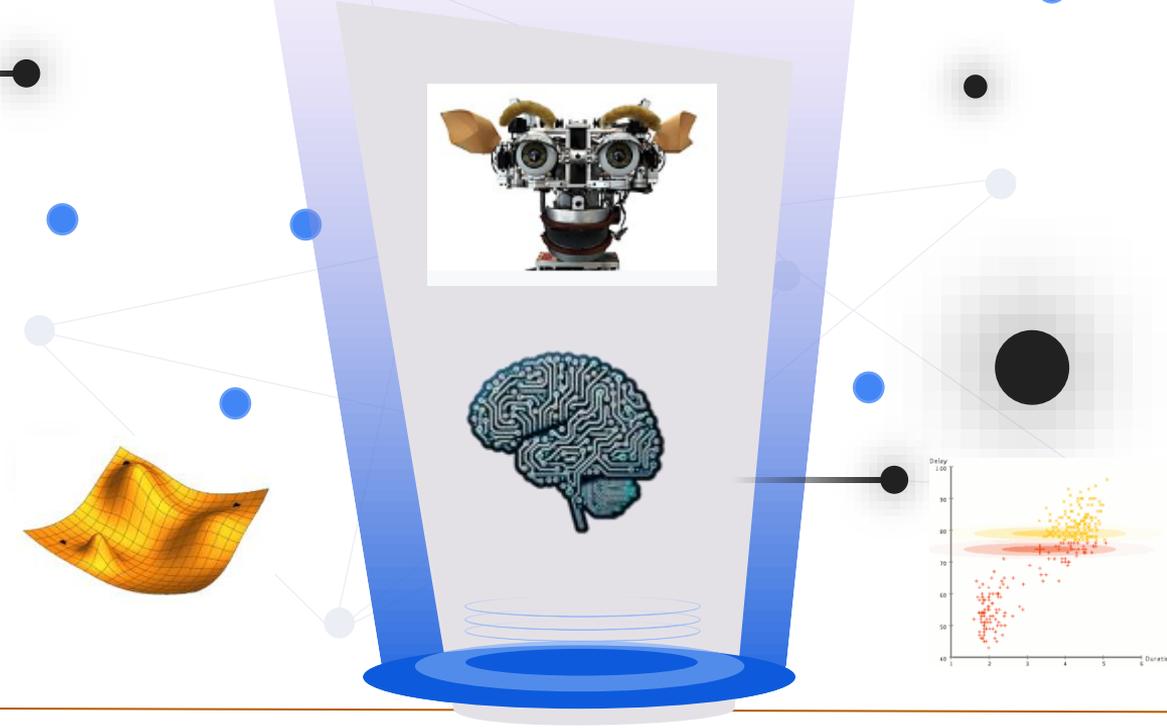


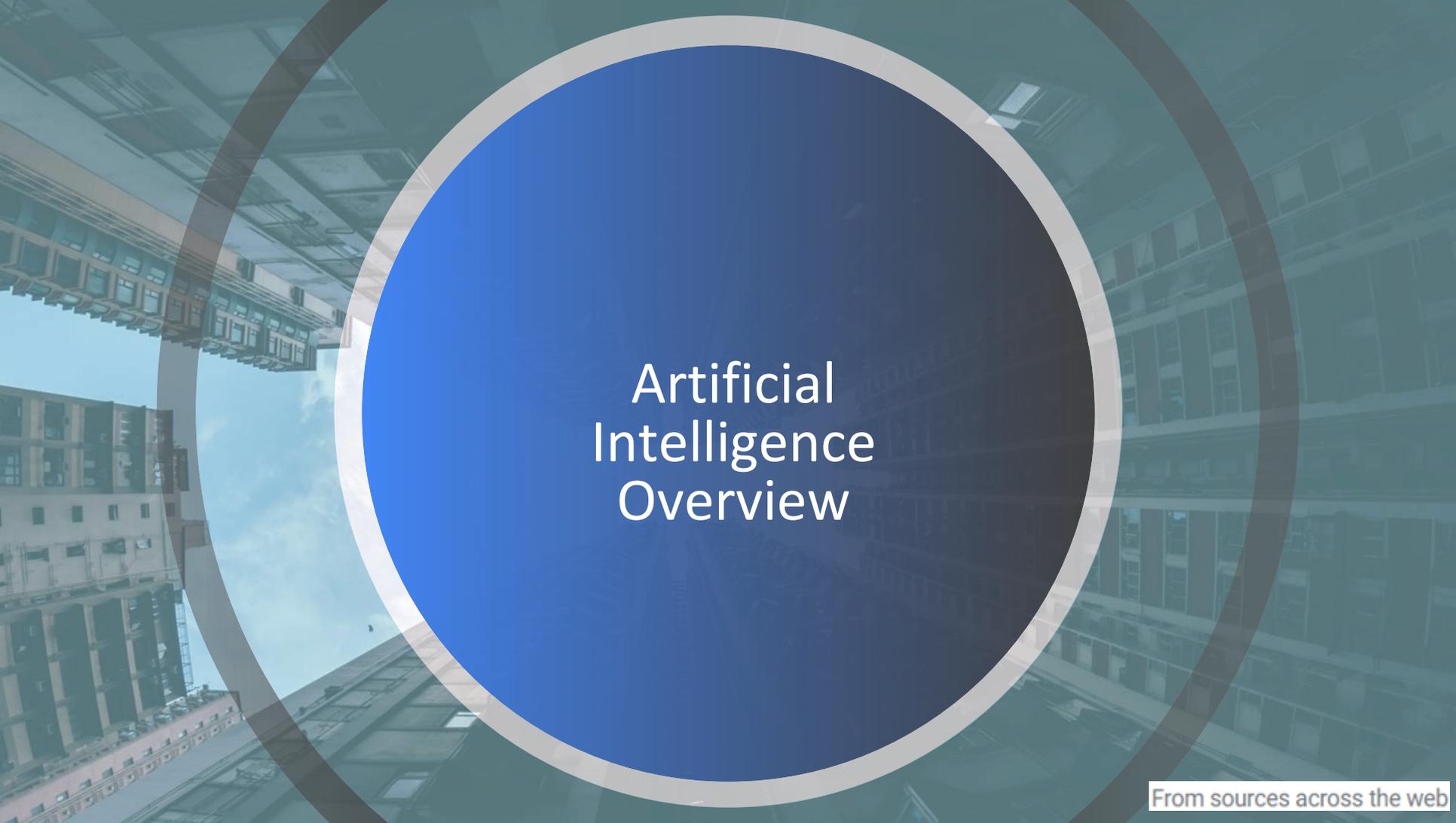
# Standards (PIDX) enables successful Artificial Intelligence (AI)



Anthony Aming  
25<sup>th</sup> April, 2024

# Introduction and Agenda

- Introduction
- Overview of AI
- See the key role of standards, like PIDX, to enable successful AI.
- Learn how and what analytics drives AI.
- Hear what is needed for efficient AI.
- Discuss the Future of AI.
- Use Cases

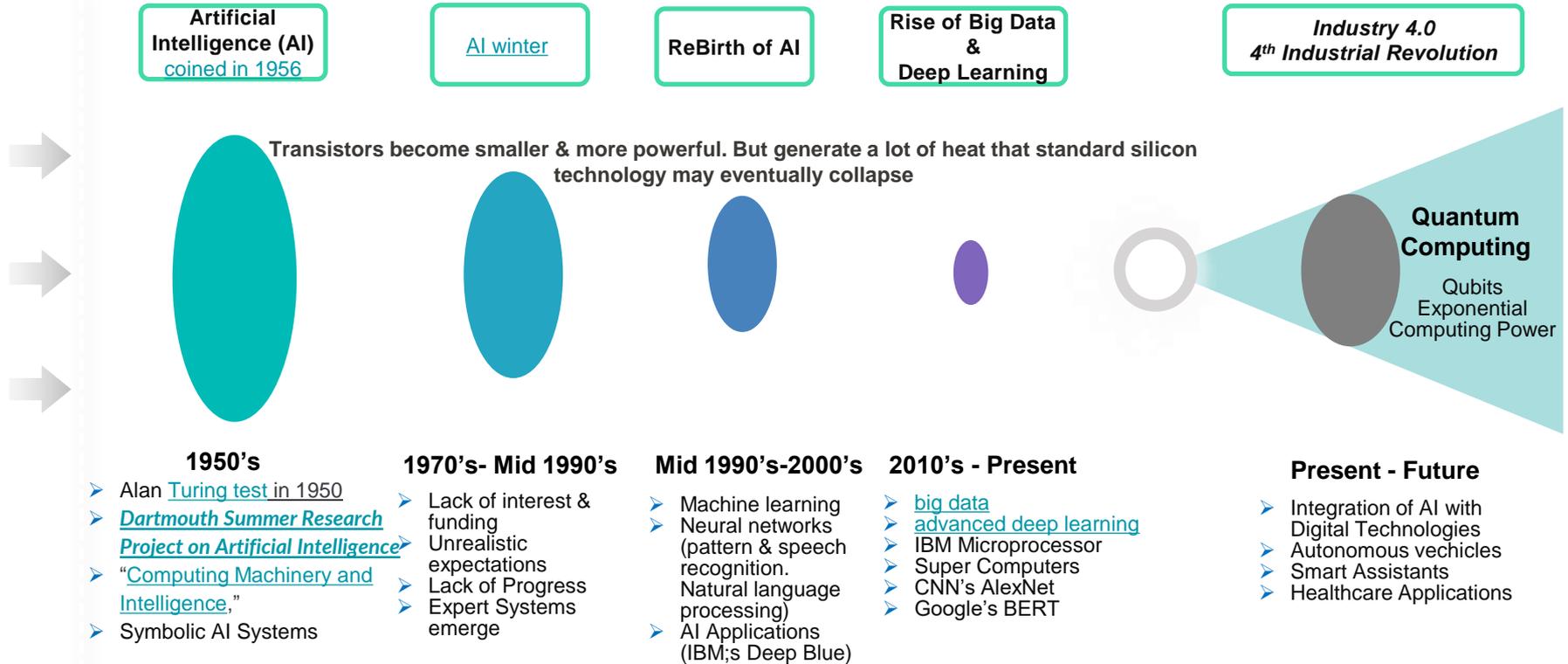
The slide features a background of a modern building with a curved facade and many windows, viewed from a low angle looking up. A large, semi-transparent blue circle is centered on the page, containing the title text. The text is white and arranged in three lines. The overall aesthetic is clean and professional.

# Artificial Intelligence Overview

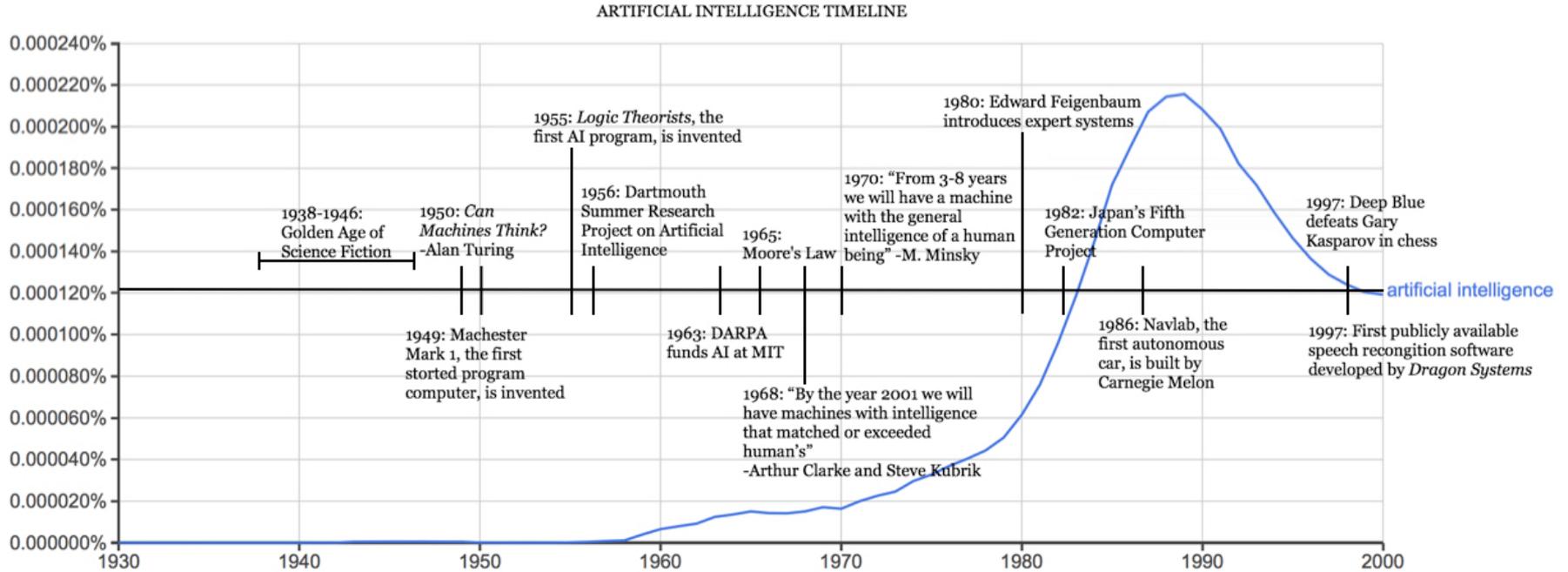
# What is Artificial Intelligence (AI)

- **Artificial intelligence (AI)** is the [intelligence](#) of [machines](#) or [software](#), as opposed to the intelligence of living beings, primarily [of humans](#). It is a [field of study](#) in [computer science](#) that develops and studies intelligent machines. Such machines may be called AIs. [Definitions](#) from Wiktionary
- Artificial intelligence is the simulation of human intelligence by a machine.
- Artificial intelligence (AI) is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence. While AI is an interdisciplinary science with multiple approaches, advancements in machine learning and deep learning, in particular, are creating a paradigm shift in virtually every industry. Artificial intelligence allows machines to model, or even improve upon, the capabilities of the human mind. And from the development of self-driving cars to the proliferation of generative AI tools.
- AI is increasingly becoming part of everyday life. AI is everywhere, especially in our phones and mobile apps, where it performs common tasks like facial recognition, speech recognition, spam filtering, grammar suggestions, and language translation.
- The first true example of machine learning came in 1951 when a checkers program at the University of Manchester learned how to play well enough to beat human players. The earliest form of game AI.

