Using AI in the Environmental Industry

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BRENDAN ROBINSON, ERM

Sustainability is our business

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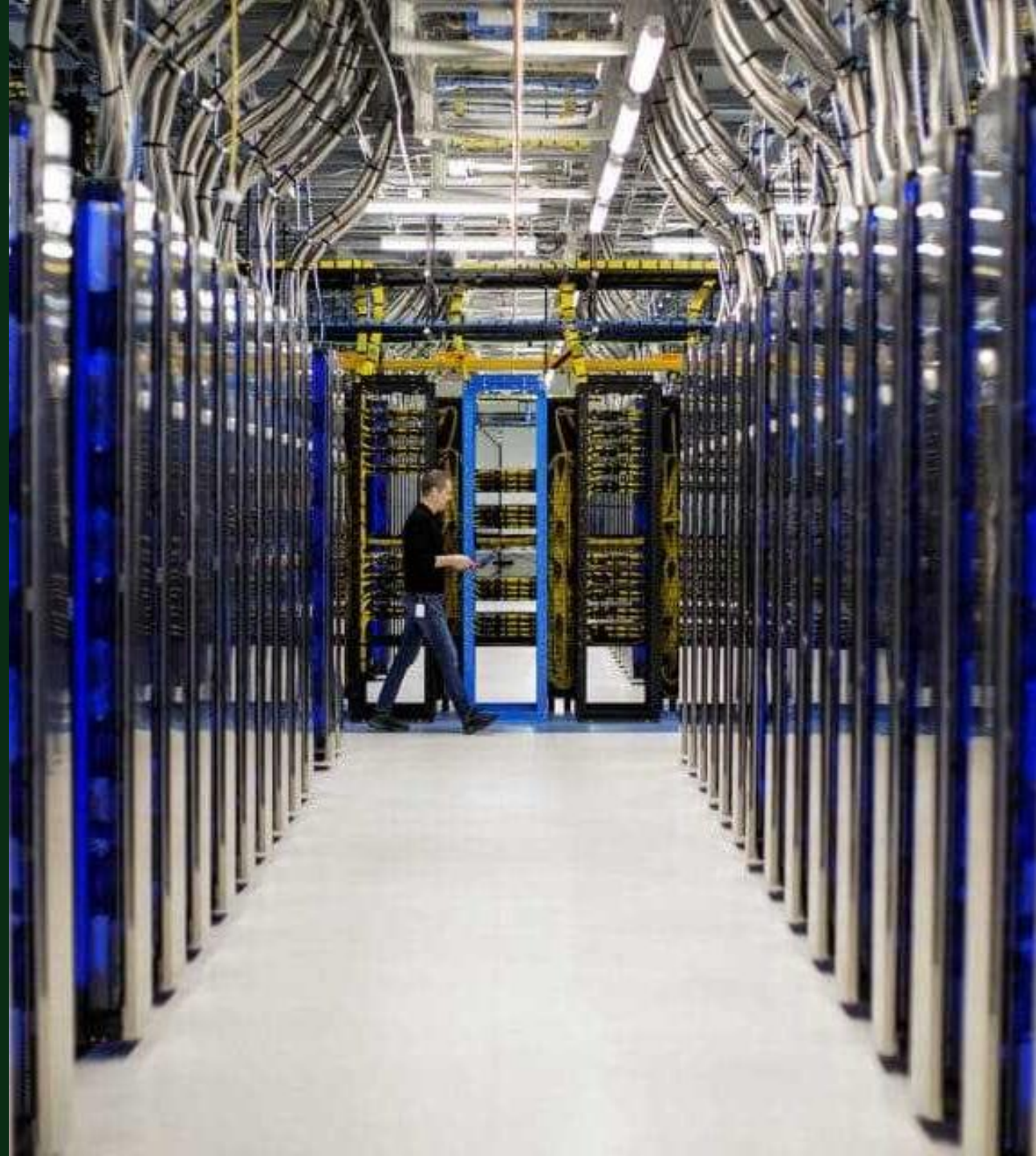
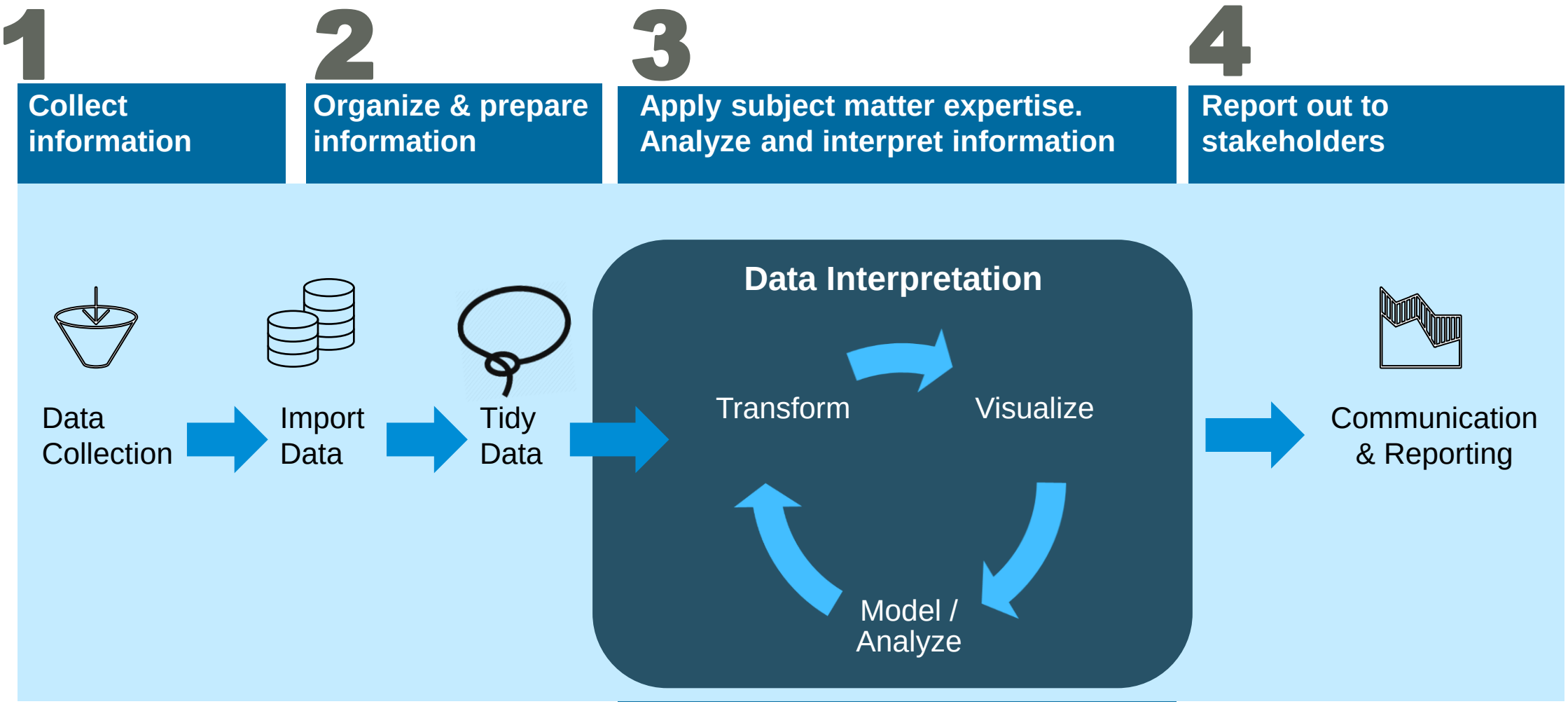


