AI and Generative AI: Current Capabilities and Future Possibilities in Maximo and beyond

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AI

Hype or Reality?

Forbes

Why The AI Hype Needs A Reality Check

Emil Sayegh Contributor ⓘ

Serial technology CEO covering all things IT & Tech.

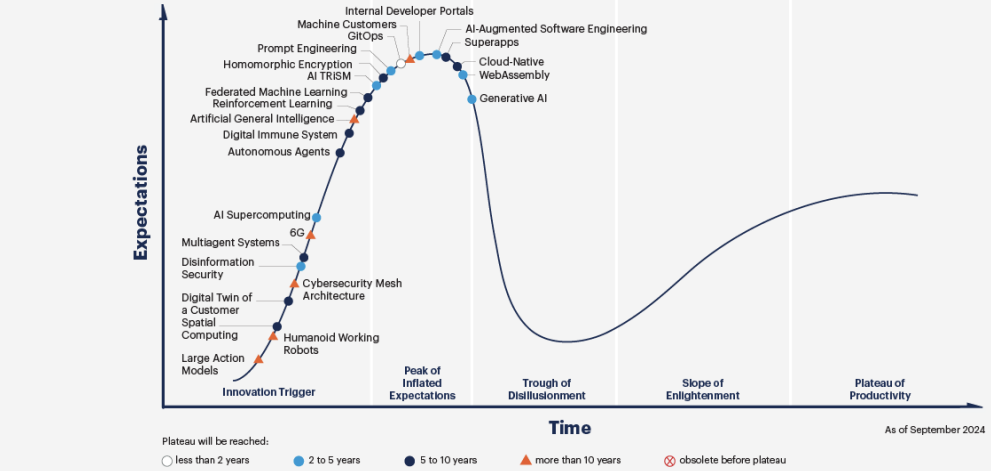
Focus On Benefits, Not Buzzwords

The AI hype train is speeding toward a disappointment unless we rethink how we approach it. We need to stop overmarketing AI as the solution to everything and start focusing on the real value it brings. AI, when applied correctly, can offer immense benefits — efficiency, accuracy, cost savings and more. But it's not magic, and we shouldn't treat it like a one-size-fits-all solution.

Spotlight on 2024 Gartner Hype Cycle™ for Emerging Technologies

Disruptive technologies hold great potential — for those businesses capable of overcoming the risks involved.

By **Arun Chandrasekaran** | October 10, 2024



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Gartner

Agenda

- AI & GenAI - Fundamentals and Trends
- GenAI in Maximo

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My personal question …

How can I,
How can we,
working for, in, with companies implement AI & GenAI in action?

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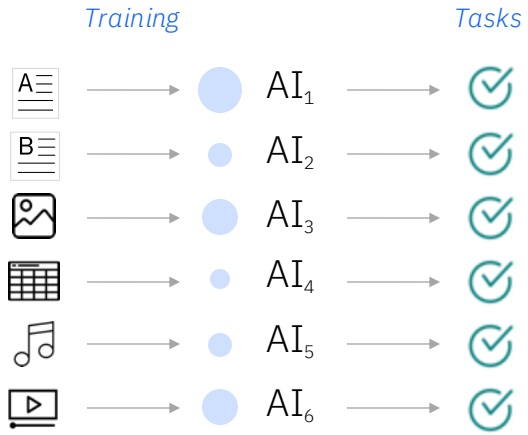
Foundation models establish a new paradigm for AI capabilities

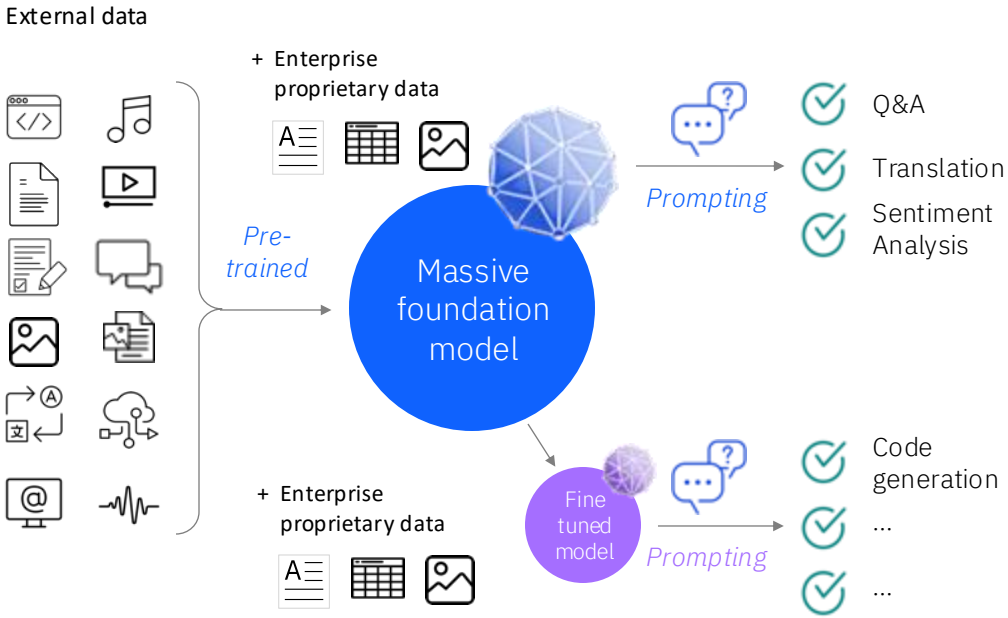
The impact of generative AI

Traditional AI models



- Individual siloed models
- Require task specific training
- Lots of human supervised training

Foundation models



- Massive multi-tasking model
- Adaptable with minimized training
- Pre-trained unsupervised learning

- Massive unlabeled data
- Self-supervision at scale

Enhanced capabilities

- Summarization
- Conversational Knowledge
- Content Creation
- Code Co-Creation

Key advantages

- Lower upfront costs through less labeling
- Faster deployment through fine tuning and inferencing
- Equal or better accuracy for multiple use cases
- Incremental revenue. through better performance

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Data is the lifeblood of AI

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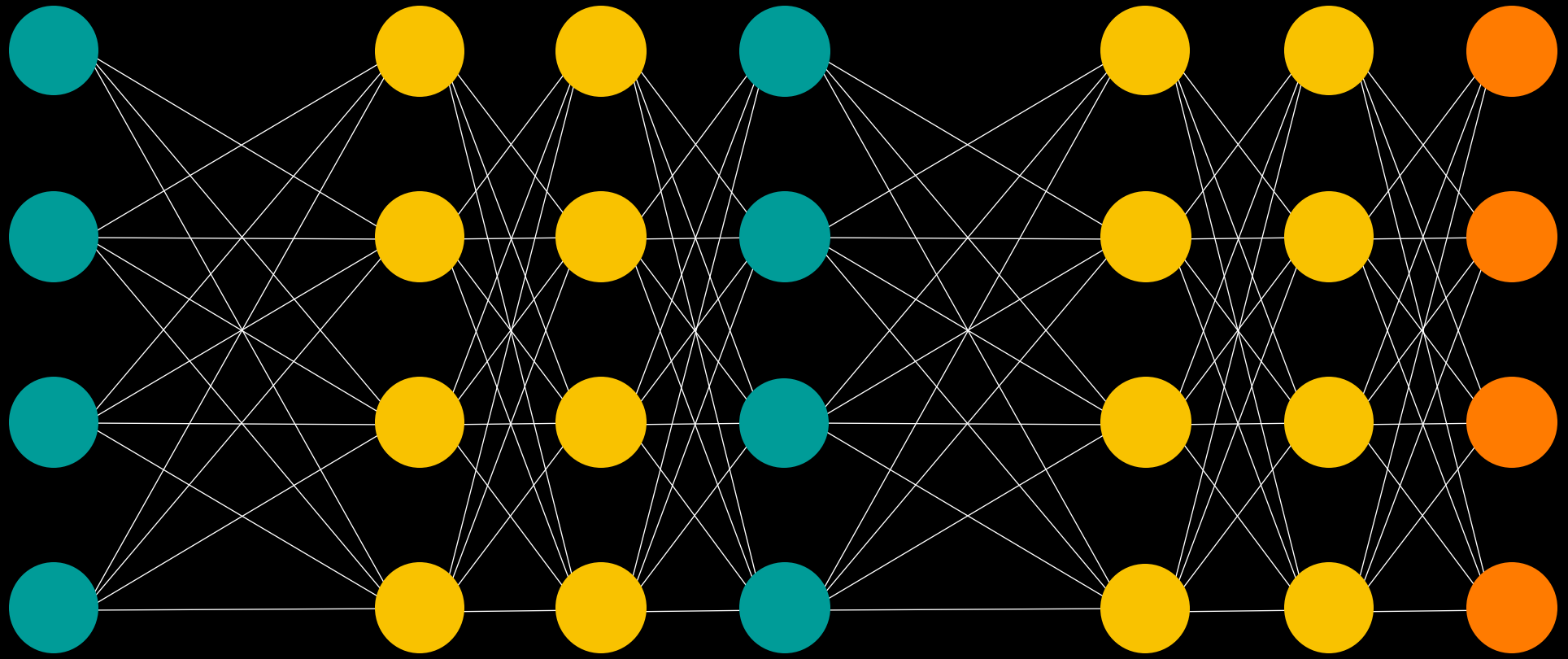
Foundation models



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Foundation model training:

a lot of unlabeled data + a little labeled data

Unlabeled data for training:
100 billion sentences

Labeled data for fine tuning:
1000 examples

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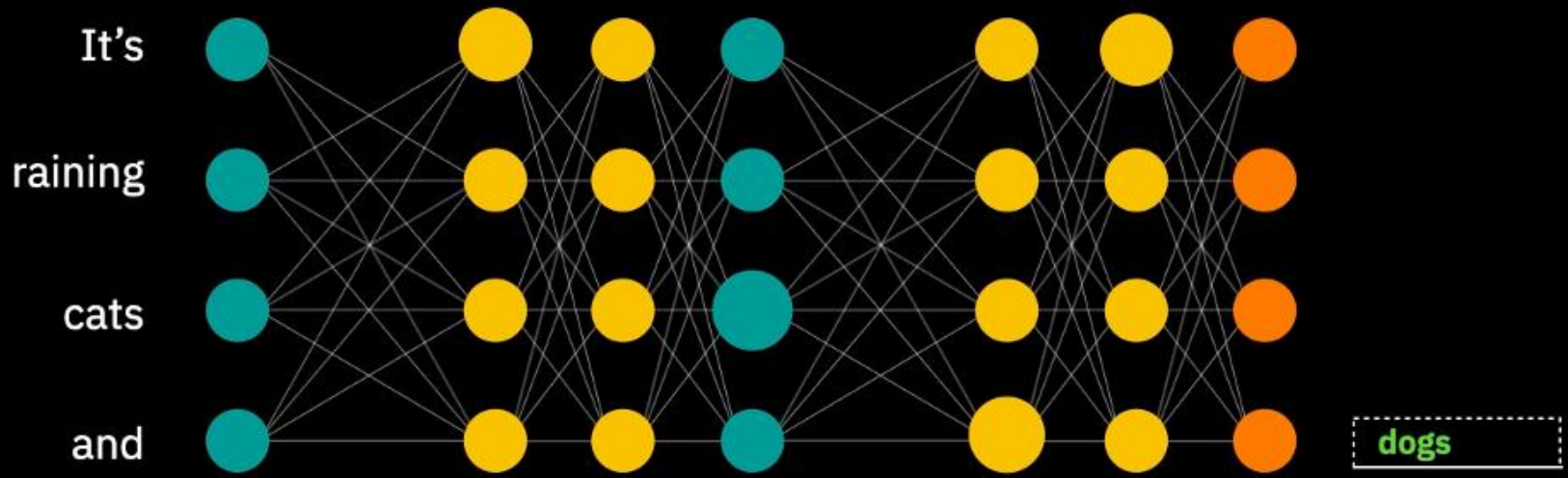
Training a foundation model: Self-supervision



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The use cases for Foundation Models go well beyond Large Language Models (LLMs)