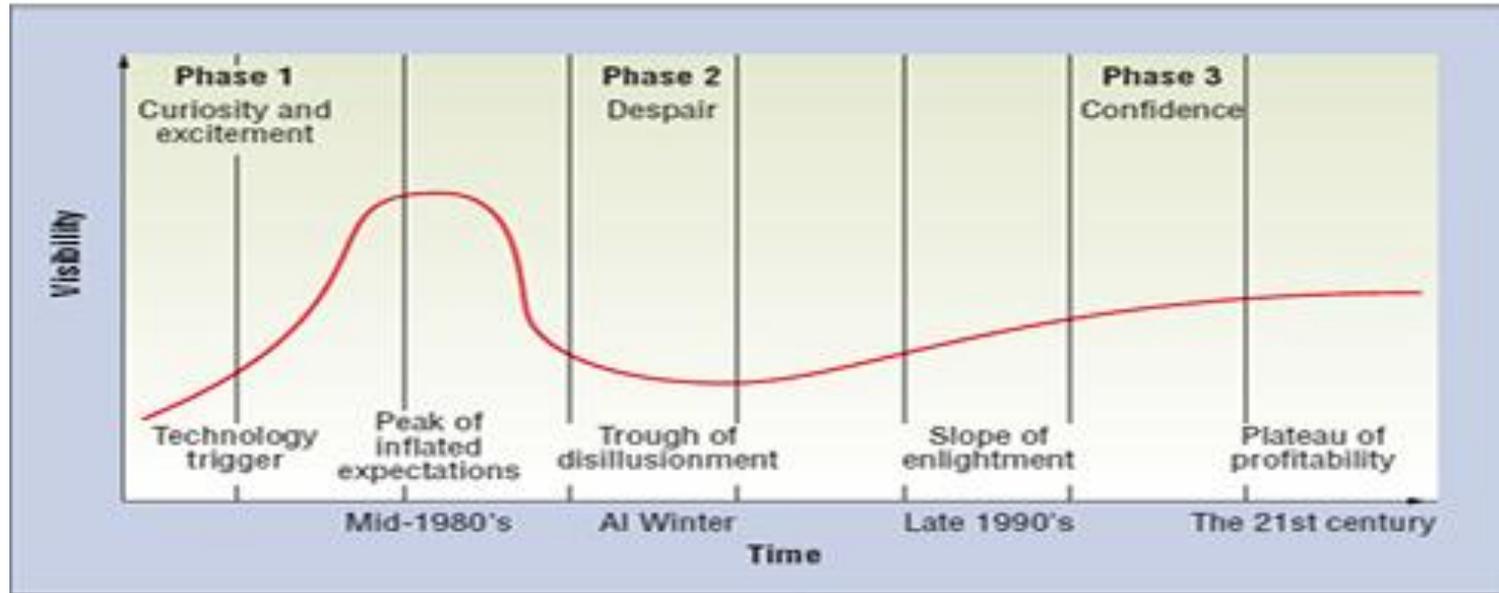
# Evolution of Artificial Intelligence (AI)



# Artificial Intelligence (AI) Timeline (Rockwell Anyoha)



# Hype Cycle of Artificial Intelligence (AI)



The Hype Cycle and AI winter [Menzies03]

# Artificial Intelligence (AI) Categories

## Narrow AI (Artificial Narrow Intelligence or Weak AI)

Artificial Narrow Intelligence (ANI) is a type of Artificial Intelligence which **mainly focuses on executing specific commands**. These AI tools can perform proficient tasks as per the instructions provided to them. These systems fulfill particular tasks without the capacity to learn beyond their intended purpose, such as image recognition software, self-driving cars, and AI virtual assistants like Siri. Although Narrow AI has made significant advancements in recent years, it is not without its drawbacks.

The limitations of Narrow AI include:

- Lack of flexibility
- Incomplete comprehension of context
- Incapacity to adapt and learn
- Reliance on data

Despite these shortcomings, Narrow AI continues to play an essential role in many AI applications, providing practical solutions to everyday problems and enhancing user experiences.

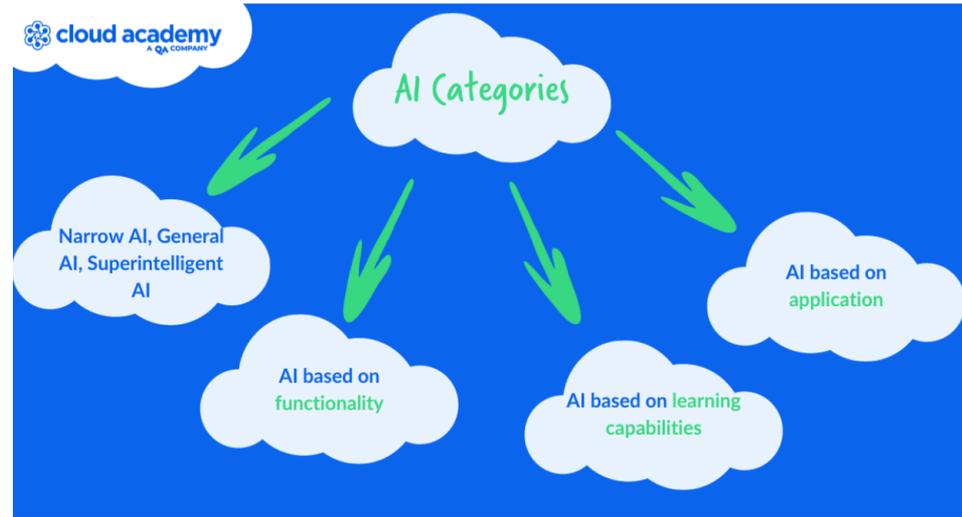
## General AI (Artificial General Intelligence or Strong AI)

Artificial General Intelligence (AGI) is a more advanced form of AI, **capable of learning, thinking, and carrying out a vast array of tasks in a manner comparable to humans**. The objective of designing AGI is to create machines that can execute multifaceted duties and serve as lifelike, intellectually comparable assistants to people in daily life. However, we are still considerably distant from constructing an AGI system.

The realization of AGI requires the development and refinement of fundamental technologies, such as supercomputers, quantum hardware, and generative AI models like ChatGPT. As researchers continue to push the boundaries of AI, the prospect of achieving General AI remains an exciting and significant milestone in the field.

## Superintelligent AI

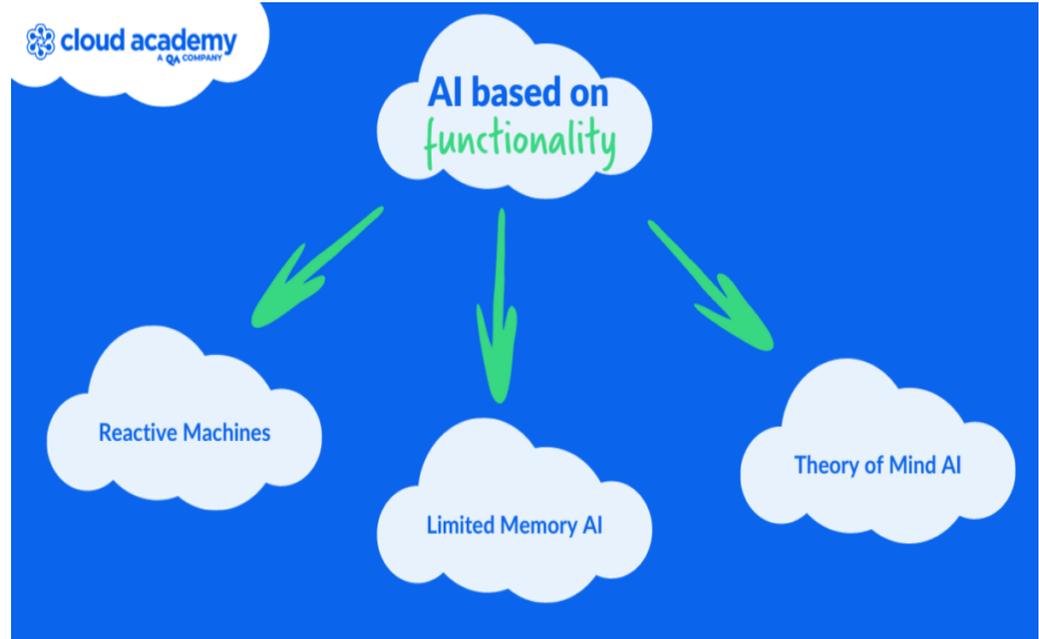
Super AI, or Artificial Superintelligence (ASI), is the theoretical level of AI wherein its **capabilities exceed that of human intelligence, and it attains self-awareness**. These hypothetical AI systems possess the potential to become the most proficient form of intelligence on the planet, outstripping human intelligence and being markedly better at all tasks we undertake. The concept of self-aware AI raises ethical concerns and debates surrounding the creation of sentient AI. While the idea of superintelligent AI might sound like science fiction, it serves as a reminder that as AI research and development continues to advance, potential risks and ethical implications must be carefully considered and addressed.



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# Artificial Intelligence (AI) based on Functionality

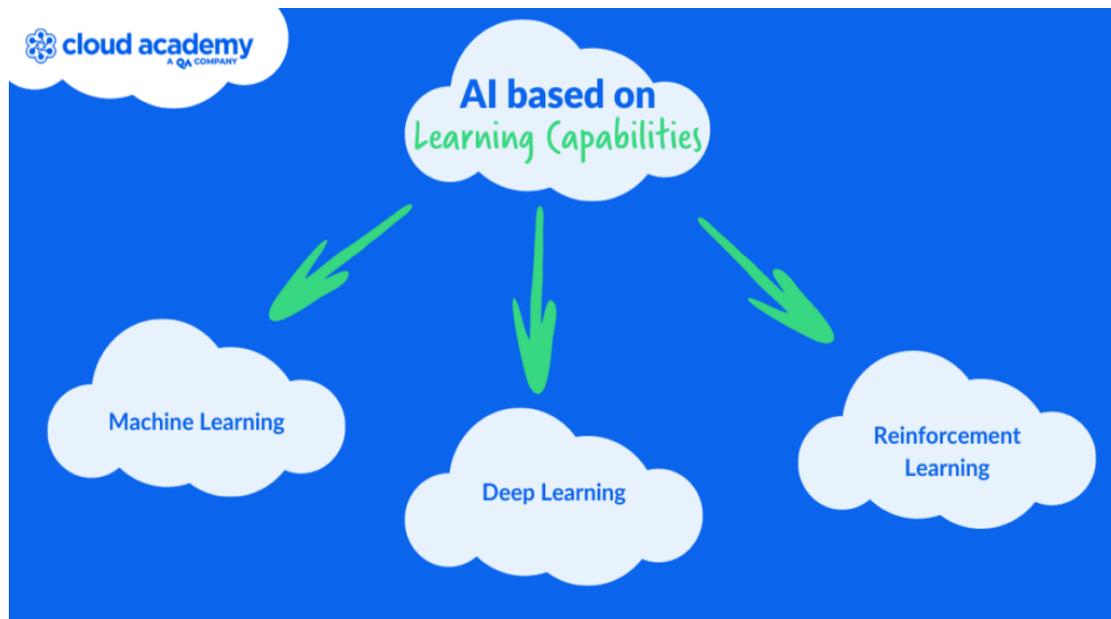
- **Reactive Machines:** These AI systems perform tasks based on current data without learning from past experiences.
- **Limited Memory AI:** These AI systems utilize past data to make informed decisions and enhance their performance over time.
- **Theory of Mind AI:** These AI systems focus on understanding and interpreting the mental states of other agents.



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# Artificial Intelligence (AI) based on Learning Capabilities

- **Machine Learning:** This allows us to give machines the ability to interpret, process, and analyze data, helping them solve real-world problems.
- **Deep Learning:** A subset of Machine Learning, it utilizes artificial neural networks to acquire knowledge from data.
- **Reinforcement Learning:** Another type of Machine Learning, it uses rewards and punishments to acquire knowledge from its environment.



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# Artificial Intelligence (AI) based on Application

**Natural Language Processing (NLP)** is a branch of AI that facilitates machines to comprehend and process human language. NLP has applications in enhancing user experience and communication, with potential use cases in various industries and fields.

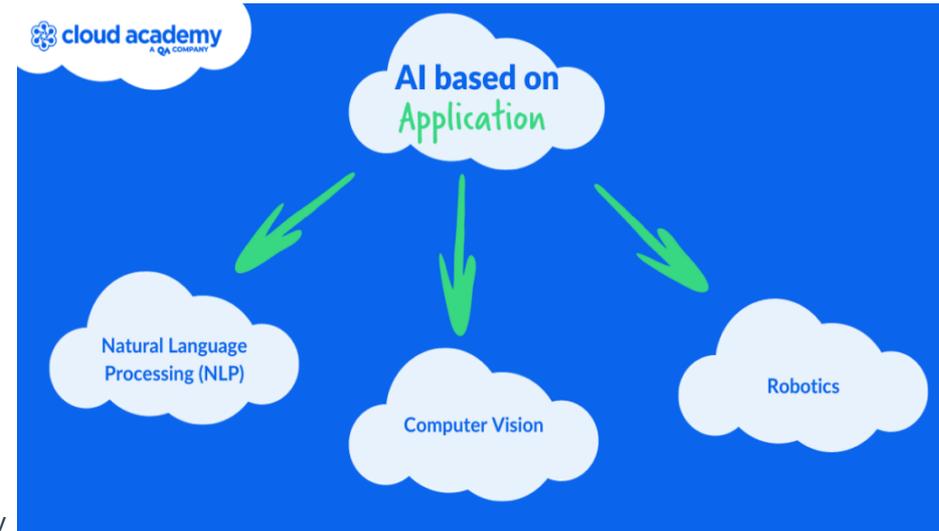
**Computer Vision** Computer Vision is an AI system that enables machines to interpret and analyze visual information from the world, such as images and videos. It utilizes pattern recognition algorithms to educate computers to interpret and comprehend the visual world, analogous to how the human brain comprehends visual information. By employing computer vision systems, we can enable applications such as:

- Facial recognition
- Object detection and tracking
- Image and video analysis
- Autonomous vehicles

The potential of computer vision is vast, with applications ranging from security and surveillance to healthcare and entertainment. As computer vision technology continues to advance, we can expect to see even more innovative and impactful applications emerge in the future.

## Robotics

Robotics is the field of AI that incorporates AI systems into robots to perform tasks autonomously. By integrating AI into robots, they can explore their environment, identify and recognize objects, and handle objects without human interference. AI empowers robots with capacities like spatial relations, computer vision, and motion control, enabling them to carry out tasks that necessitate intelligence and adaptability. Robotics has applications in various industries, including manufacturing, healthcare, and service industries. As AI research and development continue to progress, we can expect to see increasingly advanced and capable robots emerging, with the potential to revolutionize the way we work and live.



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# Some Types of Artificial Intelligence (AI)

 Limited memory <span>▼</span>	 Theory of mind <span>▼</span>	 Reactive machines <span>▼</span>
 Deep learning <span>▼</span>	 Reactive AI <span>▼</span>	 Artificial superintelligence <span>▼</span>
 Artificial general intelligence... <span>▼</span>	 NLP <span>▼</span>	 Robotics <span>▼</span>
 Self-aware <span>▼</span>	 Computer vision <span>▼</span>	 Super AI <span>▼</span>
 Expert system <span>▼</span>	 Reinforcement learning <span>▼</span>	 Supervised learning <span>▼</span>
 Neural network <span>▼</span>	 Smart assistants <span>▼</span>	 Narrow AI <span>▼</span>

# Challenges of Artificial Intelligence (AI)

- Change Management: Adapting to large-scale digital changes.
- Complex Software and Technology: Integrating diverse tools.
- Customer Needs Evolution: Keeping pace with changing demands.
- Skills Gap: Ensuring proper IT and AI skills.
- Security Concerns: Safeguarding data.
- Budget Constraints: Allocating resources effectively.
- Cultural Mindset: Fostering a digital-friendly culture.
- Organizational Silos: Breaking down barriers.
- Measuring ROI: Evaluating value

# Some Benefits of Artificial Intelligence (AI)

- **Improved Efficiency and Productivity:** Automate tasks, optimize processes, and improve decision-making, leading to significant efficiency gains, Eg. Predictive Maintenance.
- **Reduced Costs:** Eg. optimize drilling operations, reduce well completion times, and improve reservoir management
- **Enhanced Safety:** Eg. reducing the need for human intervention in hazardous environments with remote monitoring and control systems to operate equipment in dangerous areas, reducing the risk of accidents.
- **Innovation and New Business Models:** Eg. explore and develop unconventional resources, such as shale oil and gas, and develop new products and services, such as data-driven oilfield services
- **Automating Repetitive Tasks:** Repetitive tasks such as data entry and [factory work](#), as well as customer service conversations, can all be automated using AI technology. This lets humans focus on other priorities.
- **Solving Complex Problems:** AI's ability to process large amounts of data at once allows it to quickly find patterns and solve complex problems that may be too difficult for humans, such as predicting financial outlooks or optimizing energy solutions.
- **Improving Customer Experience:** AI can be applied through user personalization, chatbots and automated self-service technologies, making the customer experience more seamless and increasing customer retention for businesses.
- **Advancing Healthcare and Medicine:** AI works to advance [healthcare](#) by accelerating medical diagnoses, drug discovery and development and [medical robot](#) implementation throughout hospitals and care centers.
- **Reducing Human Error:** The ability to quickly identify relationships in data makes AI effective for catching mistakes or anomalies among mounds of digital information, overall reducing human error and ensuring accuracy.

