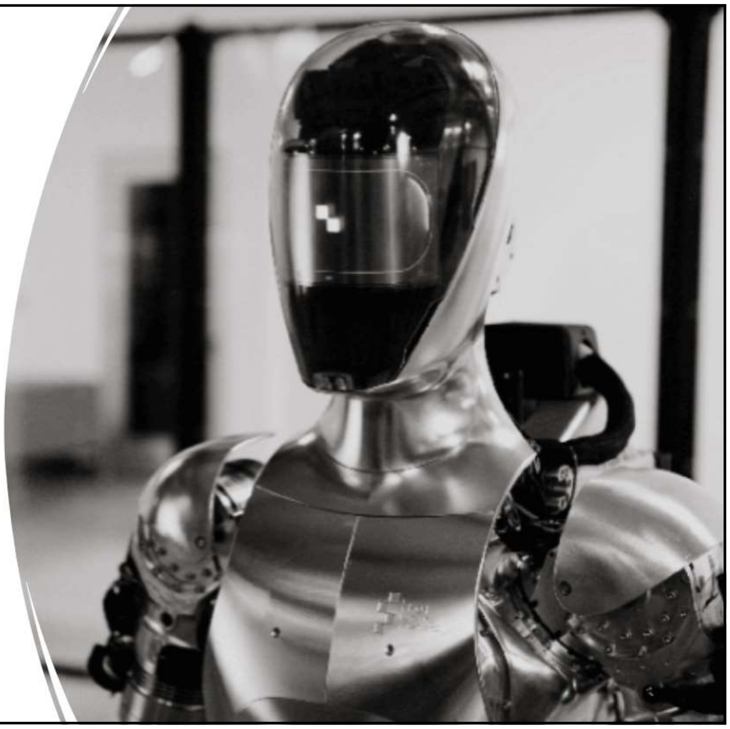
Figure 1

- Figure Status Update - OpenAI Speech-to-Speech Reasoning (youtube.com)



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Optimus

- Optimus - Gen 2 (youtube.com)

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Services

- Microsoft
  - Cortana
  - Dynamics 365
  - Bing
  - Microsoft 365
  - Power BI
  - Scheduler
  - Pix

- Azure
- Dynamics 365
- Cognitive Services
- Azure Machine Learning Studio
- Data Science Virtual Machines
- Knowledge Mining
- Conversational AI

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Social Media

- Instagram/Facebook Meta AI
- xAI
- Snapchat
- Microsoft Teams

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Language Models

Copilot

Gemini

Supercharge your creativity and productivity

Chat to start writing, planning, learning and more with Google AI

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Healthcare

Services

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Self Driving

- Tesla
- General Motors (GM)
- Nuro
- May Mobility
- Cruise
- Waymo
- Aurora

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Helping Our Astronauts

NASA engineers use A.I. to design spacecraft parts (youtube.com)

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Defensive Uses

- Threat Detection
- Behavior Analysis
- Vulnerability Management
- Automated Response and Remediation
- User Authentication
- Malware Detection and Prevention:
- Phishing Detection

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Behavioral Modeling and Generative AI

- Uniform Cost Search (UCS)
- Data-Sets
- Sensory
- Path Planning
- Machine Learning

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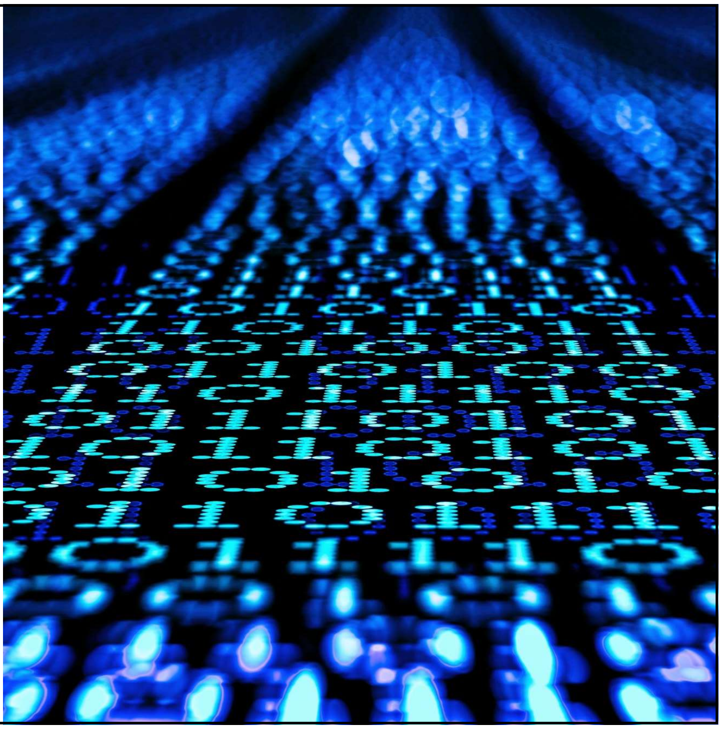
Malicious Uses

