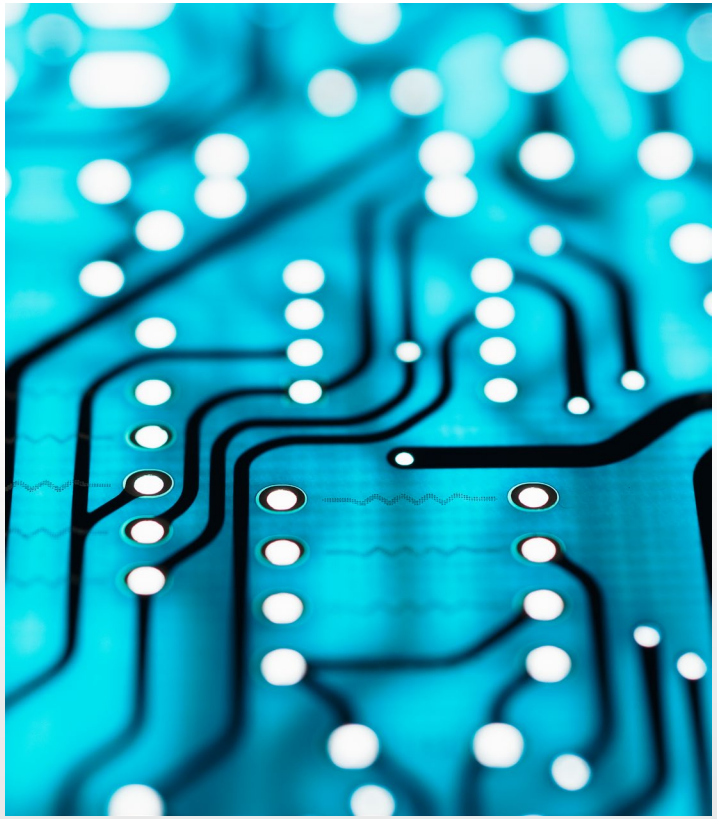
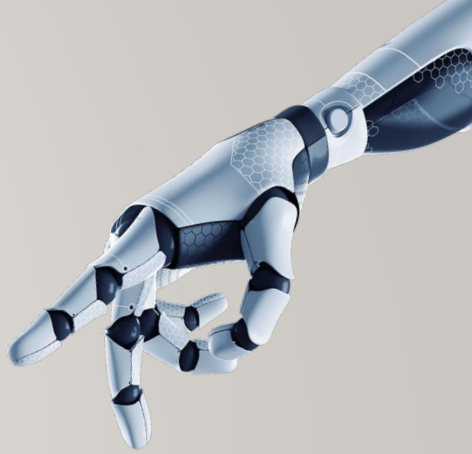




ARTIFICIAL INTELLIGENCE

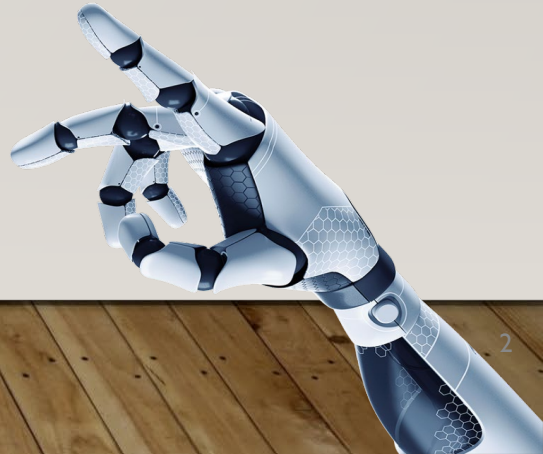
BEYOND THE HYPE

NICK PATEL M.D.

CEO & FOUNDER STEALTH CONSULTING

AGENDA

- What is AI vs Automation?
- AI Timeline
- Review components: *ML, NLP, DL, Gen AI, LLMs*
- AI Hype-cycle
- AI in Healthcare
- AI Ethics/Regulations



WHAT IS AI vs AUTOMATION?

ARTIFICIAL INTELLIGENCE IS A BROAD TERM FOR TECHNOLOGIES THAT ENABLE COMPUTERS TO LEARN AND THINK LIKE HUMANS

Purpose: Capability of machines or computer programs to perform tasks that typically require human intelligence. AI systems are designed to simulate human reasoning and decision-making processes, learn from data, and adapt to new situations. AI can handle complex and unstructured data and make predictions or decisions based on patterns and algorithms.

Flexibility and Adaptability: Can handle a wide range of tasks and adapt to changing conditions or data. They are flexible and can be applied to various domains, from healthcare diagnosis to autonomous driving.

Decision-Making: can make decisions or recommendations based on data and algorithms. For example, AI can recommend personalized content on a website or suggest treatment options for a patient based on medical data.

Examples: Personal assistants, self-driving cars, content creation, disease diagnosis, robotic surgery

AUTOMATION IS A BROAD TERM FOR TECHNOLOGIES THAT ARE PROGRAMMED TO DO PREDEFINED TASKS OR PROCESSES

Purpose: It is focused on streamlining repetitive and rule-based activities, often with the goal of improving efficiency and reducing errors.

Flexibility and Adaptability: They do not possess learning capabilities and do not adapt to new situations unless explicitly reprogrammed.

Decision-Making: Does not have make decisions but executes tasks as instructed (programmed) without interpreting the data or context

Examples: COVID symptom checker chatbots, industrial robots on manufacturing assembly lines, automated email responses etc.

AI TIMELINE

1943

Walter Pitts and Warren S. McCulloch published A Logical Calculus of the Ideas Immanent in Nervous Activity, discussing networks of idealized artificial “neurons” and how they perform simple logical functions.

1947

Statistician John W. Tukey introduced the term “bit” for a binary digit, a unit of information stored in a computer.

1949

Donald Hebb published Organization of Behavior: A Neuropsychological Theory that proposed a theory about learning based on conjectures about neural networks.

1950

- Claude Shannon published “Programming a Computer for Playing Chess” articles on developing a chess-playing computer program.
- Alan Turing proposed the Turing Test in Computing Machinery and Intelligence, arguing that if a machine can trick a human into thinking that it’s human, then the machine has intelligence.

1951

Marvin Minsky and Dean Edmunds created the first artificial neural network using 3,000 vacuum tubes, simulating a network of 40 neurons.

1955

AI Born- Scientists John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon coined the term “Artificial Intelligence,” which is defined as the “science and engineering of making an intelligent machine.”

- Herbert Simon and Allen Newell created the first AI program, the Logic Theorist, which goes on to prove 38 of the first 52 theorems in Whitehead and Russell’s Principia Mathematica.

1956

The Dartmouth Conference was held, with Dartmouth professor John McCarthy bringing together leading experts to discuss topics like natural language processing, computer vision, and neural networks.

1959

Arthur Samuel coined the term "machine learning."

- Oliver Selfridge published Pandemonium: A Paradigm for Learning, which described a model for how computers could recognize patterns not specified in advance.
- John McCarthy published Programs with Common Sense, which described the Advice Taker program for solving problems by manipulating sentences in formal languages so the program could "learn from their experience as effectively as humans do."

1961

The first industrial robot, Unimate, was deployed on an assembly line in a General Motors plant.