# Some Disadvantages of Artificial Intelligence (AI)

While artificial intelligence has its benefits, the technology also comes with **risks and potential dangers** to consider.

- **Lack of Ai Transparency & Explainability**
- **Job Displacement:** AI's abilities to automate processes, generate rapid content and work for long periods of time can mean [job displacement](#) for human workers.
- **Social Manipulation through AI Algorithms**
- **Social Surveillance with AI Technology**
- **Bias and Discrimination due to AI:** AI models may be trained on data that reflects biased human decisions, leading to outputs that are [biased or discriminatory](#) against certain demographics.
- **Privacy Concerns:** The data collected and stored by AI systems may be done so without user consent or knowledge, and may even be accessed by unauthorized individuals in the case of a data breach.
- **Socioeconomic Inequality as a result of AI**
- **Weakening Ethics & Goodwill because of AI:** AI systems may be developed in a manner that [isn't transparent, inclusive or sustainable](#), resulting in a [lack of explanation](#) for potentially harmful AI decisions as well as a negative impact on users and businesses.
- **Autonomous Weapons powered by AI**
- **Financial crises brought about by AI algorithms**
- **Loss of Human Influence**
- **Uncontrollable Self-Aware AI**
- **Environmental Costs:** Large-scale AI systems can require a [substantial amount of energy](#) to operate and process data, which increases carbon emissions and water consumption.

# Examples of Artificial Intelligence (AI)

## ➤ Generative AI Tools

[Generative AI](#) : Tools, sometimes referred to as chatbots — including [ChatGPT](#), [Gemini](#), [Claude](#) and [Grok](#) — use artificial intelligence to produce written content in a range of formats, from essays to code and answers to simple questions.

## ➤ Smart Assistants

[Personal AI assistants](#), like Alexa and Siri, use natural language processing to receive instructions from users to perform a variety of '[smart tasks](#).' They can carry out commands like setting reminders, searching for online information or turning off your kitchen lights use AI algorithms to understand natural language commands, answer questions, perform tasks, and provide personalized recommendations to users.

➤ **Natural Language Processing:** NLP applications, such as language translation, sentiment analysis, and text summarization, leverage AI techniques to analyze and understand human language, enabling chatbots, language translation services, and automated content generation.

➤ **Image Recognition:** Image recognition systems powered by AI, such as facial recognition technology used in security systems and social media platforms, can identify and classify objects, people, and scenes in images and videos with high accuracy.

## ➤ Autonomous/Self-Driving Cars

[Self-driving cars](#) are a recognizable example of deep learning, since they use deep neural networks to detect objects around them, determine their distance from other cars, identify traffic signals and much more.

## ➤ Wearables

Many [wearable sensors](#) and devices used in the healthcare industry apply deep learning to assess the health condition of patients, including their blood sugar levels, blood pressure and heart rate. They can also derive patterns from a patient's prior medical data and use that to anticipate any future health conditions.

## ➤ Visual Filters

Filters used on social media platforms like TikTok and Snapchat rely on algorithms to distinguish between an image's subject and the background, track facial movements and adjust the image on the screen based on what the user is doing

➤ **Healthcare Diagnostics:** AI algorithms are used in healthcare for medical image analysis, disease diagnosis, and treatment planning. AI-powered diagnostic systems can analyze medical images, such as X-rays and MRI scans, to detect abnormalities and assist radiologists in making accurate diagnoses.

➤ **Fraud Detection:** Financial institutions use AI-based fraud detection systems to analyze transaction data, identify suspicious patterns, and prevent fraudulent activities, such as credit card fraud and identity theft.



Role or Standards

# Critical Role of Standards for Artificial Intelligence (AI)

Standards play a critical role in shaping the development, deployment, and governance of AI technologies, contributing to their reliability, quality, ethicality, and societal impact. By adhering to common standards, stakeholders can build and deploy AI solutions that are interoperable, trustworthy, and aligned with legal, ethical, and regulatory requirements.

- **Interoperability:** Standards help ensure interoperability between different AI systems, software, and hardware components. This interoperability facilitates the integration of AI solutions into existing systems and promotes compatibility between various AI products and services. By adhering to common standards, developers can create AI systems that can communicate with each other seamlessly, exchange data effectively, and work together efficiently.
- **Quality and Reliability:** Standards define best practices, guidelines, and quality requirements for AI development and deployment. They help establish benchmarks for performance, reliability, safety, security, and ethical considerations. Adhering to these standards ensures that AI systems meet certain quality standards, perform as expected, and are reliable and trustworthy for users.
- **Ethical and Regulatory Compliance:** Standards play a vital role in promoting ethical principles, fairness, transparency, and accountability in AI systems. They provide guidelines for ethical AI development and usage, addressing issues such as bias mitigation, privacy protection, data governance, and algorithmic transparency. Compliance with ethical and regulatory standards is essential to ensure that AI technologies are deployed responsibly and in accordance with legal and ethical norms.
- **Risk Mitigation:** Standards help identify and mitigate risks associated with AI technologies, such as security vulnerabilities, safety hazards, and unintended consequences. They provide frameworks for risk assessment, risk management, and safety assurance throughout the AI lifecycle, from design and development to deployment and operation. By following standard risk management practices, developers can identify potential risks early, implement appropriate safeguards, and minimize the likelihood of adverse outcomes.
- **Market Adoption and Innovation:** Standards promote market adoption and innovation by providing a common framework for collaboration, competition, and knowledge sharing within the AI ecosystem. They facilitate interoperability between different stakeholders, including developers, vendors, researchers, policymakers, and end-users, enabling the exchange of ideas, technologies, and best practices. Standards also help reduce barriers to entry for new players, foster competition, and stimulate innovation in the AI industry.

# How Artificial Intelligence (AI) works

**Artificial Intelligence (AI) works through a combination of algorithms, data, and computational power to simulate human intelligence and perform tasks that typically require human-like cognition.**

- **Data Collection:** AI systems require large amounts of data to learn from and make decisions. This data can be structured (e.g., databases, spreadsheets) or unstructured (e.g., text, images, audio). Data collection involves gathering relevant information from various sources, such as sensors, databases, the internet, or user interactions.
- **Data Preprocessing:** Before feeding the data into AI algorithms, preprocessing steps may be necessary to clean, normalize, and transform the data into a suitable format for analysis. This may involve removing noise, handling missing values, standardizing units, and encoding categorical variables.
- **Algorithm Selection:** AI algorithms are mathematical models or techniques that process input data to produce output predictions, classifications, or insights. The choice of algorithm depends on the specific task, the nature of the data, and the desired outcomes. Common AI algorithms include machine learning algorithms (e.g., decision trees, support vector machines, neural networks), optimization algorithms, and rule-based systems.
- **Training the Model:** In supervised learning, the AI model is trained using labeled data, where both input features and corresponding target labels are provided. During training, the model learns patterns and relationships in the data by adjusting its internal parameters through iterative optimization algorithms, such as gradient descent. The goal is to minimize the difference between the predicted outputs and the actual labels.
- **Evaluation and Validation:** After training, the AI model is evaluated and validated using separate datasets to assess its performance, generalization ability, and robustness. Evaluation metrics vary depending on the task, but common metrics include accuracy, precision, recall, F1 score, and area under the curve (AUC).
- **Deployment and Inference:** Once the AI model has been trained and validated, it can be deployed to perform inference on new, unseen data. During inference, the trained model takes input data and generates predictions or decisions without further learning. This process may involve deploying the model in production environments, such as web applications, mobile apps, or embedded systems, to make real-time predictions or automate decision-making tasks.
- **Feedback Loop:** AI systems often incorporate a feedback loop to continuously improve performance over time. Feedback can come from user interactions, real-world outcomes, or new data. By collecting feedback and updating the model accordingly, AI systems can adapt to changing environments, learn from experience, and improve their accuracy and effectiveness.

# Key Standards Commonly used in Artificial Intelligence (AI)

- **ISO/IEC 27001:** This standard specifies requirements for establishing, implementing, maintaining, and continually improving an **information security management system (ISMS)**. It is relevant to AI systems to ensure the security and confidentiality of data used by AI algorithms and applications.
- **ISO/IEC 27701:** This standard provides guidelines for implementing a **privacy information management system (PIMS)** based on the requirements of ISO/IEC 27001 and the principles of privacy by design. It is relevant for AI systems to address privacy concerns and comply with data protection regulations such as the GDPR.
- **ISO/IEC 38500:** This standard provides guidance for **corporate governance of information technology (IT)**. It outlines principles and practices for governing the use and management of IT resources, including AI systems, to ensure **alignment with business objectives and compliance with legal and regulatory requirements**.
- **ISO/IEC 2382:** This standard provides a **comprehensive framework of terms and definitions related to information technology, including AI terminology**. It helps ensure clear and consistent communication among stakeholders in the AI ecosystem, facilitating collaboration, knowledge sharing, and interoperability.
- **IEEE 7000:** This standard provides a **taxonomy and classification scheme for AI systems**, covering various dimensions such as functionality, autonomy, and performance. It helps categorize and differentiate different types of AI technologies, applications, and capabilities, enabling better understanding and comparison.
- **ISO/IEC 19757:** This standard defines **a framework for specifying knowledge representation languages (KRLs) and interchange formats** for representing and exchanging knowledge in AI systems. It helps ensure interoperability and compatibility between different AI systems, tools, and platforms by standardizing knowledge representation formats.
- **IEEE P7003:** This standard provides guidelines for **addressing ethical considerations in the design and development of autonomous and intelligent systems**, including AI technologies. It helps developers and organizations integrate ethical principles, values, and norms into AI systems to promote fairness, transparency, accountability, and respect for human rights.
- **IEEE P7006:** This standard provides guidelines for **addressing transparency in AI systems**, including methods, techniques, and best practices for explaining the decision-making processes and outcomes of AI algorithms. It helps enhance trust, understanding, and acceptance of AI systems by stakeholders, including users, regulators, and the general public.

# Potential Benefits of Artificial Intelligence (AI) for PIDX Community

The Petroleum Industry Data Exchange (PIDX) community, which focuses on developing global data standards for the oil and gas industry, can leverage AI in various ways to transform various aspects of the oil and gas industry, from Upstream exploration and production, Midstream, Downstream to supply chain management and trading:

- Improve Capital Efficiency
- Reduce Costs
- Improve Operational Efficiency & Productivity
- Agile decision-making
- Timely mitigation of risks
- Drive Innovation.
- Automation of processes

# Potential Applications of Artificial Intelligence (AI) for PIDX Community

- **Predictive Maintenance:** AI algorithms can analyze sensor data from equipment and machinery used in oil and gas operations to predict when maintenance is needed. By detecting potential equipment failures in advance, companies can schedule maintenance proactively, minimize downtime, and reduce maintenance costs.
- **Production Optimization:** AI-based optimization algorithms can analyze real-time data from drilling rigs, production wells, and refineries to optimize production processes, such as drilling, extraction, refining, and distribution. By optimizing operations, companies can increase production efficiency, reduce waste, and improve profitability.
- **Supply Chain Management:** AI can analyze historical and real-time data from the supply chain, including logistics, inventory, and procurement, to optimize supply chain operations. AI algorithms can predict demand, identify supply chain risks, optimize inventory levels, and streamline logistics processes, enabling companies to improve supply chain efficiency and responsiveness.
- **Exploration and Reservoir Management:** AI techniques, such as machine learning and geospatial analysis, can analyze seismic data, well logs, and geological data to identify potential oil and gas reserves and optimize reservoir management strategies. By leveraging AI for exploration and reservoir management, companies can reduce exploration costs, improve resource recovery, and maximize reservoir performance.
- **Health, Safety, and Environmental (HSE) Management:** AI can analyze data from sensors, cameras, and other sources to monitor health, safety, and environmental conditions in oil and gas facilities. AI algorithms can detect safety hazards, identify environmental risks, and provide early warnings of potential incidents, helping companies prevent accidents, minimize environmental impact, and ensure compliance with regulations.
- **Data Integration and Standardization:** AI can facilitate data integration and standardization across different systems and platforms used in the oil and gas industry. AI-based data integration tools can automate data mapping, transformation, and validation processes, enabling companies to streamline data exchange, improve data quality, and enhance interoperability between systems.
- **Market Intelligence and Trading:** AI algorithms can analyze market data, news, and social media sentiment to provide insights into market trends, price movements, and trading opportunities in the oil and gas industry. AI-powered trading platforms can execute trades automatically based on predefined trading strategies, enabling companies to optimize trading decisions and maximize returns.

# Some Potential **Solutions Resulting** from the use of Artificial Intelligence (AI) by PIDX Community

- Has the job been scheduled/assigned?
- Know what is going on and respond at the right time.
- How to optimize processes real time.
- Are all materials/resources available and ready for the job?
- Is the job done?
- Are all information and data needed easily and readily available/accessibile?
- Are all documentation created and submitted?
- ETC.

# PIDX role in Artificial Intelligence (AI)

- **Setting Standards Strategy:** Developing a strategic vision and roadmap for standardization efforts within a particular industry or domain.
- **Coordinating Standardization Activities:** Facilitating collaboration among stakeholders, standard-setting organizations, government agencies, and industry consortia to ensure alignment and minimize duplication of efforts.
- **Promoting Standards Adoption:** Advocating for the adoption of standards among industry players, government agencies, and other relevant stakeholders to drive interoperability, compatibility, and market acceptance.
- **Monitoring Standards Compliance:** Monitoring compliance with established standards and ensuring that stakeholders adhere to agreed-upon specifications and guidelines.
- **Addressing Emerging Issues:** Addressing emerging challenges, technological advancements, and regulatory developments that may impact standardization efforts and industry practices.



Analytics drive AI

# Analytics used by Artificial Intelligence (AI)

Artificial Intelligence (AI) utilizes various types of analytics techniques to analyze data, extract insights, and make predictions.

- Descriptive Analytics
- Diagnostic Analytics
- Predictive Analytics
- Prescriptive Analytics
- Text Analytics
- Image and Video Analytics
- **Diagnostic and Predictive Analytics:** Diagnostic and predictive analytics combine elements of both diagnostic and predictive analytics to provide a deeper understanding of past events and future trends. This type of analytics involves analyzing historical data to diagnose past performance and identify predictive patterns that can inform future decisions. Diagnostic and predictive analytics techniques include time series analysis, clustering, and association rule mining.

