GHD Digital

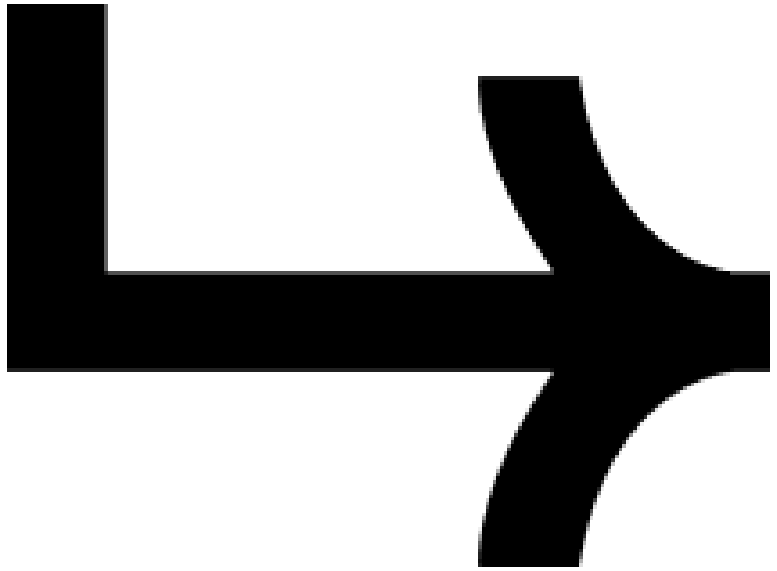
The metamorphic influence of AI

→ Shaping the future of the environmental industry

AI and more recently Generative AI has opened a world of endless creative possibilities and is revolutionising our way of life.

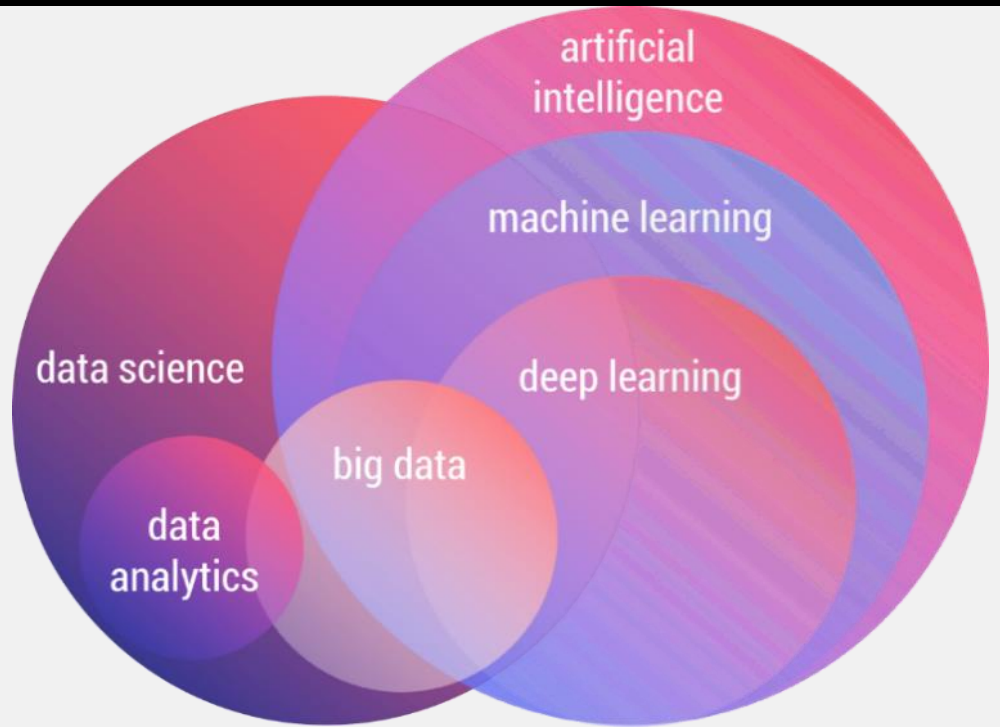
How can the environmental industry capitalise on its potential and countless applications, while addressing its potential challenges and risks?

Agenda



- What is AI?
- AI application to environment industry
- Examples of how AI is being used for environmental compliance
- Examples of how AI is being used across contaminated sites
- Benefits of AI Adoption
- Overcoming common concerns of AI
- Conclusions

What is AI?