1966

- Joseph Weizenbaum developed ELIZA, the world's first chatbot and an ancestor of Alexa and Siri.

Shakey, the first general-purpose mobile robot, was introduced. It was able to reason about its own actions.

1969

Arthur Bryson and Yu-Chi Ho talked about backpropagation as a multi-stage dynamic system optimization method, which contributed to the success of deep learning in the 2000s and 2010s.

1970

The first anthropomorphic robot, the WABOT-1, was designed at Waseda University in Japan.

1979

Kunihiko Fukushima developed neocognitron — a multilayered artificial, hierarchical, and neural network.

1997

Deep Blue, the first computer chess program, beat the reigning world chess champion, Gary Kasparov.

2000

Cynthia Breazeal at MIT developed Kismet, which can recognize and simulate emotions.

Honda's ASIMO robot demonstrated it can walk as fast as a human and deliver trays to customers in a restaurant-like setting.

1969

Arthur Bryson and Yu-Chi Ho talked about backpropagation as a multi-stage dynamic system optimization method, which contributed to the success of deep learning in the 2000s and 2010s.

2001

Steven Spielberg released the A.I. Artificial Intelligence movie, in which a childlike android called David has the ability to love.

2006

Michele Banko, Oren Etzioni, and Michael Cafarella coined the term "machine reading," an inherently unsupervised autonomous understanding of text.

2009

Rajat Raina, Anand Madhavan, and Andrew Ng published Large-scale Deep Unsupervised Learning Using Graphics Processors. They asserted that "modern graphics processors far surpass the computational capabilities of multicore CPUs, and have the potential to revolutionize the applicability of deep unsupervised learning methods."

2011

A convolutional neural network won the German Traffic Sign Recognition competition with 99.46% accuracy, compared to humans at 99.22%.

Watson, IBM's natural language question-answering computer, beat two former champions on Jeopardy.

2012

University of Toronto's convolutional neural network achieved a 16% error rate in the ImageNet Large Scale Visual Recognition Challenge, an improvement from the 25% error rate achieved the year before by the best entry.

2017

Google DeepMind's A.I. AlphaGo beat champion Lee Sedol in the complex board game of Go.