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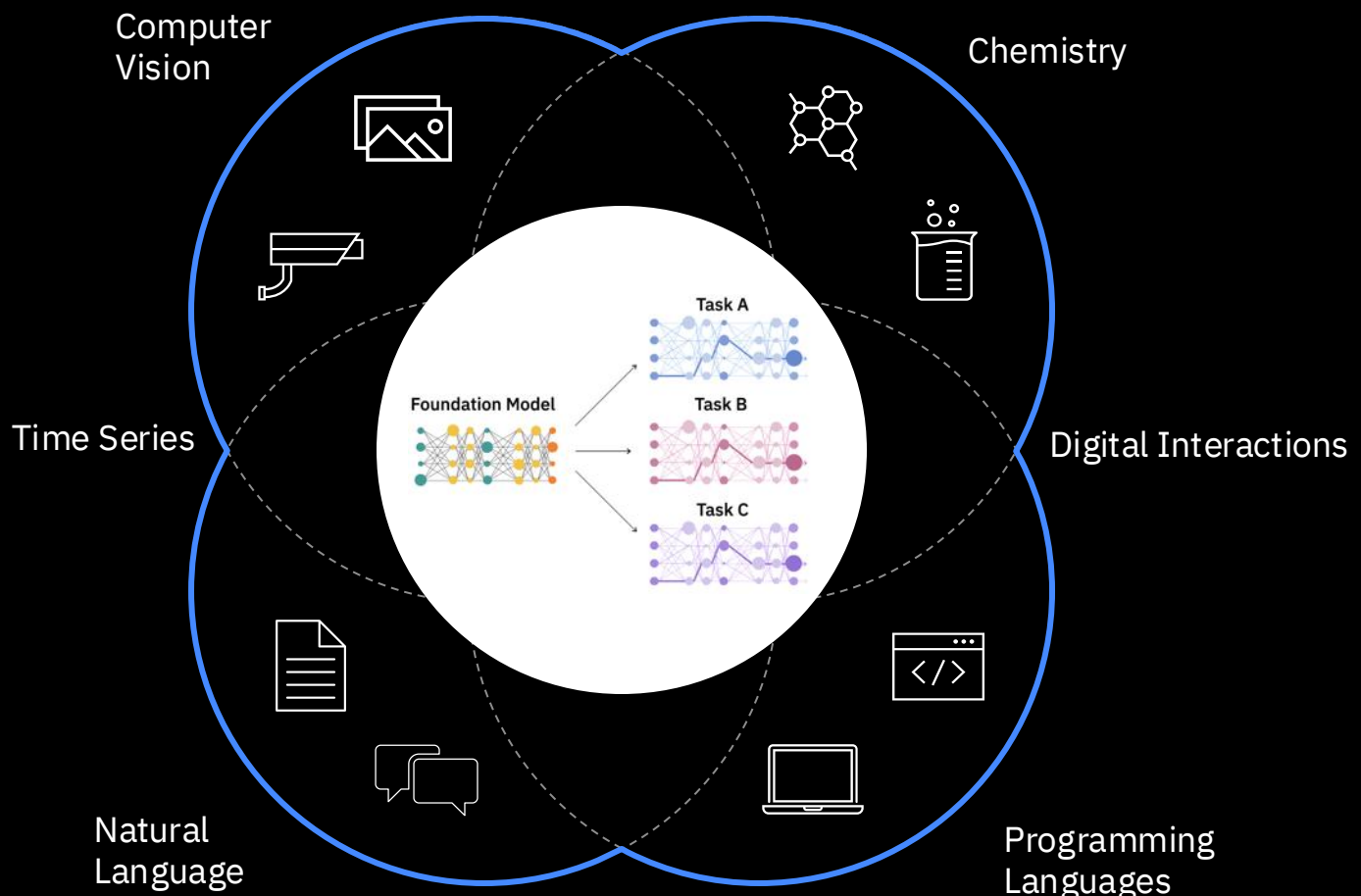
But the implications of foundation models go well beyond Large Language Models (LLMs)



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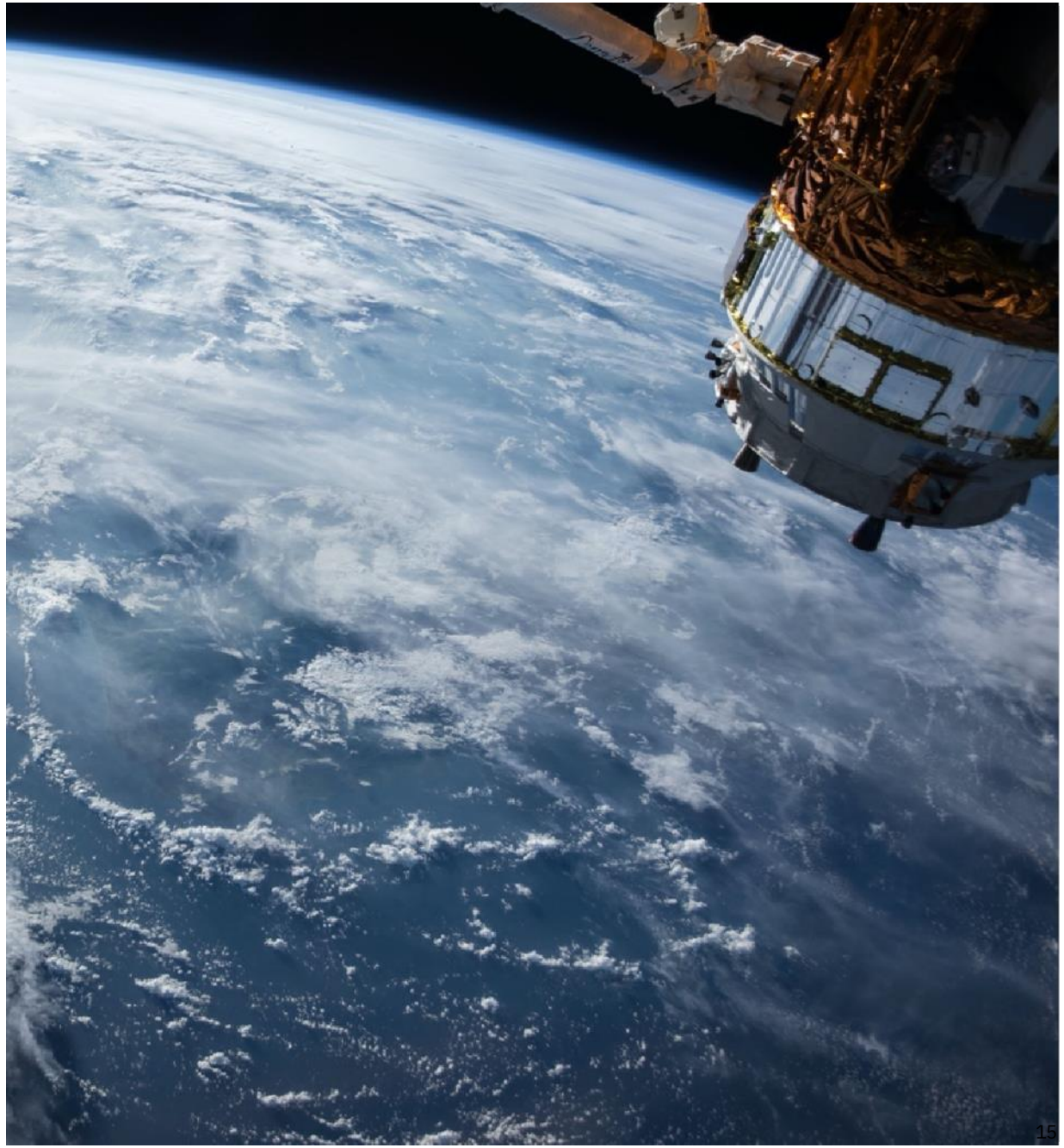
We collaborated with NASA to develop a Geospatial foundation model trained on HLS data.

The Harmonized Landsat Sentinel-2 (HLS) dataset provides global land observations every 2-3 days at 30 meter resolution.



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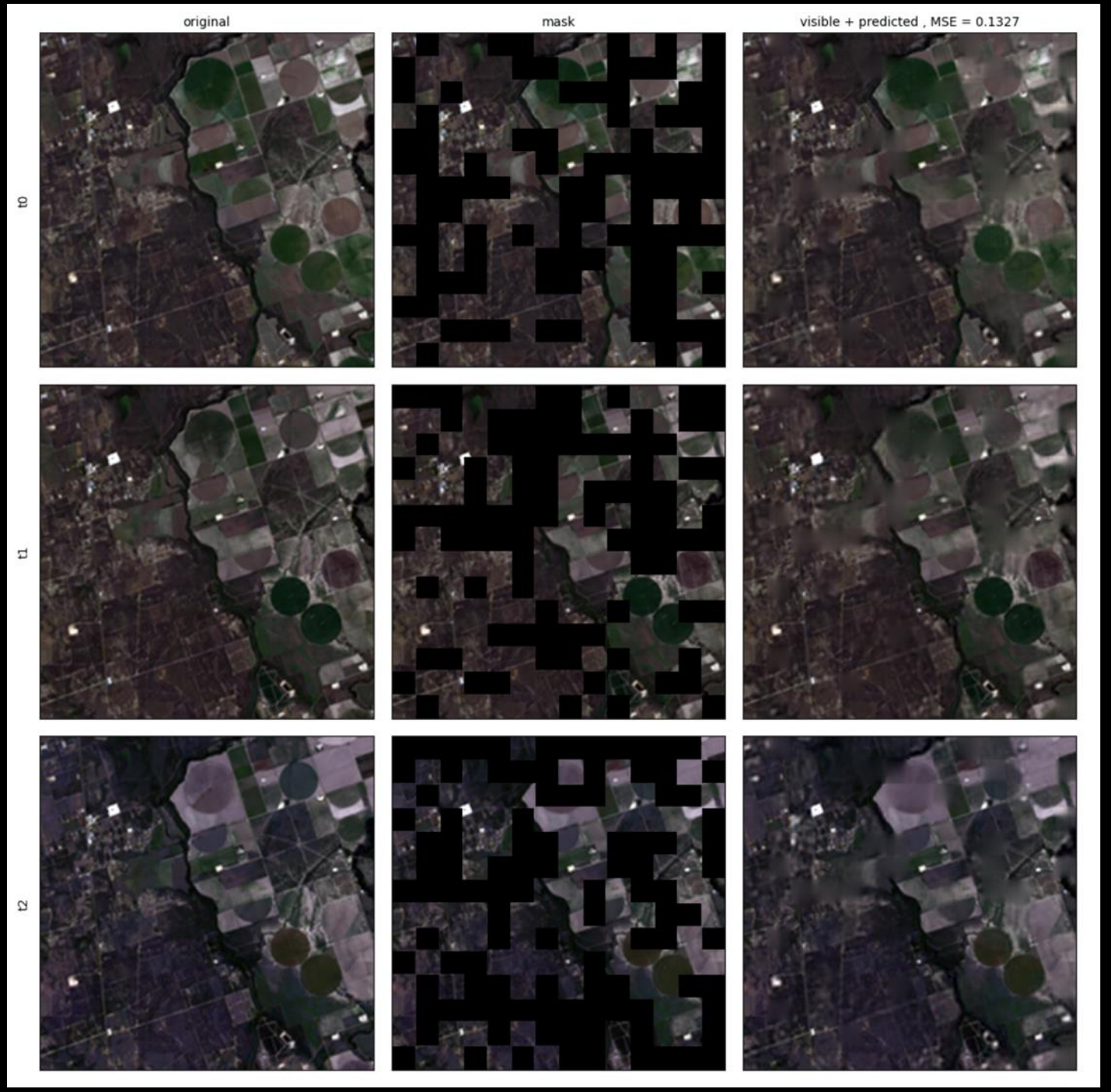
Geospatial Foundation Model Training Result



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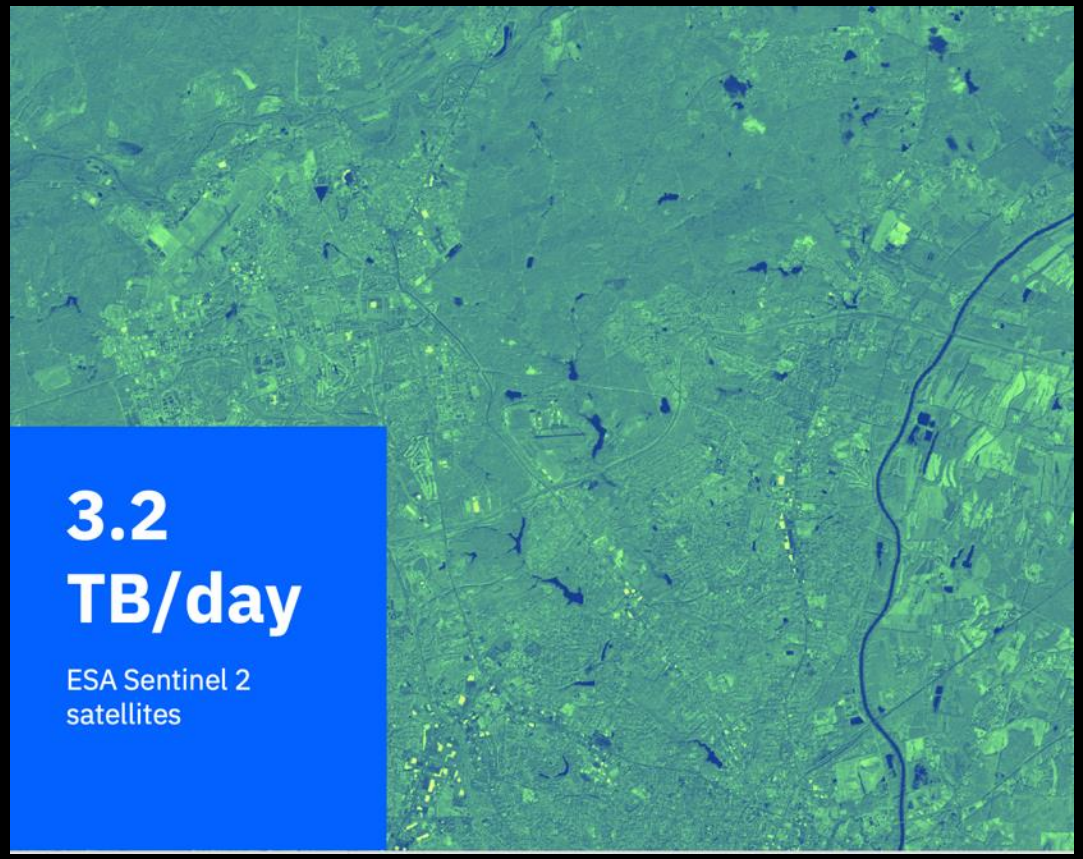
Two core types of geospatial data relevant for sustainability