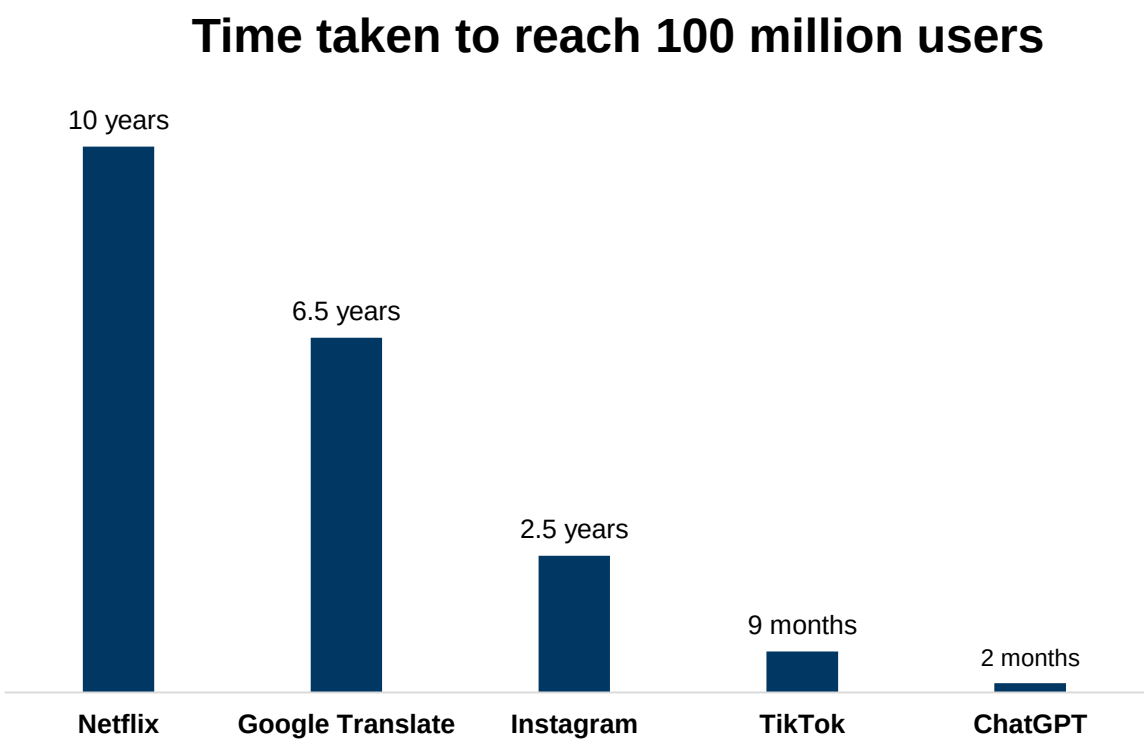
- Artificial Intelligence, refers to the simulation of human intelligence processes by computer systems.
- AI systems aim to mimic cognitive functions such as problem-solving, learning, reasoning, perception, and decision-making.
- AI allows computers to analyze data, recognize patterns, make informed decisions, and adapt to changing circumstances.
- AI encompasses a wide range of technologies, methodologies, and applications, all aimed at creating systems that can exhibit intelligent behavior.

Exploring generative AI?

Generative AI enables machines to create new content whether it be text, images, videos, music, art, or computer code.

- Simplification of a prompt-based user interface has made generative AI accessible to a wide demographic
- Estimates show that the Generative AI market will reach USD$1.5T in 2033 compared to USD$50B in 2023
- 90% of executives are aware of the imminent disruptions coming from Generative AI. Only half express confidence in being able to embrace the benefits of the technology for their organizations
- Fast evolving use cases are taking shape across environmental and engineering industry each week

Generative AI – rapid adoption



AI application to environment industry

→ **Shaping the future of environment industry**

Imagine if you could:

1	Ask any question about a permit, regulation or how to comply with regulations and permits across your facilities and get an instant answer from an AI solution
2	Combine environmental compliance data with operations data in a data lake and have AI prescribe changes in your operations to ensure compliance or reduce GHG emissions
3	Have the AI solution quickly prescribe a roadmap for getting a contaminated site to closure based on data from thousands of other similar sites
4	Optimize spending across a portfolio of contaminated sites to get the largest reduction in reserve, provision, or liability
5	Have a report or permit written for you after providing the AI solution with some key information

Examples of how AI is currently being used for environmental compliance

- Permit deconstruction – understanding permit requirements quickly. Apply to audits or due diligence projects.
- Automated environmental/ESG reporting
- Permit management compliance system with dashboard and notifications
- Automated compliance reporting – text, tables and figures directly from data
- Predicting environmental compliance risks by integrating operations and environment data