2019 Quantum Computing

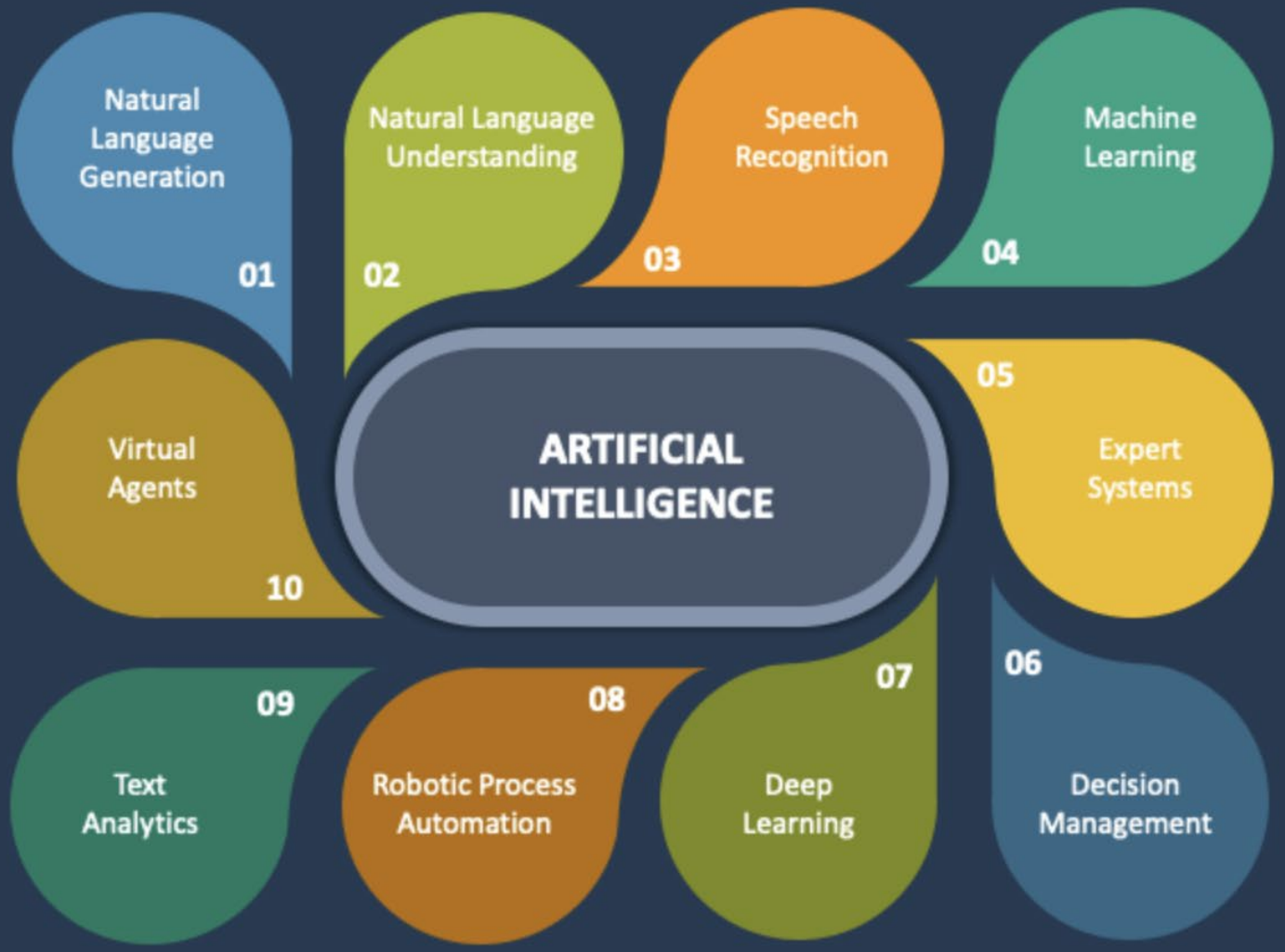
2022 OpenAI & DALL-E 2

2023-24 Rapid expansion in AI capabilities

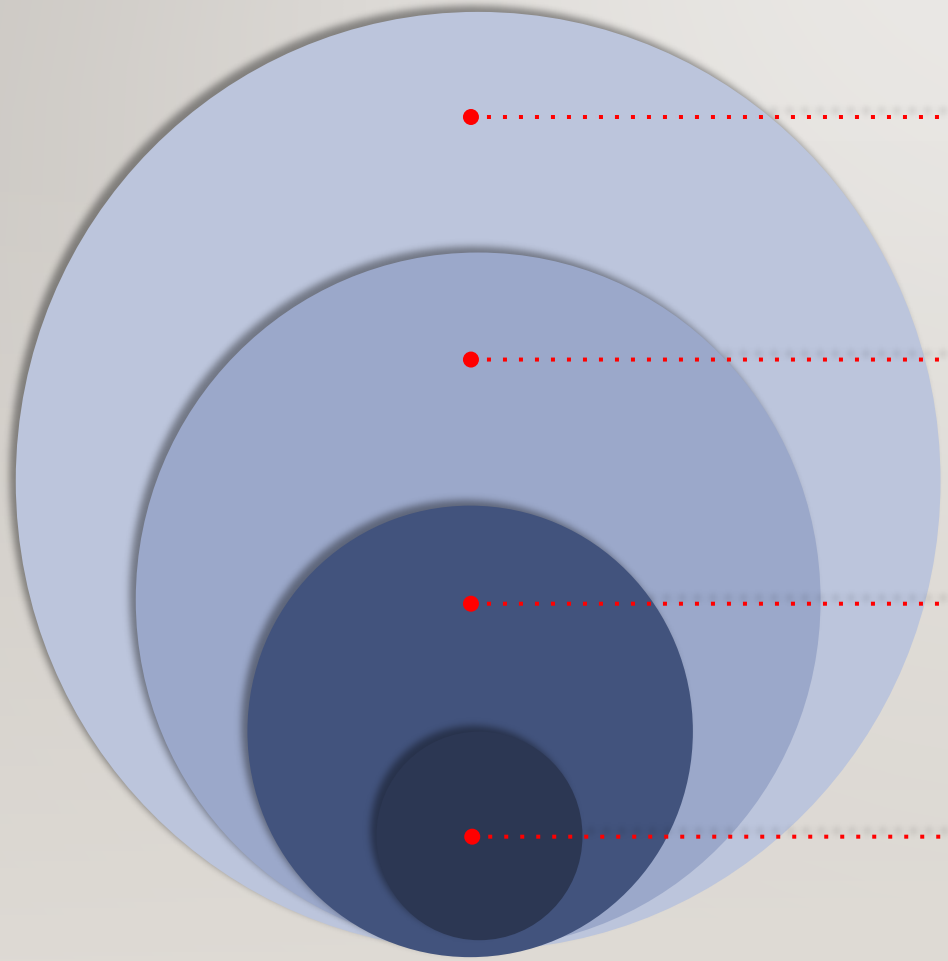
AI COMPONENTS

ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) Technologies



“AI” IS AN UMBRELLA TERM THAT HAS MULTIPLE MEANINGS



Artificial Intelligence

Ability for a machine to **imitate human behavior**

Machine Learning

Subset of AI that allows a system to **automatically learn from data** and improve from experience

Supervised Learning

Maps input to output so it’s able to **correctly classify new samples of data**.

Generative AI

AI system capable of **generating text, code, images, audio, video** in response to prompts

- **MACHINE LEARNING (ML):** The heart of AI, allowing machines to learn from data. It includes various algorithms and techniques for building models that can make predictions or decisions without being explicitly programmed for the task.

- **NATURAL LANGUAGE PROCESSING (NLP):** NLP enables machines to understand, interpret, and generate human language. This includes a range of tasks from speech recognition, language translation, and sentiment analysis to chatbots and virtual assistants.

- **DEEP LEARNING:** A subset of machine learning, deep learning uses neural networks with many layers (deep neural networks) to analyze large amounts of data. It's particularly effective for tasks like image and speech recognition.

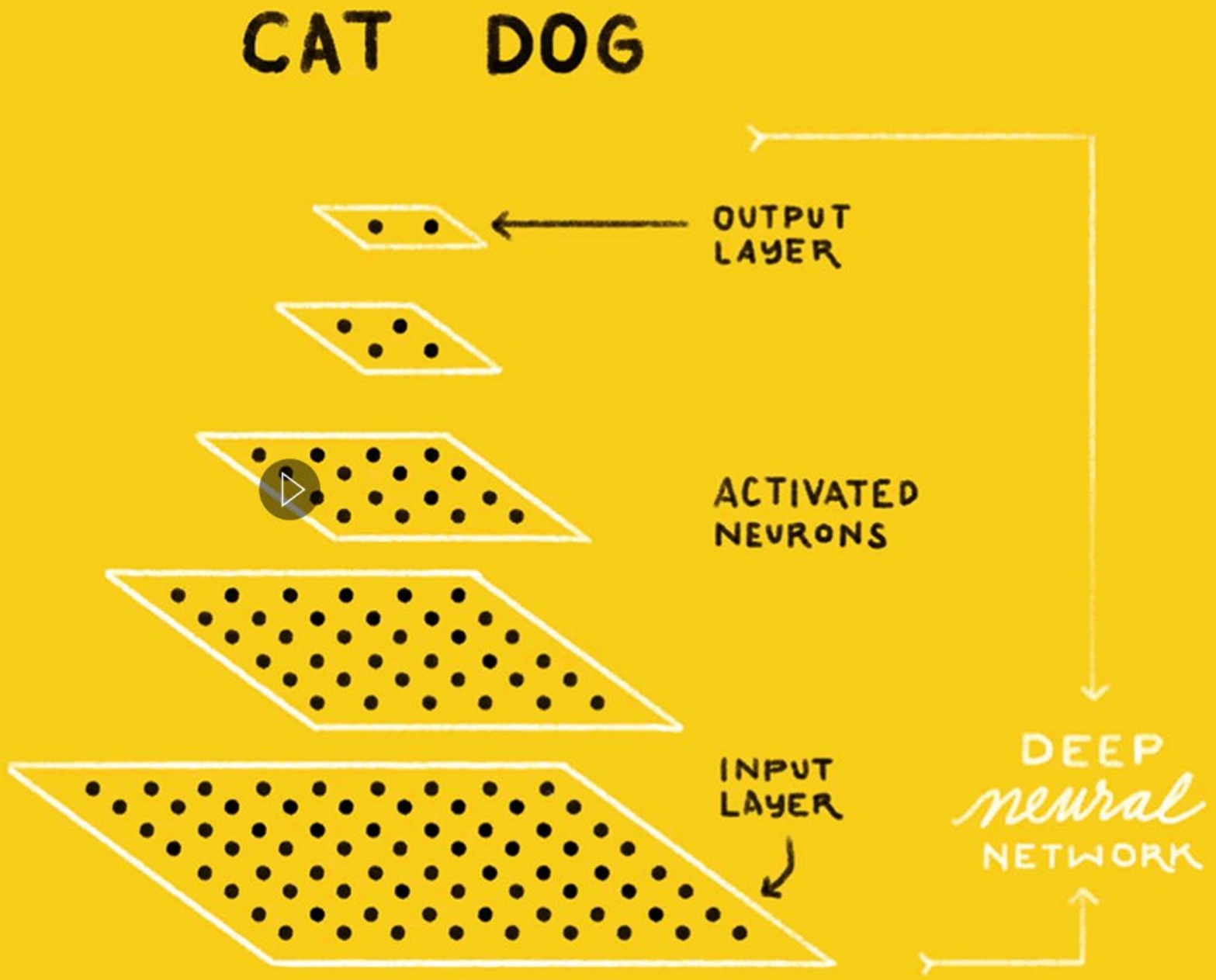
- **ROBOTICS:** Robotics involves the design, construction, operation, and use of robots, often incorporating AI to allow autonomous or semi-autonomous function. Robotics is applied in manufacturing, healthcare, service industries, and exploration.

- **COMPUTER VISION:** Computer vision enables machines to interpret and make decisions based on visual data from the world. Applications include facial recognition, object detection, and autonomous vehicles.