- Malware Generation
- Social Engineering
- Deepfakes
- Hacking (exploiting)



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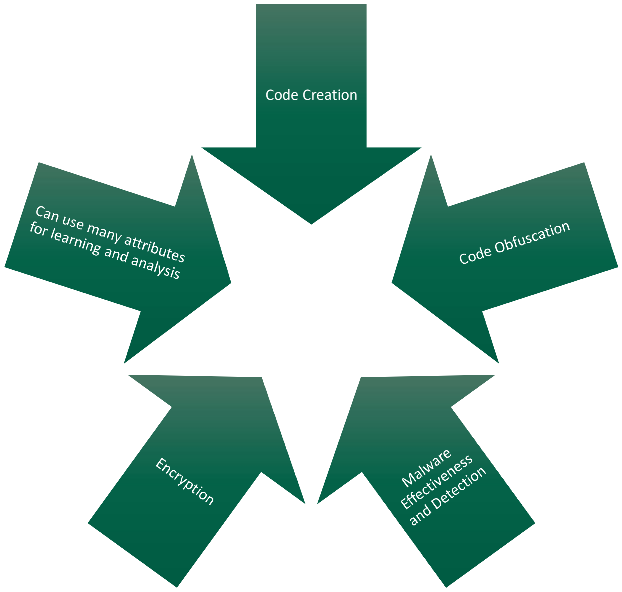
Malware Generation



- Code Creation
- Code Obfuscation
- Malware Effectiveness and Detection
- Encryption
- Can use many attributes for learning and analysis

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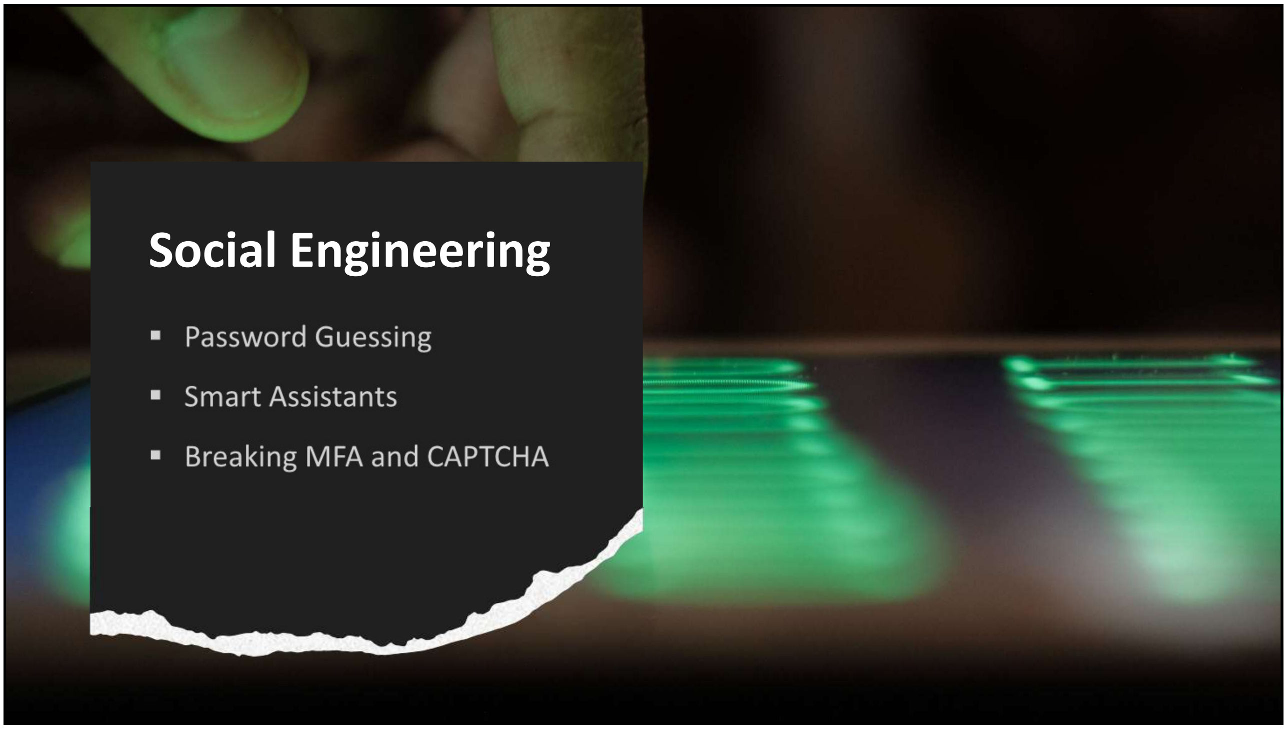