AI powered divestiture of assets

Federal or State Environmental Agency

1200 Sites

Automated web scraping to download all permits files

Documents & Unstructural data

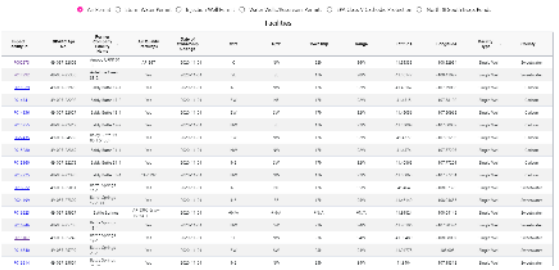
Approx. 120,000 Docs

AI and NLP powered permit deconstruction

Spreadsheet or tabular data

8,000+ Docs processed

Centralized virtual room for accessing permits from all facilities



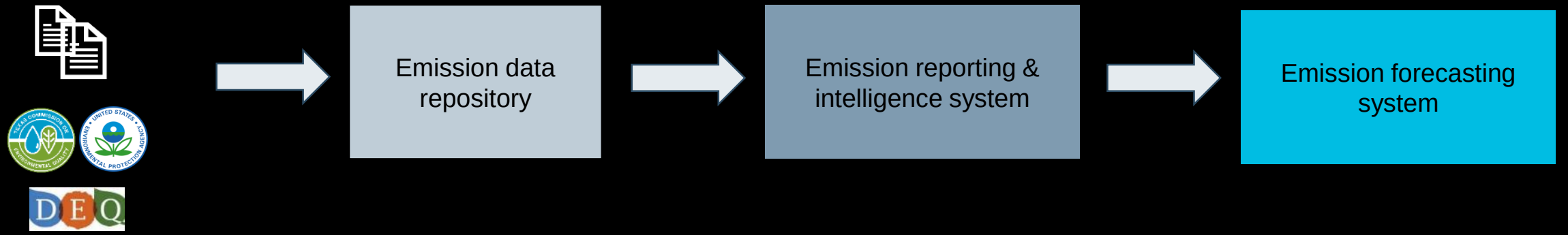
Automated form creation with extracted data

Ownership transfer form

Approx. 3,600 Forms Created for submission

Emissions management solution

Integrated GHG and emission management system



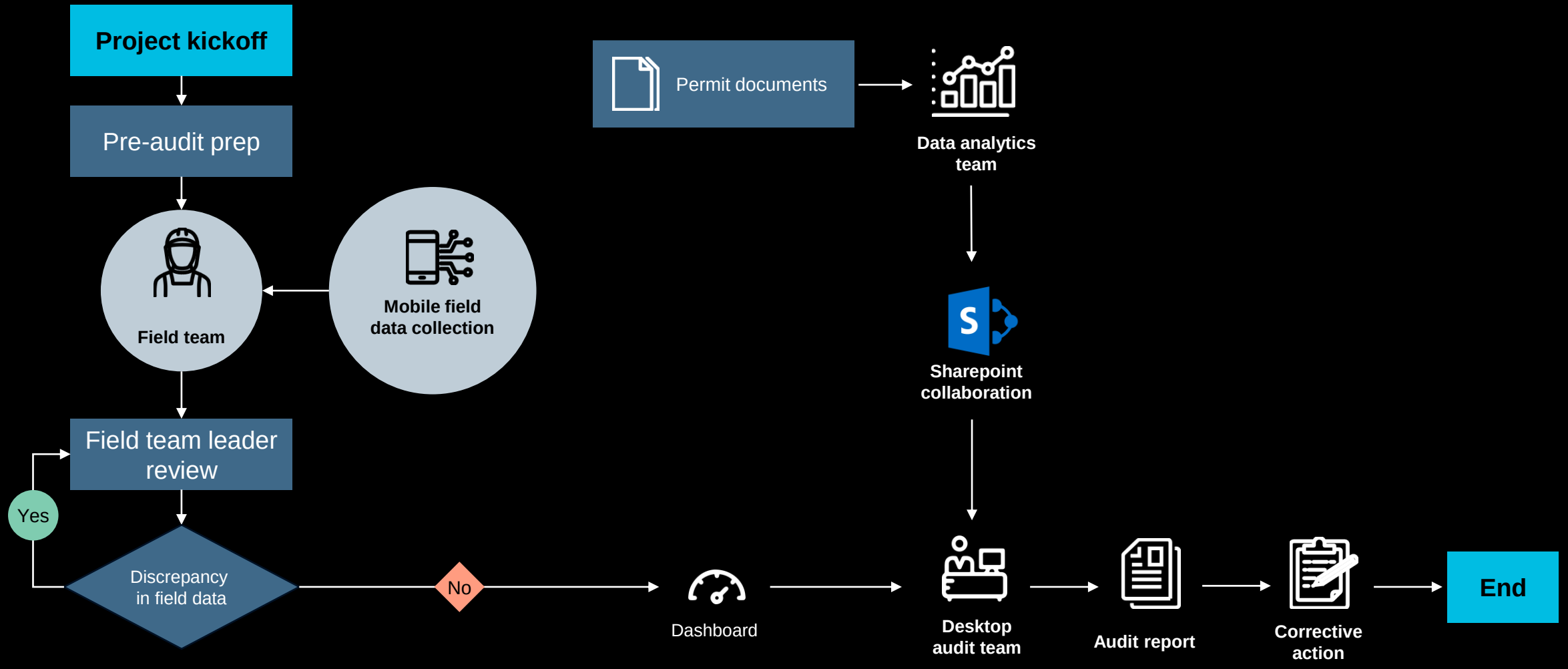
- Production, operation, equipment data
- Lab reports
- Environment protection agency

