



**INGENERC**  
*Excellence Through Insight*

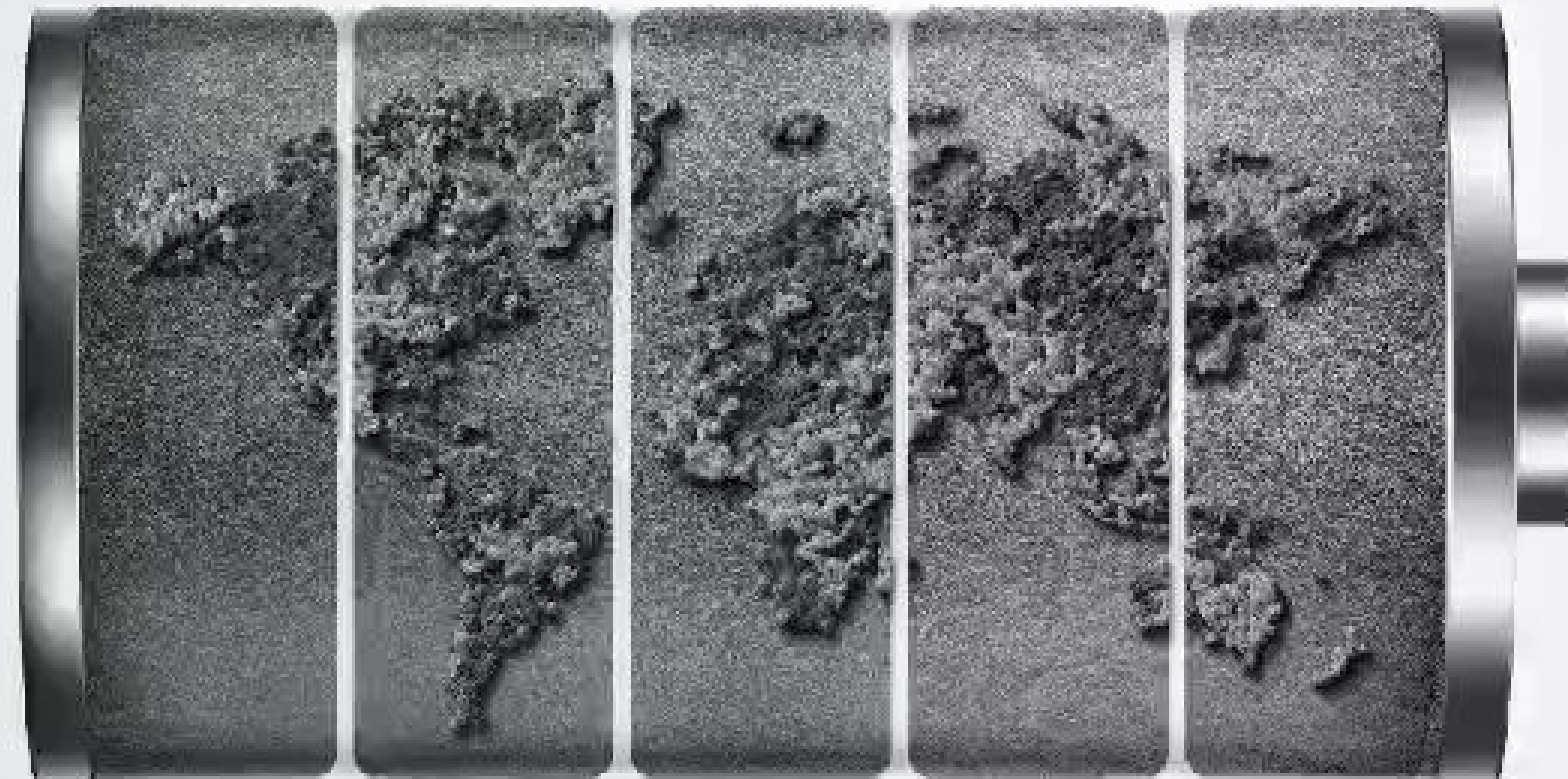


**Driving Innovation: Harnessing Applied AI in Process Manufacturing**



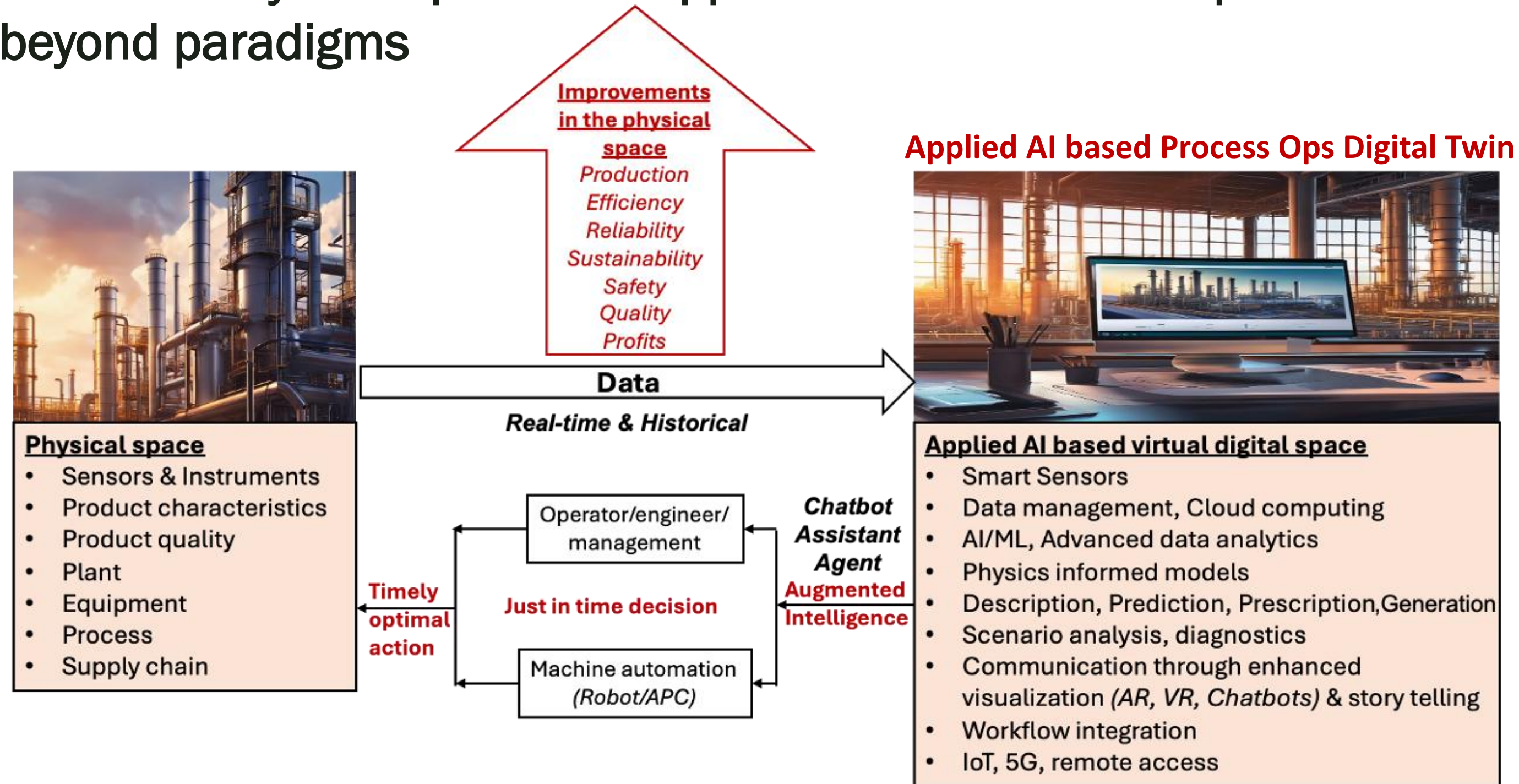


## Brief Ingenero Overview video



# Applied AI Based Physical-Digital Loop

Interaction between the Physical space and Applied AI based virtual space drives improvements beyond paradigms