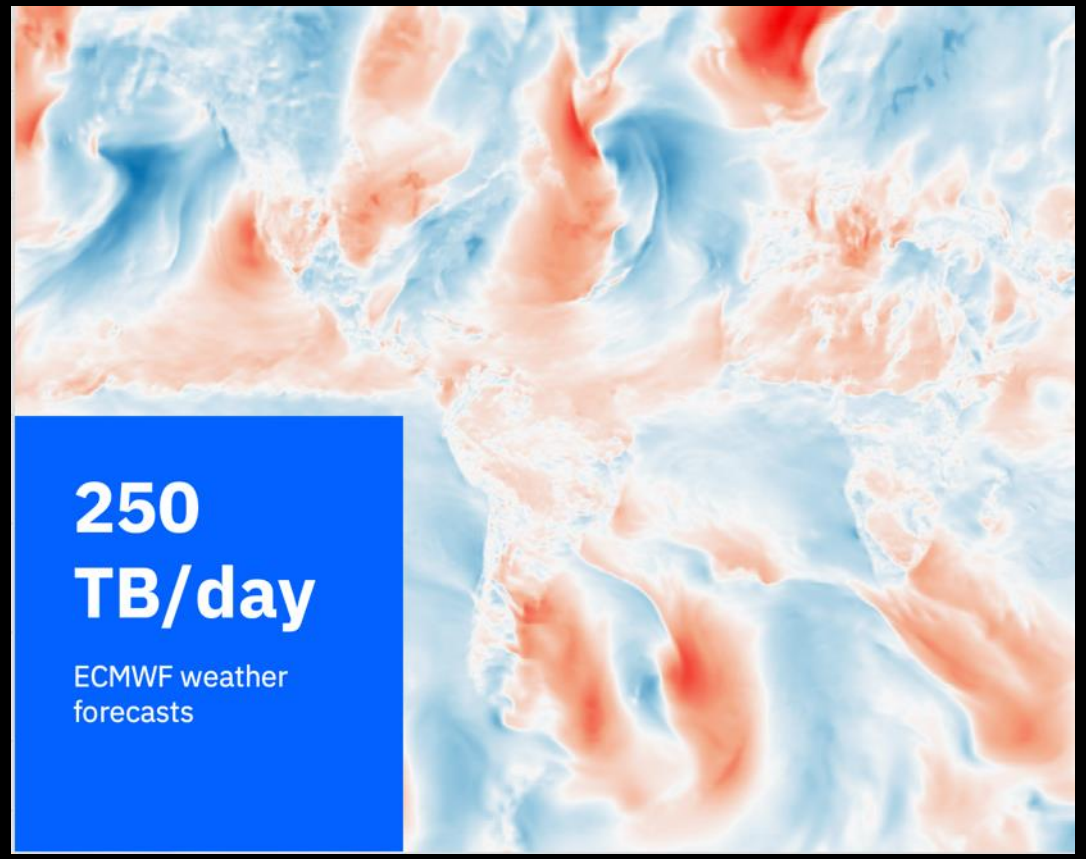
Satellite and aerial imagery

- Multimodal – images from multiple satellites representing different spectral bands



Weather measurements & forecasts

- Multimodal – time series from different processes (temperature, precipitation, wind,…)



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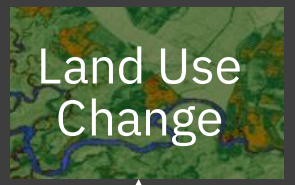
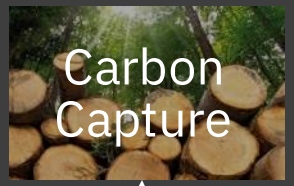
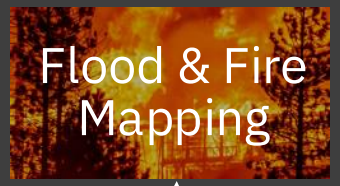
Foundation models for sustainability

Image Segmentation Use Cases







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Task Specific Model

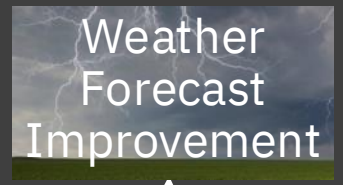
Task Specific Model

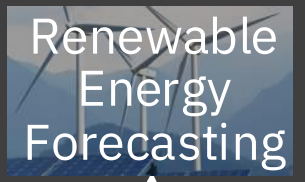
Task Specific Models

Foundation Model (Spatiotemporal Transformer)

Satellite & Aerial Data

Weather Use Cases





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Task Specific Model

Task Specific Models

Task Specific Model

Foundation Model (Temporal Patch Transformer)

Weather Observations/Forecasts Data

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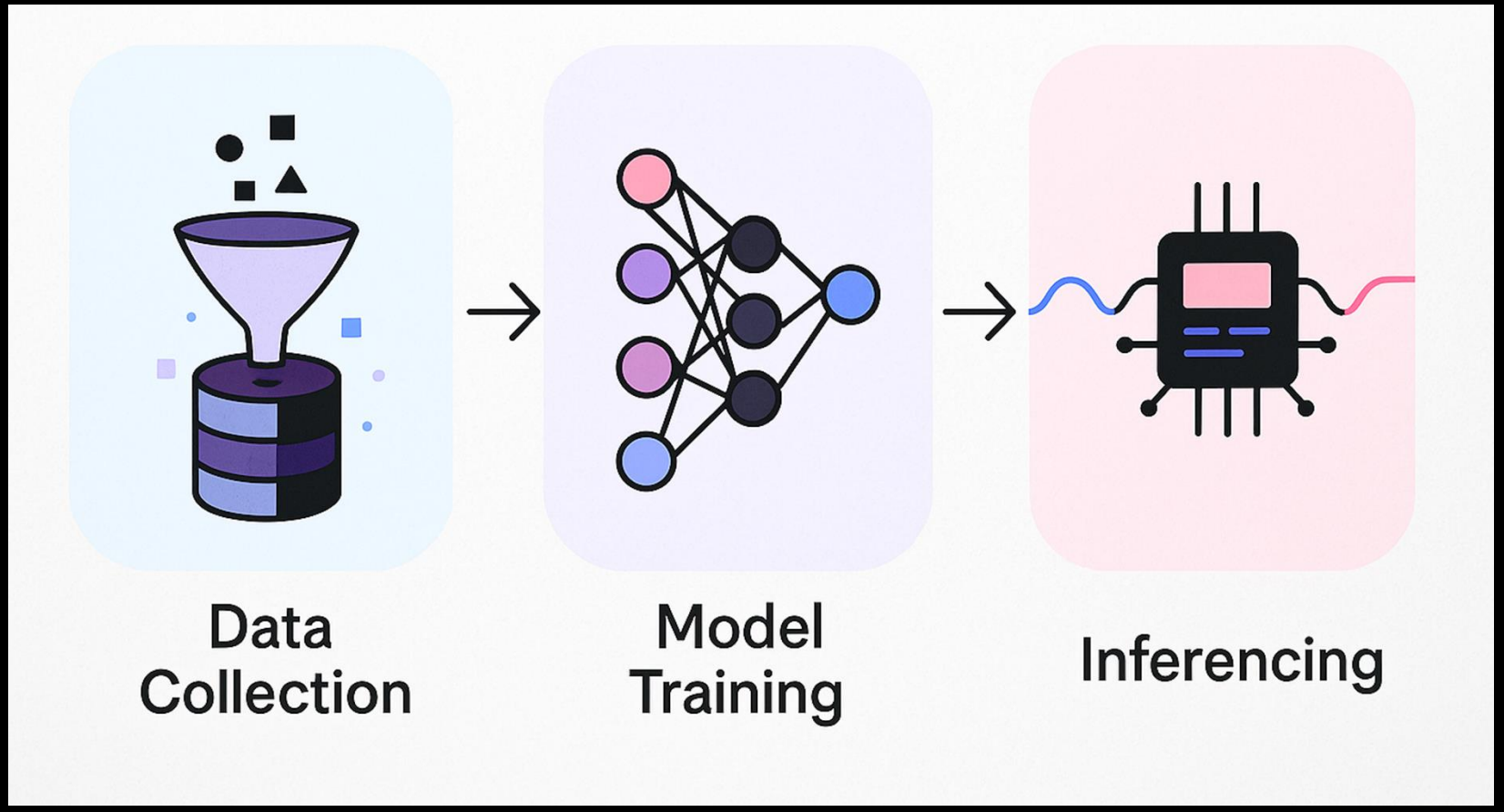
What is inside the “black box” of AI



Who has heard about Agents?

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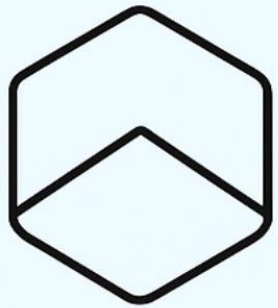
Fundamental Shift in AI is underway

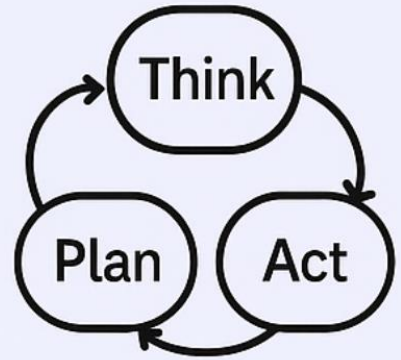


AI that can generate for you

- Prediction
- Text Generation
- Pattern matching

Assistants

Powered by single cutomsized LLM



Agents

Powered by Think-Plan-Act

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Who
has
heard
about
RAG?

Two common issues with large language models

Lack of information source

“The bank offers 2.5% interest on accounts with a balance over $20,000.00.”

This sounds great – but where did the information come from?

How can a user verify that this is true?

Where is it documented?

Outdated information

“Who is the highest-scoring player in the NBA?”

The Llama-3-405b-instruct model returns:

” Kareem Abdul-Jabbar holds the record for the most points scored in the NBA with a total of 38,387 points”.

This is an outdated answer as Lebron James broke that record in 2023.

This means that llama-3-405b-instruct was trained on pre-2023 data.

What is retrieval-augmented generation?

RAG is an AI framework for retrieving facts from an external knowledge base to ground large language models (LLMs) on the most accurate, up-to-date information and to give users insight into LLMs' generative process.

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Retrieval augmented generation (RAG)

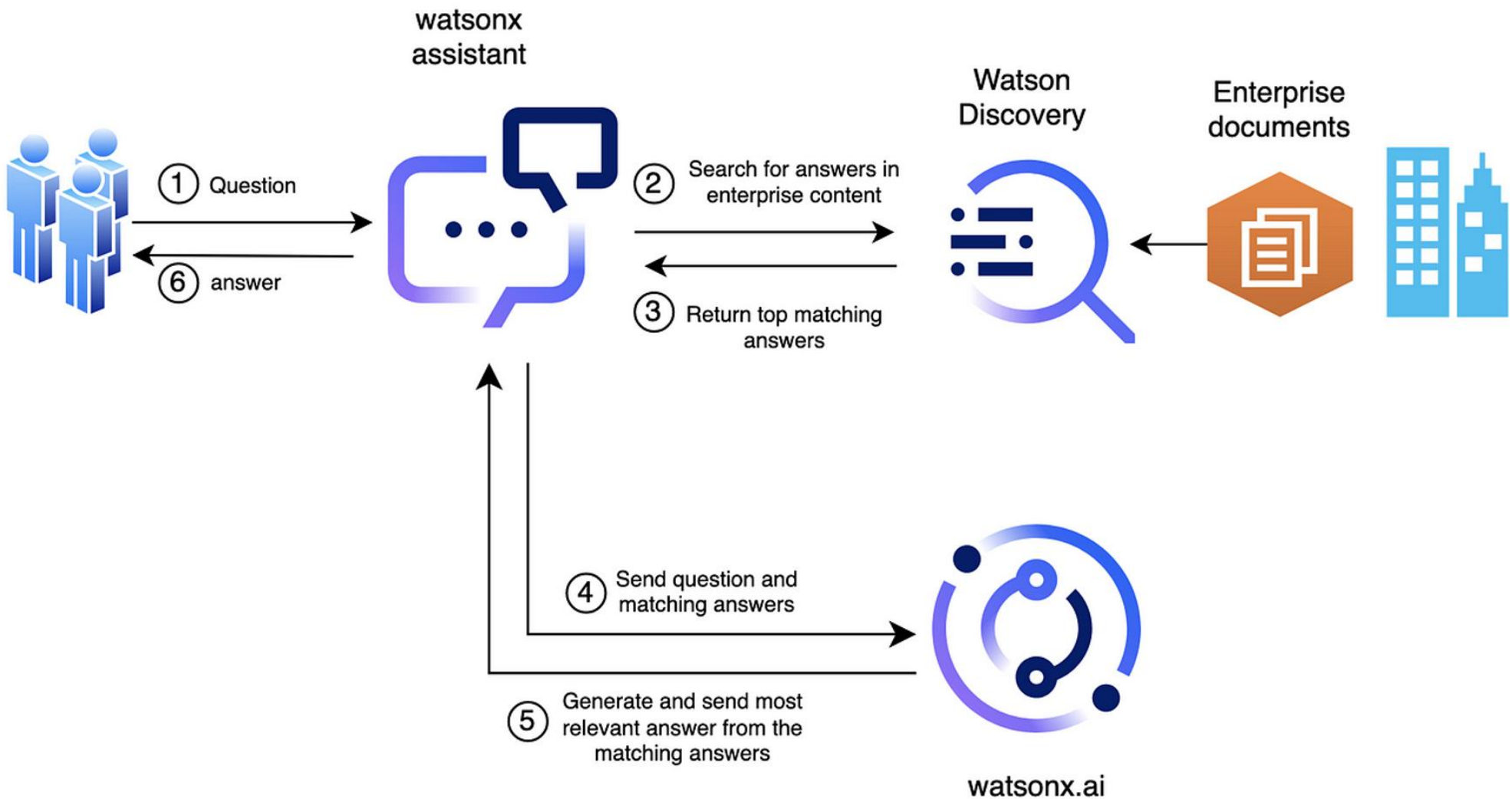
RAG addresses these issues:

- Where did the LLM get its answer?
- Is the answer based on updated material?