What DO we do with Data?

Data Workflow



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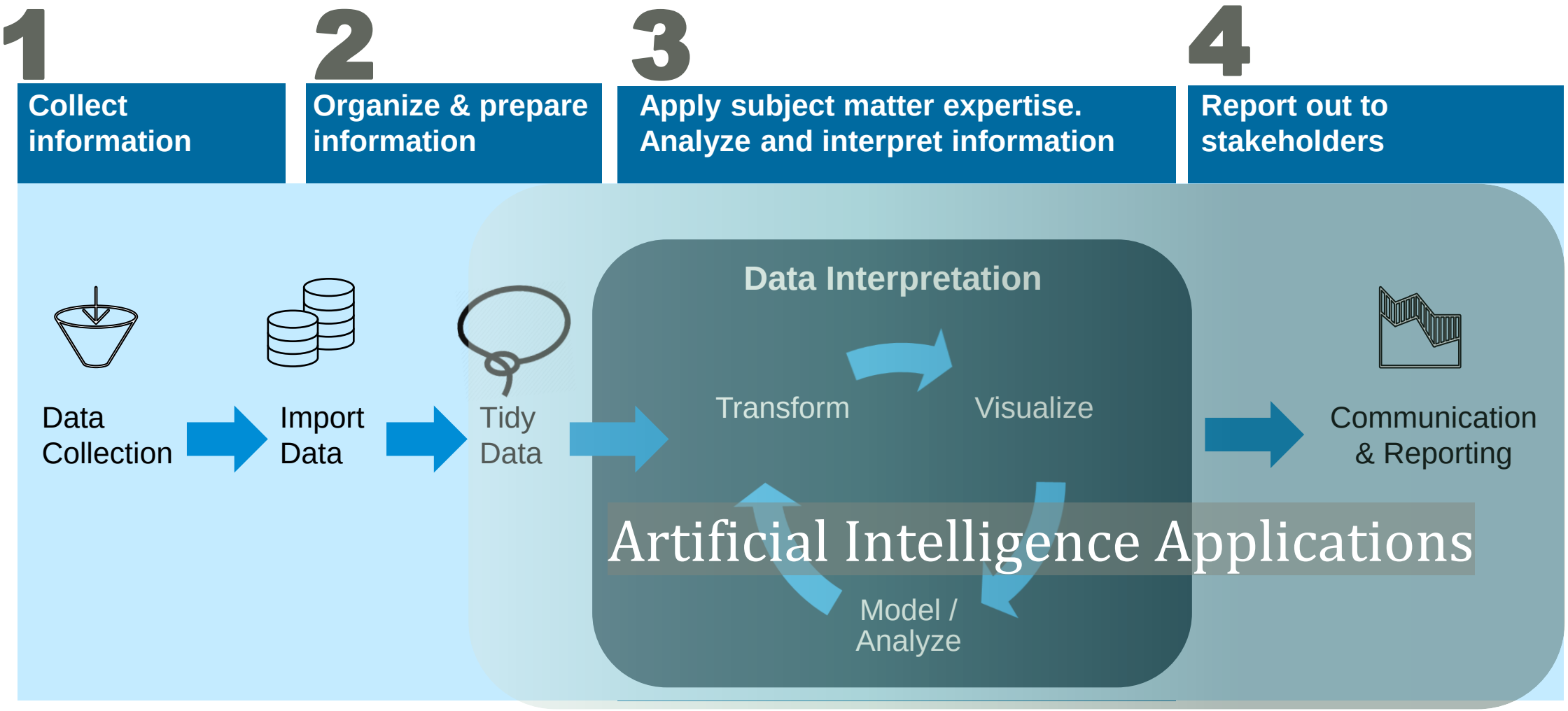


You are already using AI!!