- Streamlined data processing
- AI & NLP engines for image and table extraction
- Dedicated GHG and emission database

- Data validation, integrity check
- Process simulation preparation
- Emission calculation and report generation
- Visual analytics, data mining & intelligence reporting tool

- Emission trend analysis
- Facility benchmarking by emission intensity
- Emission reduction scenario analysis

Powering air compliance audits through AI and analytics



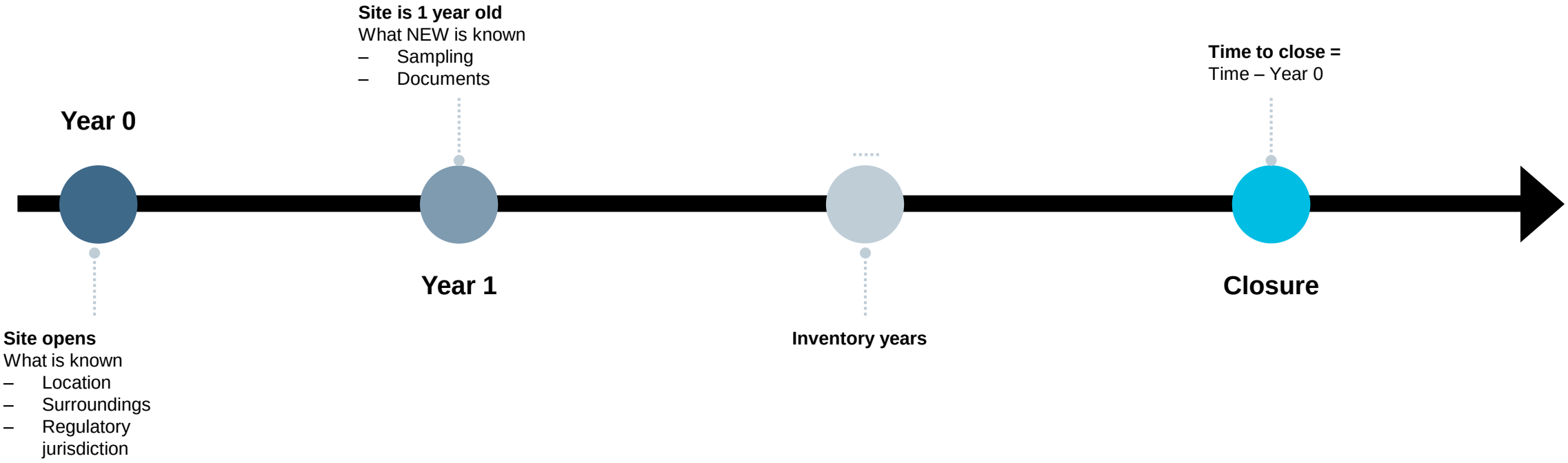
Examples of how AI is currently being used across contaminated sites

- Digitization of structured and unstructured data through data and document mining from spreadsheets, word, pdf, pictures, videos, borehole logs, etc.
- Data and document scrapping from EPA/state websites, and other publicly available sites
- Advanced descriptive and predictive data analytics to improve decision making at site and portfolio level
- Automated reporting – reports (text, tables, figures, photos) generated at a click of a button
- Contaminated sites bot – ask any question about a site

Predictive data analytics – California geotracker study

- Conducted advanced analytics using the proprietary S3 Analytics Framework (Patent Pending) and AI to enable predictions based on California Geo-Tracker data (California database for contaminated sites).