RAG does this by:

- Working with “external data” (data not used for training the LLM):
  - Source of answers? From curated, validated, and accurate data
  - Currency of data? As current as the source
- NO model retraining required

A “human interaction” analogy of RAG is providing an update document to a person and asking them to answer question based on the information in the document.



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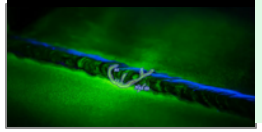
Generative AI Opportunities: Applying foundation models in our Asset Lifecycle Management Software portfolio

In flight

Failure mode context understanding

We are training a GenAI model to understand failure points. **FMEA (Failure Mode and Effects Analysis) data is not available for many kinds of assets, and it can take time to acquire.** This model can then be applied to other assets where data does not exist.

MVI prompt tuning



We are using foundation models and prompt-tuning to dramatically reduce the effort required to train the model for MVI.

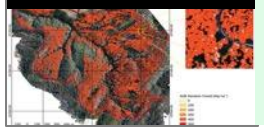
Work order intelligence

GA

We are training an LLM to classify and recommend work order codes, which will assist and (if desired) enable auto-approval of work orders overcoming human error and limitations.

Above ground biomass measurement

Preview Q1



Use Geospatial Foundation Models to measure above ground biomass for known land cover and vegetation species.

Health: prediction & anomaly

We are using GenAI to create sensor-level models trained on a small sample of sensor data. This greatly speeds time to value for asset health prediction.

Flood and fire detection

Use geospatial model to detect fire tracks and floods leveraging data from NASA. Would enable stakeholders to quickly understand the impacts of flood and fire.

MVI anomaly detection

MVI AI currently can lack accuracy for “Few-Shot” anomaly detection. We are building a transformer-based foundation model that will fill these gaps.

Activity based scope 3 estimation

GA

Leverage LLM to ingest and understand invoice level data to categorize business activities and estimate carbon emissions generated by the business at a more granular level.

In pipeline

Assist: technician assistant

We are using a GenAI assistant trained on service manuals and work orders to give technicians the latest asset service info and generate repair workflows.

MAS onboarding assistant

We are training an LLM model to answer questions that arise in implementation that can guide clients about costs, effort and risks.

Envizi SRM assistant

The sustainability disclosure environment is complex. We hope to train a GenAI virtual assistant to help guide our users through the process.

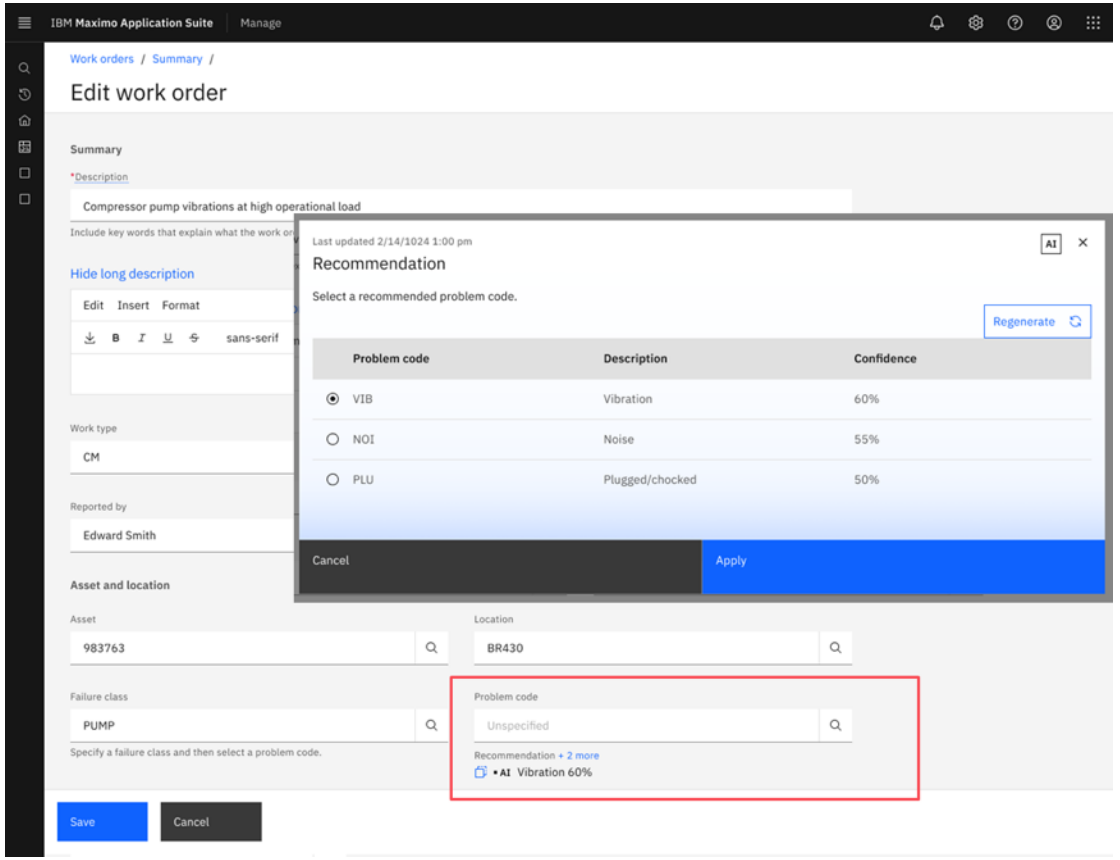
Envizi sustainability assistant

Sustainability journeys can be complex and require digesting vast amounts of data. We hope to train a Gen AI model to assist our users in this journey.

Work Order Intelligence Problem Code Recommendations using watsonx

New GenAI feature recommends problem codes to assist with existing challenges faced by customers to address poor quality (or missing) work order data, impacting effective maintenance prioritization decisions as well as time spent on review and approval.

- AI model trained using long and short descriptions from a small set of related work orders
- Work Orders displays the AI recommendations for review/accept
  - Uses new IBM Design UI elements incorporated into Graphite
  - Provides confidence score of the predictions
- Work queue surfaces the top AI recommendation to accept
- Leverages watsonx



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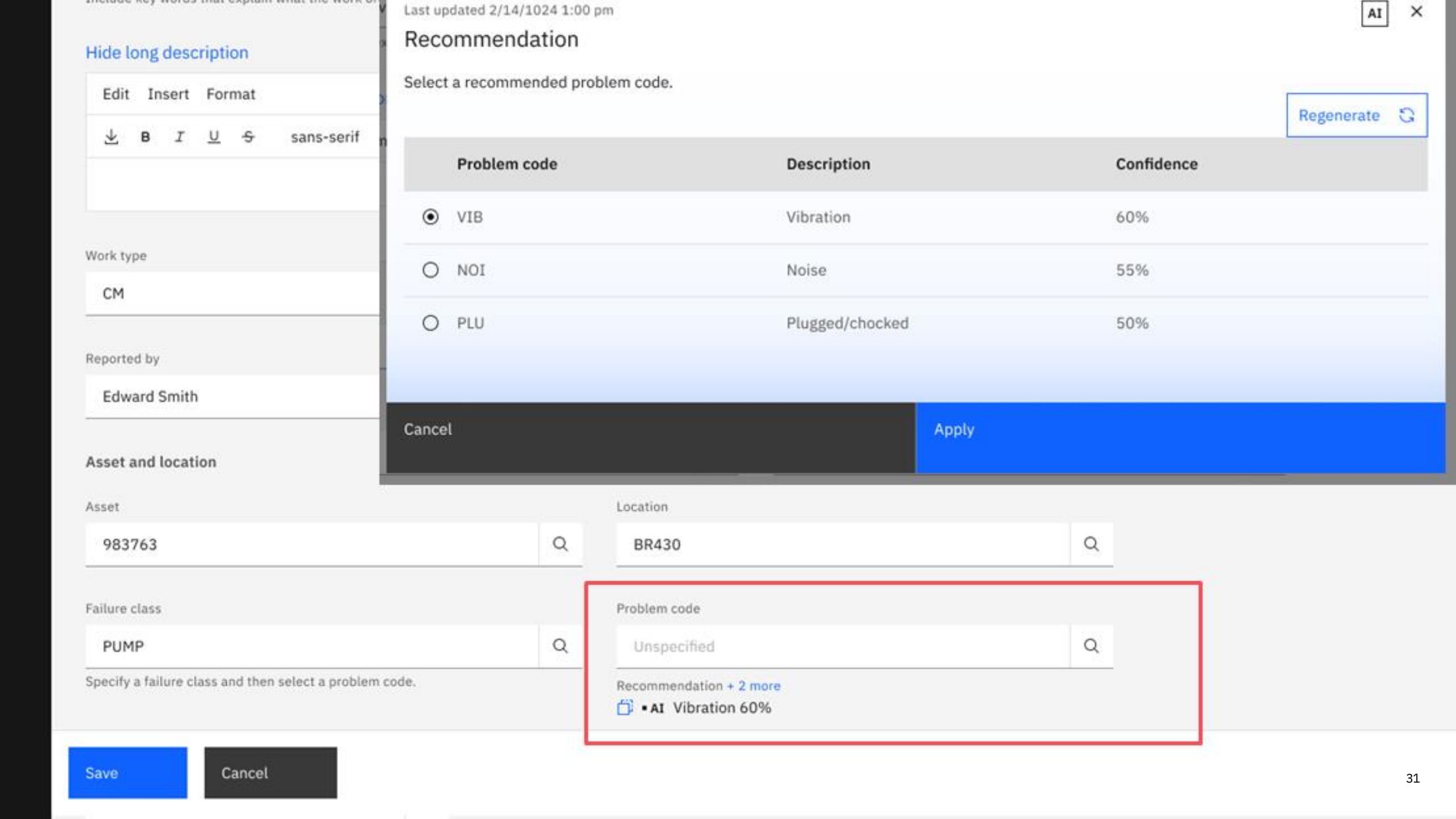
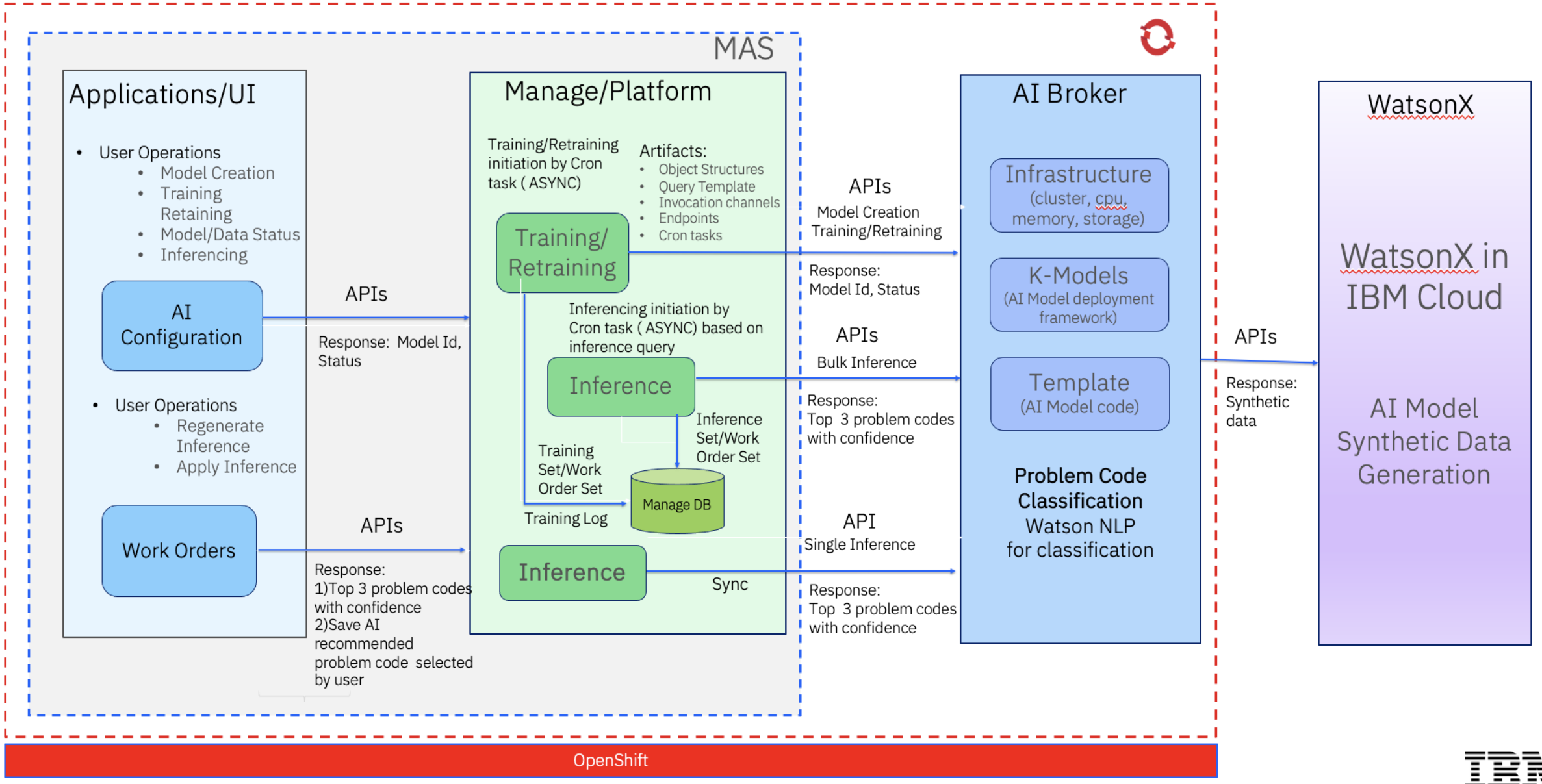