AI has been in use for many years

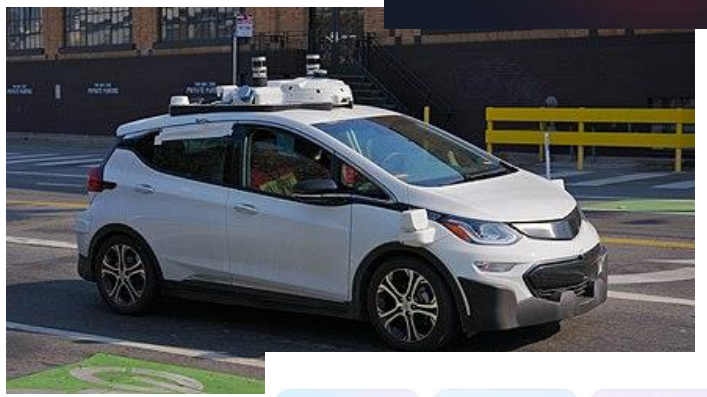
Most applications use a combination of AI technologies

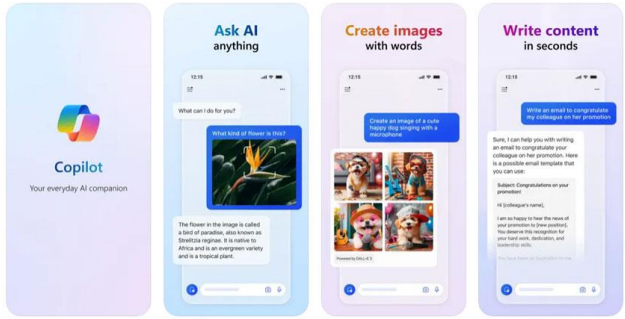
Expert Systems– Trained to perform a single task, learns patterns from data or follows pre-programmed rules (e.g., chess playing computer)

Machine Learning – Uses historical data and pre-programmed information to make predictions and perform complex tasks. Learns from the data and gets "smarter" as more data is received (e.g., fraud detection, anomaly detection, self-driving cars)

Natural Language Processing - uses machine learning and deep learning to analyze human language (Email filters, predictive text, Chatbots, report writing…..?)

Generative AI – Uses AI to learn from historical data to create new content, for example Generative Pre-trained Transformers (GPT), (e.g., reports, summaries, images…?)