Social Engineering

- Password Guessing
- Smart Assistants
- Breaking MFA and CAPTCHA

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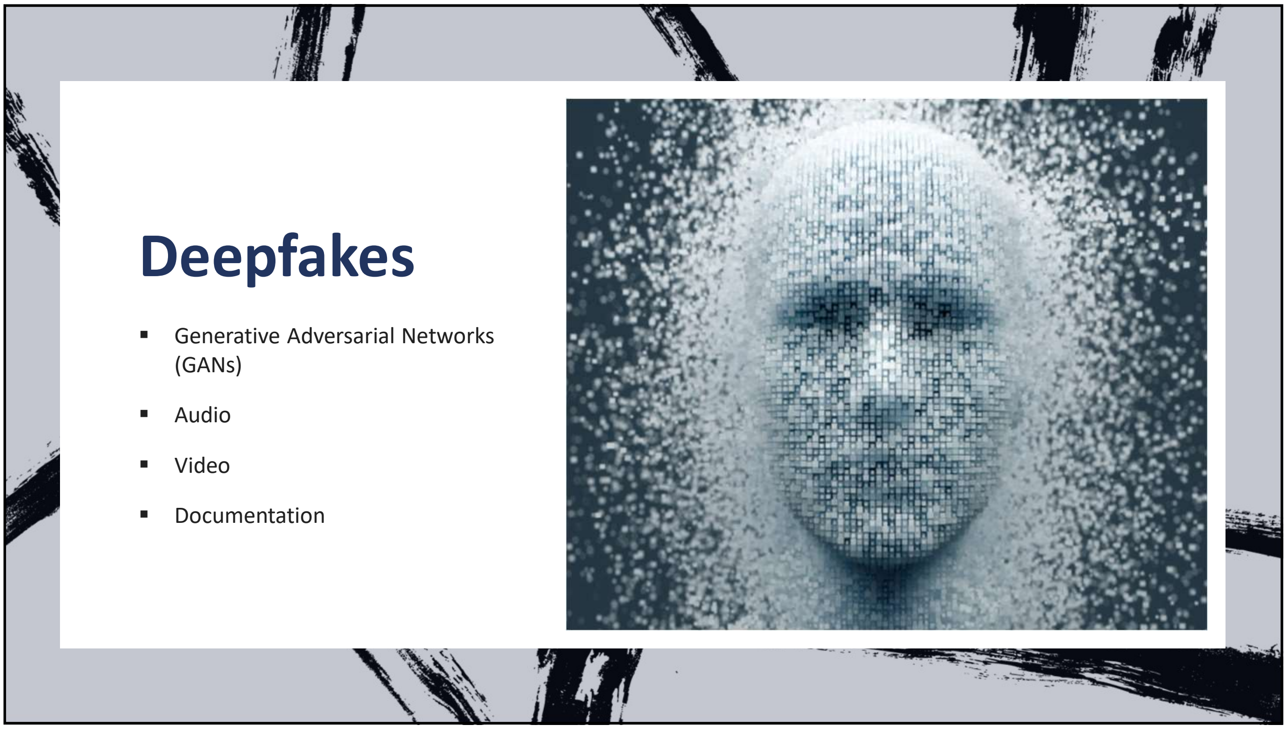