# Analytics used by Artificial Intelligence (AI)

## Descriptive Analytics:

- **Description:** Descriptive analytics focuses on summarizing historical data to provide insights into past trends, patterns, and relationships.
- **Examples:**
  - A retail company analyzes sales data from the past year to identify trends in customer purchasing behavior, such as popular products, seasonal fluctuations, and geographic preferences.
  - An e-commerce platform visualizes website traffic data to understand user engagement, including page views, bounce rates, and conversion rates, using charts and graphs.
  - A manufacturing plant generates daily reports on production output, downtime, and quality metrics to monitor performance and identify areas for improvement.

## Diagnostic Analytics:

- **Description:** Diagnostic analytics aims to understand why certain events occurred by identifying the root causes and factors contributing to specific outcomes.
- **Examples:**
  - A healthcare provider analyzes patient data to identify factors contributing to readmissions, such as medication non-adherence or post-operative complications.
  - An IT department investigates a network outage by analyzing system logs, network traffic, and configuration changes to determine the root cause of the incident.
  - A marketing team conducts A/B testing to compare the performance of different advertising campaigns and identify which factors contribute to higher conversion rates.

# Analytics used by Artificial Intelligence (AI)

## Predictive Analytics:

- **Description:** Predictive analytics uses historical data to forecast future outcomes and trends, enabling organizations to anticipate and prepare for future events.
- **Examples:**
  - An insurance company builds a predictive model to forecast customer churn, identifying factors that indicate a higher likelihood of policy cancellation.
  - A transportation company uses predictive analytics to forecast demand for ride-sharing services in different areas, optimizing driver allocation and reducing wait times.
  - An e-commerce platform employs predictive analytics to forecast inventory demand, ensuring sufficient stock levels to meet customer demand while minimizing excess inventory costs.

## Prescriptive Analytics:

- **Description:** Prescriptive analytics recommends actions to achieve desired outcomes by leveraging predictive insights and optimization techniques.
- **Examples:**
  - An energy utility company uses prescriptive analytics to optimize energy distribution, recommending adjustments to power generation and transmission to minimize costs while meeting demand.
  - A supply chain management system employs prescriptive analytics to optimize inventory levels and transportation routes, recommending the most cost-effective strategies for sourcing and distribution.
  - A healthcare provider uses prescriptive analytics to optimize treatment plans for patients with chronic conditions, recommending personalized interventions based on predictive insights and clinical guidelines.

# Analytics used by Artificial Intelligence (AI)

## Text Analytics:

- **Description:** Text analytics involves analyzing unstructured text data to extract insights, sentiment, and information from sources such as customer feedback, social media posts, and survey responses.
- **Examples:**
  - A customer service department uses text analytics to analyze customer reviews and feedback, identifying common issues, sentiments, and trends to improve products and services.
  - A social media monitoring tool analyzes tweets and posts to gauge public sentiment about a brand or topic, identifying positive and negative sentiment trends in real-time.
  - A market research firm analyzes open-ended survey responses to identify emerging themes and topics, categorizing responses and extracting key insights from qualitative data.

## Image and Video Analytics:

- **Description:** Image and video analytics involve analyzing visual data, such as images and videos, to extract insights, recognize patterns, and detect objects.
- **Examples:**
  - An autonomous vehicle uses image recognition to detect pedestrians, vehicles, and traffic signs, enabling it to navigate safely and avoid collisions.
  - A retail store employs video analytics to analyze customer behavior, tracking foot traffic, dwell times, and browsing patterns to optimize store layout and product placement.
  - A healthcare provider uses medical imaging analysis to diagnose diseases and conditions from MRI scans, X-rays, and CT scans, leveraging image recognition algorithms to detect abnormalities and anomalies.

# Future Analytics may be used by Artificial Intelligence (AI)

Advancements in AI technologies are expected to lead to the development and adoption of more sophisticated analytics techniques, enabling organizations to extract deeper insights, make more accurate predictions, and drive greater value from their data. Some analytics techniques that are likely to be used by AI in the future:

- Causal Inference:
- Counterfactual Reasoning:
- Anomaly Detection:
- Graph Analytics:
- Federated Learning:
- Explainable AI (XAI):

These are some examples of advanced analytics techniques that are likely to be used by AI in the future, enabling organizations to extract deeper insights, make more accurate predictions, and drive greater value from their data across various industries and domains.

# Future Analytics to be used by Artificial Intelligence (AI)

## Causal Inference:

- **Description:** Causal inference aims to identify causal relationships between variables and understand the impact of interventions or actions on outcomes.
- **Examples:**
  - A healthcare provider uses causal inference techniques to evaluate the effectiveness of different treatment options for a specific condition, determining which interventions yield the best outcomes for patients.
  - A marketing team uses causal inference to assess the impact of advertising campaigns on sales, identifying which marketing channels and messages contribute most to customer conversions.

## Counterfactual Reasoning:

- **Description:** Counterfactual reasoning involves predicting what would have happened under different conditions or scenarios, enabling organizations to assess the potential outcomes of alternative actions.
- **Examples:**
  - A financial institution uses counterfactual reasoning to assess the impact of different loan approval policies on default rates, determining which policies would minimize risk and maximize profitability.
  - A retail company uses counterfactual reasoning to evaluate the potential sales impact of pricing changes, promotions, and product placements, optimizing pricing strategies to maximize revenue and customer satisfaction.

## Anomaly Detection:

- **Description:** Anomaly detection involves identifying patterns or data points that deviate significantly from the norm or expected behavior, indicating potential anomalies or outliers.
- **Examples:**
  - A cybersecurity company uses anomaly detection to detect unusual network activity, identifying potential security breaches, malware infections, or unauthorized access attempts in real-time.
  - An industrial manufacturer uses anomaly detection to monitor equipment performance and detect potential failures or malfunctions before they occur, minimizing downtime and maintenance costs.

# Future Analytics to be used by Artificial Intelligence (AI)

## Graph Analytics:

- **Description:** Graph analytics involves analyzing relationships and connections between entities in complex networks or graphs, enabling organizations to uncover insights and patterns hidden in interconnected data.
- **Examples:**
  - A social media platform uses graph analytics to identify influential users, detect communities or clusters of users with similar interests, and optimize content recommendations and advertising targeting.
  - A transportation company uses graph analytics to analyze traffic flow, identify congestion hotspots, and optimize transportation routes and logistics operations to minimize travel times and fuel consumption.

## Federated Learning:

- **Description:** Federated learning enables organizations to train machine learning models collaboratively across distributed data sources while preserving data privacy and security.
- **Examples:**
  - Healthcare institutions use federated learning to train predictive models for disease diagnosis and treatment recommendations using patient data from multiple hospitals and healthcare providers, without sharing sensitive patient information.
  - Financial institutions use federated learning to develop fraud detection models using transaction data from multiple banks and financial institutions, improving fraud detection accuracy while protecting customer privacy.

## Explainable AI (XAI):

- **Description:** Explainable AI focuses on developing AI models and algorithms that provide transparent explanations for their decisions and predictions, enabling humans to understand and trust AI systems.
- **Examples:**
  - A healthcare provider uses explainable AI models to provide physicians with insights into how AI-driven diagnostic systems arrived at specific diagnoses, enabling doctors to make more informed treatment decisions and communicate effectively with patients.
  - A financial regulator uses explainable AI models to audit and monitor algorithmic trading systems, ensuring transparency and accountability in financial markets and mitigating the risks of algorithmic bias and manipulation.



Efficient AI

# Efficient Artificial Intelligence (AI)

## ➤ High-Quality Data:

Example: Autonomous vehicles rely on vast amounts of high-quality data for training their perception systems. Companies like Waymo have collected millions of miles of driving data, including various weather conditions, traffic scenarios, and pedestrian behaviors, to train their AI models effectively. This data is meticulously labeled to accurately identify objects such as cars, pedestrians, and traffic signs, enabling the vehicles to make informed decisions in real-time.

## ➤ Robust Algorithms:

Example: Fraud detection systems in financial institutions utilize advanced machine learning algorithms to analyze patterns in transaction data and identify potentially fraudulent activities. These algorithms, such as random forests or gradient boosting machines, are robust to variations in fraudulent behavior and can adapt to new fraud tactics over time, helping financial institutions stay ahead of evolving threats.

## ➤ Computational Power:

Example: DeepMind's AlphaFold is a groundbreaking AI system that predicts protein folding structures with remarkable accuracy. This achievement was made possible by harnessing immense computational power, including powerful GPUs and TPUs, to train deep learning models on vast protein structure databases. The computational resources enable AlphaFold to simulate the complex physical interactions governing protein folding, significantly advancing our understanding of biology and drug discovery.

## ➤ Domain Expertise:

Example: AI-powered precision agriculture systems leverage domain expertise from agronomists and farmers to optimize crop yields and resource utilization. By integrating data from satellite imagery, weather forecasts, soil sensors, and crop health assessments, these systems provide actionable insights for farmers to make informed decisions about irrigation, fertilization, and pest control, ultimately maximizing productivity while minimizing environmental impact.

# Efficient Artificial Intelligence (AI)

## ➤ Interpretability and Explainability:

Example: Healthcare AI applications, such as diagnostic systems for interpreting medical images like X-rays and MRIs, require interpretability and explainability to gain trust from healthcare professionals. Techniques like attention mechanisms in deep learning models can highlight regions of interest in medical images, providing clinicians with explanations for model predictions and enabling them to verify the accuracy of diagnoses.

## ➤ Ethical Considerations:

Example: Facial recognition technology deployed by law enforcement agencies has raised ethical concerns regarding privacy invasion and potential biases, particularly against marginalized communities. In response, organizations like the Algorithmic Justice League advocate for transparency, accountability, and fairness in AI systems. They promote the development of unbiased facial recognition algorithms and advocate for policies that protect individual privacy rights and mitigate the risks of algorithmic discrimination.

## ➤ Continuous Learning and Improvement:

Example: Personalized recommendation systems used by streaming platforms like Netflix and Spotify continuously learn from user interactions to enhance content recommendations. These systems employ reinforcement learning algorithms that adapt recommendations based on user feedback, such as likes, dislikes, and viewing habits, ensuring that users receive personalized and engaging content tailored to their preferences.

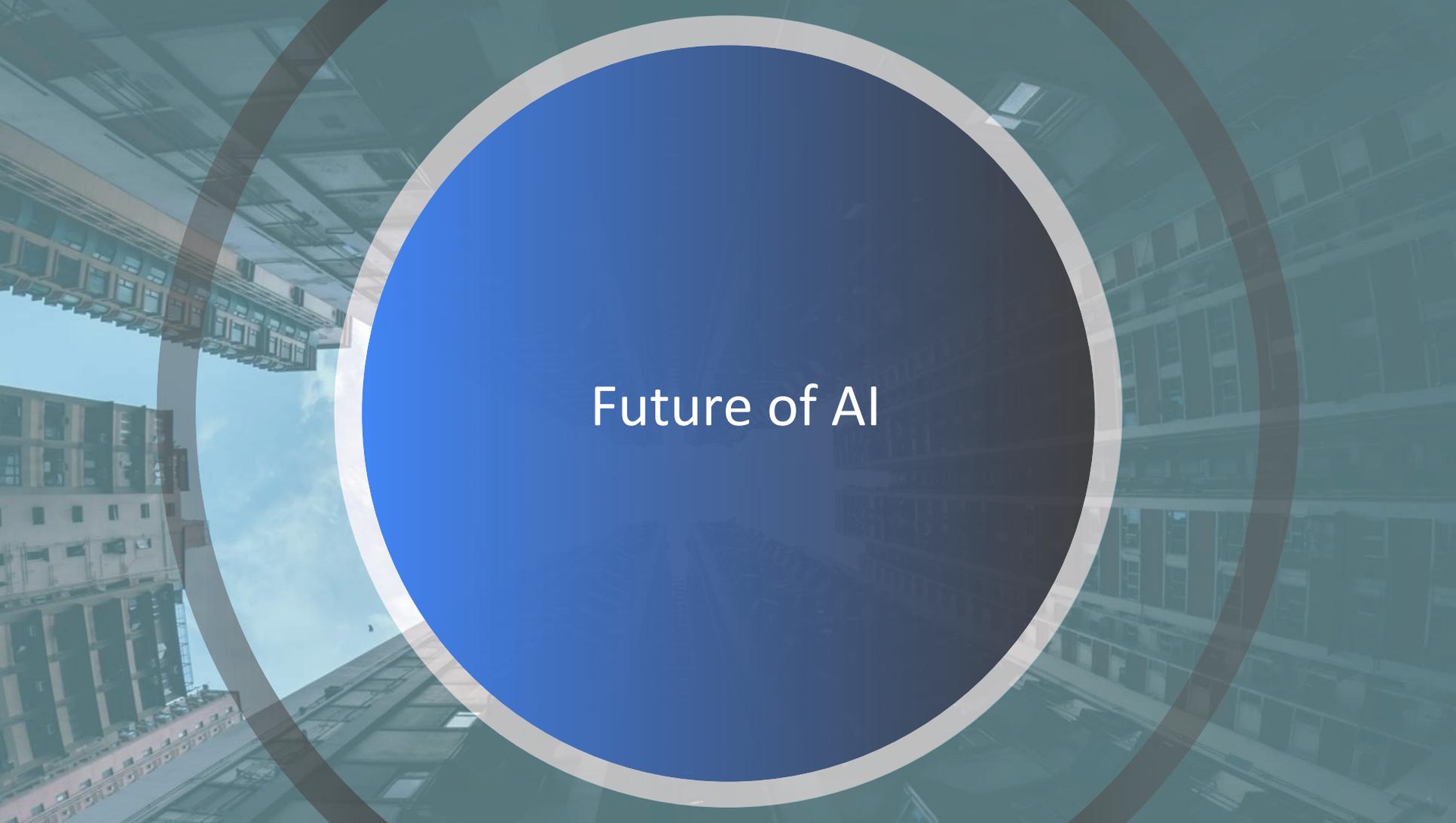
**By integrating these elements into AI development and deployment, organizations can build efficient and successful AI systems that deliver meaningful value while addressing societal concerns and ethical considerations.**

# Ways to achieve Successful Artificial Intelligence (AI)

- Migrate your BI operations to the cloud.
- Adopt a modular approach to your BI strategy.
- Solve immediate problems with data.
- Align BI projects with AI goals.
- Build AI with a feedback loop to business stakeholders.
- Prioritize data management to improve their AI initiatives.

Adopting free and paid AI tools is not enough on its own, especially as the industry continues to evolve and take shape.

Companies must also ensure that they can use AI effectively to get ahead of the competition. This requires a thoughtful approach to integration and implementation, which is where [business intelligence \(BI\)](#) comes in as a key enabler.



# Future of AI

# Future of Artificial Intelligence (AI)

## Future of Artificial Intelligence

In the near [future](#), AI is poised to advance in machine learning capabilities and related frameworks like generative adversarial networks (GANs), which can help further develop generative AI and autonomous systems. Inevitably, AI will continue to make an impact across multiple industries, potentially causing job displacement, but also new job opportunities.

Looking ahead, one of the next big steps for artificial intelligence is to progress beyond weak or narrow AI and achieve artificial general intelligence (AGI). With AGI, machines will be able to think, learn and act the same way as humans do, blurring the line between organic and machine intelligence. This could pave the way for increased automation and problem-solving capabilities in medicine, transportation and more — as well as [sentient AI](#) down the line.

While likely groundbreaking, future advancements in AI have raised concerns such as heightened job loss, widespread disinformation, unpredictable AI behavior and possible moral dilemmas associated with reaching [technological singularity](#).

For now, Society is largely looking toward federal and business-level AI regulations to help guide the technology's future.