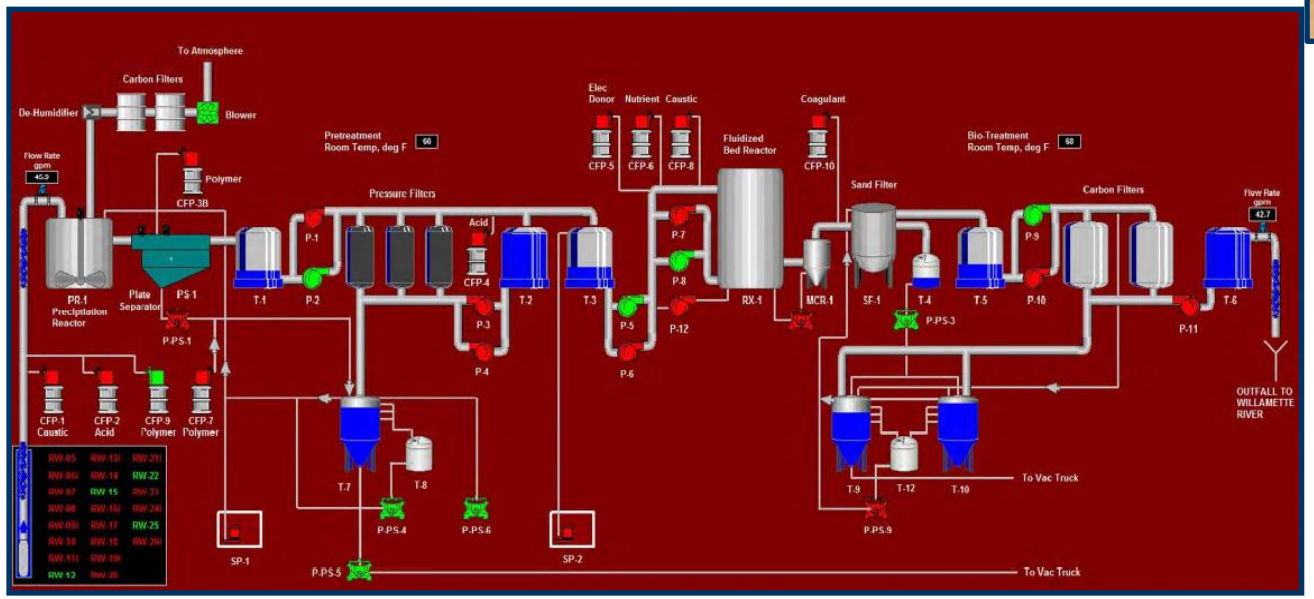




Remediation System Challenge

Increasing complexities of remediation treatment management

- Availability and quantity of data, controls, automation
- Reporting expectations and compliance risk, cost pressure
- Traditional data evaluation and reporting processes overwhelmed by ~300 data streams, millions of records each day



Deployed a web-based Digital Twin

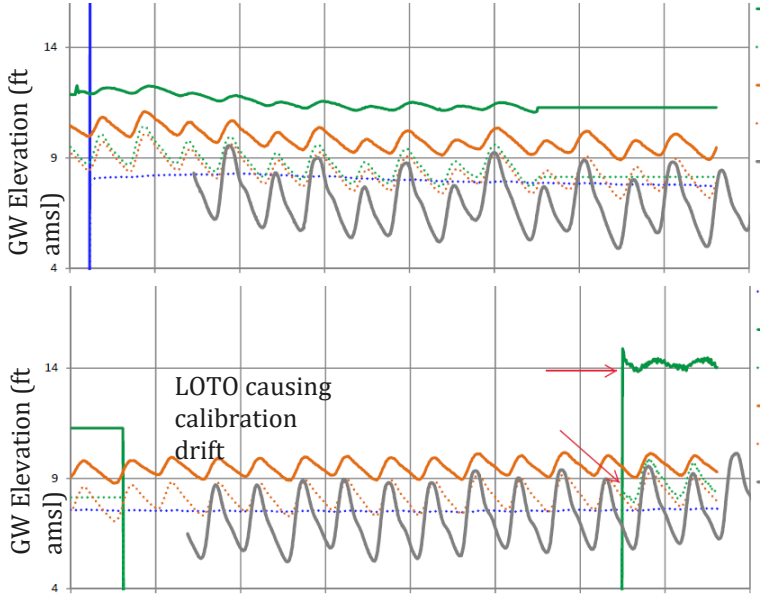
- Real-time data analysis and visualization (dashboards) of entire data history
- Machine learning algorithms for data filtering and reporting
- Machine learning algorithms for anomaly detection, operator alerts
- TwinThread