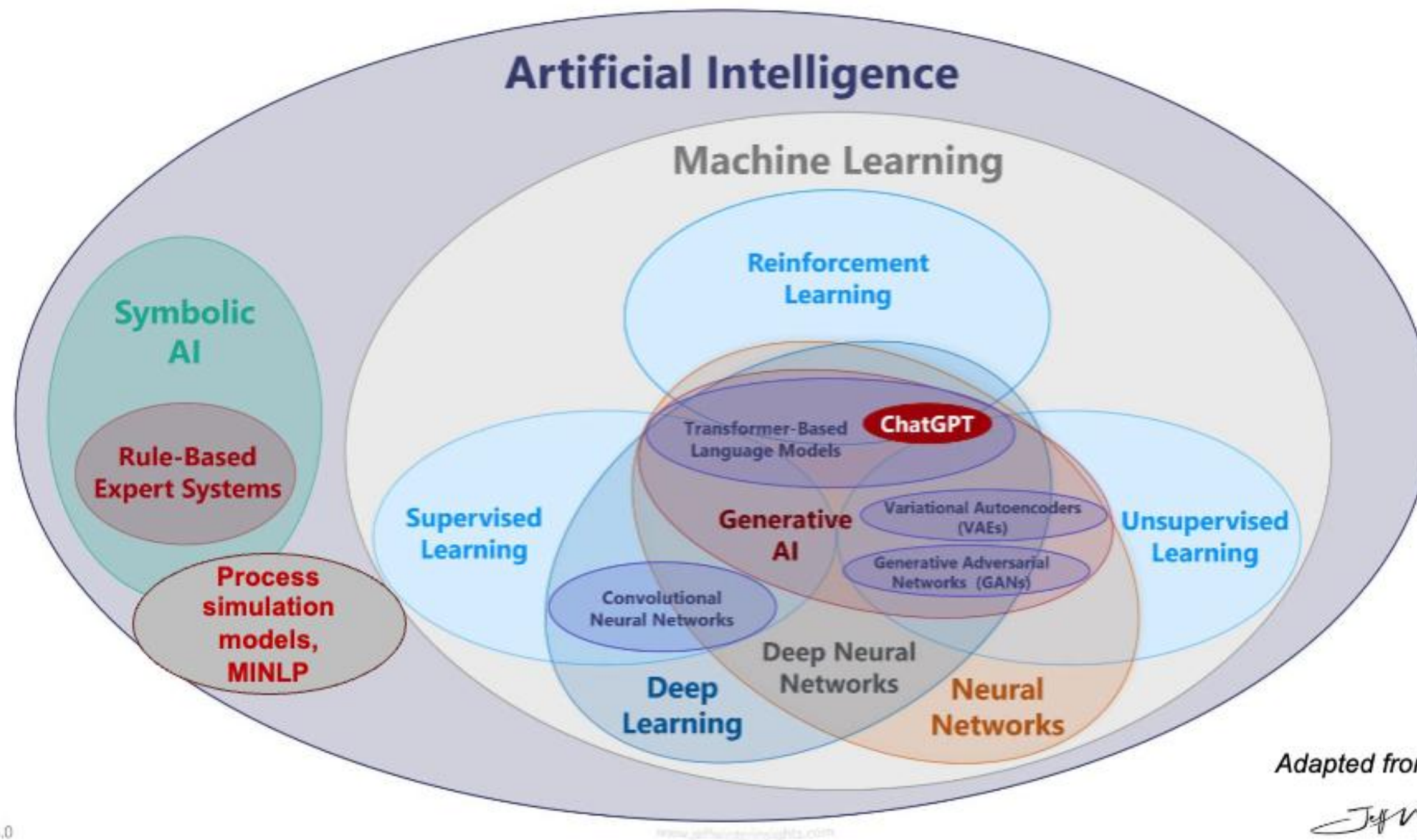


**Our goal with our Applied AI-based process operations digital twin solution is to deliver a versatile tool that empowers diverse personnel across the organization to intelligently support engineering projects and plant operations**



# Composite AI For Advanced Analytics

A combination of AI techniques is necessary for most Process Manufacturing applications, ranging from planning & optimization, prediction & forecasting, operations decision intelligence to closed loop implementation systems