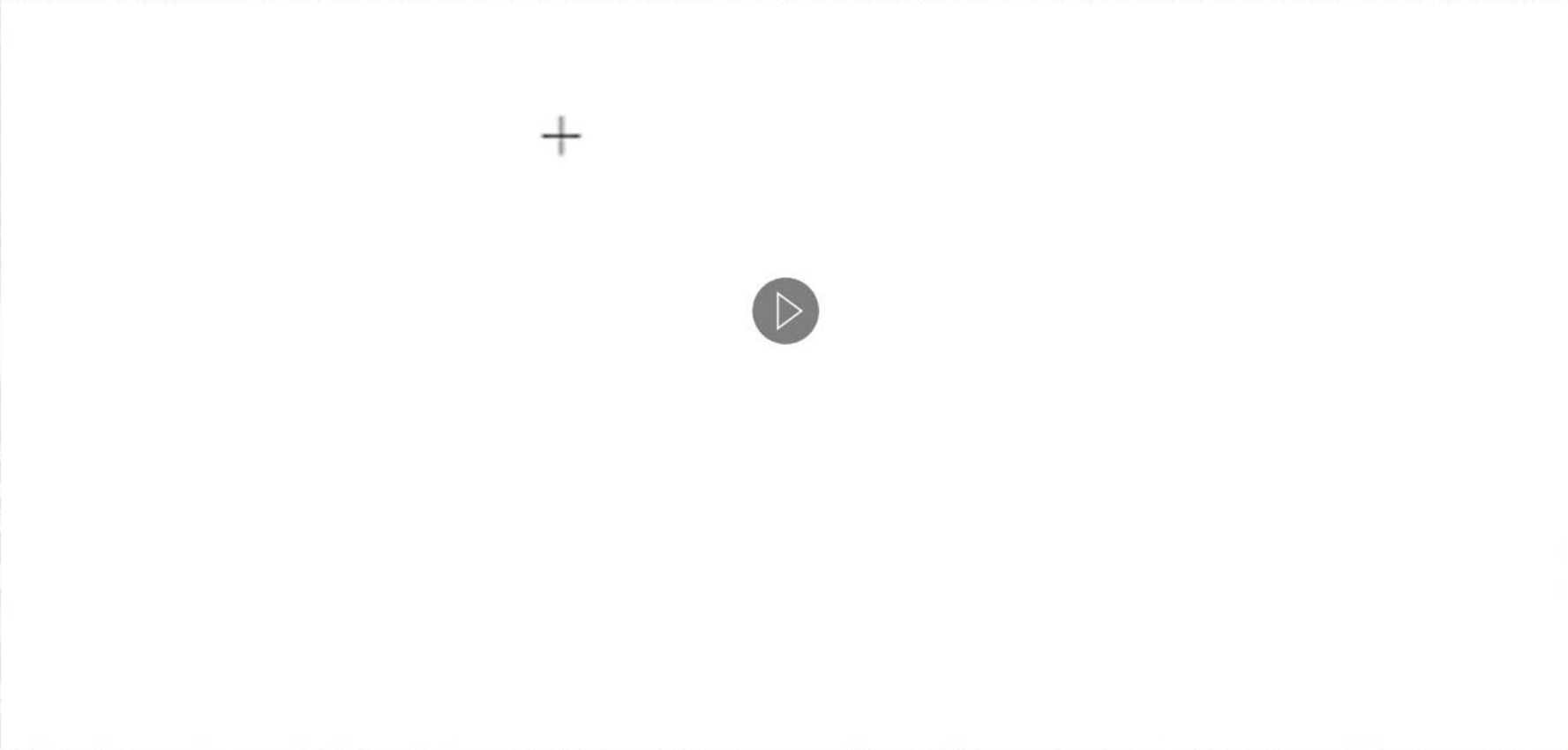
- **LLMs (Large Language Models):** type of artificial intelligence technology developed to understand and generate human-like text based on the input they receive. These models are a subset of machine learning models known as transformers, which have been designed to handle various tasks related to natural language understanding (NLU) and natural language generation (NLG).

IS THIS A

CAT or DOG?



Play Time



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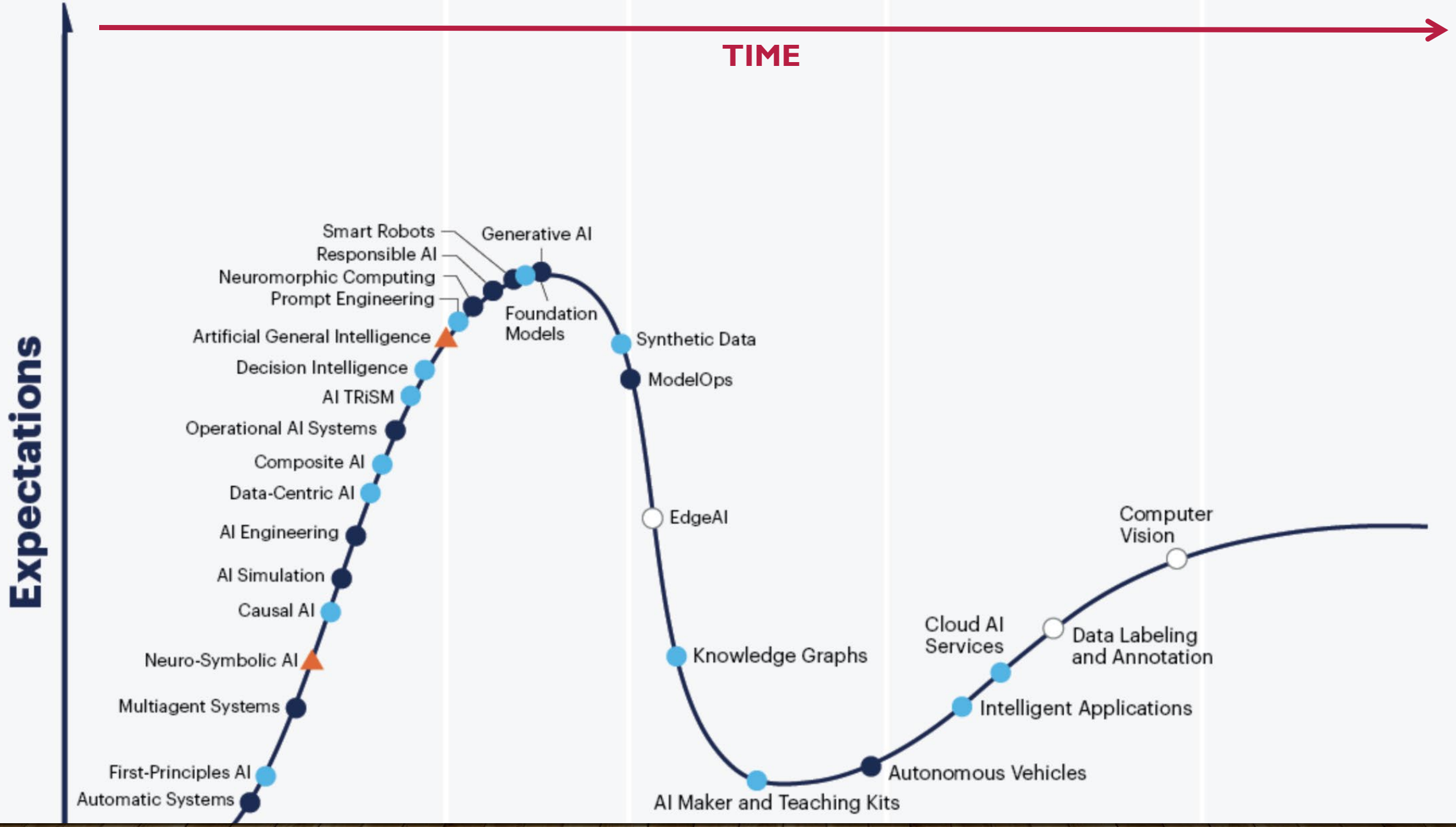
AI HYPE CYCLE