Last updated 2/14/1024 1:00 pm
AI
Recommendation
Select a recommended problem code.
Regenerate
Problem code
Description
Confidence
VIB
Vibration
60%
NOI
Noise
55%
PLU
Plugged/chocked
50%
Cancel
Apply
Hide long description
Edit
Insert
Format
B
I
U
S
sans-serif
Work type
CM
Reported by
Edward Smith
Asset and location
Asset
983763
Location
BR430
Failure class
PUMP
Specify a failure class and then select a problem code.
Problem code
Unspecified
Recommendation + 2 more
AI Vibration 60%
Save
Cancel

Work Order Intelligence - Architecture



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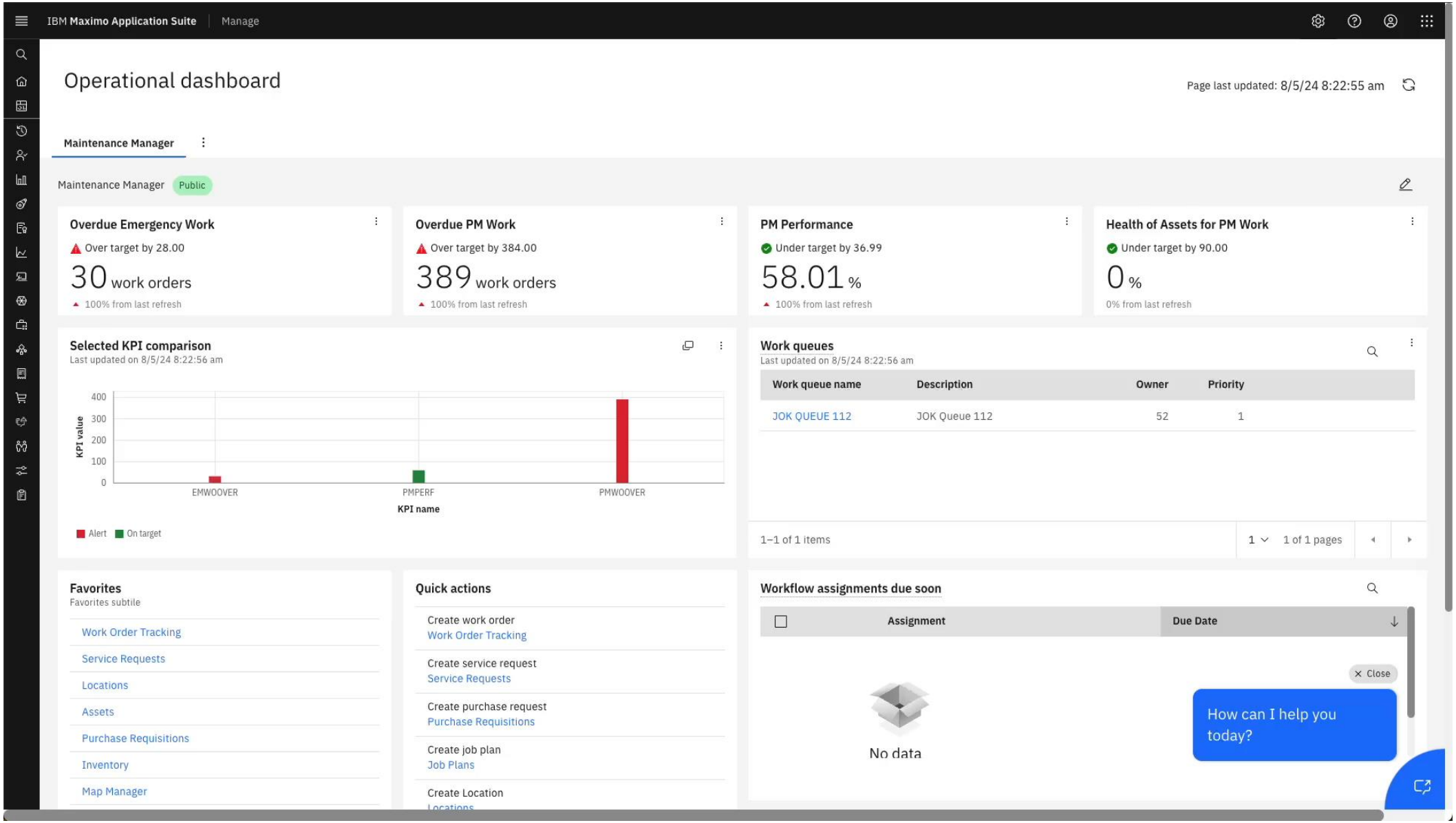
Conversational AI demo

Target delivery: **Future**



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Maximo AI Assistant

Content Retrieval

- Quickly find and display hidden, relevant information from unstructured texts and data sets across all integrated Maximo systems using natural language prompts. Initial support for WO/SR/Assets.

Calculations

- Perform calculations based on natural language (i.e. Count, Sum, Max/Min, Frequencies) to support further analysis

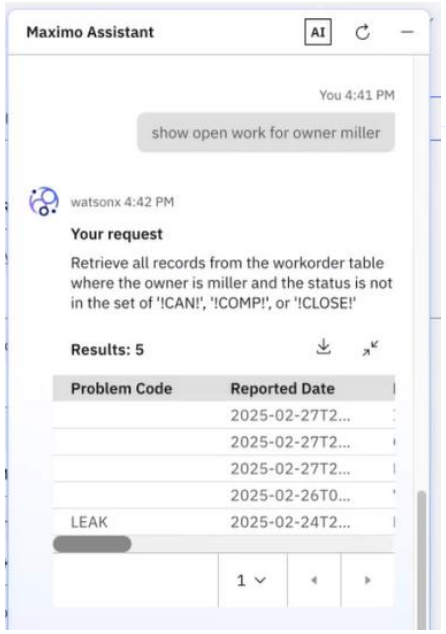
FUTURE (9.1+)

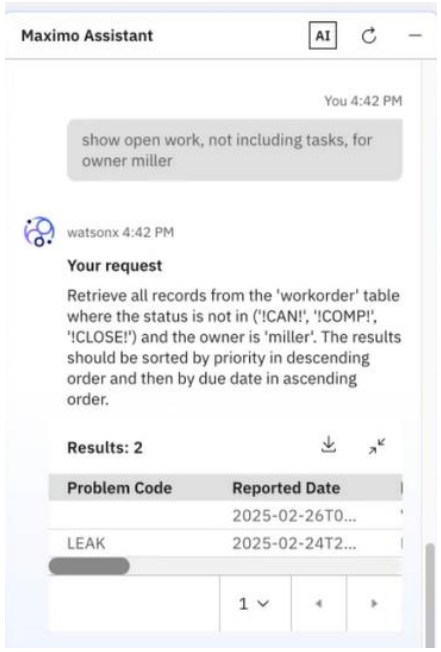
Summarizations

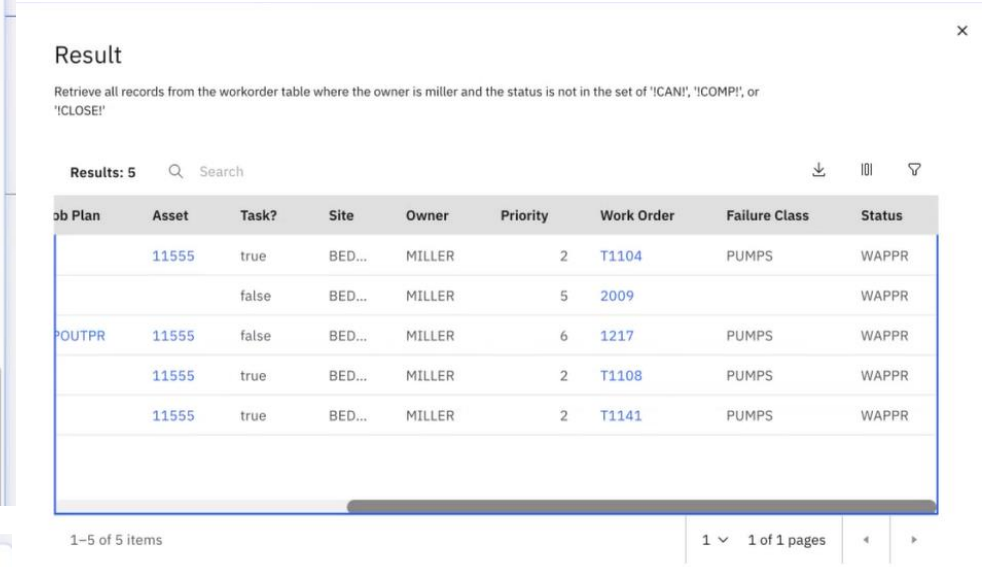
- Capture key points and overviews by transforming large amounts of domain-specific texts and data into summaries

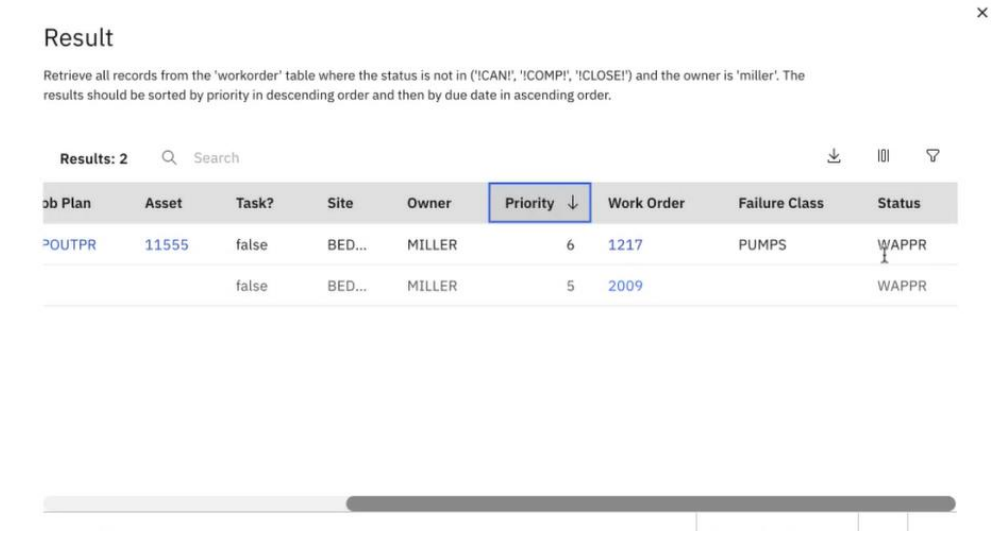
Workflow Automation

- Automatically recommend and guide the execution of next steps related to human-entered tasks and goals









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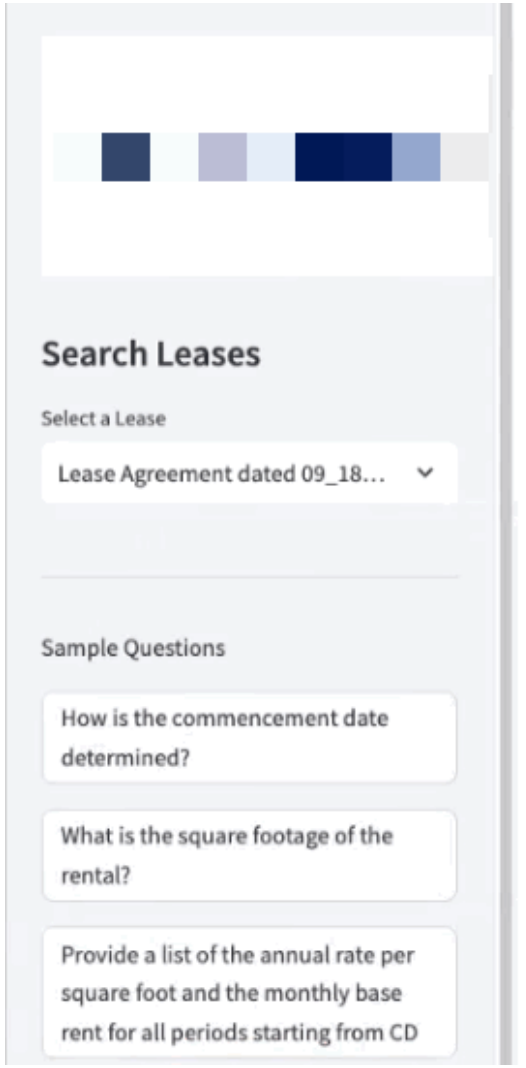
Target delivery: **Future**