Descriptive and Predictive Analytics

Upgrade of Legacy Evaluation Processes for Groundwater Elevation

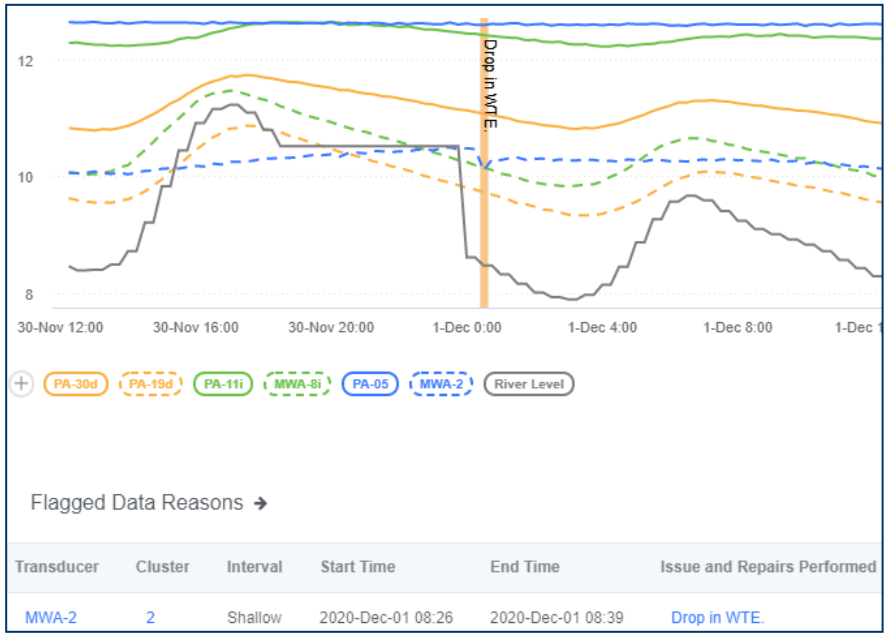
Legacy Process: Visual Evaluation

- Subtle variations are missed, resulting in inaccurate data collection, use in decision-making.
- Inefficient, inconsistent, hard to track.
- Increased operational and compliance risk.



Resolution: Advanced Data Analytics/Machine Learning

- Anomaly detection identifies subtle variations in data.
- Affected raw data is flagged and automatically removed from performance evaluation/reporting calculations
- "Smart" alerts let team know potential equipment failure.
- Increased efficiency, reduced operational & compliance risk