TIME
Expectations
Smart Robots
Responsible AI
Neuromorphic Computing
Prompt Engineering
Generative AI
Foundation Models
Artificial General Intelligence
Decision Intelligence
AI TRiSM
Operational AI Systems
Composite AI
Data-Centric AI
AI Engineering
AI Simulation
Causal AI
Neuro-Symbolic AI
Multiagent Systems
First-Principles AI
Automatic Systems
Synthetic Data
ModelOps
EdgeAI
Knowledge Graphs
AI Maker and Teaching Kits
Autonomous Vehicles
Intelligent Applications
Cloud AI Services
Data Labeling and Annotation
Computer Vision

AI IN HEALTHCARE

CURRENT CHALLENGES

- Length of Stay
- 30 – Day readmissions
- ER wait times
- Primary care access
- Domestic utilization of HMH services
- Provider burnout
- Staffing constraints/rising costs
- Growth of catchment area
- Lack of a unified consumer experience
- Care gap closure
- Chronic disease management/Quality

Digital strategy is both an offensive and defensive play; it helps with growth but also prevents against market share loss to new entrants

Offensive Play

Providing differentiated digital experience and value proposition, with investments in digital capabilities focused on convenience and personalization for volume growth

Hospitals with **higher patient experience scores** show up to **50% higher profit margins** than average peers[1]

- ***Aggressive focus on new customer volume growth***
- ***Differentiating customer knowledge for retention***
- ***Share of wallet growth through innovative products***
- ***Focus on end to end ownership of customer relationship from wellness to sick care***

Defensive Play

Empowers health systems in responding to business / market condition; with investments in capabilities that protect against the downside

41% of patient revenue at risk for "poor" digital experience[2], 1 in 5 patients have already switched providers due to poor digital experience

- ***Primary focus on market share retention***
- ***Investment in digital channels and partnerships to counter the impact of new entrants***
- ***Investment in "brilliant basics" capabilities to improve administrative and clinical experiences***
- ***Focus on specific service lines and traditional inpatient and ambulatory services***

Sources: 1) PressGaney 2) Fierce Healthcare

ARTIFICIAL INTELLIGENCE IN HEALTHCARE

Role of AI in Healthcare

ARTIFICIAL INTELLIGENCE IN HEALTHCARE

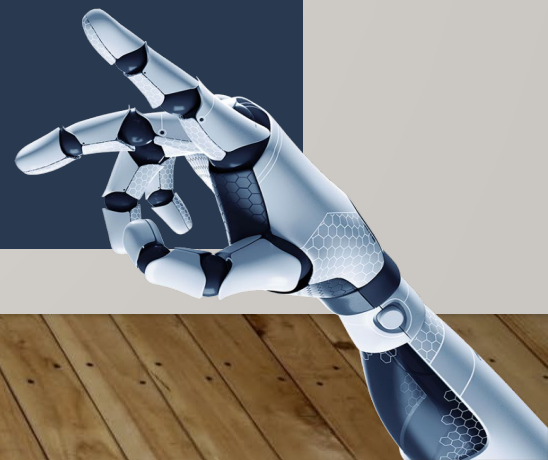
Pros and Cons

Pros

- Better data-driven decisions
- Increased disease diagnosis efficiency
- Treatment time cut in half
- Integration of information
- Reduce unnecessary hospital visits
- Create time-saving administrative duties

Cons

- Concerns regarding privacy & security
- Lack of curated healthcare data
- High initial capital investment
- Lack of interoperability
- Reluctance from staff to embrace AI
- Potential for increased unemployment



ARTIFICIAL INTELLIGENCE IN HEALTHCARE

Challenges in Healthcare AI Market

- High initial capital requirement
- Potential for increased unemployment
- Difficulty in Deployment
- Reluctance among medical practitioners to adopt AI
- Lack of curated healthcare data
- Concerns regarding privacy and security
- Lack of interoperability between AI solutions
- State and federal regulations

NON EXHAUSTIVE

AI AND AUTOMATION HAS TREMENDOUS POTENTIAL TO DISRUPT PATIENT CARE AND HOSPITAL OPERATIONS

Create Personalized & Equitable Experiences

*Analyze large amounts of patient data to **create dynamic, real-time, and tailored experiences**, products, services, and communication, that account for unique patient contexts and **enable equitable outcomes***

Enhance Consumer Health Literacy

*Fuel **patient education** by offering coherent, tailored explanations that **simplify healthcare jargon and adjust for language translation** to offer new ways to clarify and confirm understanding*

Streamline Administrative Efficiencies

*Complement administrative staff by **reducing manual, error-prone processes** like claims processing and appointment scheduling associated with high cycle time and costs*