Deepfakes

- Generative Adversarial Networks (GANs)
- Audio
- Video
- Documentation

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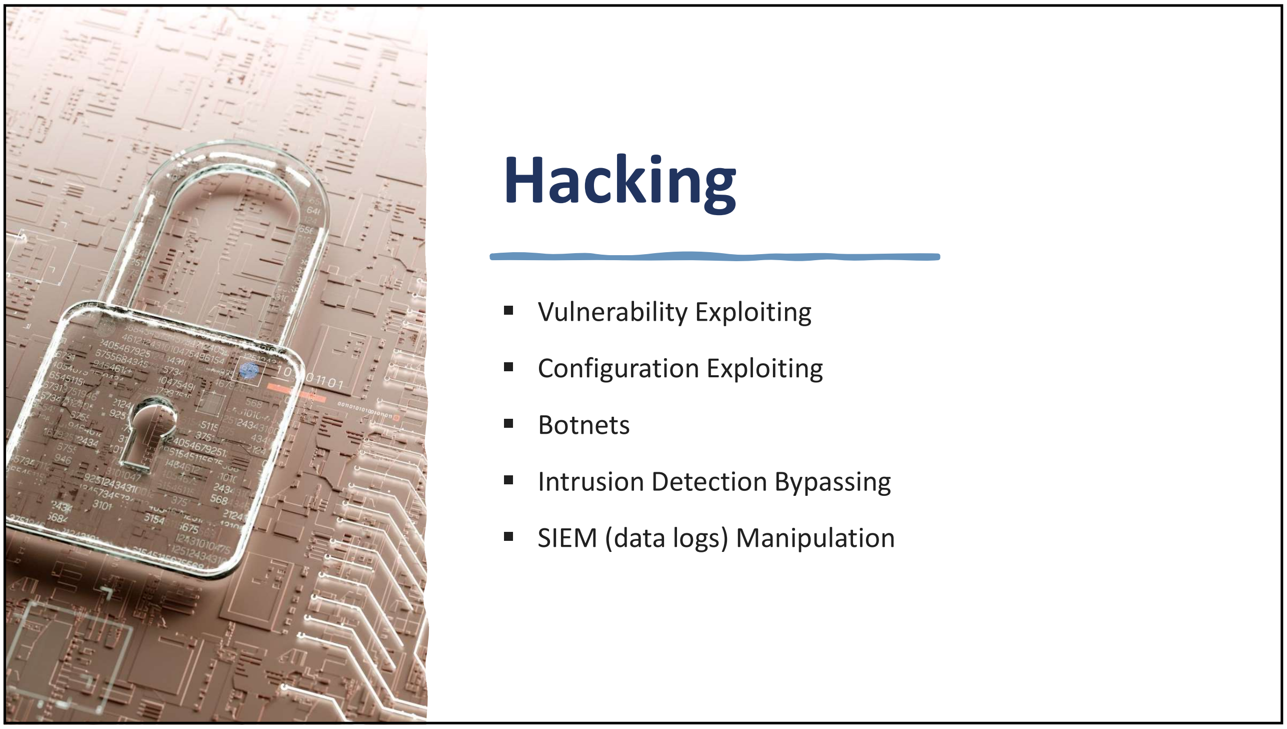

Hacking

- Vulnerability Exploiting
- Configuration Exploiting
- Botnets
- Intrusion Detection Bypassing
- SIEM (data logs) Manipulation