- The goal was to understand:
  - the "**key drivers**" that dictate the length of time to close a site to inform decisions and reduce risk
  - With what accuracy can we **predict the time to close** a site based on 1-year of data

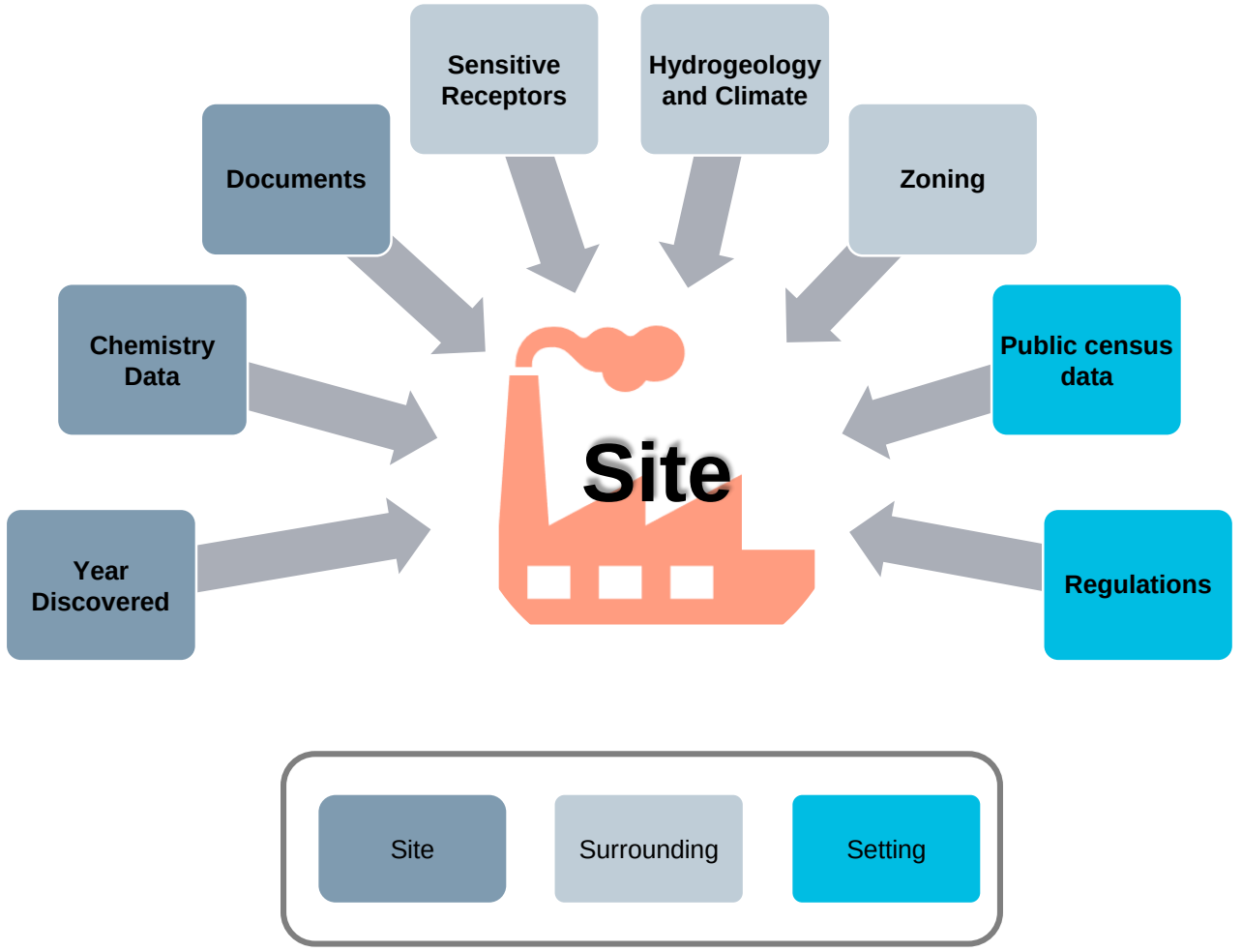


GeoTracker study – Dataset description

GeoTracker data

- Data for 70,000+ sites mined
- > 350,000 documents mined
- Historical narratives
- Timelines of regulatory status changes
- Laboratory analytical data and field data
- X, Y, and Z of all sampled locations
- Much data uploaded for each site