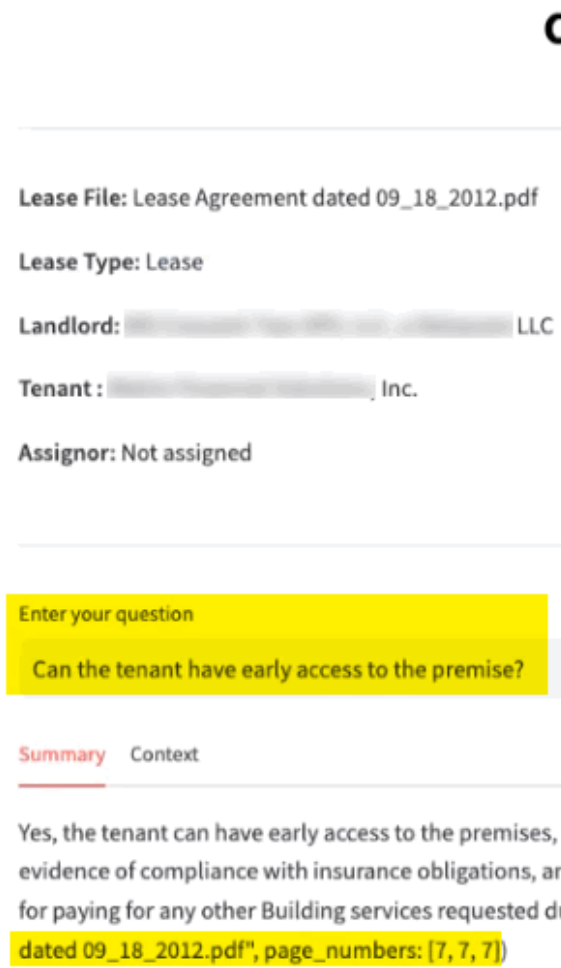
Uncover lease information using GenAI

Query unstructured source documents to uncover lease details not normally abstracted during the lease abstraction process

Improve accuracy of data already abstracted by using AI to validate lease data entered in MREF

Save time and money leveraging Gen AI to assist with lease abstraction activities





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Maximo Application Suite

Best-of-class capabilities to provide complete view of enterprise assets

Manage
Intelligent Asset Management

Monitor
Monitor and Detect Anomalies

Health
360 View of Assets

Predict
Predictive Failures

Visual Inspection
AI-Powered Insights

Schedule
Schedule Work and Resources

Mobile
Technician Work Execution

Assist
Prescriptive Assistance

Safety
Actionable Insights for Worker Safety

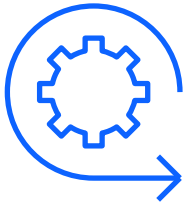
IBM Cloud Pak for Data | IBM Watson Studio | IBM Watson ML

Red Hat OpenShift
Infrastructure Independent
Common Operating Environment

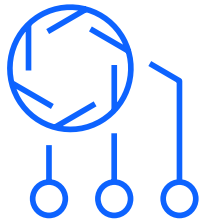
IBM Cloud | AWS | Azure | Google Cloud | Private | Edge | Systems

Key benefits of IBM Maximo Visual Inspection

Fast, easy, accurate

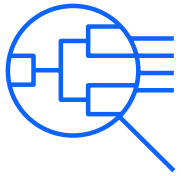


Point-and-click AI model building – in just a few hours



Process automation

AI-powered insights at scale



Real-time quality assurance – “error proofing”

Improve efficiency & performance of assets – Maximo integration

The Great Belt Bridge, Denmark

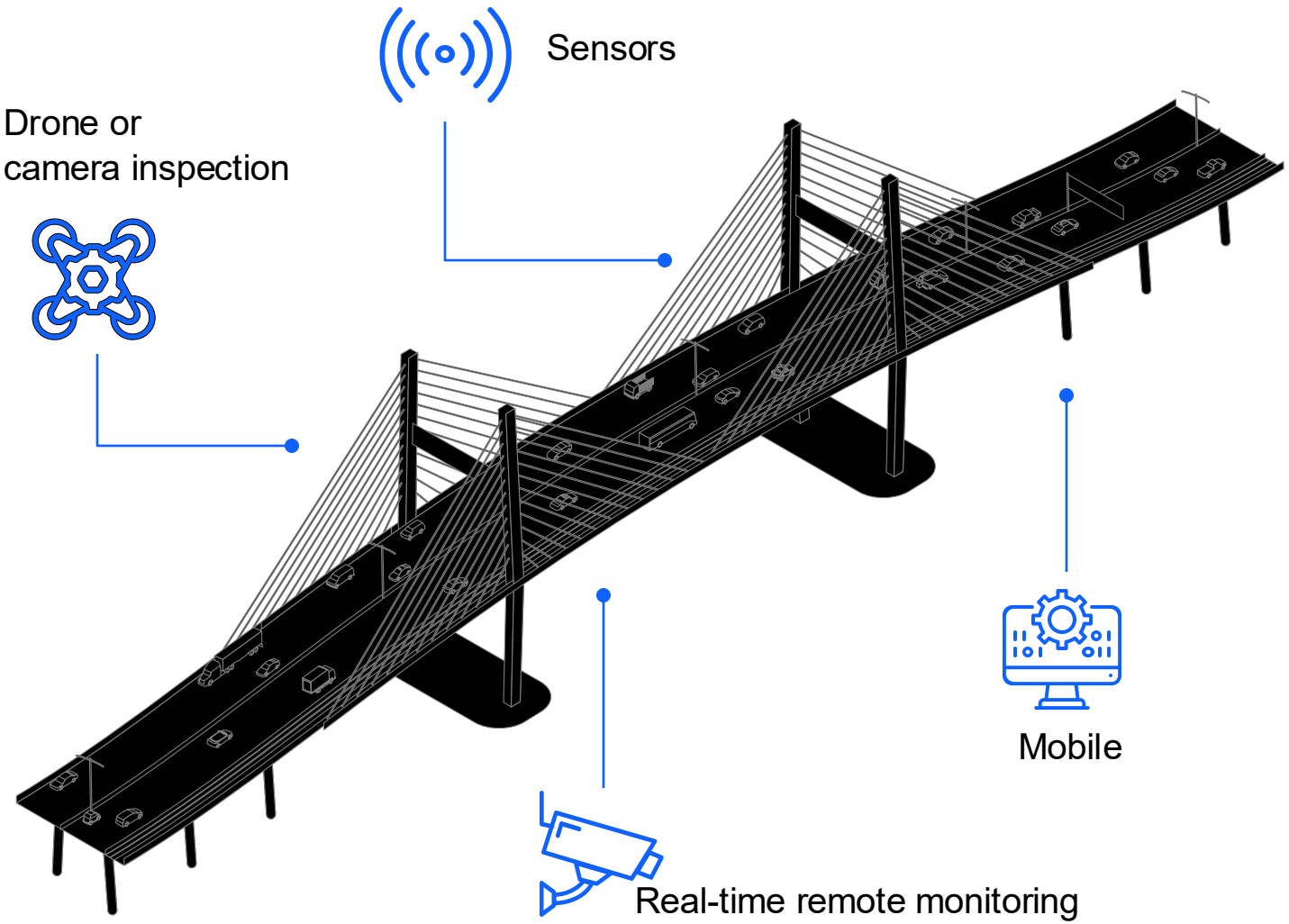
Modernized Civil Infrastructure Inspection

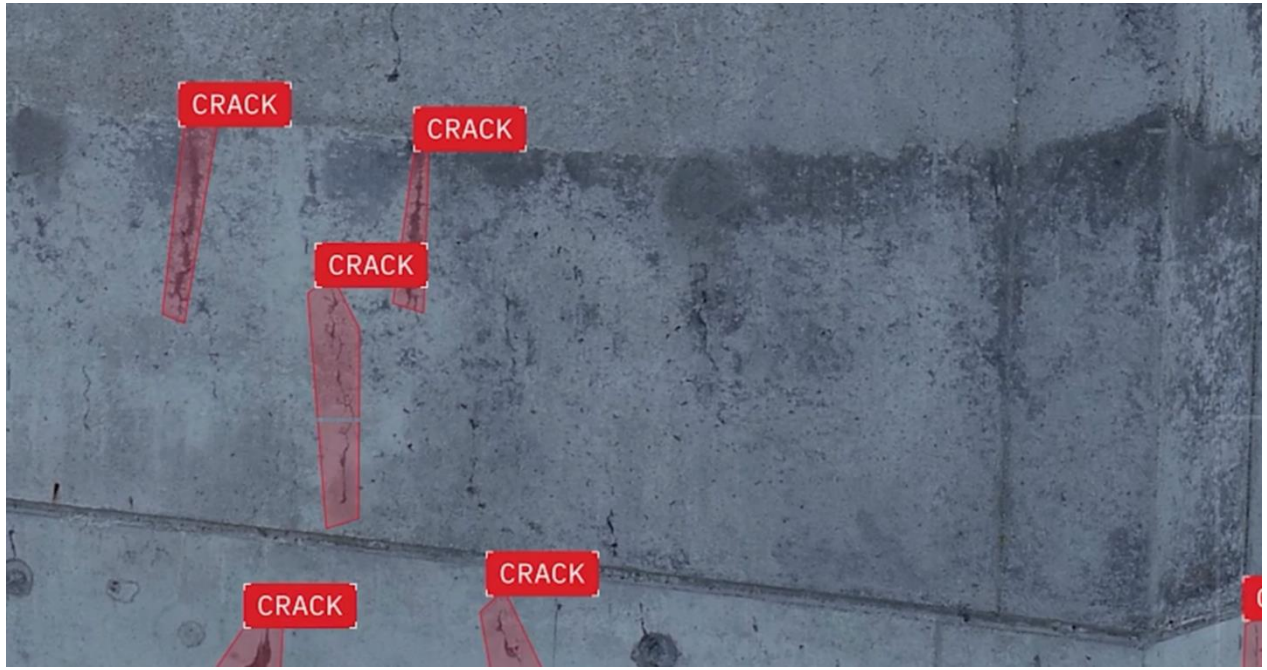
Reduce manual inspections

Deliver consistency and accuracy with minimal human effort and risk

Improve speed and precision

High-resolution AI immediately identifies cracks on large surface areas

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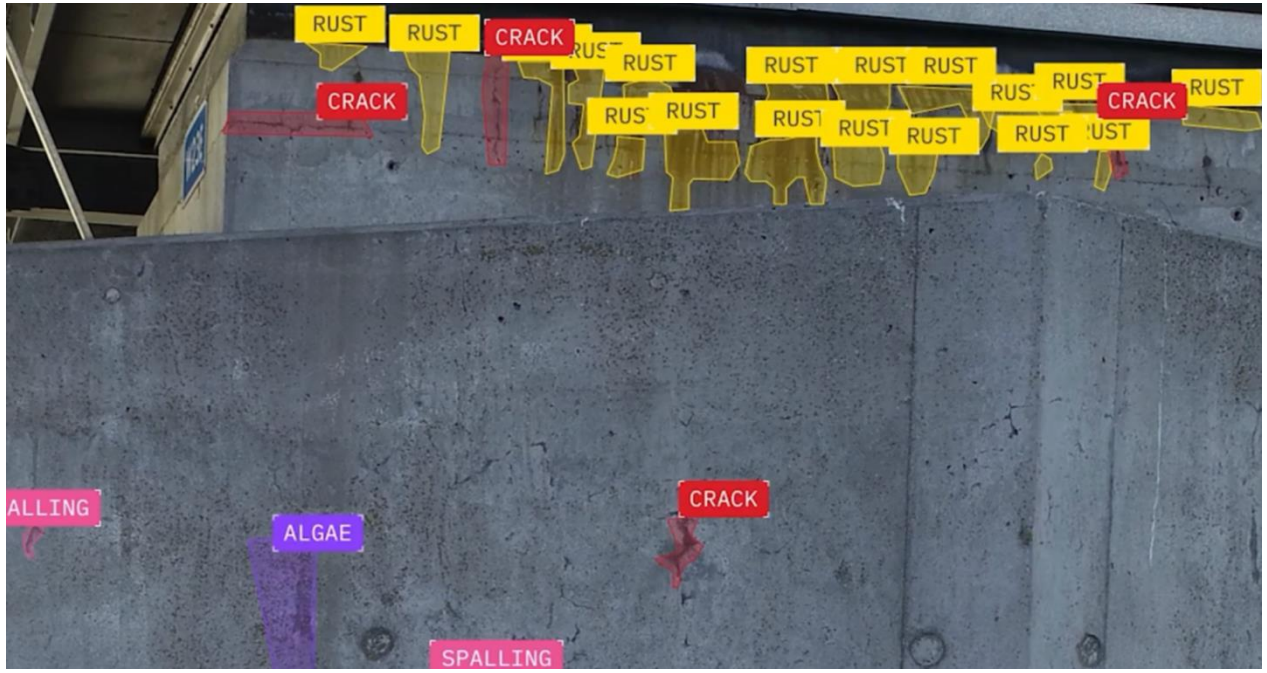
RUST
RUST
CRACK
RUST
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CRACK
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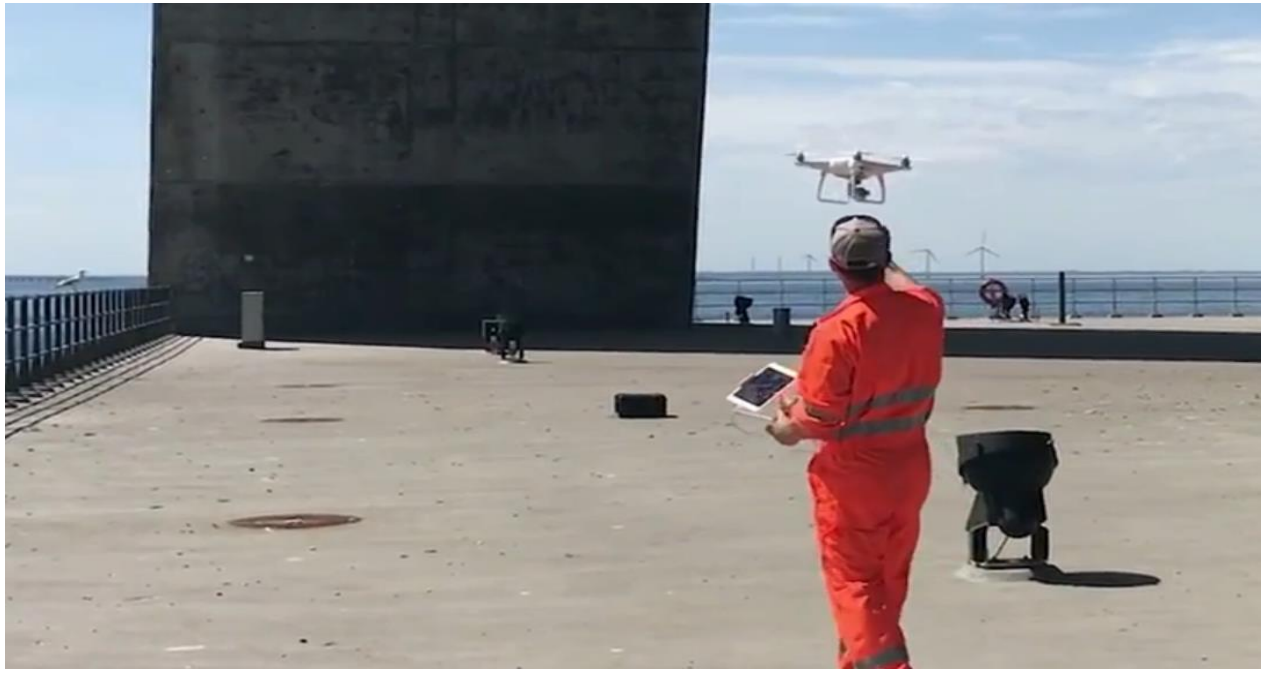
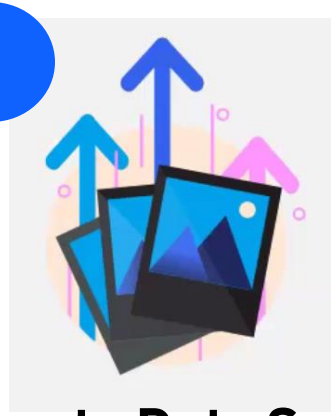
RUST
CRACK
ALLING
ALGAE
CRACK
SPALLING