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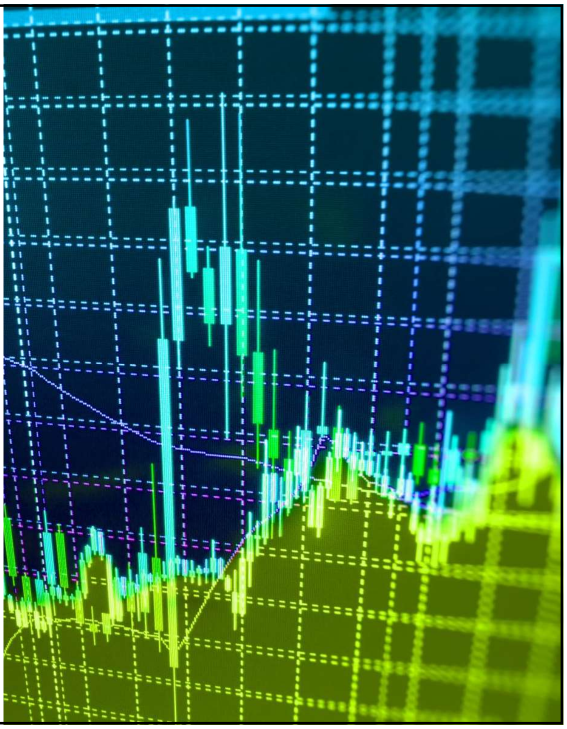
Threats to AI

- Data Poisoning
- Data Extraction
- Behavior modification
- Evasion
- Bias/Misuse
- Loss of Control



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Data Poisoning

- When Training data is intentionally tampered with
- Affects the results of AI decision making process
- In the form of subtle modifications
  - Label Poisoning – Injecting “mislabeled” or malicious data
  - Training Poisoning – modification of training data
  - Model Inversion – exploiting AI responses to infer information
  - Stealth Attacks – Creating or exploiting known vulnerabilities

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Data Extraction

- AI is used for
  - Invoicing – Extract key and relevant data
  - Accounting – Financial Statements, expense and revenue reports
  - Tax reporting - Tracking and compiling vast amounts of financial data
  - Pattern Recognition and Extraction

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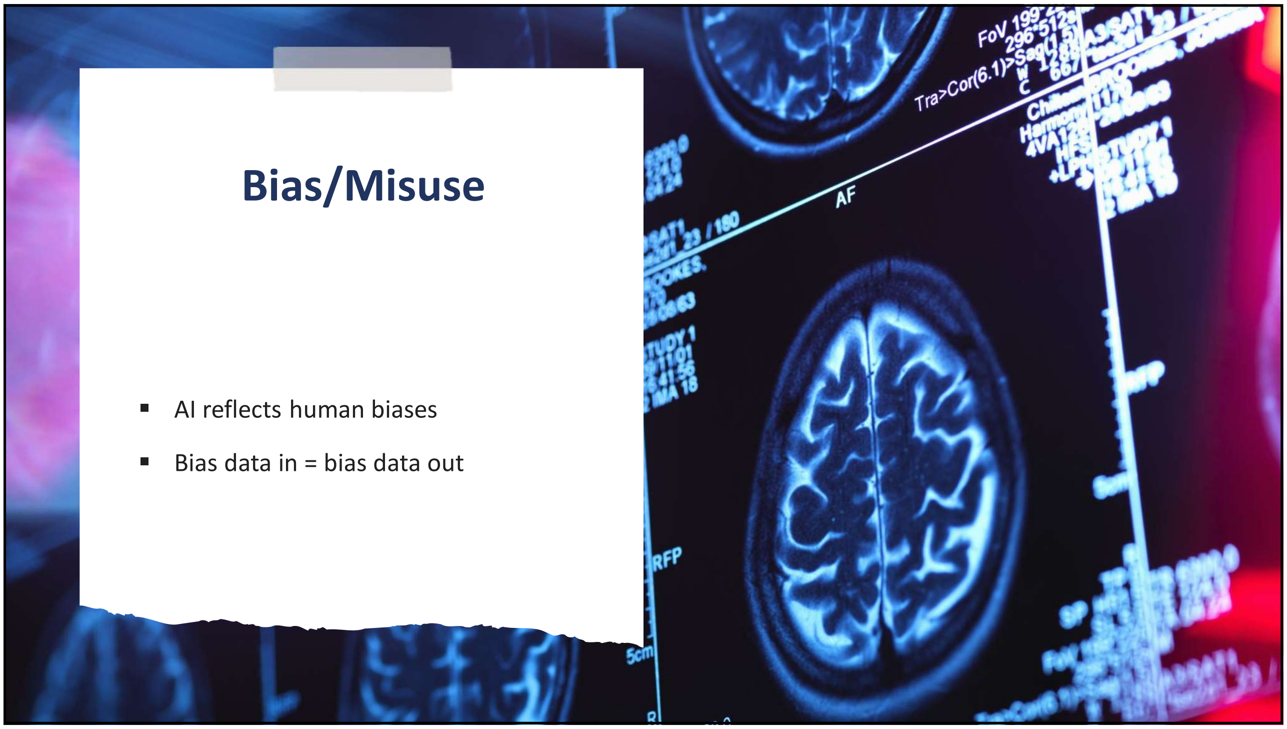