# Future of Artificial Intelligence (AI)

Predicting the future of AI involves considering various technological, societal, and ethical factors that may influence its development and impact. Several trends and possibilities can be identified. Immense potential for transformative change across society, economy, and various industries. It's essential to address challenges related to ethics, governance, and societal impact to ensure that AI technologies are developed and deployed in a manner that aligns with human values and promotes the common good.

- **Advancements in Deep Learning and Neural Networks:** Deep learning, a subset of machine learning, has been a driving force behind recent AI breakthroughs. Continued advancements in deep learning architectures, algorithms, and training techniques are likely to lead to more powerful AI models capable of solving increasingly complex tasks.
- **AI-Powered Automation:** AI technologies will continue to automate repetitive and mundane tasks across various industries, leading to increased efficiency, productivity, and cost savings. This automation may impact job roles and necessitate reskilling and upskilling efforts to adapt to the changing workforce landscape.
- **AI in Healthcare:** AI has significant potential to revolutionize healthcare by improving diagnostics, drug discovery, personalized medicine, and patient care. AI-powered medical imaging, predictive analytics, and digital health platforms are expected to play a vital role in enhancing healthcare outcomes and reducing costs.
- **Ethical and Responsible AI:** There is growing awareness of the ethical, societal, and legal implications of AI, including issues related to bias, fairness, transparency, privacy, and accountability. Future developments in AI will likely prioritize ethical considerations and responsible AI practices to ensure that AI technologies are deployed in a manner that benefits society while minimizing potential harms.
- **AI for Good:** AI has the potential to address some of the world's most pressing challenges, such as climate change, poverty, healthcare access, and education. Initiatives focused on leveraging AI for social good, sustainability, and humanitarian purposes are expected to gain momentum, with AI technologies being applied to tackle global challenges and improve quality of life for people around the world.
- **AI Governance and Regulation:** As AI becomes more pervasive, governments, policymakers, and international organizations are likely to establish regulations, standards, and guidelines to govern AI development, deployment, and use. These regulations may address issues such as data privacy, algorithmic transparency, safety, and security to ensure that AI technologies are developed and deployed responsibly.
- **Human-AI Collaboration:** Rather than replacing humans, AI is likely to augment human capabilities and enable new forms of collaboration between humans and machines. Future AI systems may work synergistically with humans, assisting them in decision-making, problem-solving, and creativity across various domains and tasks.

# Future Artificial Intelligence (AI) in Action

AI applications continue to grow as AI technologies advance and find new use cases across industries and sectors. AI has the potential to transform various aspects of our lives, driving innovation, efficiency, and productivity across society. Innovative applications across various industries and sectors, transforming the way we live, work, and interact with the world.

- **Virtual Assistants:** Virtual assistants like Siri, Google Assistant, and Amazon Alexa use AI algorithms to understand natural language commands, answer questions, perform tasks, and provide personalized recommendations to users.
- **Recommendation Systems:** Recommendation systems used by companies like Netflix, Amazon, and Spotify employ AI techniques to analyze user preferences and behavior, recommending movies, products, and music tailored to individual tastes.
- **Autonomous Vehicles:** Self-driving cars and autonomous vehicles use AI algorithms, including computer vision, sensor fusion, and machine learning, to perceive their environment, make real-time decisions, and navigate safely without human intervention.
- **Image Recognition:** Image recognition systems powered by AI, such as facial recognition technology used in security systems and social media platforms, can identify and classify objects, people, and scenes in images and videos with high accuracy.
- **Natural Language Processing (NLP):** NLP applications, such as language translation, sentiment analysis, and text summarization, leverage AI techniques to analyze and understand human language, enabling chatbots, language translation services, and automated content generation.
- **Healthcare Diagnostics:** AI algorithms are used in healthcare for medical image analysis, disease diagnosis, and treatment planning. For example, AI-powered diagnostic systems can analyze medical images, such as X-rays and MRI scans, to detect abnormalities and assist radiologists in making accurate diagnoses.
- **Fraud Detection:** Financial institutions use AI-based fraud detection systems to analyze transaction data, identify suspicious patterns, and prevent fraudulent activities, such as credit card fraud and identity theft.
- **Robotics:** AI-driven robots and robotic systems are used in manufacturing, logistics, healthcare, and other industries to automate repetitive tasks, assist human workers, and perform complex operations with precision and efficiency.
- **Natural Language Generation (NLG):** NLG systems generate human-like text from structured data, enabling applications such as automated report generation, personalized content creation, and virtual storytelling.
- **Smart Home Devices:** AI-powered smart home devices, such as smart thermostats, security cameras, and voice-controlled speakers, use machine learning algorithms to learn user preferences and adapt to their behavior, providing convenience, security, and energy efficiency.

# Future Artificial Intelligence (AI) in Action

- **Personalized Education:** AI-powered educational platforms could provide personalized learning experiences tailored to individual students' strengths, weaknesses, and learning styles. These platforms could adapt the curriculum in real-time, provide personalized tutoring, and offer feedback to optimize learning outcomes.
- **Precision Medicine:** AI algorithms could analyze vast amounts of genomic data, medical records, and clinical research to develop personalized treatment plans for individual patients. AI could help identify optimal drug combinations, predict treatment outcomes, and customize therapies based on patients' genetic profiles and medical histories.
- **Autonomous Healthcare Assistants:** AI-powered healthcare assistants could provide personalized health monitoring, medication management, and wellness recommendations to individuals at home. These assistants could analyze biometric data, track health trends, and alert users and healthcare providers to potential health risks or abnormalities.
- **Smart Cities:** AI could play a crucial role in building smarter, more efficient cities by optimizing transportation systems, managing energy consumption, and enhancing public safety. AI-powered systems could optimize traffic flow, reduce energy waste, and improve emergency response times by analyzing real-time data from sensors, cameras, and other IoT devices.
- **Environmental Monitoring and Conservation:** AI algorithms could analyze satellite imagery, sensor data, and environmental models to monitor ecosystems, track biodiversity, and detect environmental changes in real-time. AI-powered systems could help identify conservation priorities, mitigate environmental risks, and guide sustainable resource management practices.
- **Predictive Maintenance for Infrastructure:** AI could revolutionize infrastructure management by predicting maintenance needs and optimizing asset performance. AI algorithms could analyze sensor data from bridges, roads, and buildings to identify potential maintenance issues before they occur, preventing costly repairs and ensuring the safety and reliability of critical infrastructure.
- **Augmented Reality (AR) in Manufacturing and Maintenance:** AI-powered AR applications could provide real-time guidance and assistance to workers in manufacturing and maintenance tasks. AR glasses equipped with AI algorithms could overlay digital instructions, schematics, and troubleshooting guides onto physical objects, helping workers perform tasks more efficiently and accurately.
- **AI in Space Exploration:** AI could enhance space exploration missions by autonomously analyzing vast amounts of data collected from satellites, rovers, and telescopes. AI algorithms could help identify promising targets for exploration, analyze geological formations, and navigate spacecraft with greater precision in space.

# Artificial Intelligence (AI) for eCommerce

- **Personalized Recommendations:** AI algorithms analyze customer data, browsing history, purchase behavior, and preferences to provide personalized product recommendations. These recommendations can be displayed on eCommerce websites, product pages, or through email marketing, helping customers discover relevant products and increasing conversion rates.
- **Chatbots and Virtual Assistants:** AI-powered chatbots and virtual assistants provide real-time customer support, answer questions, and assist shoppers throughout their shopping journey. Chatbots can handle common inquiries, provide product recommendations, and even facilitate transactions, improving customer satisfaction and reducing customer service costs for eCommerce businesses.
- **Dynamic Pricing and Demand Forecasting:** AI algorithms analyze market trends, competitor pricing, and customer demand to optimize pricing strategies dynamically. AI-driven pricing solutions adjust prices in real-time based on factors such as inventory levels, demand fluctuations, and competitor actions, helping eCommerce businesses maximize revenue and profitability.
- **Fraud Detection and Prevention:** AI-powered fraud detection systems analyze transaction data, user behavior, and historical patterns to identify suspicious activities and prevent fraudulent transactions. AI algorithms can detect fraudulent patterns, anomalies, and unusual behaviors in real-time, helping eCommerce businesses mitigate risks and protect against fraud losses.
- **Search and Visual Recognition:** AI technologies enhance search functionality and product discovery on eCommerce platforms. Natural Language Processing (NLP) algorithms improve search relevance and accuracy, while visual recognition technologies enable image-based search and product recommendations based on visual similarity, enhancing the shopping experience for customers.
- **Inventory Management and Supply Chain Optimization:** AI algorithms optimize inventory management and supply chain operations by predicting demand, optimizing stock levels, and streamlining logistics processes. AI-driven inventory management systems analyze historical data, market trends, and external factors to forecast demand, minimize stockouts, and reduce inventory holding costs.
- **Customer Segmentation and Targeted Marketing:** AI enables eCommerce businesses to segment customers based on demographic, behavioral, and psychographic attributes and target them with personalized marketing campaigns. AI-powered marketing automation tools analyze customer data to create targeted email campaigns, social media ads, and promotional offers tailored to specific customer segments, improving engagement and conversion rates.
- **Product Content Optimization:** AI algorithms analyze product descriptions, images, and reviews to optimize product content for search engines and improve discoverability. AI-driven content optimization tools identify keywords, enhance product descriptions, and generate compelling product copy to attract more organic traffic and improve search rankings on eCommerce platforms.

# Quantum Computing for Artificial Intelligence (AI)

Quantum computing is a revolutionary paradigm in computing that harnesses the principles of quantum mechanics to perform computations in fundamentally new ways. Unlike classical computers, which use bits as the basic unit of information (0 or 1), quantum computers use quantum bits or qubits, which can exist in multiple states simultaneously thanks to the phenomenon of superposition.

- **Superposition:** Qubits can exist in multiple states simultaneously, thanks to superposition. This allows quantum computers to perform many calculations in parallel, leading to exponential speedups for certain types of problems.
- **Entanglement:** Qubits can become entangled, meaning the state of one qubit is dependent on the state of another, even if they are physically separated. Entanglement allows for the creation of highly correlated qubit states, enabling more powerful computational operations.
- **Quantum Gates:** Quantum gates are the basic building blocks of quantum circuits, similar to classical logic gates. Quantum gates manipulate qubits by performing operations such as rotations, flips, and entanglements, enabling complex quantum computations.
- **Quantum Algorithms:** Quantum algorithms are algorithms designed to run on quantum computers, leveraging the unique properties of qubits to solve specific types of problems more efficiently than classical algorithms. Examples include Shor's algorithm for factoring large numbers and Grover's algorithm for searching unsorted databases.
- **Quantum Decoherence:** Quantum systems are fragile and susceptible to decoherence, which occurs when qubits lose their quantum properties due to interactions with the environment. Decoherence limits the duration of quantum computations and poses a significant challenge in building practical quantum computers.

Quantum computing has the potential to revolutionize fields such as cryptography, optimization, materials science, drug discovery, and artificial intelligence by solving complex problems that are currently intractable for classical computers. However, building practical quantum computers remains a significant engineering challenge due to the need for precise control over qubits, mitigating decoherence effects, and scaling up quantum systems to a large number of qubits.

# Artificial Intelligence (AI) in “Society 6.0”

"Society 6.0" is not a widely recognized term or concept. Let's speculate on potential future societal paradigms beyond Society 5.0 based on ongoing trends and emerging technologies for what Society 6.0 might entail:

- **Conscious and Ethical Technology Integration:** Society 6.0 could emphasize a deeper integration of technology with a focus on consciousness and ethical considerations. This paradigm might prioritize technologies that enhance human well-being, foster empathy and compassion, and promote sustainable interactions with the environment.
- **Augmented Human Capabilities:** Society 6.0 might see advancements in human augmentation technologies, such as brain-computer interfaces, genetic enhancements, and cyborg technologies. These enhancements could enable humans to transcend their biological limitations and enhance cognitive, physical, and emotional capabilities.
- **Holistic Wellness and Health:** Society 6.0 could prioritize holistic approaches to wellness and health, integrating physical, mental, emotional, and spiritual well-being. This paradigm might emphasize preventive healthcare, personalized medicine, mind-body interventions, and the integration of traditional and complementary healing practices.
- **Regenerative Economies and Societies:** Society 6.0 might prioritize regenerative economies and societies that prioritize sustainability, resilience, and circularity. This paradigm could involve reimagining economic systems, governance structures, and social norms to prioritize long-term well-being and ecological balance over short-term gains.
- **Collaborative and Decentralized Governance:** Society 6.0 could feature more collaborative, participatory, and decentralized forms of governance. This paradigm might involve the use of blockchain technology, decentralized autonomous organizations (DAOs), and liquid democracy systems to enable greater citizen participation, transparency, and accountability in decision-making processes.
- **Planetary Consciousness and Stewardship:** Society 6.0 might emphasize a planetary consciousness and stewardship, where humanity recognizes its interconnectedness with the Earth and takes collective responsibility for the well-being of the planet and all its inhabitants. This paradigm could involve initiatives to address global challenges such as climate change, biodiversity loss, and social inequality through international cooperation and solidarity.
- **Cultural Evolution and Diversity:** Society 6.0 could prioritize cultural evolution and diversity, celebrating the richness of human cultures, languages, and traditions while embracing cross-cultural exchange, collaboration, and understanding. This paradigm might promote cultural diversity as a source of resilience, creativity, and innovation in a rapidly changing world.