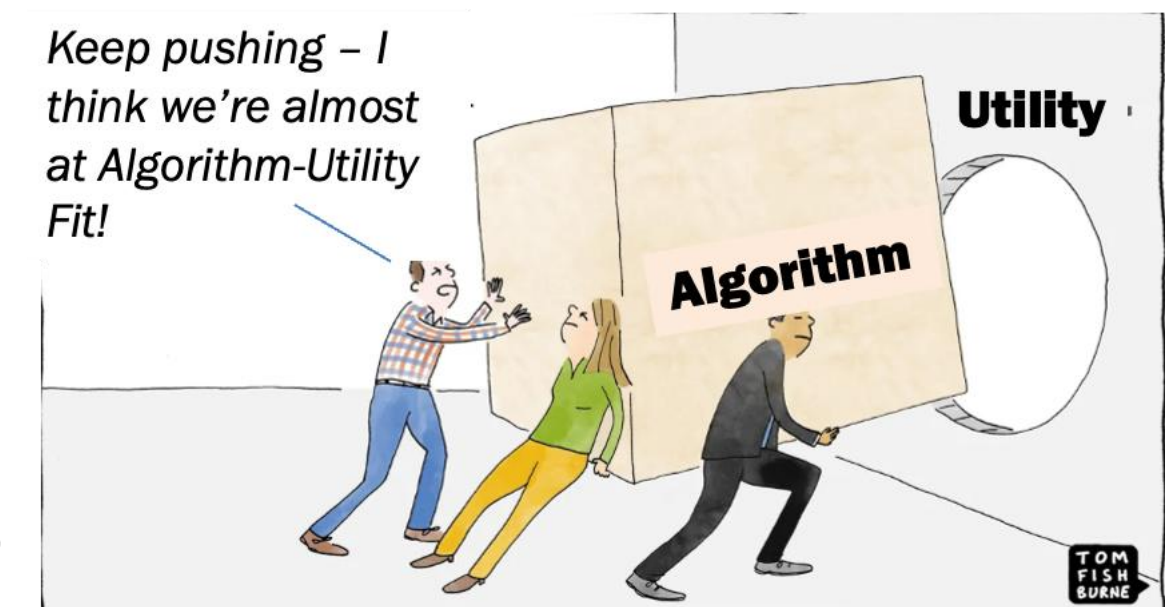


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Adapted from figure by

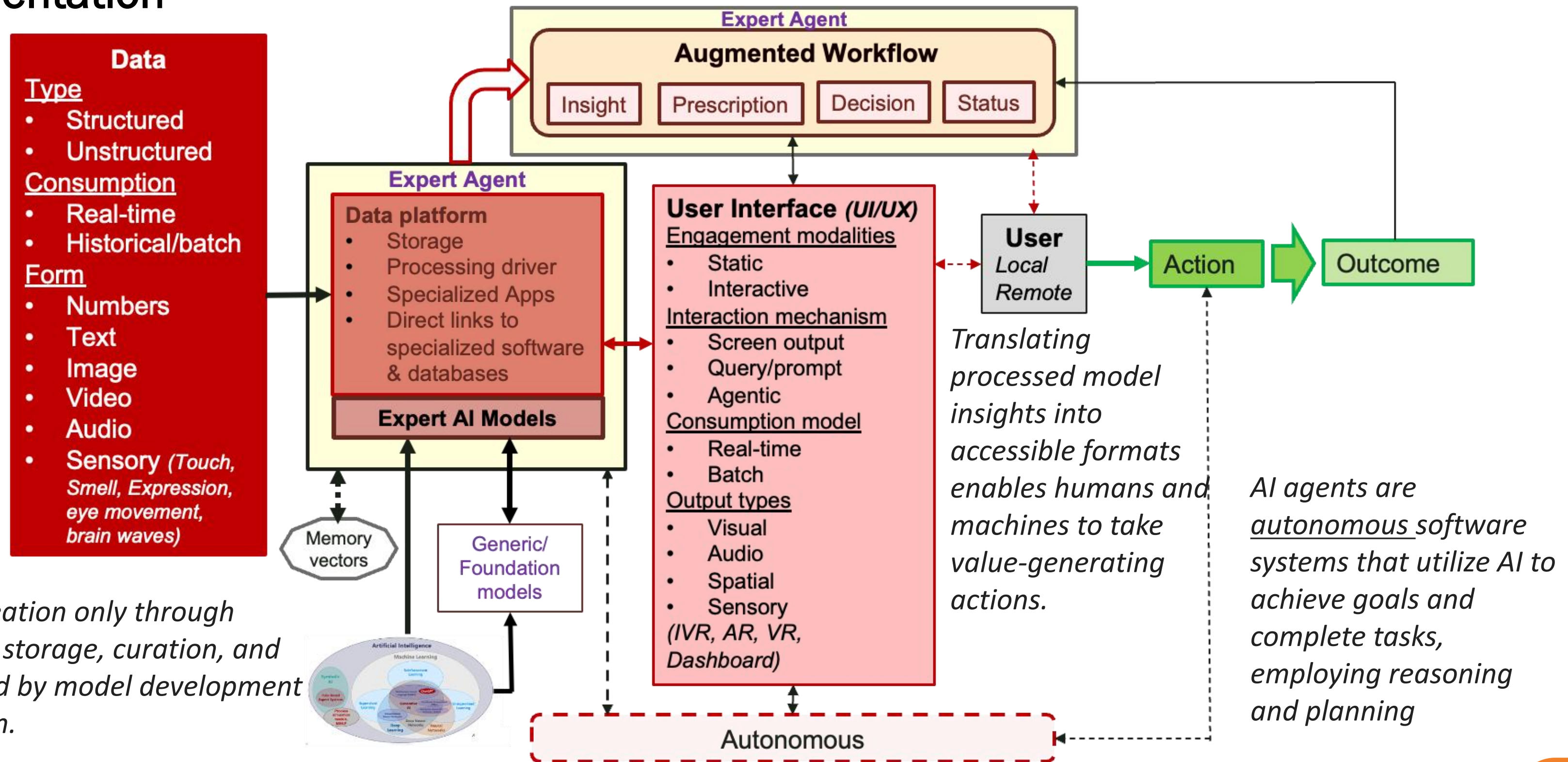
Jeff Winter

Leveraging our domain expertise, we selectively combine AI techniques tailored to specific end-use needs, rather than forcing any single technique into every situation.