Bias/Misuse

- AI reflects human biases
- Bias data in = bias data out

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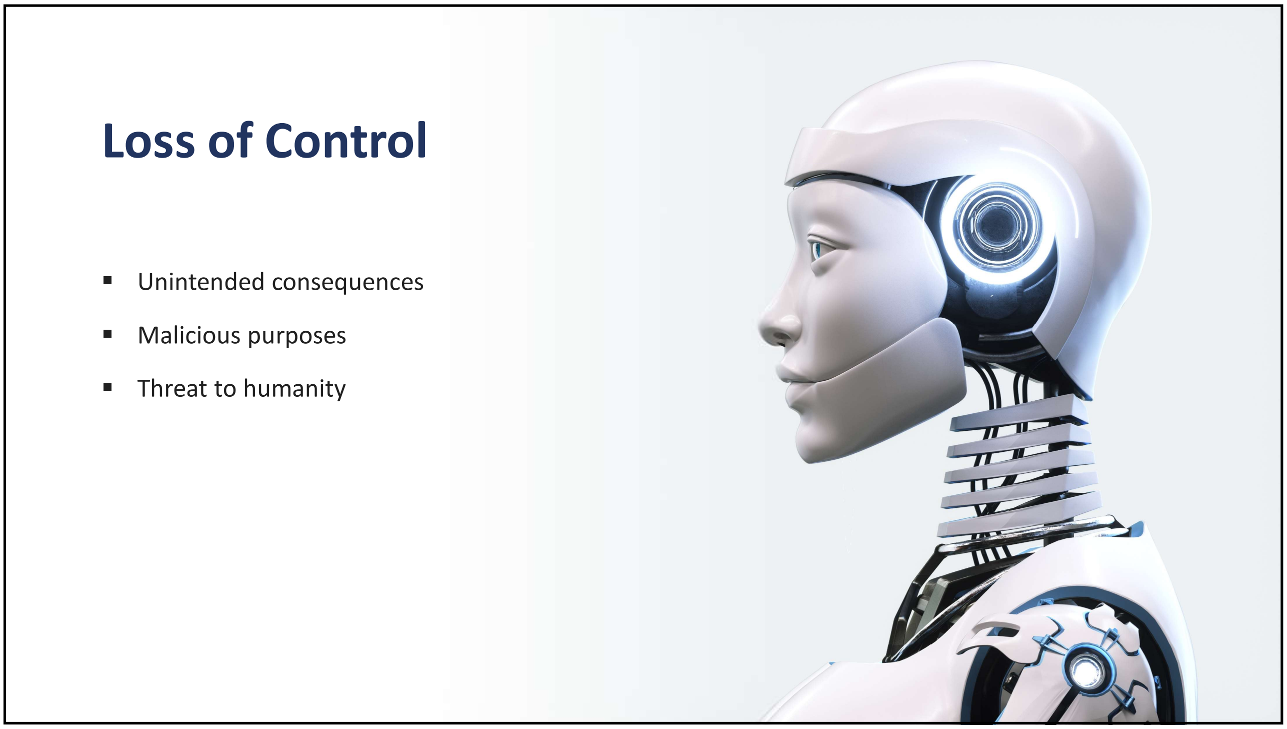