Alleviate Employee Burnout

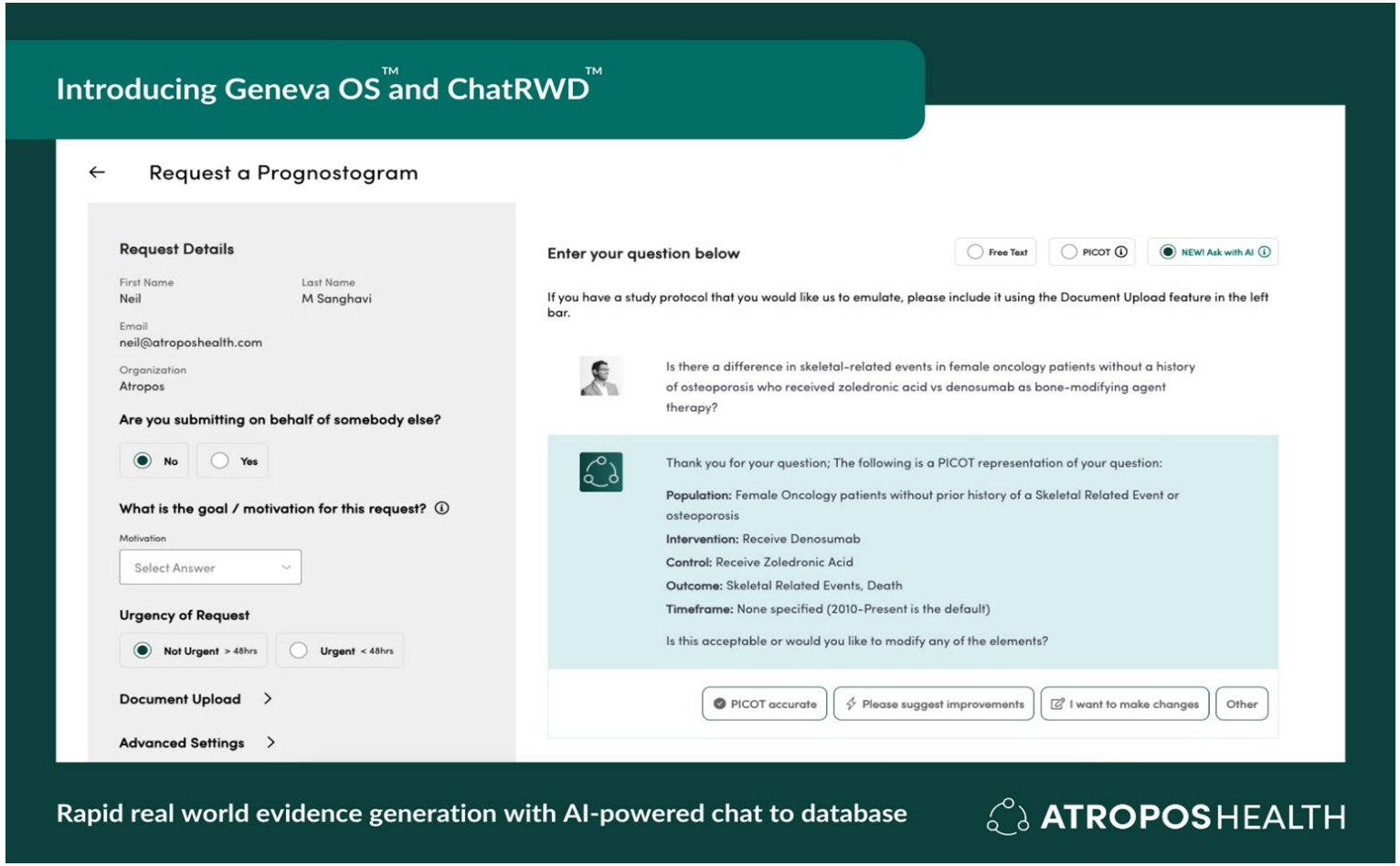
Alleviate employee burnout** leading to dissatisfaction and turnover by reducing **time-consuming, manual tasks**, and allowing staff to **focus on patients and optimizing clinical outcomes

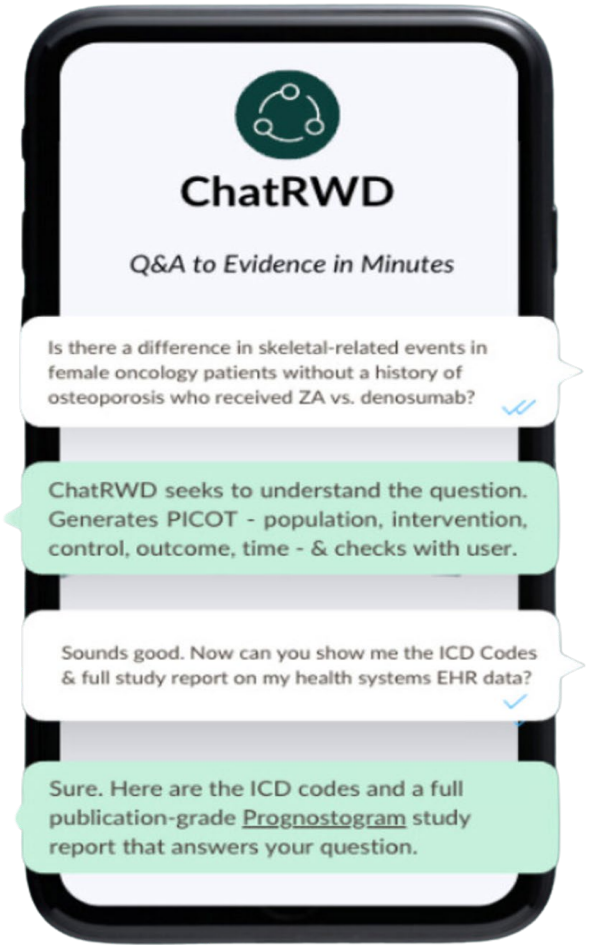
Increase Patient Utilization & Adherence

*Empower patients **with easy-to-understand health information** and ease of scheduling to access healthcare and understand the **importance of adhering** to patient visits and medication regimens*

ChatRWD is the first application incorporating chat-to-database capability to help healthcare leaders advance and accelerate evidence generation rapidly **saving organizations** valuable **time, money** and **staffing resources.**

***Cut observational research production from months to minutes**, while maintaining **precision, transparency**, and **producing rigorous evidence** for healthcare.*





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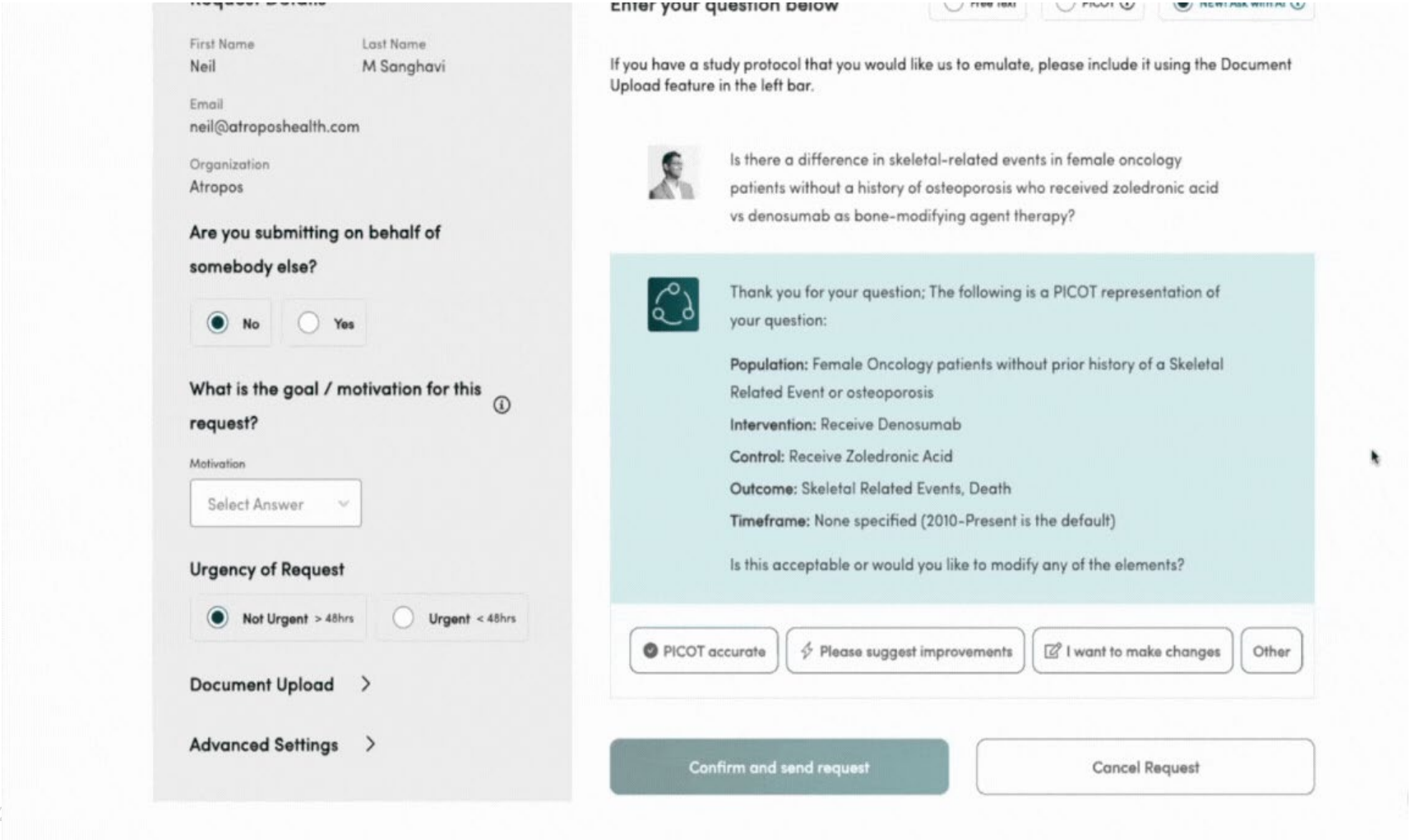