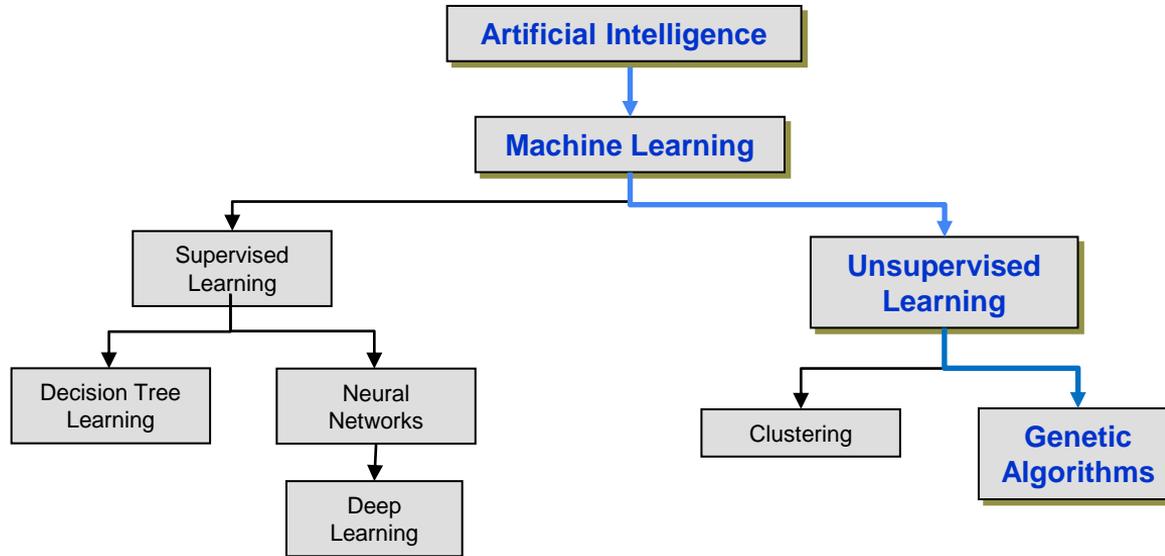
# Top 13 Artificial Intelligence (AI) for 2024





# Use Cases

# Artificial Intelligence: Used to interpret seismic data

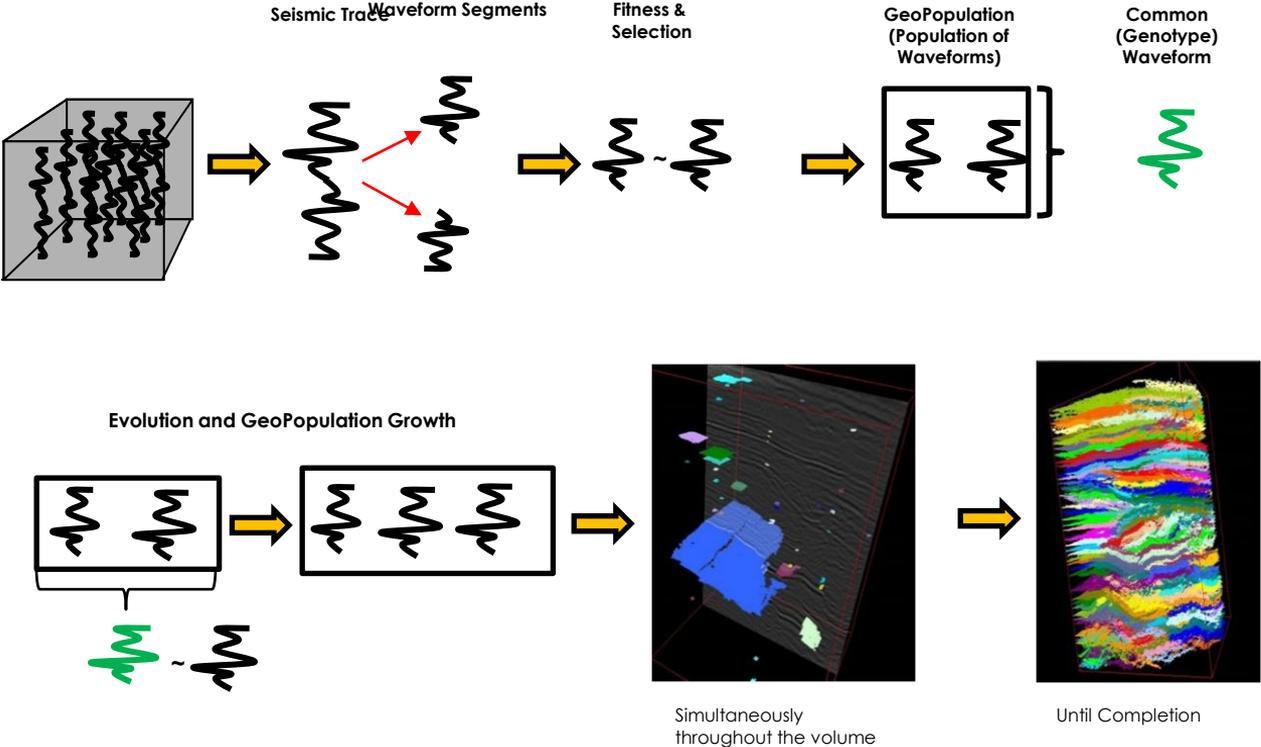


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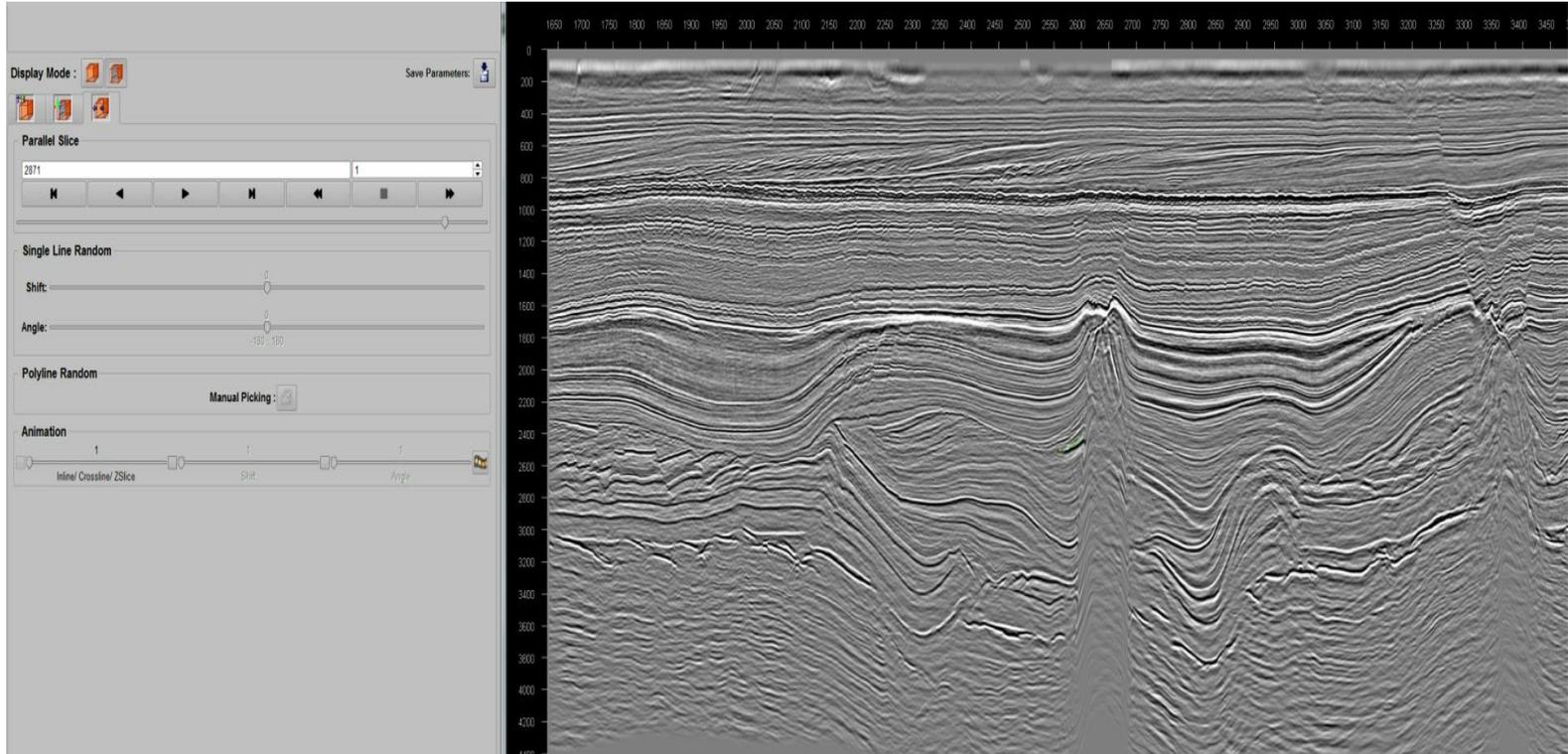
UNBIASED

 Seisnetics

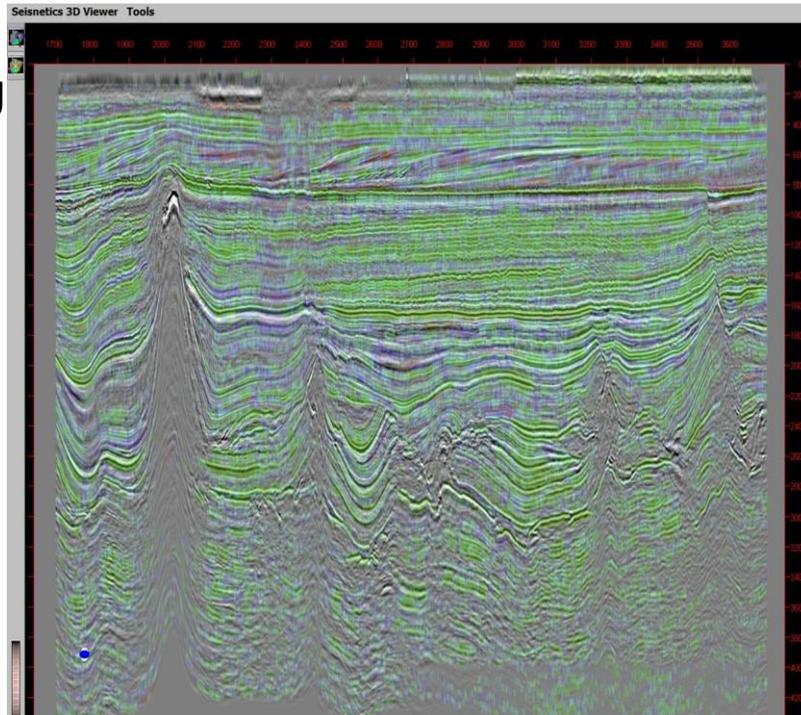
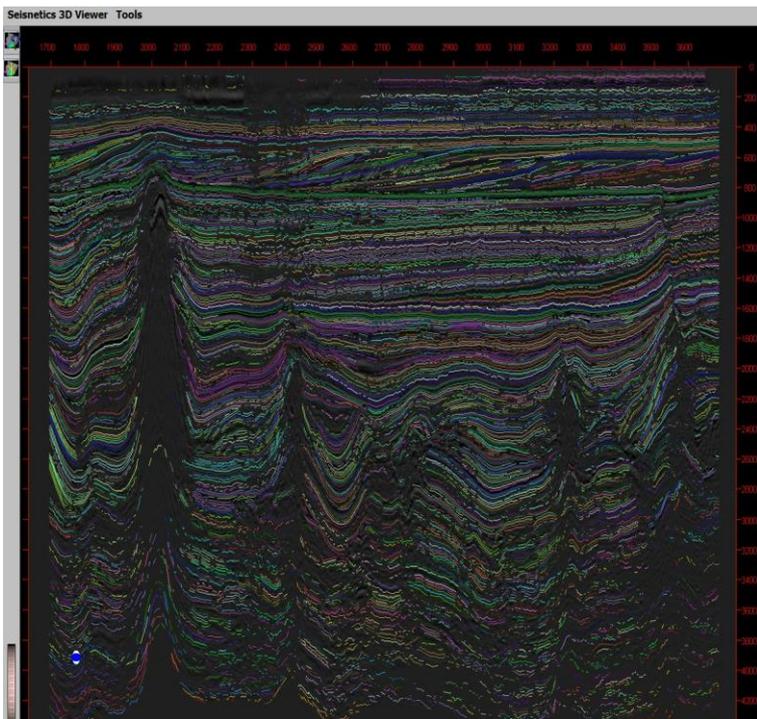
# Creating GeoPopulations of Waveforms using AI



# AI generated Depositional Environment



# Using the AI generated Fitness Attribute



# Case Study – Dutch North Sea

## The Project

- Mature but under-explored area of the North Sea
- **Recent discoveries in adjacent areas opening new plays**
- A number of fallow areas which have unidentified additional potential

## The Challenge

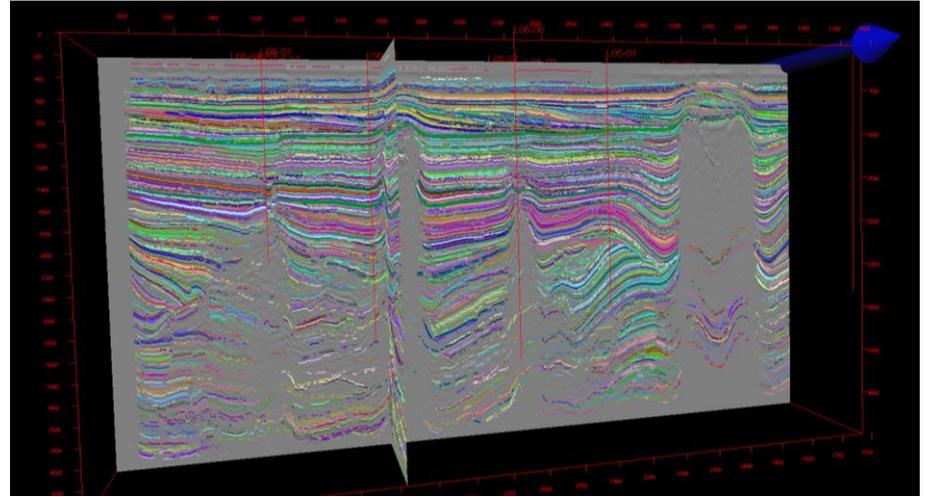
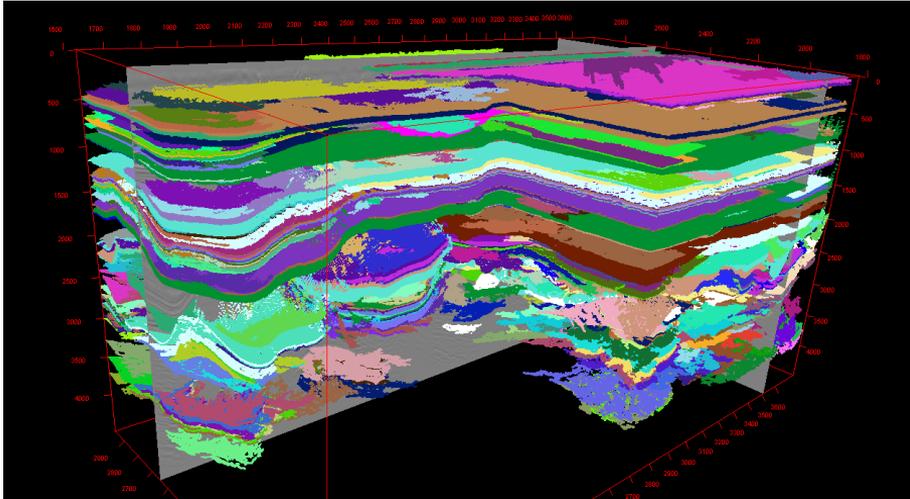
- Blind test – no prior knowledge of the area
- Complex geology – salt diapirs, minibasins, early rifting, inversion and oblique-slip reactivation, Upper Cretaceous chalk interval etc...
- Key target intervals sit beneath shallower complexity (salt etc...) which can interfere with interpretation

## The Objective

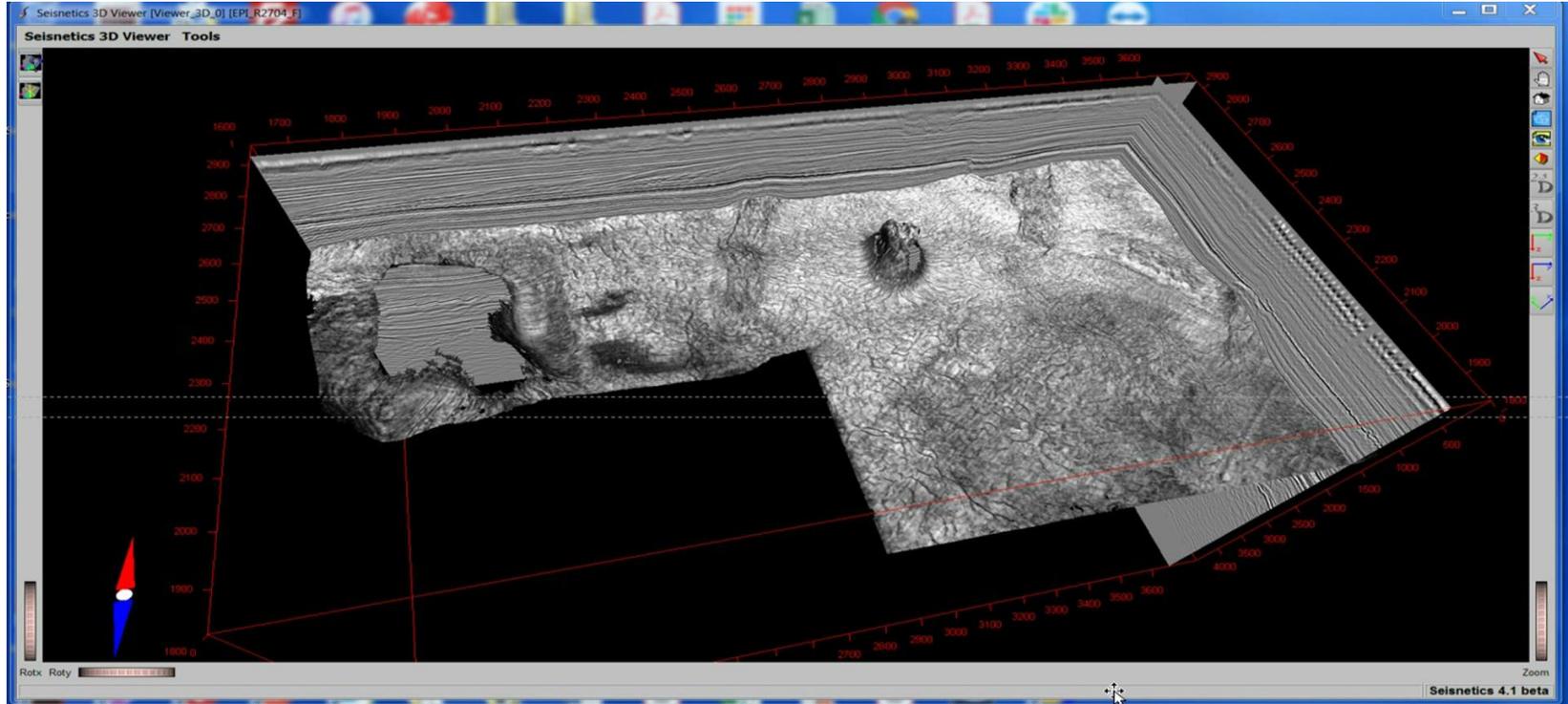
- Rapid Interpretation of the geology
- Identify plays and prospectivity
- Test the blind study generated results against drilled structures.