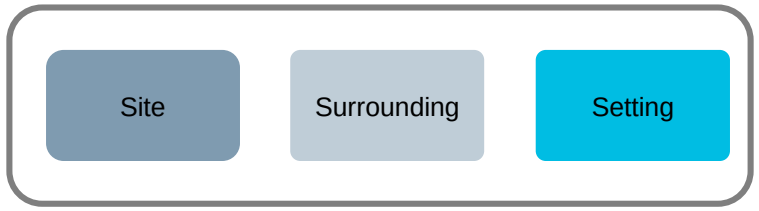
Further enriched the GeoTracker dataset with other data so each site could be holistically described with respect to all the S3 categories (Site, Surrounding and Setting)



GeoTracker study learnings

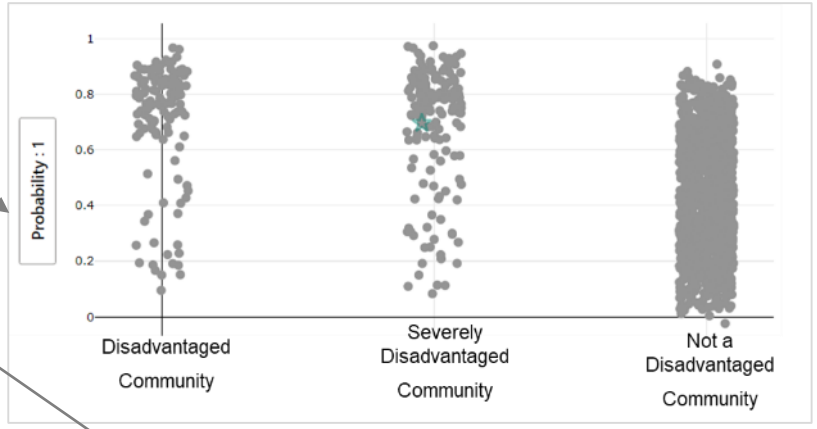
The model had **77% accuracy** predicting when site closures will occur based on **only data from 1st year of site**

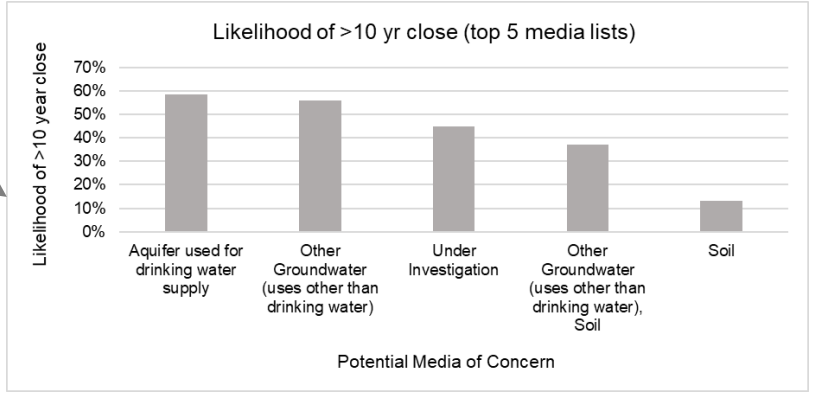
Top 10 drivers of long site closures
“Size” of Site
Is site in a disadvantaged community
Sampling data size (# records in first year)
Did site open after 2005
Potential media of concern
Max concentration in water matrix (first year)
Number of sampled locations (first year)
Number of distinct chemicals sampled (first year)
Toxic Release Rating
Percent Unemployment



On average, sites take longer to close if they:

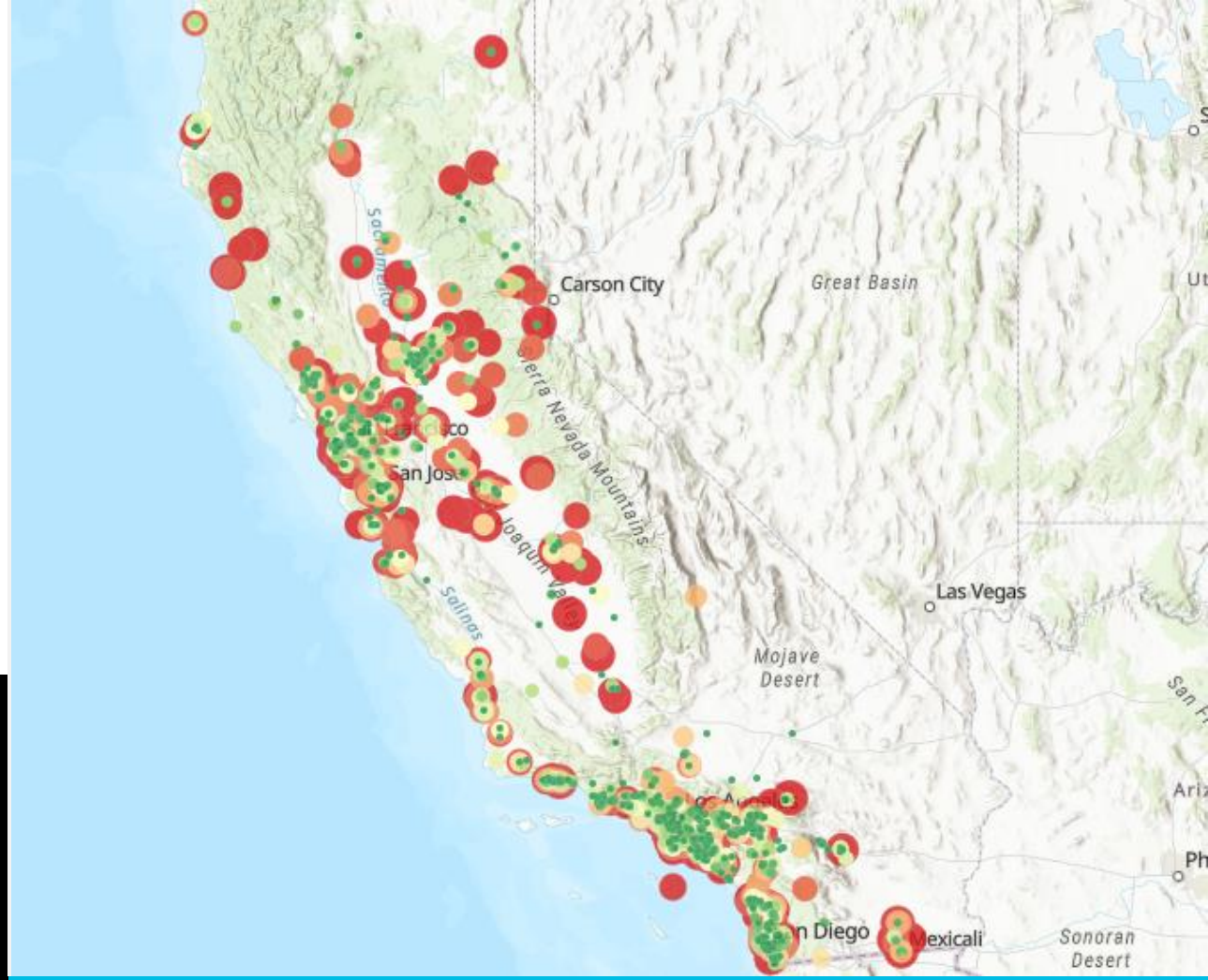
1. Are in a disadvantaged community
2. Media of concern is not just “Soil”





Geotracker study predictions can be viewed on a map interface

Map enables visualization of geotracker sites according to their predicted closure timelines



Contaminated sites bot

→ **ChatGPT for contaminated sites industry**

Using large language model (LLM) technology, the contaminated sites bot enables you to ask any question and it will scan all relevant documents, permits or regulations to provide an answer quickly.