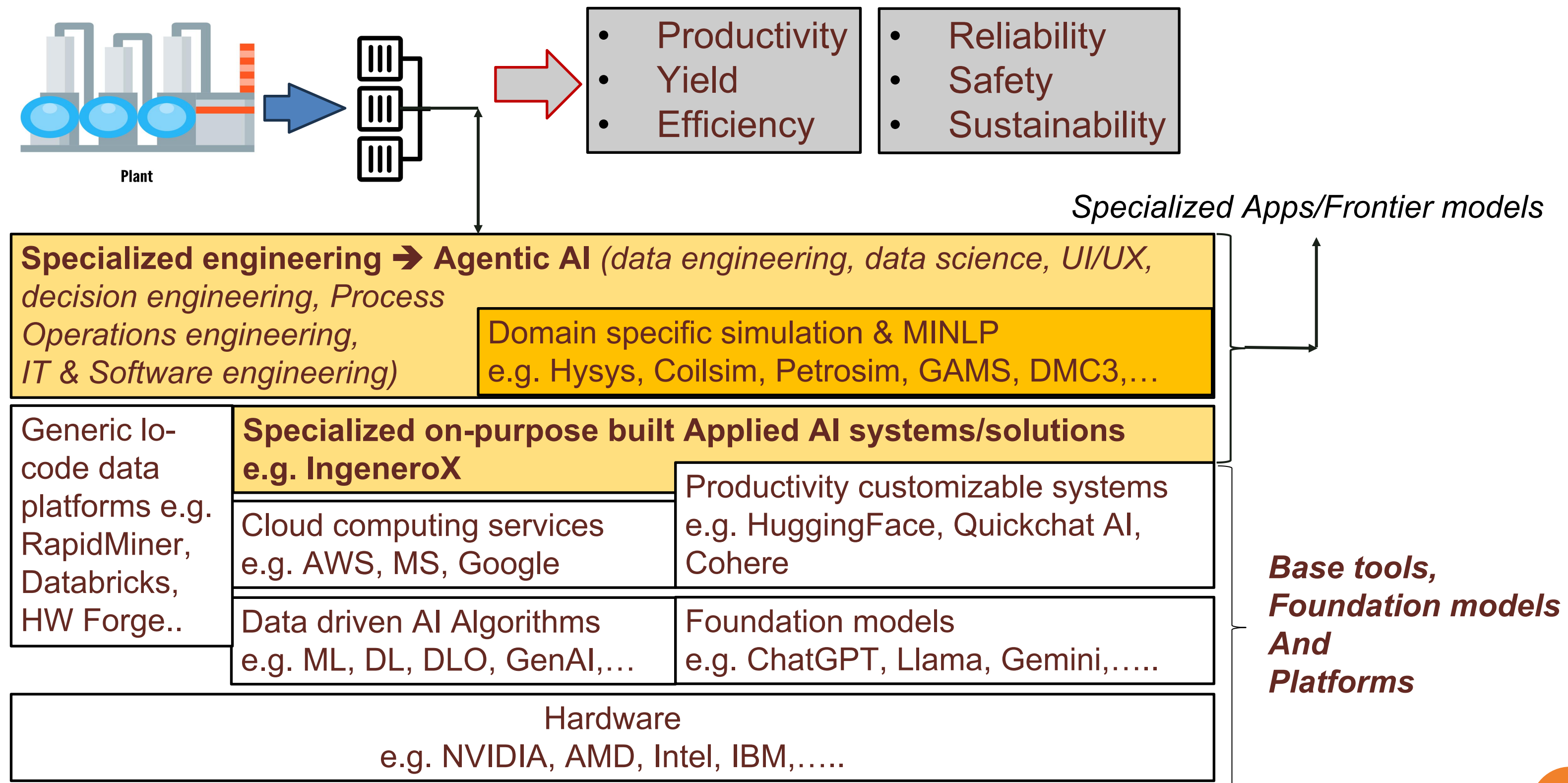


Augmented workflows and improved outcomes from Applied AI based digital solutions, drive their implementation