AI Model training and execution with Maximo Visual Inspection

1

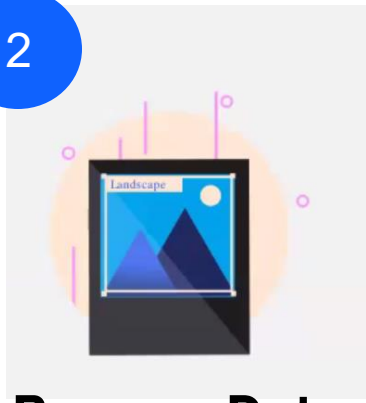


Create Data Set

Collect example images around:

- **Insulators:** cracked/broken skirts, missing cotter pins, flash-over damage, etc.
- **Structures:** rust, missing bolts, rot, missing top plates, damaged guys, damaged or missing guy protectors, etc.
- **Conductors:** broken strands, damaged wraps, rust, etc.

2

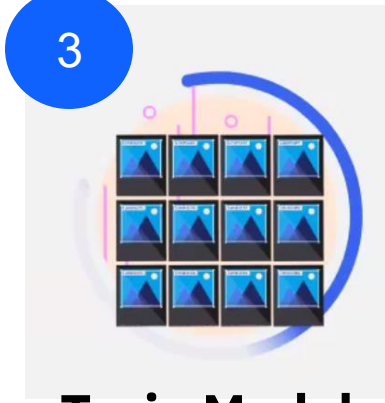


Prepare Data

Import images and click to:

- Assign categories to images
- Label objects within images

3



Train Model

Click to create a model:

- Object Detection
- Image Classification
- Anomaly Detection

4

Deploy Model

Real-time Processing or Batch Processing using:

- IP Cameras
- Image Folder
- Video Folder

IBM

+0056.6ft
Woonsocket Winter Street
Vitrified Clay Pipe Circular 12
Crack

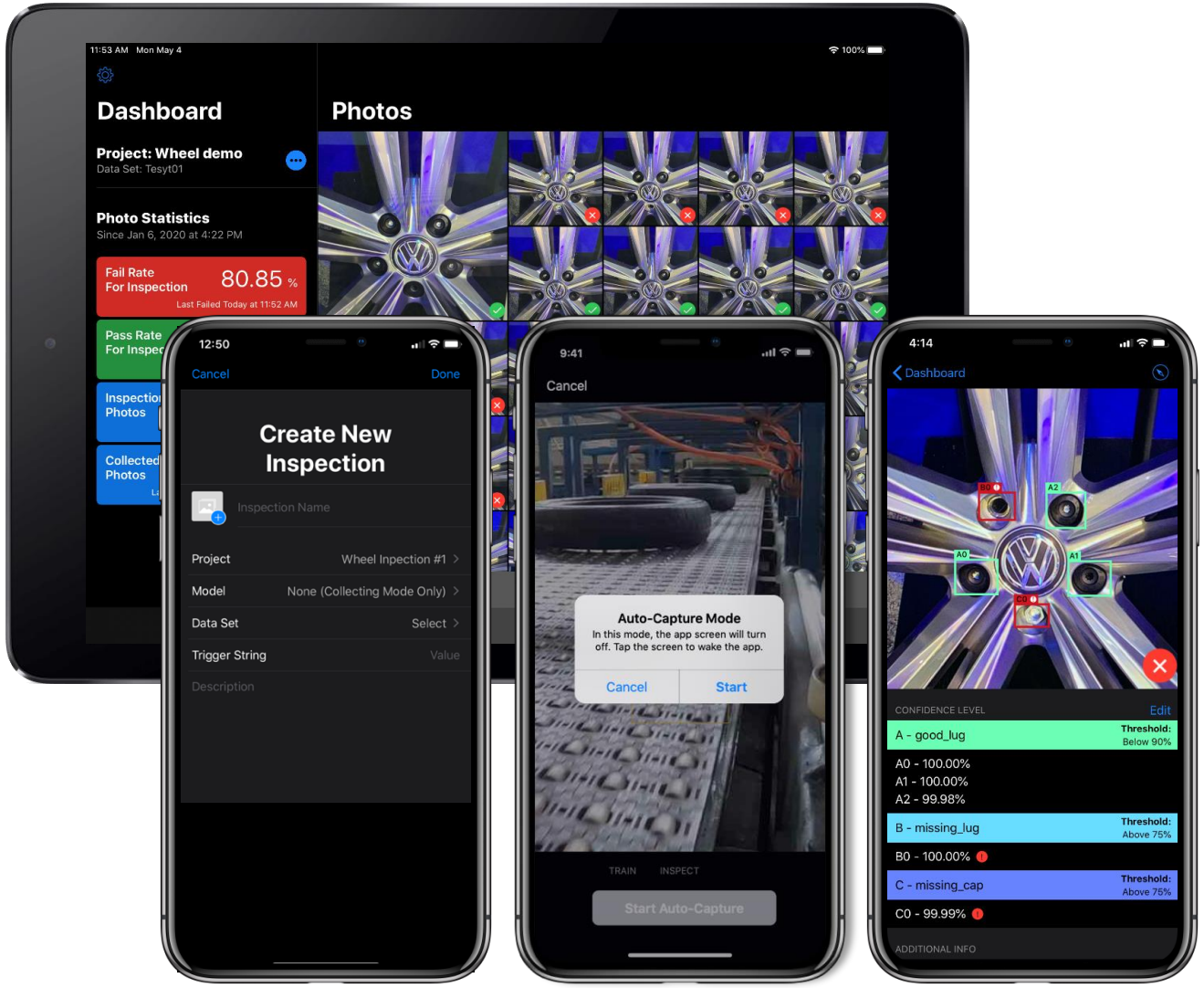
jetbridge_connected
cargo_open
aircraft
beltloader_baggage
employee

Maximo Visual Inspection **Mobile**

All-in-one:
compute, camera, 5G

Speed to value:
Capture, train, prove

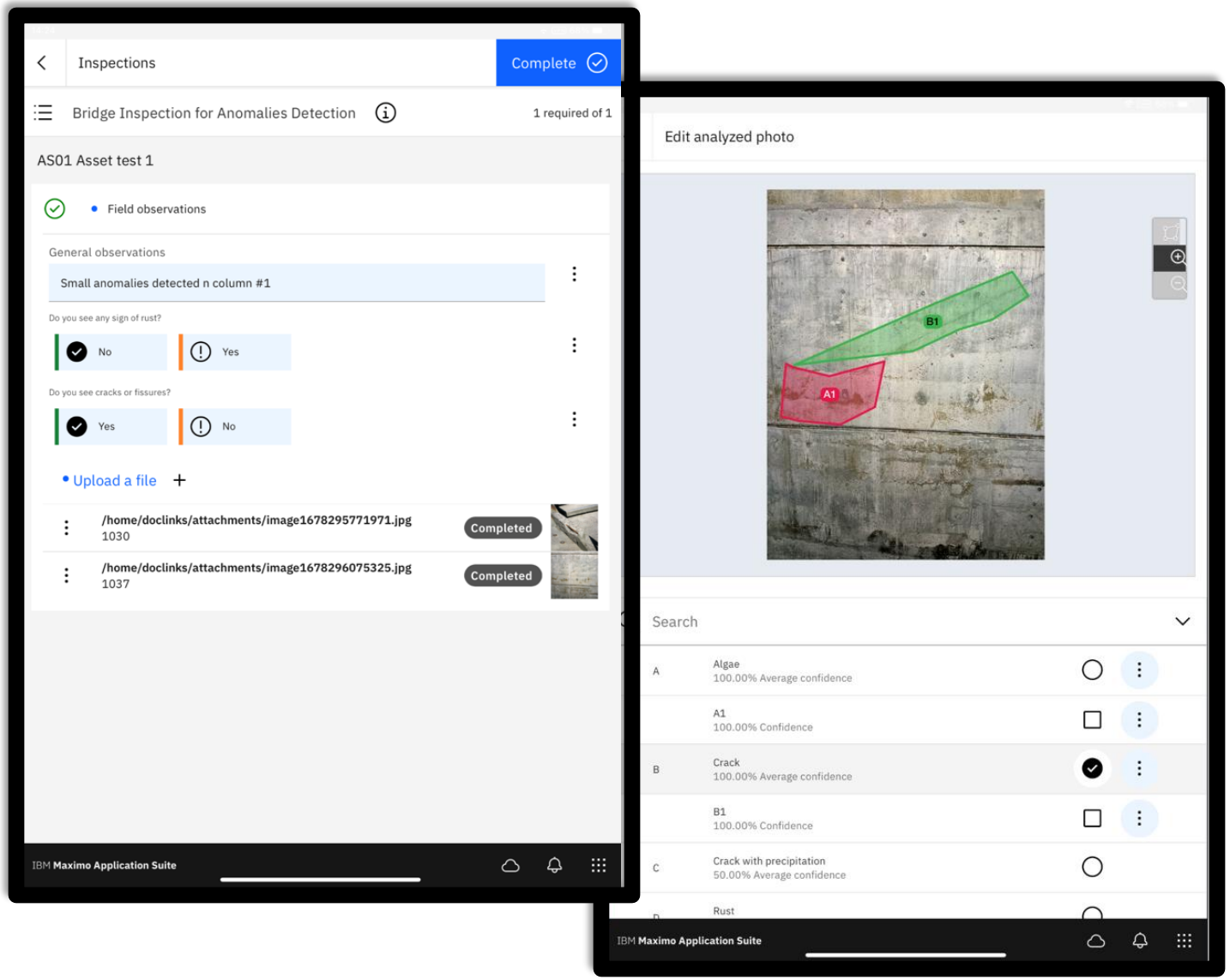
Integration with model training platform; perform **inferencing at the edge**



Mobile Inspections in MAS

Functionalities:

- Integration Maximo Visual Inspections with Maximo Mobile
- Add automated visual inspection to an asset inspection workflow
- Performs inferencing remotely, allowing the flexibility to run on a wide variety of mobile devices