# Pre-interpretation Processing using AI

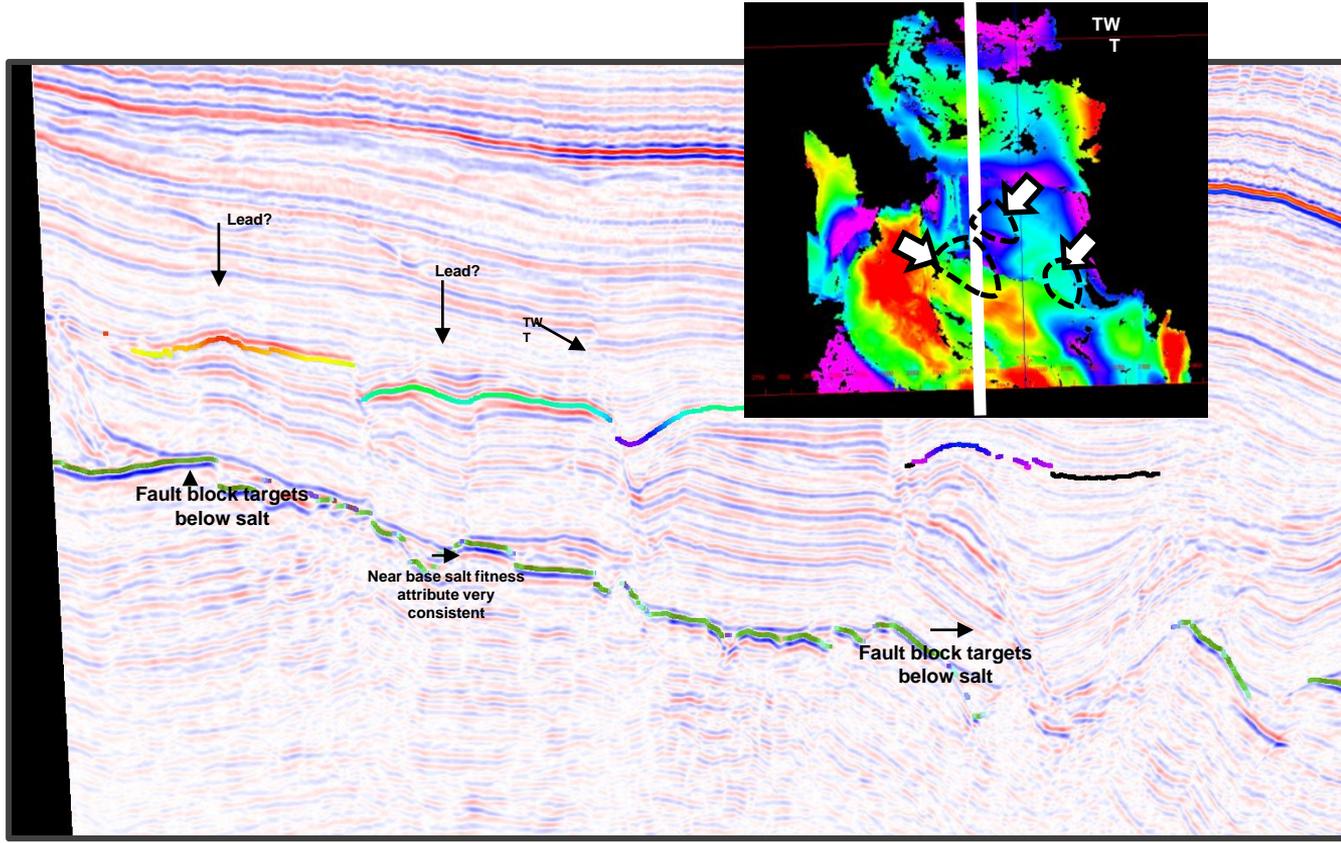
- 1,100 sq km of 3D seismic data processed in just 51 minutes
- 7,000 GeoPopulations with twt, amplitude and fitness attributes – queryable database
- Parameters autogenerated by the algorithm – non biased



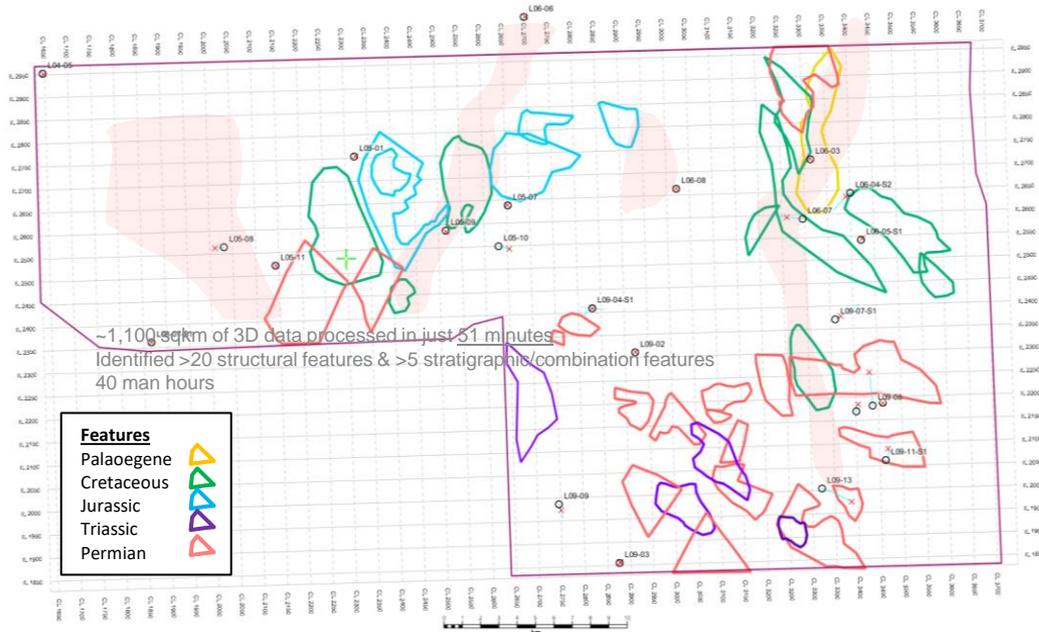
# Quickly Find & High-grade Prospects using the AI Results



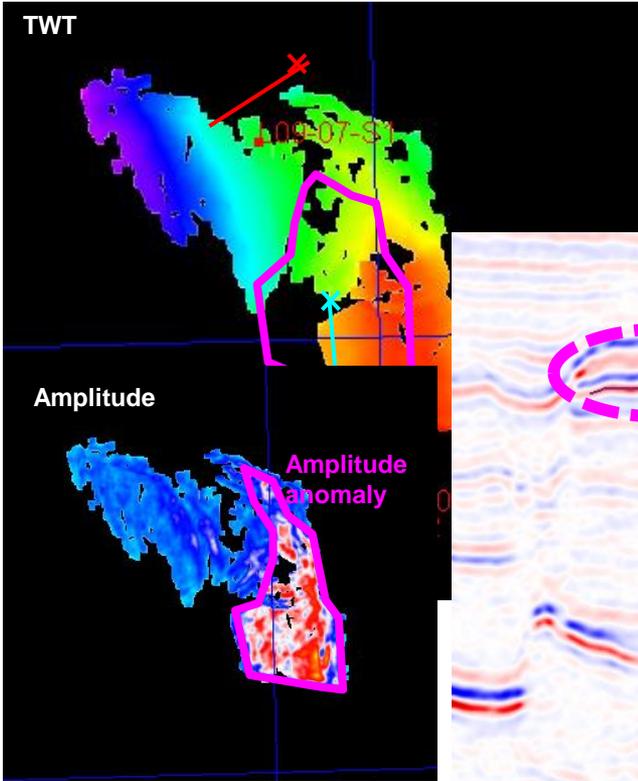
# North-South Line Through Trend of Pre- & Post-Salt Leads



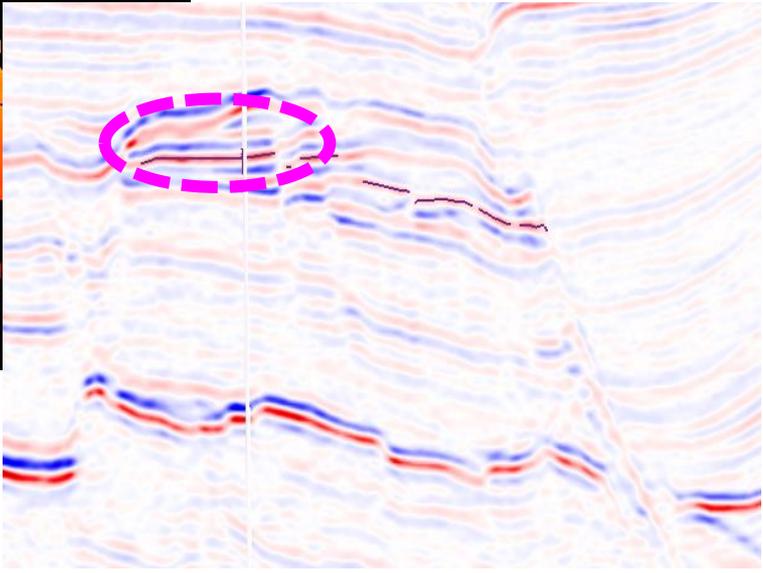
# Screening Highlights from AI Results



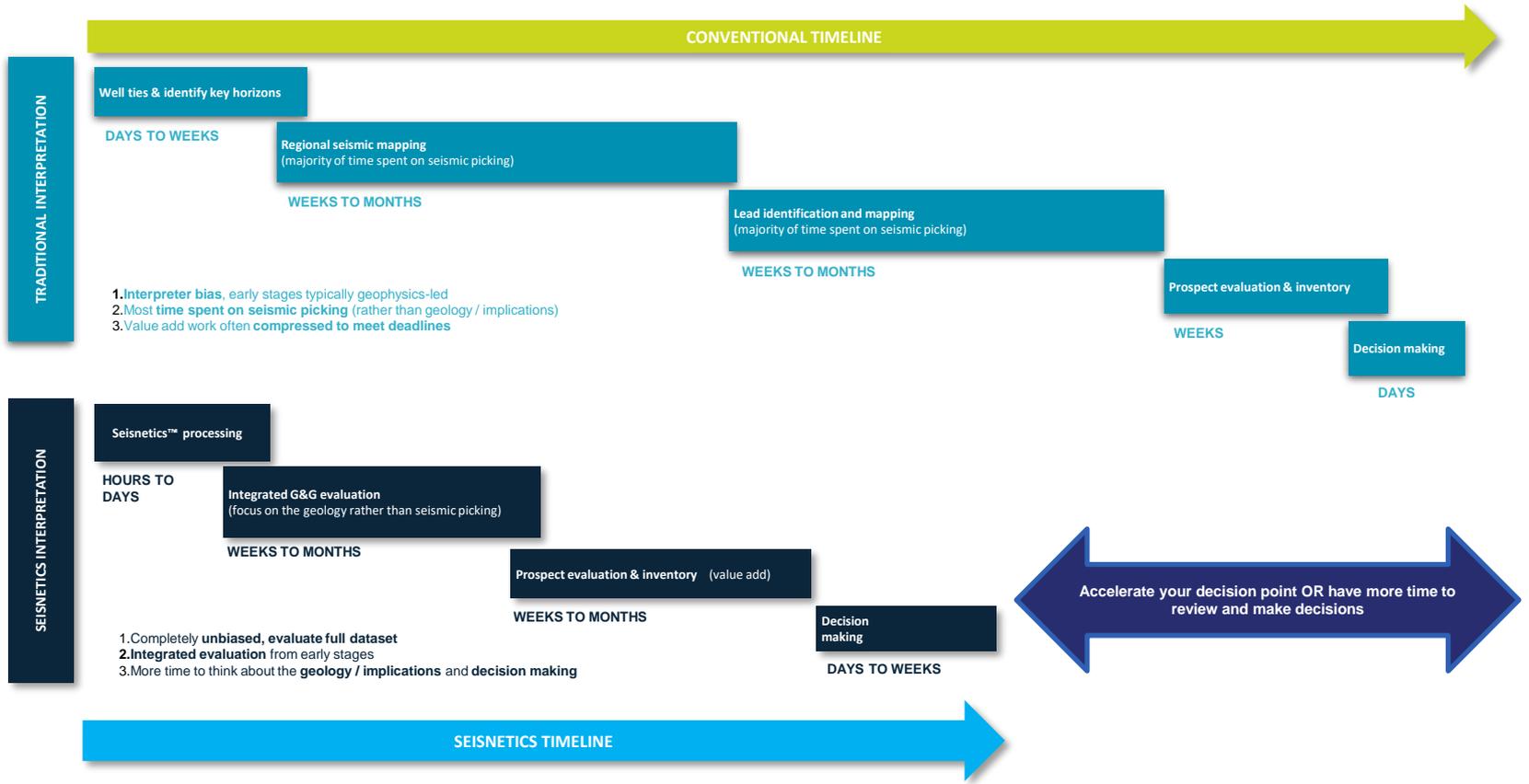
# Did We Identify The Discovered Fields In The 3D? – Yes!