**Predictive models → AI assistants → Agentic AI**

Ingenero addresses the need for: Performance + UX around “useful” use cases





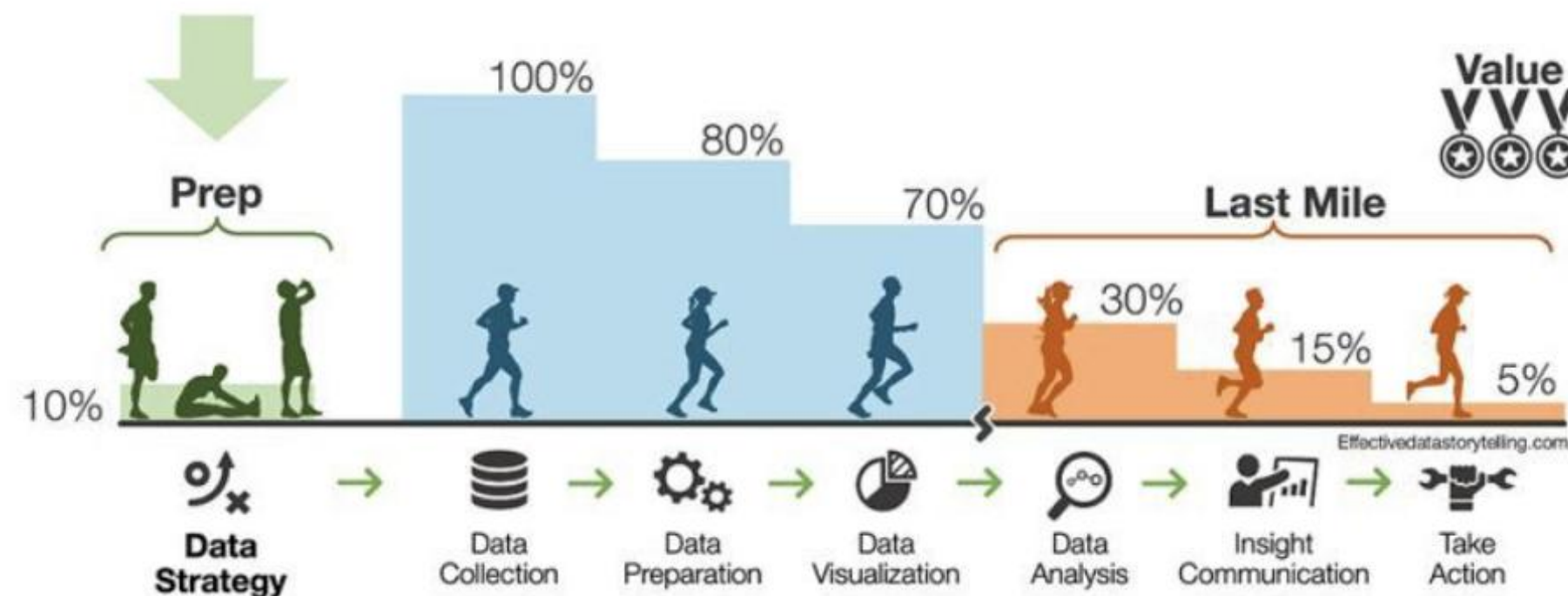
# Artificial Intelligence (AI) Based Transformation

To extract value, there is a need for skills to leverage AI beyond just reporting

**Deploy appropriate technology → Reshape workflows and functions → Enhance → Invent**

Working with Applied AI solution providers with domain expertise, facilitates making this leap happen

Actions → Results



Managing the interconnectivity of use cases and solutions within a domain, is one of the keys to transformation success