Predictive Analytics Sensor Malfunction Management

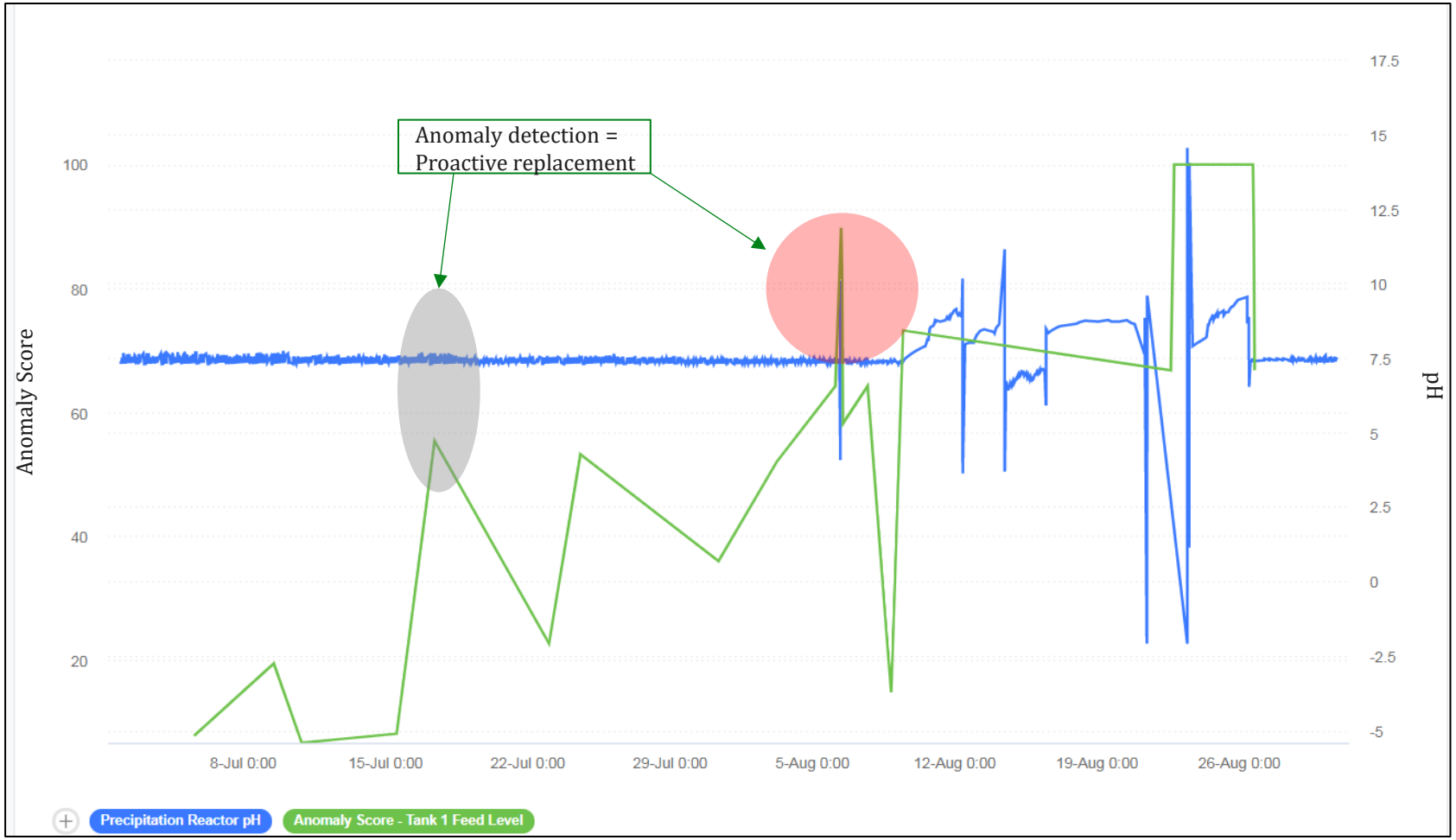
Challenge – Compliance Risk and Alarms

pH pattern change shows malfunction of sensor leading to shutdown

pH sensor failure resulting in failing bio-reactor health and plant shutdown

Resolution – application of predictive analytics to monitor sensor

- Proactive approach to understanding equipment health
- Reduces risk of non-compliance



Using AI to Manage Emissions

Digital Twin for managing emissions from industrial assets

ERM emissions.AI

Uses engineering expertise and advanced analytics to establish an energy and emissions **digital twin** of a facility.

Using AI-techniques, the solution learns from historic energy and emissions performance.

AI models are used to evaluate what is realistically achievable taking into account dynamic variables, including

- Operating constraints,
- Production output targets, and
- Energy efficiency targets.

Natural Language Processing

AI for managing compliance risks from changing regulations

ERM Libryo

Natural Language Processing solution to **track client regulatory obligations** and manage compliance across multiple jurisdictions.

- Solution provides summaries of regulations, and updates/alerts about changes
- Support future audits
- Compliance registers are customized, targeted on specific client jurisdictions and applicable regulations
- Complete source citations and version histories for transparency

AI Assistants

AI for supporting consultants

CL Hero

Domain expert AI that uses Natural Language Processing to process client/consultant documents.

- Upload documents and data to train your ‘Hero’.
- Chat with your Hero to get answers to questions, generate reports, or create new data tables.
- Each response is defensible, with citations and lineage.
- Your Hero can be trained to generate output in an specific ‘voice’, e.g., Reporting, Proposal, Conversational, Technical.
  - Still **needs human review**!
- Data is protected and secured