- Triassic field example
- This GeoPop has identified a structure which has been drilled and is a proven discovery.
- The amplitude attribute is also highlighting the hydrocarbon bearing section



# Compress the project generation timeline using AI



# ADNOC generated \$500 million in value with AI

- ADNOC announced it generated **\$500 million** (Dh1.84 billion) in value by deploying artificial intelligence (AI) solutions in 2023.
- Value was generated by deploying **30 industry-leading AI tools** across its full value chain, from field operations to corporate decision-making.
- Led to major sustainability achievements – the tools helped **remove 1 million tonnes of carbon dioxide (CO2) emissions between 2022 and 2023**. (equivalent to removing around 200,000 gasoline-powered cars from the road).
- The milestone marks the start of a multi-year program to accelerate the deployment of a suite of AI solutions across ADNOC's value to chain to further enhance safety, while driving down emissions and driving up value.

“As we grow our diversified portfolio to ensure secure, reliable and responsible supply of energy, we are further integrating AI to future-proof our business and drive greater and more sustainable value from our assets and resources.” said **Dr Sultan Ahmed Al Jaber**, Minister of Industry and Advanced Technology and ADNOC Managing Director and Group CEO



Since 2017, ADNOC has operated two industry-leading centers of AI excellence - the Panorama Digital Command Centre (pictured), and the Thamama Subsurface Center of Excellence.

# ADNOC generated \$500 million in value with AI continued

- In ADNOC's upstream operations, AI applications play a central role in mapping subsurface resources, optimizing drilling, production activity and smarter reservoir management.
- **CPAD** (ADNOC's Centralized Predictive Analytics and Diagnostics) program uses AI to remotely monitor critical operational equipment – to reduce unplanned shutdowns and streamline routine maintenance across upstream and downstream facilities.
- **Emission X** gather historic and real-time data from hundreds of sources on operational sites to accurately predict emission sources up to five years in advance, allowing operators to take preventative action. Emission X was developed by AIQ, a joint venture between ADNOC and G42 established in 2020 to drive an AI-powered transformation of the energy sector towards a more sustainable future. Also supporting ADNOC's net zero by 2045 ambition and its target to achieve near-zero methane emissions by 2030.
- **SMARTi** an intelligent computer vision system that uses AI to detect safety hazards across industrial and operational environments.
- **AR360** uses AI to visualize reservoirs and optimize development, reducing planning time and increasing well life and ultimate recovery rates.
- **Robowell** uses AI to operate equipment like flow valves in upstream facilities remotely, reducing cost, enhancing safety and increasing production capacity.

[ADNOC generated \\$500 million in value with AI | Energy – Gulf News](#)

# Key Drivers for Success

- Agile processes
- Standardize processes
- End to End Governance and Process improvements using AI
- Proactive waste removal end to end in processes
- Quality improvements to minimize Defects and Escapes
- Minimal Change Management
- Easy User Adoption

# Thank you

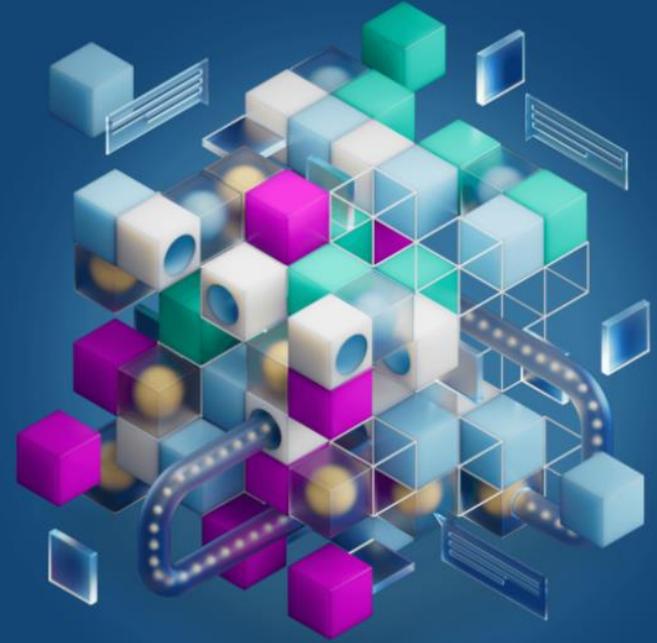
**AmingAnthony@gmail.com**

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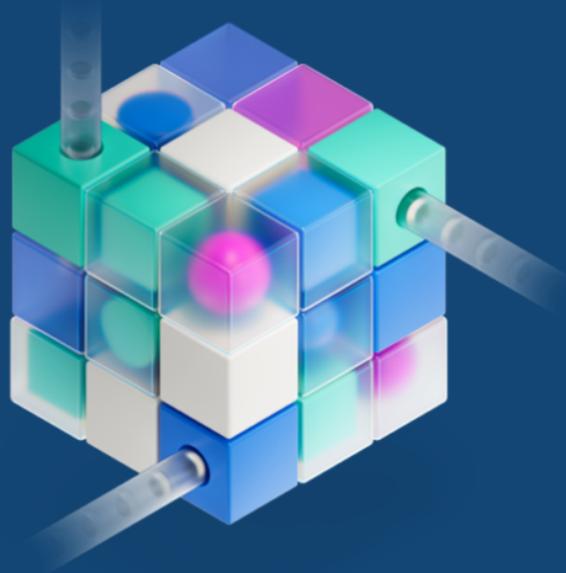
# 10 AI terms everyone should know

By Susanna Ray

The term "AI" has been used in computer science since the 1950s, but most people outside the industry didn't start talking about it until the end of 2022. That's because recent advances in machine learning led to big breakthroughs that are beginning to have a profound impact on nearly every aspect of our lives. We're here to help break down some of the buzzwords so you can better understand AI terms and be part of the global conversation.



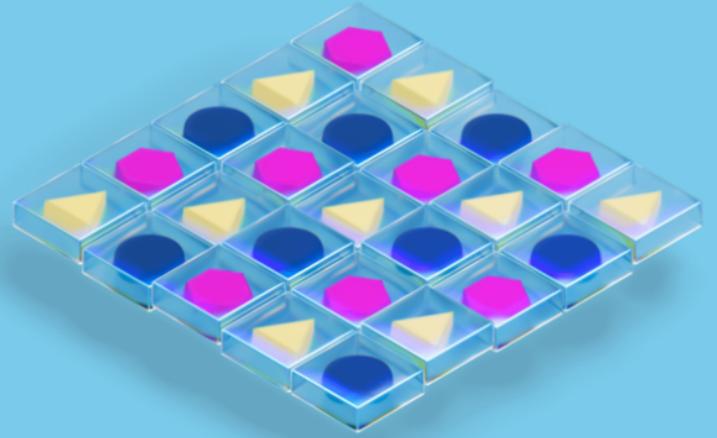
# 1. Artificial intelligence



Artificial intelligence is basically a super-smart computer system that can imitate humans in some ways, like comprehending what people say, making decisions, translating between languages, analyzing if something is negative or positive, and even learning from experience. It's artificial in that its intellect was created by humans using technology. Sometimes people say AI systems have digital brains, but they're not physical machines or robots — they're programs that run on computers. They work by putting a vast collection of data through algorithms, which are sets of instructions, to create models that can automate tasks that typically require human intelligence and time. Sometimes people specifically engage with an AI system — like asking Bing Chat for help with something — but more often the AI is happening in the background all around us, suggesting words as we type, recommending songs in playlists and providing more relevant information based on our preferences.

## 2. Machine learning

If artificial intelligence is the goal, machine learning is how we get there. It's a field of computer science, under the umbrella of AI, where people teach a computer system how to do something by training it to identify patterns and make predictions based on them. Data is run through algorithms over and over, with different input and feedback each time to help the system learn and improve during the training process — like practicing piano scales 10 million times in order to sight-read music going forward. It's especially helpful with problems that would otherwise be difficult or impossible to solve using traditional programming techniques, such as recognizing images and translating languages. It takes a huge amount of data, and that's something we've only been able to harness in recent years as more information has been digitized and as computer hardware has become faster, smaller, more powerful and better able to process all that information. That's why large language models that use machine learning — such as Bing Chat and ChatGPT — have suddenly arrived on the scene.





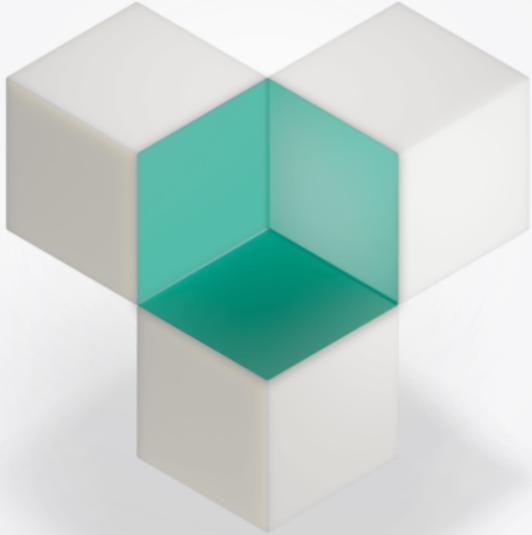
### 3. Large language models

Large language models, or LLMs, use machine learning techniques to help them process language so they can mimic the way humans communicate. They're based on neural networks, or NNs, which are computing systems inspired by the human brain — sort of like a bunch of nodes and connections that simulate neurons and synapses. They are trained on a massive amount of text to learn patterns and relationships in language that help them use human words. Their problem-solving capabilities can be used to translate languages, answer questions in the form of a chatbot, summarize text and even write stories, poems and computer code. They don't have thoughts or feelings, but sometimes they sound like they do, because they've learned patterns that help them respond the way a human might. They're often fine-tuned by developers using a process called reinforcement learning from human feedback (RLHF) to help them sound more conversational.

## 4. Generative AI

Generative AI leverages the power of large language models to make new things, not just regurgitate or provide information about existing things. It learns patterns and structures and then generates something that's similar but new. It can make things like pictures, music, text, videos and code. It can be used to create art, write stories, design products and even help doctors with administrative tasks. But it can also be used by bad actors to create fake news or pictures that look like photographs but aren't real, so tech companies are working on ways to **clearly identify** AI-generated content.



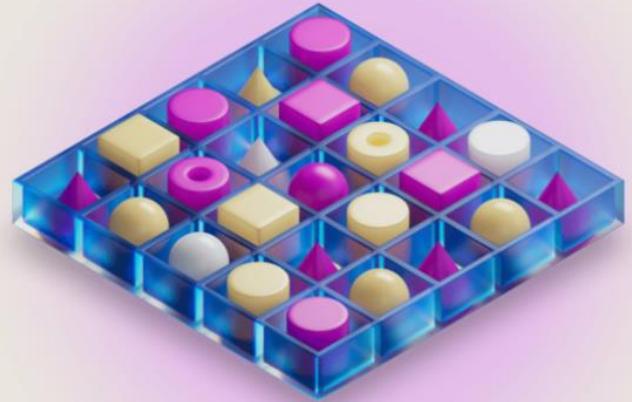


## 5. Hallucinations

Generative AI systems can create stories, poems and songs, but sometimes we want results to be based in truth. Since these systems can't tell the difference between what's real and fake, they can give inaccurate responses that developers refer to as hallucinations, or the more accurate term, fabrications — much like if someone saw what looked like the outlines of a face on the moon and began saying there was an actual man in the moon. Developers try to resolve these issues through "grounding," which is when they provide an AI system with additional information from a trusted source to improve accuracy about a specific topic. Sometimes a system's predictions are wrong, too, if a model doesn't have current information after it's trained.

## 6. Responsible AI

Responsible AI guides people as they try to design systems that are safe and fair — at every level, including the machine learning model, the software, the user interface and the rules and restrictions put in place to access an application. It's a crucial element because these systems are often tasked with helping make important decisions about people, such as in education and healthcare, but since they're created by humans and trained on data from an imperfect world, they can reflect any inherent biases. A big part of responsible AI involves understanding the data that was used to train the systems and finding ways to mitigate any shortcomings to help better reflect society at large, not just certain groups of people.



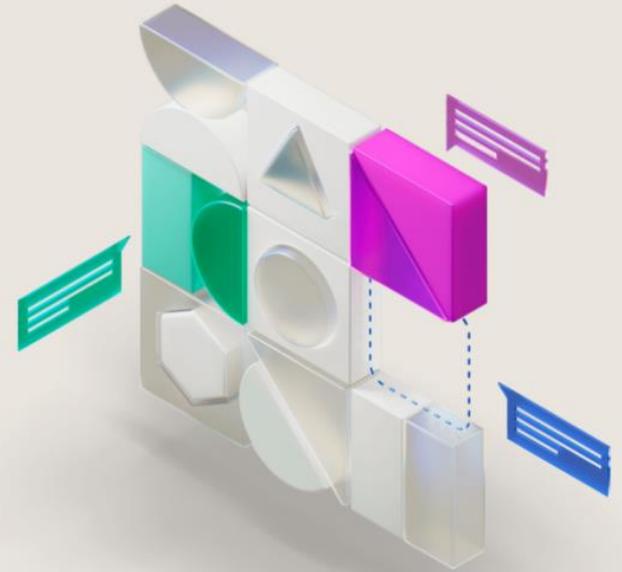


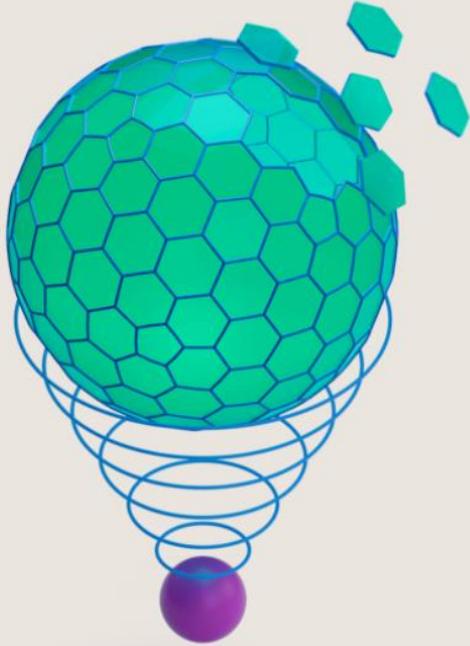
## 7. Multimodal models

A multimodal model can work with different types, or modes, of data simultaneously. It can look at pictures, listen to sounds and read words. It's the ultimate multitasker! It can combine all of this information to do things like answer questions about images.

# 8. Prompts

A prompt is an instruction entered into a system in language, images or code that tells the AI what task to perform. Engineers — and really all of us who interact with AI systems — must carefully design prompts to get the desired outcome from the large language models. It's like placing your order at a deli counter: You don't just ask for a sandwich, but you specify which bread you want and the type and amounts of condiments, vegetables, cheese and meat to get a lunch that you'll find delicious and nutritious.





## 9. Copilots

A copilot is like a personal assistant that works alongside you in all sorts of digital applications, helping with things like writing, coding, summarizing and searching. It can also help you make decisions and understand lots of data. The recent development of large language models made copilots possible, allowing them to comprehend natural human language and provide answers, create content or take action as you work within different computer programs. Copilots are built with Responsible AI guardrails to make sure they're safe and secure and are used in a good way. Just like a copilot in an airplane, it's not in charge — you are — but it's a tool that can help you be more productive and efficient.

# 10. Plugins

Plugins are a bit like when you add apps to your smart phone: They step in to fill specific needs that might pop up, enabling AI applications to do more things without having to modify the underlying model. They are what allow copilots to interact with other software and services, for example. They can help AI systems access new information, do complicated math or talk to other programs. They make AI systems more powerful by connecting them to the rest of the digital world.