Loss of Control

- Unintended consequences
- Malicious purposes
- Threat to humanity

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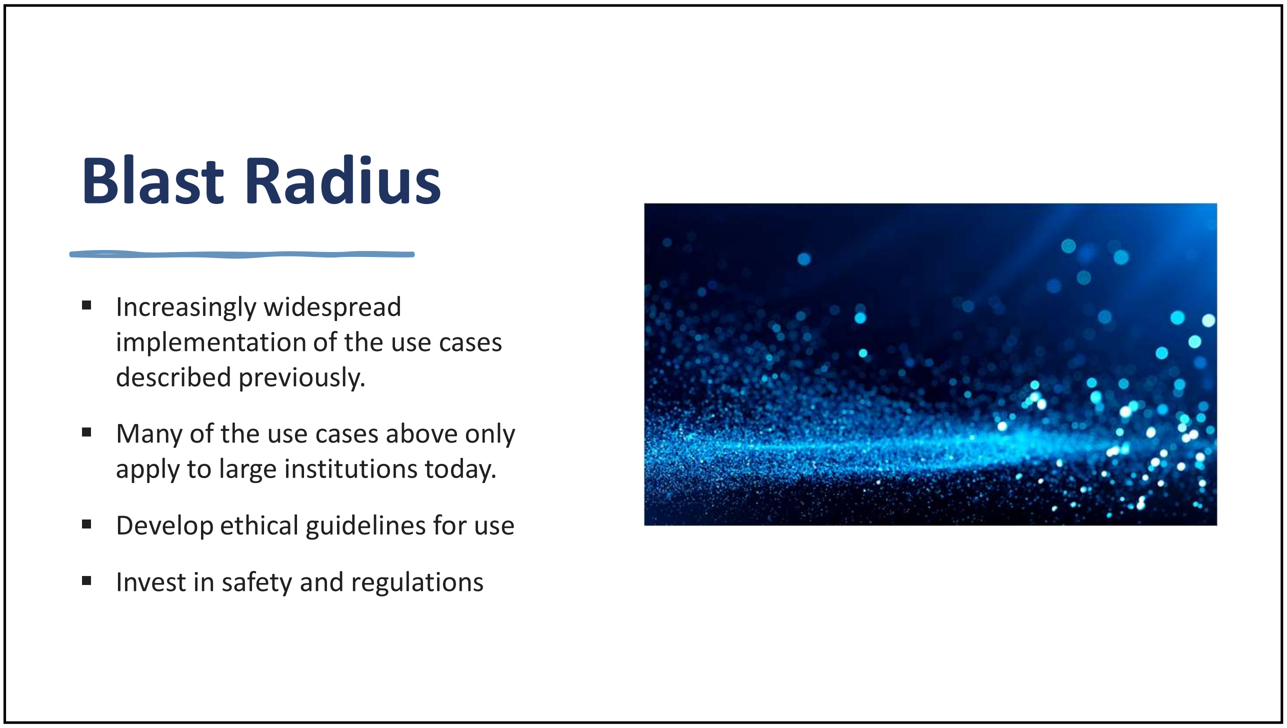

Blast Radius

- Increasingly widespread implementation of the use cases described previously.
- Many of the use cases above only apply to large institutions today.
- Develop ethical guidelines for use
- Invest in safety and regulations

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Will We Be Replaced?

- **No.**
- AI will free up employees to focus on other more complex, customer-facing tasks.
- Many people will still want personal interaction.
- AI can't do everything. Sometimes you need "real" intelligence, not artificial.