Summary

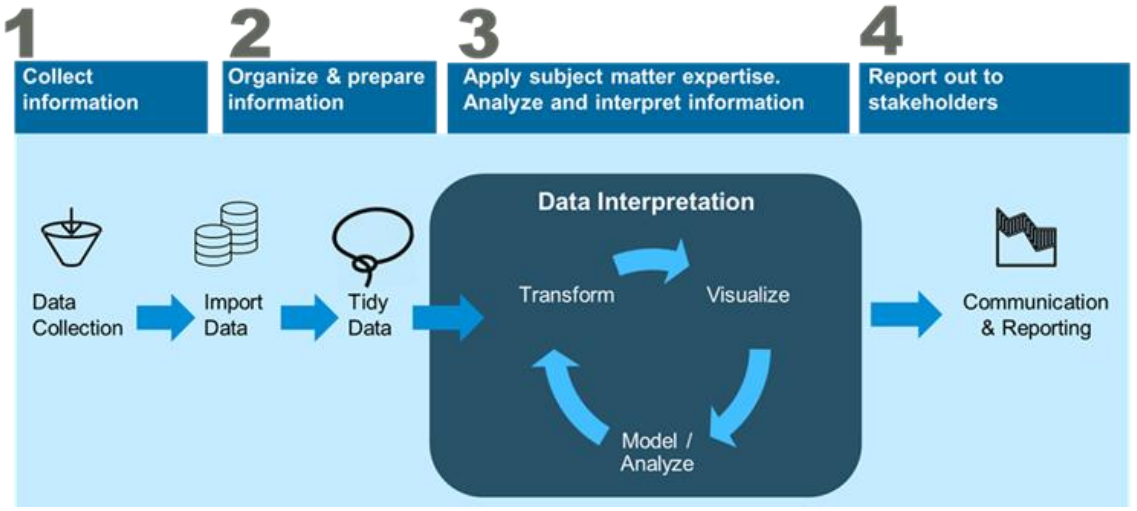
We are already using AI extensively

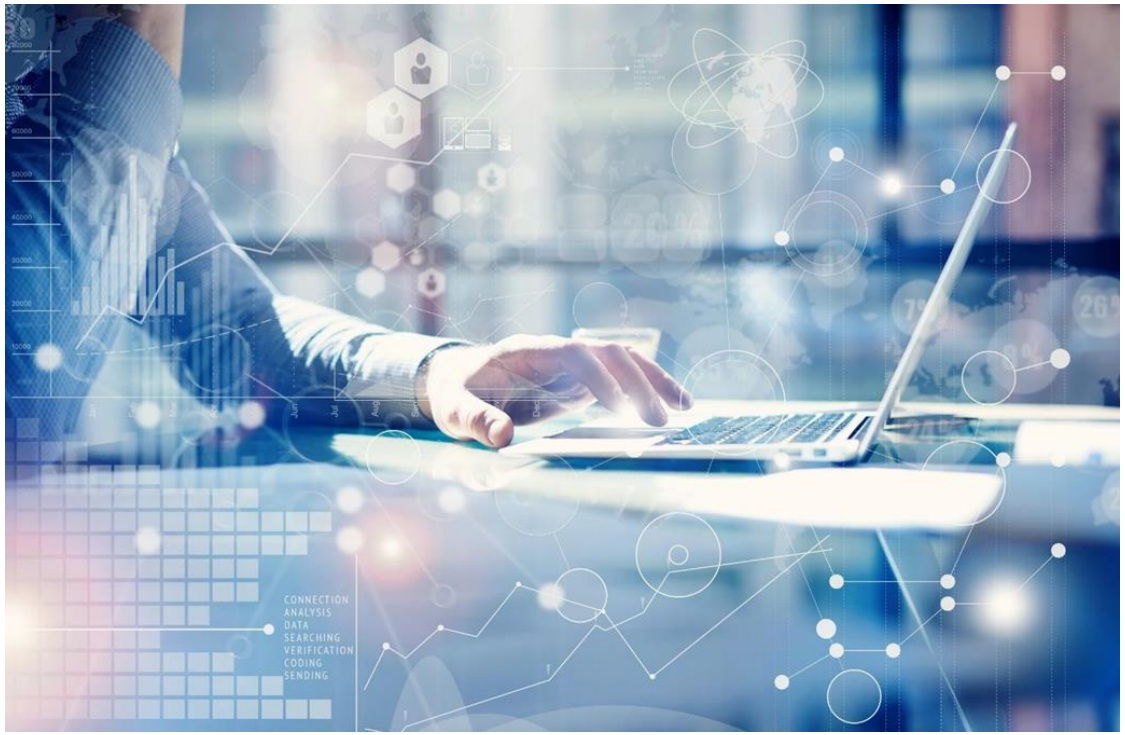
Data governance and understanding data workflows is critical to any successful use of AI

Data quality and organization is foundational

Start with the “simple” things and use established solutions

AI outputs still require human review





Thank you

Brendan Robinson

ERM

Brendan.Robinson@erm.com