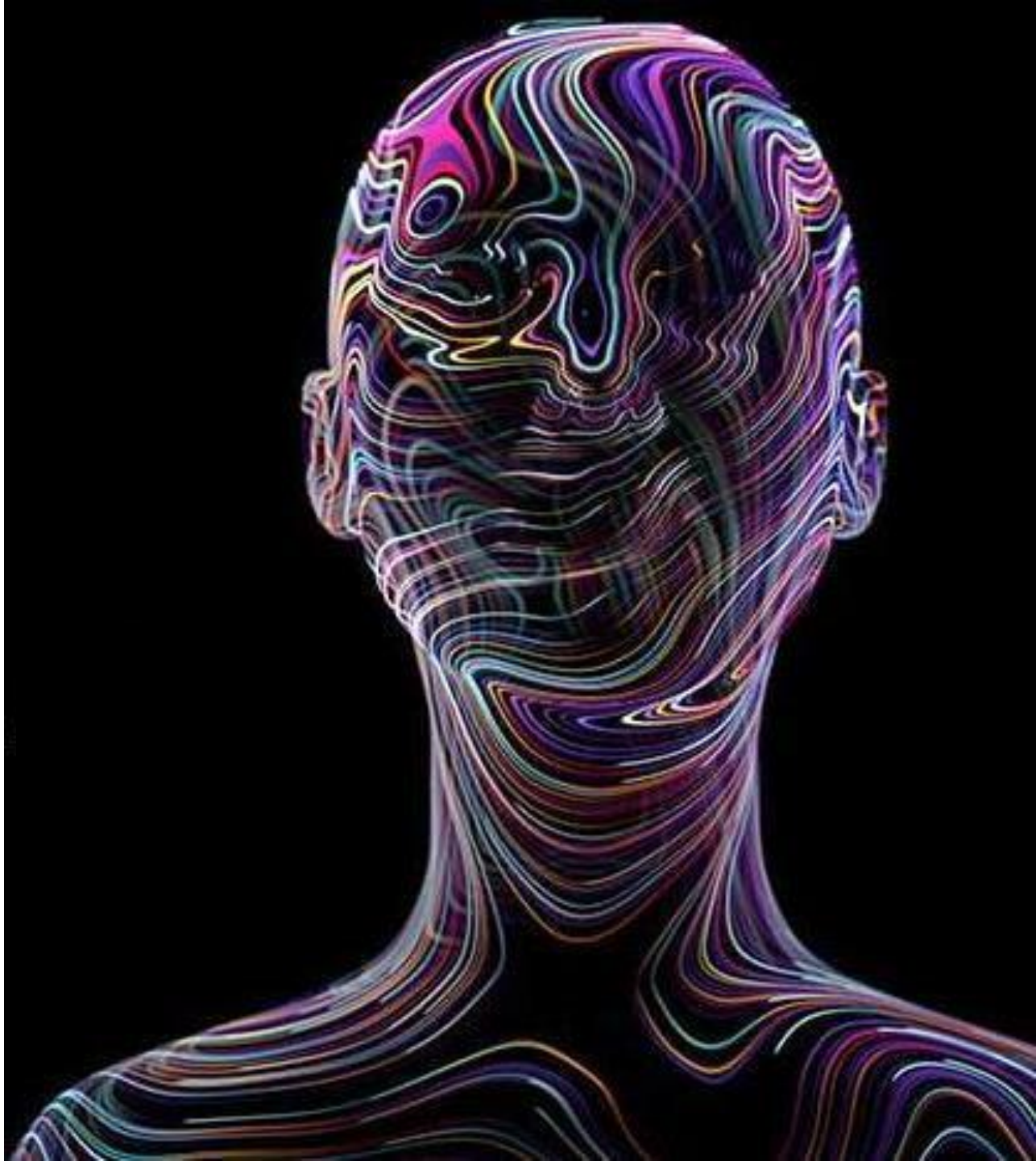
CARBot demo

Benefits of AI adoption

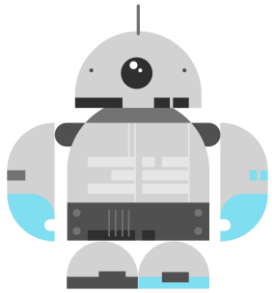
- Enable improved decisions through use of the large volumes of data environment industry generates
- Improved environmental outcomes and compliance
- Industrial operations can be optimized to reduce environmental impacts
- Reduction in human error
- 24/7 availability of AI solutions
- Remove societal or individual bias in decision making
- Reduced costs and efficiency gains, particularly from automation of repetitive tasks
- Allow humans to focus on higher value tasks and strategic thinking

Overcoming common concerns of AI adoption

– Speed of adoption and job displacement
  - Many tasks and processes can be automated. New jobs, skills and training required. Focus on higher value tasks.
– Lack of transparency
  - Make it clear what data and information the AI models are trained on and still apply human interpretation of results
– Hallucination, bias and misinformation
  - AI systems can inadvertently perpetuate or amplify biases due to biased training data or algorithmic design



Future workforce to be augmented by AI



Engineers & Scientists

Manual design calculations & hard copy manuals

Engineers & Scientists augmented by IT, software engineers, etc.

Digital design & online knowledge sharing

Engineers, Scientists & IT augmented by Artificial Intelligence Experts

AI generated designs and reports; predictions & prescriptions based on Big Data

Conclusions

Environmental industry is about to go through an AI influenced metamorphic change

- AI is already being used across the environmental industry
- We are only at the start of a metamorphic change to our environmental industry because of AI adoption
- AI will enable us to make better decisions using the large volumes of data we have generated
- AI will enable improved environmental outcomes and compliance
- AI will bring efficiencies and change how we work
- We will need to upskill ourselves on how we use and interact with AI solutions to get the most value

* Thank You

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