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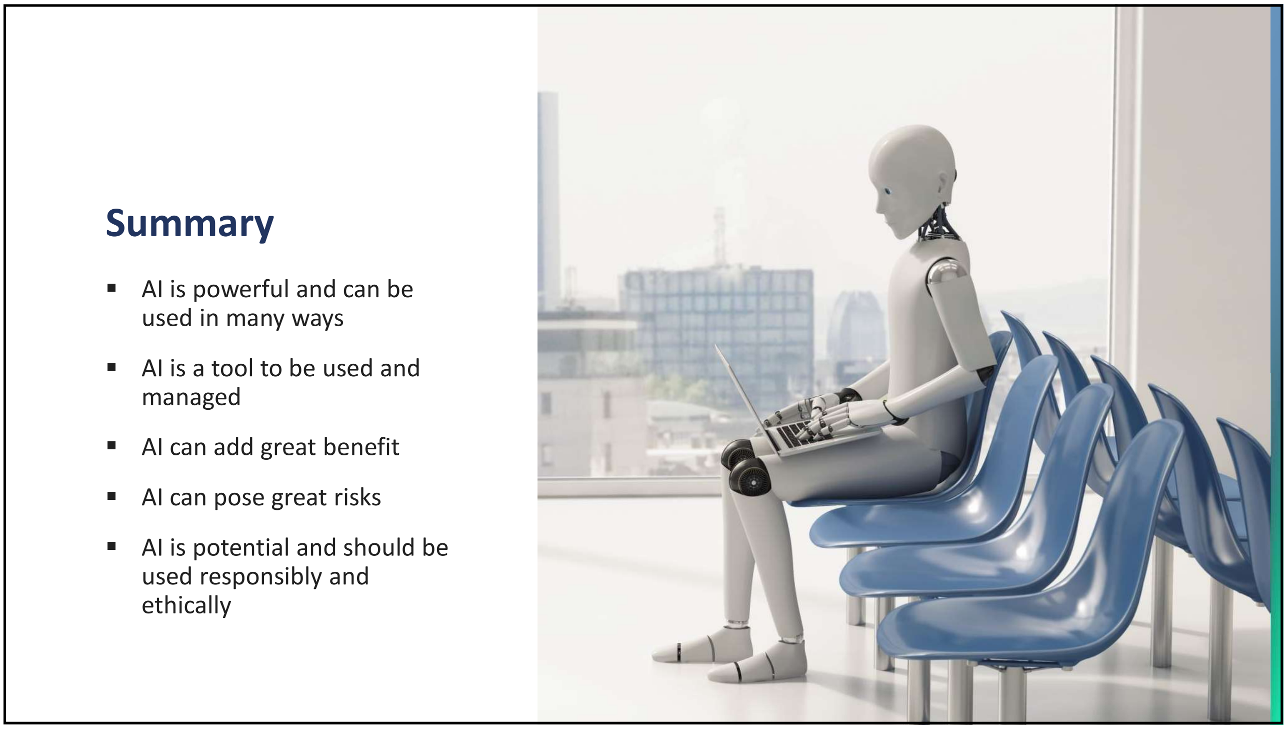

Summary

- AI is powerful and can be used in many ways
- AI is a tool to be used and managed
- AI can add great benefit
- AI can pose great risks
- AI is potential and should be used responsibly and ethically

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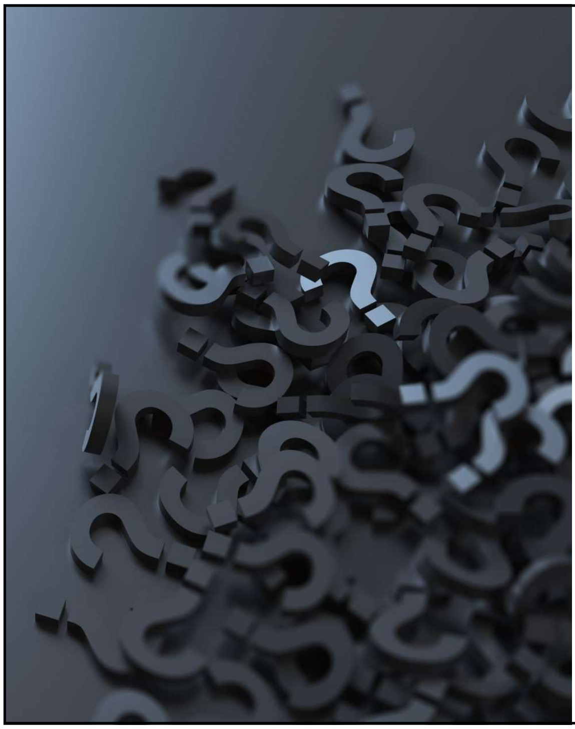

Questions?

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