AI AND AUTOMATION CONTINUES TO GROW ACROSS HEALTH SYSTEMS

HCA Healthcare

1. Use automatic speech recognition (ASR) technology and natural language processing (NLP) to convert patient conversations into medical notes
2. Use of Artificial Intelligence (AI) for early identify cancer patients from pathological reports and radiology image text.

CommonSpirit

3. Use Artificial Intelligence (AI) and Machine Learning (ML) solutions to solve for empty ORs and match with surgeons looking for block time
4. Use Artificial Intelligence (AI) to increase operations efficiencies and improve care experience in an ER setting

Tenet Health

5. Use advanced imaging technology and Artificial Intelligence (AI) to automatically analyze CT perfusion images of the brain

BaylorScott&White HEALTH

6. Use Artificial Intelligence (AI) and Robotics Process automation (RPA) optimize revenue cycle functions

PRAGMATIC APPROACH TO PRIORITIZING AND SCALING THE AI AND AUTOMATION ACROSS THE NETWORK

Diagnostic and opportunity identification

- Holistic and comprehensive approach to identifying opportunities

Strategy and Operating model

- Develop compelling, aligned, enterprise-wide vision and strategy tied to the business strategy
- Outline elements of analytics operating model and build alignment across the organization
- Identify use cases

Use case development and execution

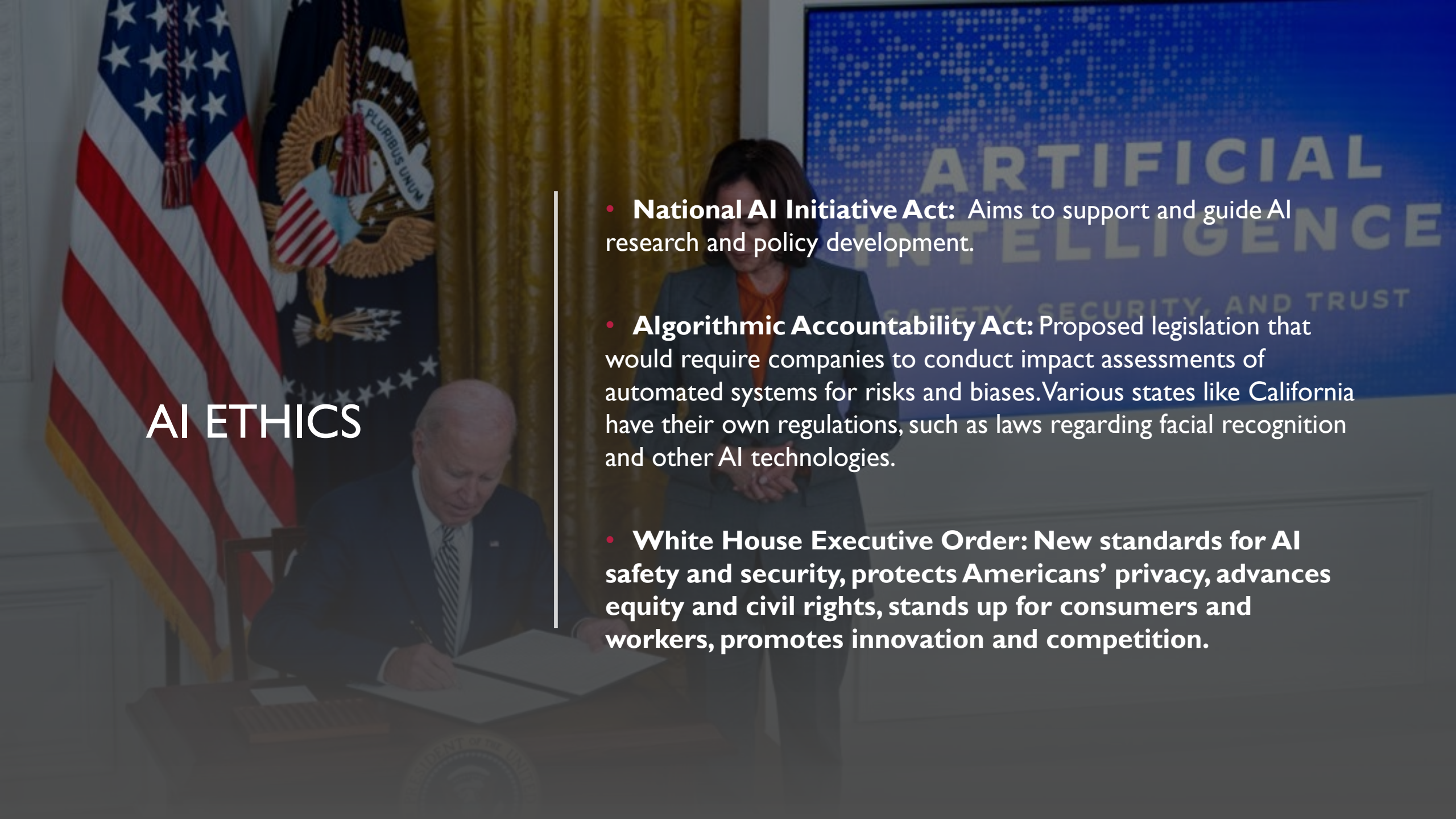
- Develop prioritized road map of opportunities based on impact and feasibility
- Prepare and stand-up infrastructure to deliver use case
- Pilot use to create proof of concept

Culture change and sustained impact

- Proceed with further use cases in waves progressively building internal capabilities
- Embrace a new culture and capabilities to enable impactful and lasting change (e.g., training)

AI REGULATION AND ETHICS


#SPIDERMANNOWAYHOME
WITH GREAT POWER...