The path to value – quality inspection

Stop defects at the point of installation

Reduce defects and expensive rework costs

$10,000s daily

Quickly react to change

Dynamically update AI models

In seconds

Reduce manual visual inspection

Improve quality inspection consistency

Accurate 24/7

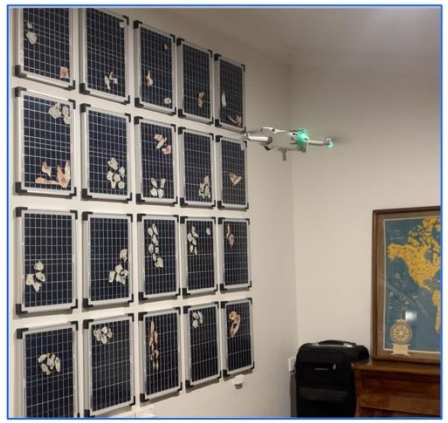
Improve production and assembly quality

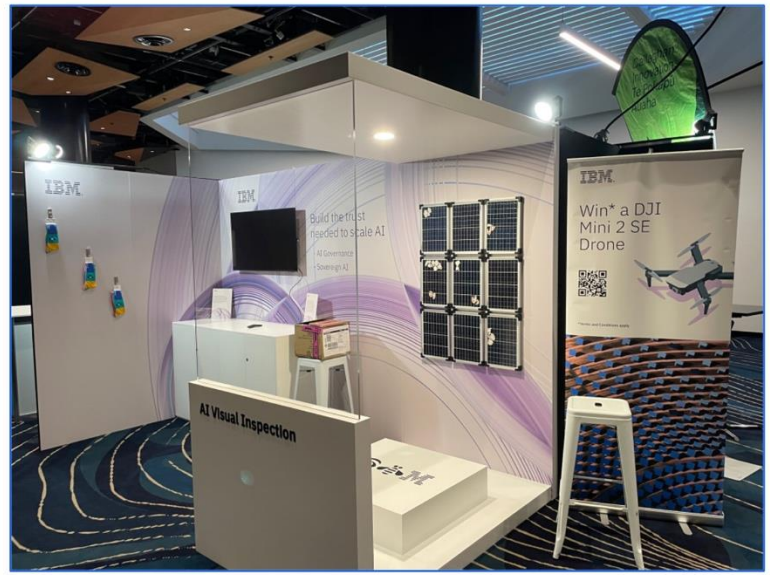
Increase revenue

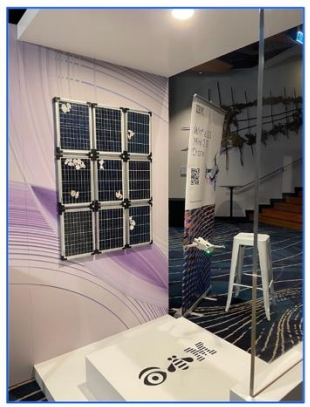
By millions $

ROI measured in weeks/months

From Drone to Fix – Solar Farm Inspection – The Setup



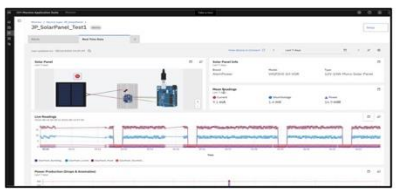




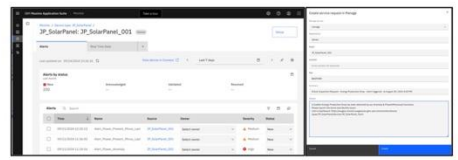
From Drone to Fix – Solar Panel Farm Inspection – Overall DEMO Flow & Stories

1. Cover Solar Panel
Cover 1 or more cells with a rag/paper – triggers power drop [SOLAR PANEL]

2. Power Generation Drop
Get auto notified of a sudden Power Production drop or anomaly [MONITOR]



3. Create Inspection Request
Auto trigger a Drone Service Request for Inspection [MONITOR]

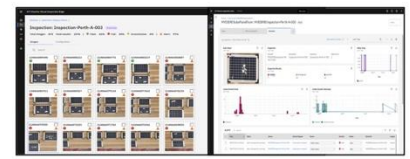


Energy Loss

4. Run Drone Visual Inspection
Drone flies up-down vs. the solar panel wall and counts # and types of defects [DRONE]

Visual Inspection

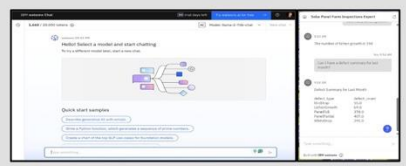
5. Analyze Inspection Results
Data & AI on Inspection Results (defects) [MVI EDGE & MONITOR & HEALTH + WA]



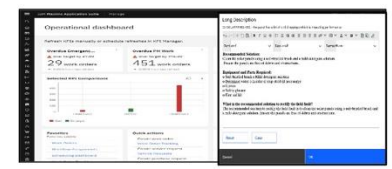
GenAI + Q&A

7a. Summarize + Q&A
Summarize Inspection Results & Power + Q&A [WATSONX & WA]

7b. Fix Recommendations
How to best fix ? + Create a Work Order [WATSONX & WA]



6. Trigger Fix Work Order
Trigger Technician Fix incl. info on panel issues & recommendations [WA]

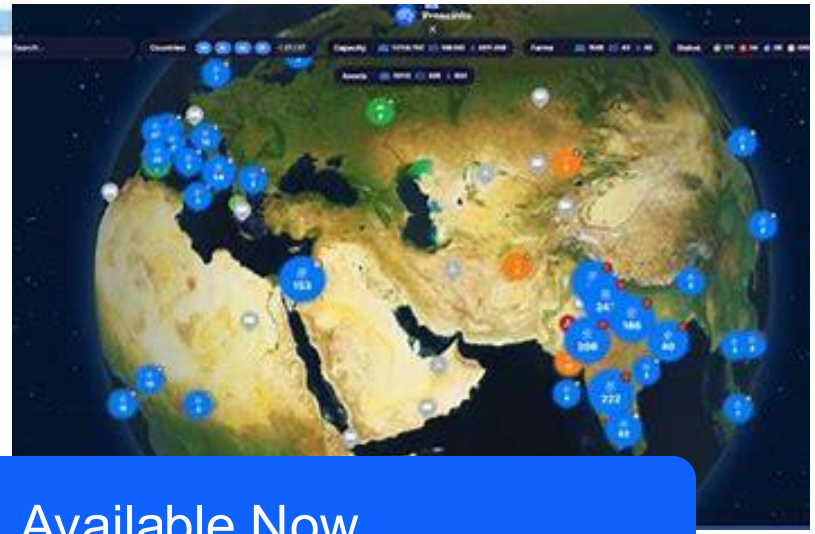


EIS & ENVIZI Data

Extra Information Corpus
MAS Manage + Health + Monitor + MVI
DJI & Solar Panel etc documentation

IBM Maximo Renewables

IBM Maximo Renewables is an AI-powered SaaS platform that collects plant data, applies data science models to identify causes for underperformance, and suggests actions to increase generation.



Solar

Utility-scale and Distributed

Wind

Supporting all major OEMs

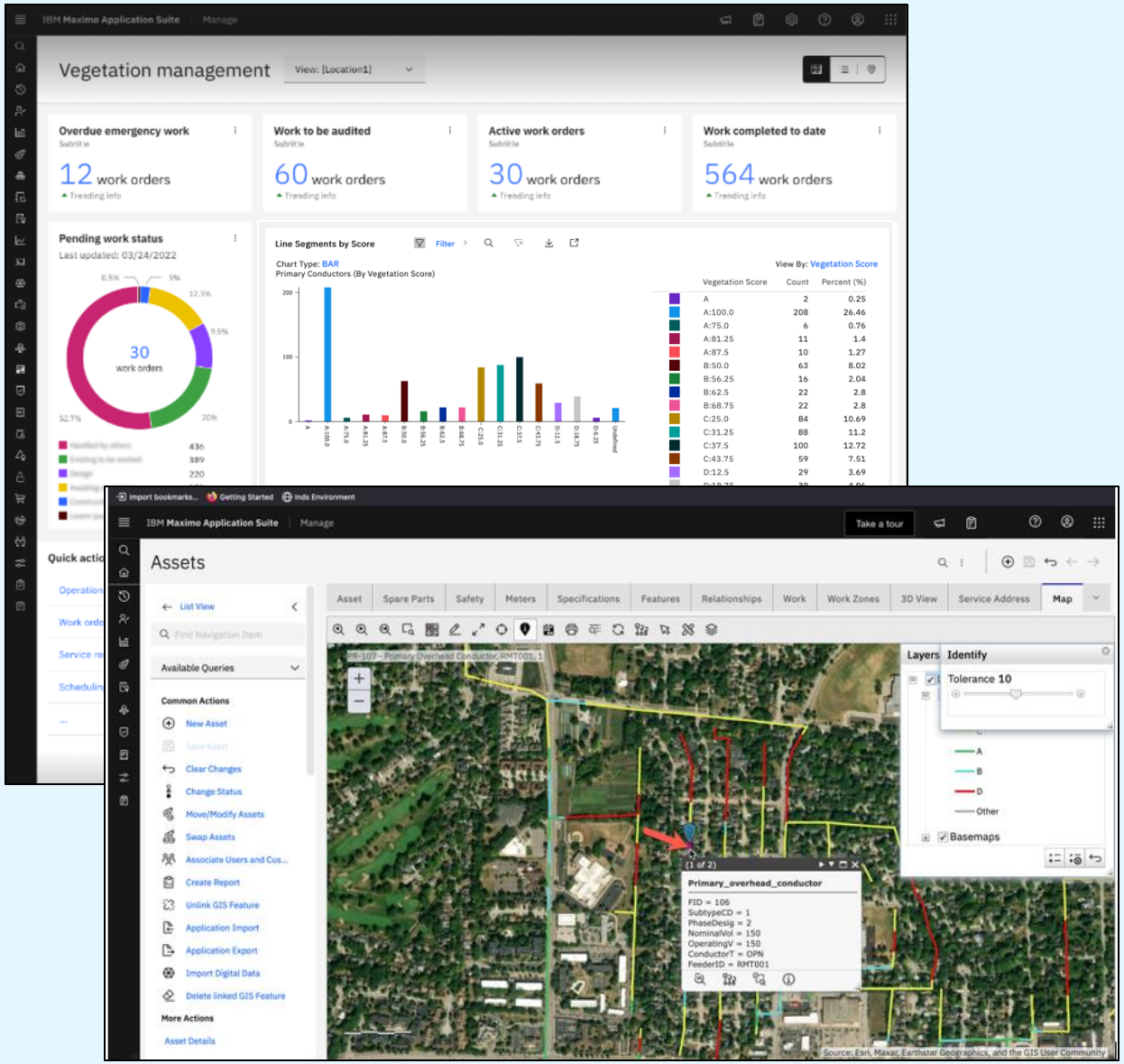
Energy Storage

Supporting multiple chemistries

Available Now

Maximo Vegetation Management Solution

From insights to execution



Structure Data

Handling a variety of huge complex data sources, gathered from different channels in different points in time. Common data types, in addition to the Customer's asset data, include ground inspection data, satellite imagery and LiDAR

Extract Insights

The second step is converting raw data into actionable insights. Characteristics like changes in tree height, canopy, tree size and tree size are crucial to vegetation management process. Efficient planning and execution requires a clear set of scores and KPIs to assist in planning and execution

Prioritize and Plan

The vegetation intelligence is mapped across the entire distribution enterprise, enabling crews to prioritize the work for the prioritized vegetation scored circuit, helping to optimize and enhance planning of tree trimming and felling activities.

Manage & Report

Managing tedious communication and manual reporting leads to management overhead and with the help of technology this overhead can be reduced. Dashboards with the exact status of work that is in progress, work completed and work remaining can be created.

Available Now

IBM Named an Enterprise Asset Management (EAM) Leader

IBM has been recognized as a market leader in Enterprise Asset Management (EAM) by the independent research and advisory firm **Verdantix**

IBM Maximo Application Suite (IBM Maximo) receiving top marks in the new report

"Green Quadrant: Enterprise Asset Management Software 2024."

verdantix

IBM is the only recognized leader across all segments

Verdantix Green Quadrant results

Connected Portfolio Intelligence Platforms (IWMS)

Asset Performance Management

Enterprise Asset Management

NORTHEAST
MAXIMO USER GROUP

“LIFE IS BEAUTIFUL NOT BECAUSE OF THE THINGS WE SEE OR DO. LIFE IS BEAUTIFUL BECAUSE OF THE PEOPLE WE MEET.”

Simon Sinek

謝謝
DZIĘKUJĘ CI
TAPADH LEIBH
KEA LEBOHA
NGIYABONGA
БАЯРЛАЛАА
MISAOTRA ANAO
TEŞEKKÜR EDERIM
WHAKAWHETAI KOE
DANKIE
TERIMA KASIH
DANKON
TANK
TAPADH LEAT
СПАСИБО
GRAZIE
MATUR NUWUN
ХВАЛА ВАМ
MULȚUMESC
РАКМЕТ СІЗГЕ
고맙습니다
GRAZIE
شكرا
FAAFETAI
GO RAIBH MAITH AGAT
ESKERRIK ASKO
БЛАГОДАРЯ
GRACIAS
THANKYOU
HVALA
ТИ БЛАГОДАРАМ
TEŞEKKÜR EDERIM
DANK JE
ΕΥΧΑΡΙΣΤΩ
GRATIAS TIBI
OBRIGADO
TAK
DANKE
AČIŪ
SALAMAT
MAHALO IĀ ʻOE
TAKK SKAL DU HA
MERCI
RAHMAT
MERCI
GRAZZI
ÞAKKA ÞÉR
ありがとうございました
DI OU MÈSI
ĎAKUJEM
HATUR NUHUN
PAXMAT САГА
SIPAS JI WERE
TERIMA KASIH
CẢM ƠN BẠN
UA TSAUG RAU KOJ
WAZVIITA
ТИ БЛАГОДАРАМ
СИПОС
KÖSZÖNÖM
GRÀCIES
SALAMAT
MAHADSANID
HVALA
ДЗЯКУЙ
FALEMINDERIT

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