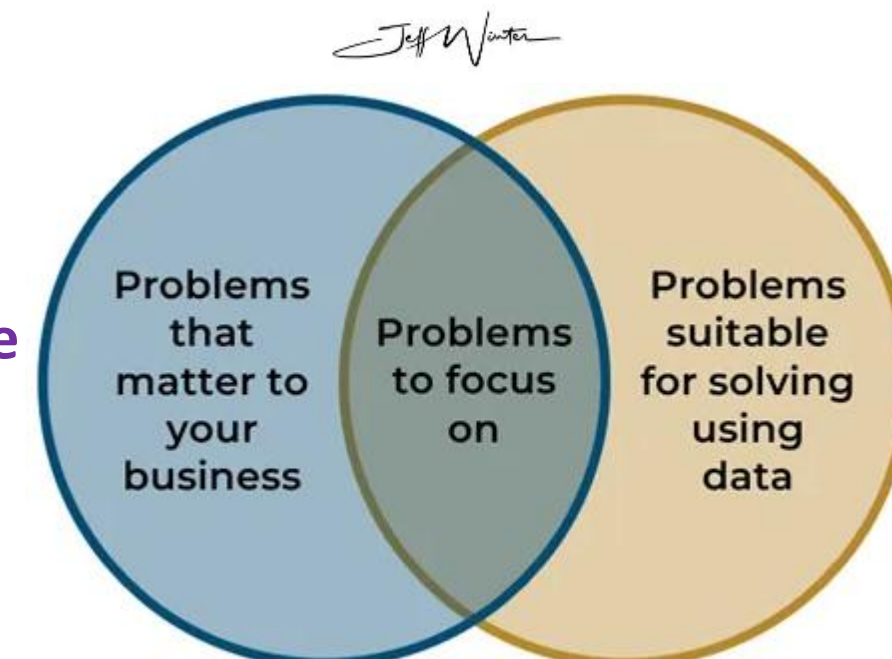
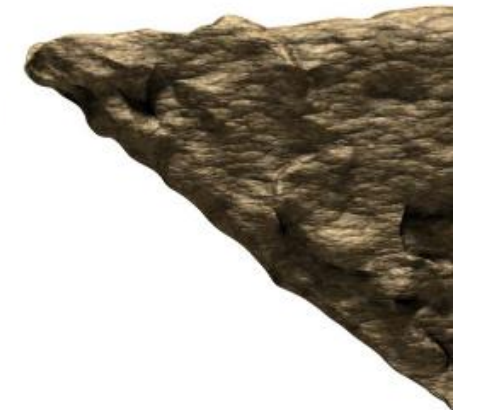
How do I influence outcomes?



How do I report results?



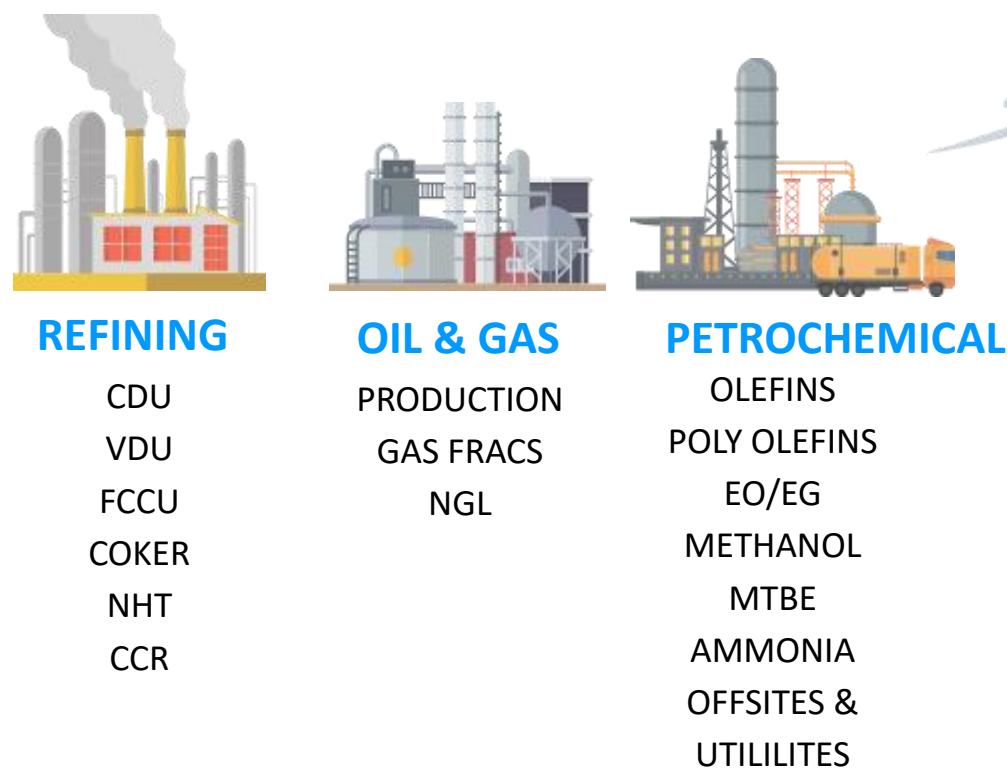
Making The Artificial Intelligence "Leap"



Working on the *right* problems

# Ingenero Experience With AI Based Digital Solutions

Ingenero has deployed Applied AI based end to end digital solutions across multiple processes and diverse domain use cases