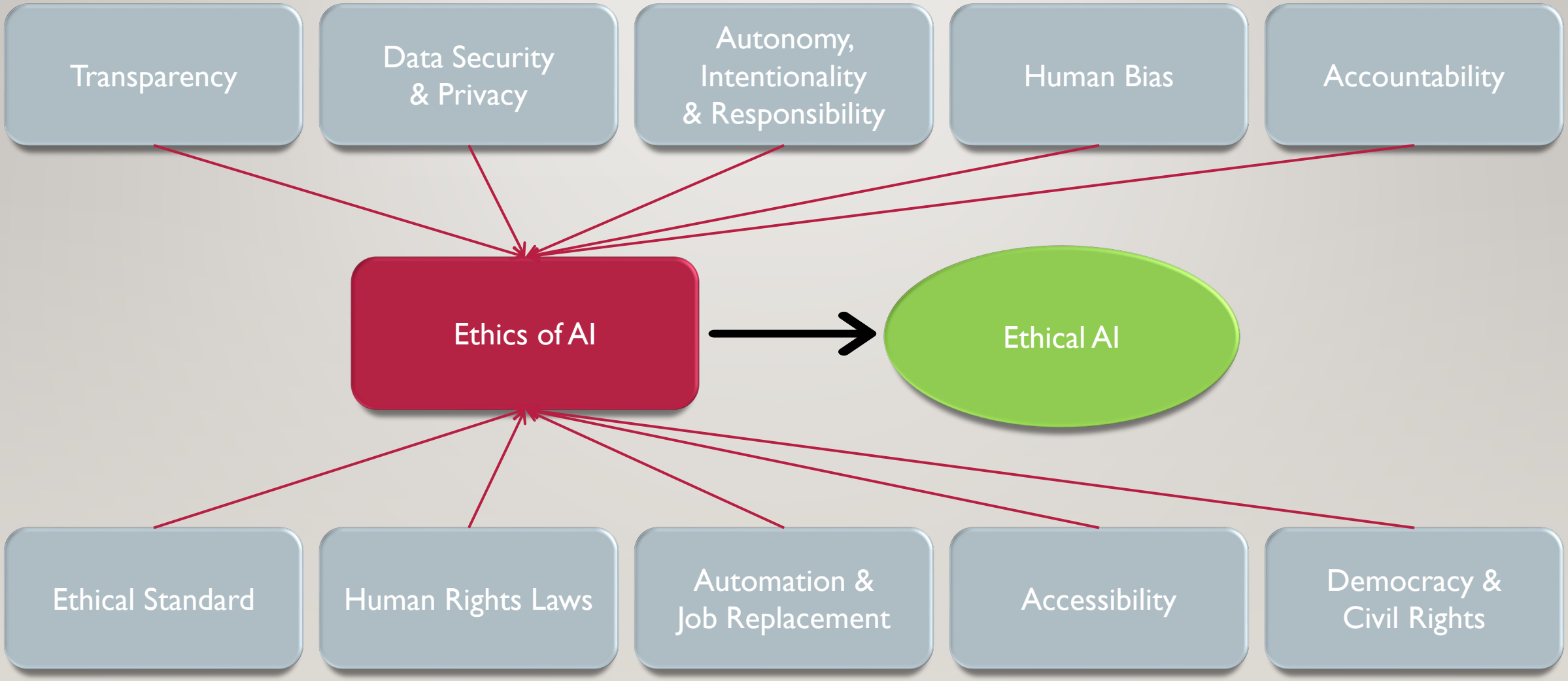


AI ETHICS

- **National AI Initiative Act:** Aims to support and guide AI research and policy development.

- **Algorithmic Accountability Act:** Proposed legislation that would require companies to conduct impact assessments of automated systems for risks and biases. Various states like California have their own regulations, such as laws regarding facial recognition and other AI technologies.

- **White House Executive Order: New standards for AI safety and security, protects Americans' privacy, advances equity and civil rights, stands up for consumers and workers, promotes innovation and competition.**



AI Ethics Framework

Valid AI

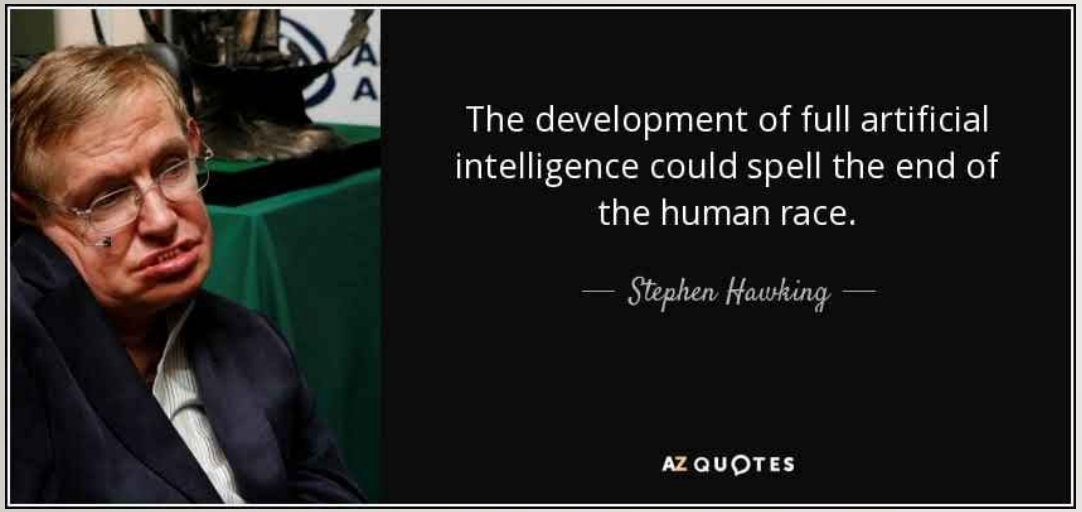
Valid AI generally refers to artificial intelligence systems that are effective, reliable, and perform as expected according to their designed tasks. The criteria for an AI being "valid" could include:

Accuracy: The AI performs with a high level of correctness in its predictions or tasks.
Reliability: The AI provides consistent results under varying conditions.
Transparency and Explainability: The AI's decisions can be understood and interpreted by humans.
Ethical Considerations: The AI adheres to ethical guidelines, ensuring fairness, privacy, and accountability.
Safety and Security: The AI is designed with robust safety features to prevent harmful outcomes and protect against security breaches.

CHAI

CHAI stands for Center for Human-Compatible Artificial Intelligence. It is a research center at the University of California, Berkeley. CHAI's focus is on developing artificial intelligence systems that are provably aligned with human interests. Key aspects of CHAI's research include:

Alignment: Researching ways to design AI systems whose goals and behaviors can be aligned with human values throughout their operation.
Value Learning: Developing techniques for AI systems to learn values effectively and safely from human behavior and preferences.
Intervention: Ensuring humans can safely and effectively intervene in an AI system's operation.
Robustness: Designing AI systems that behave well under a wide variety of conditions, particularly in ways that the designers did not specifically anticipate.



…"AI is a fundamental risk to the existence of human civilization in a way that car accidents, airplane crashes, faulty drugs or bad food were not — they were harmful to a set of individuals within society, of course, but they were not harmful to society as a whole." – Elon Musk

Before we work on artificial intelligence why don't we do something about natural stupidity?

Steve Polyak

THANK YOU

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