## 360° scalable domain use cases

- |                 |                   |
|-----------------|-------------------|
| ✓ Profitability | ✓ Reliability     |
| ✓ Production    | ✓ Safety          |
| ✓ Efficiency    | ✓ GHG Emissions   |
| ✓ Energy        | ✓ Water           |
| ✓ Yields        | ✓ Waste reduction |



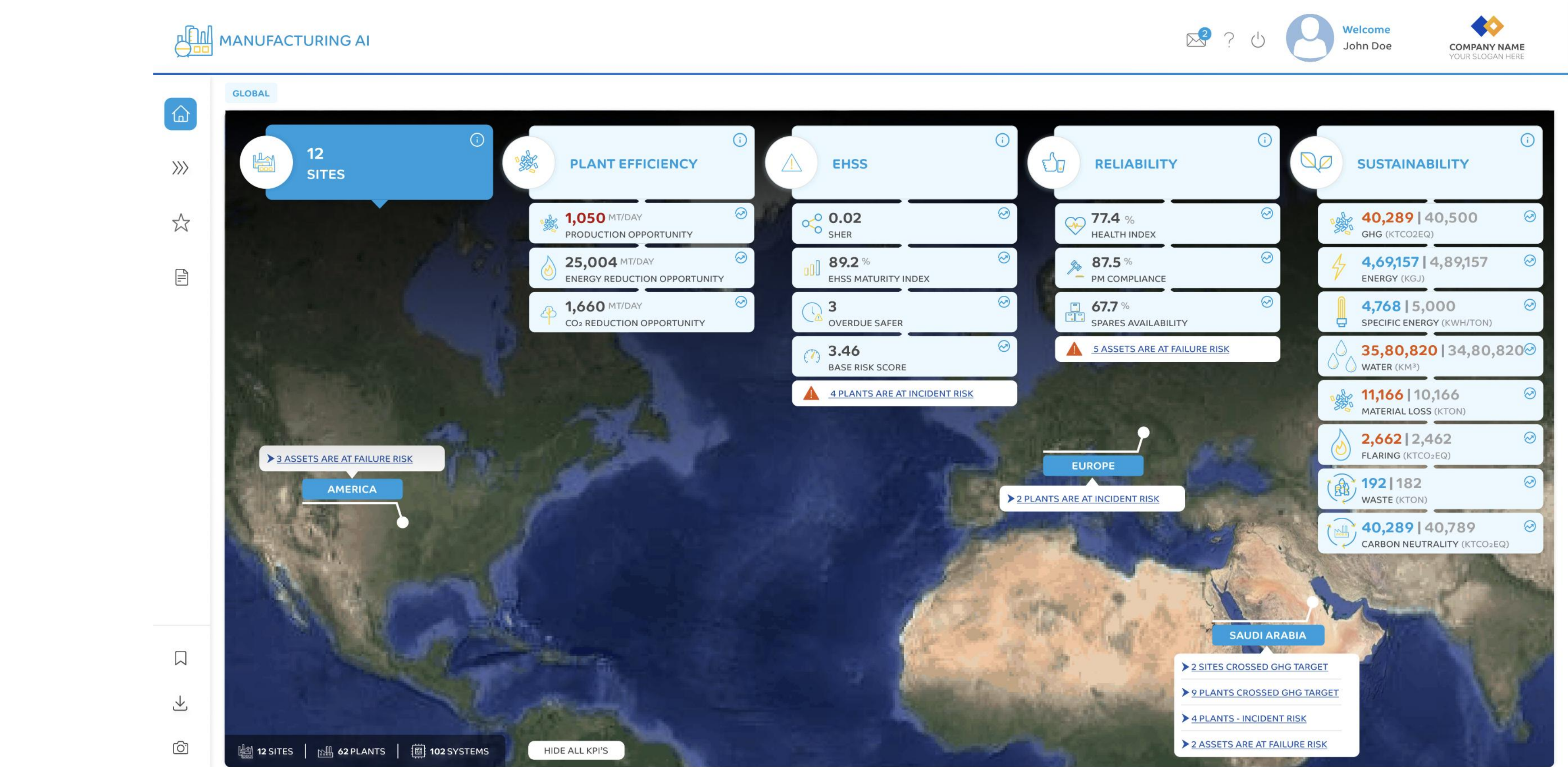
*Delivering continuous remote tracking, advanced analytics and digital twin deployments for operating facilities since 2001*

*Providing advanced operations engineering, design engineering and process safety solutions, since 2002*

*Deploying automated digital solutions since 2015*

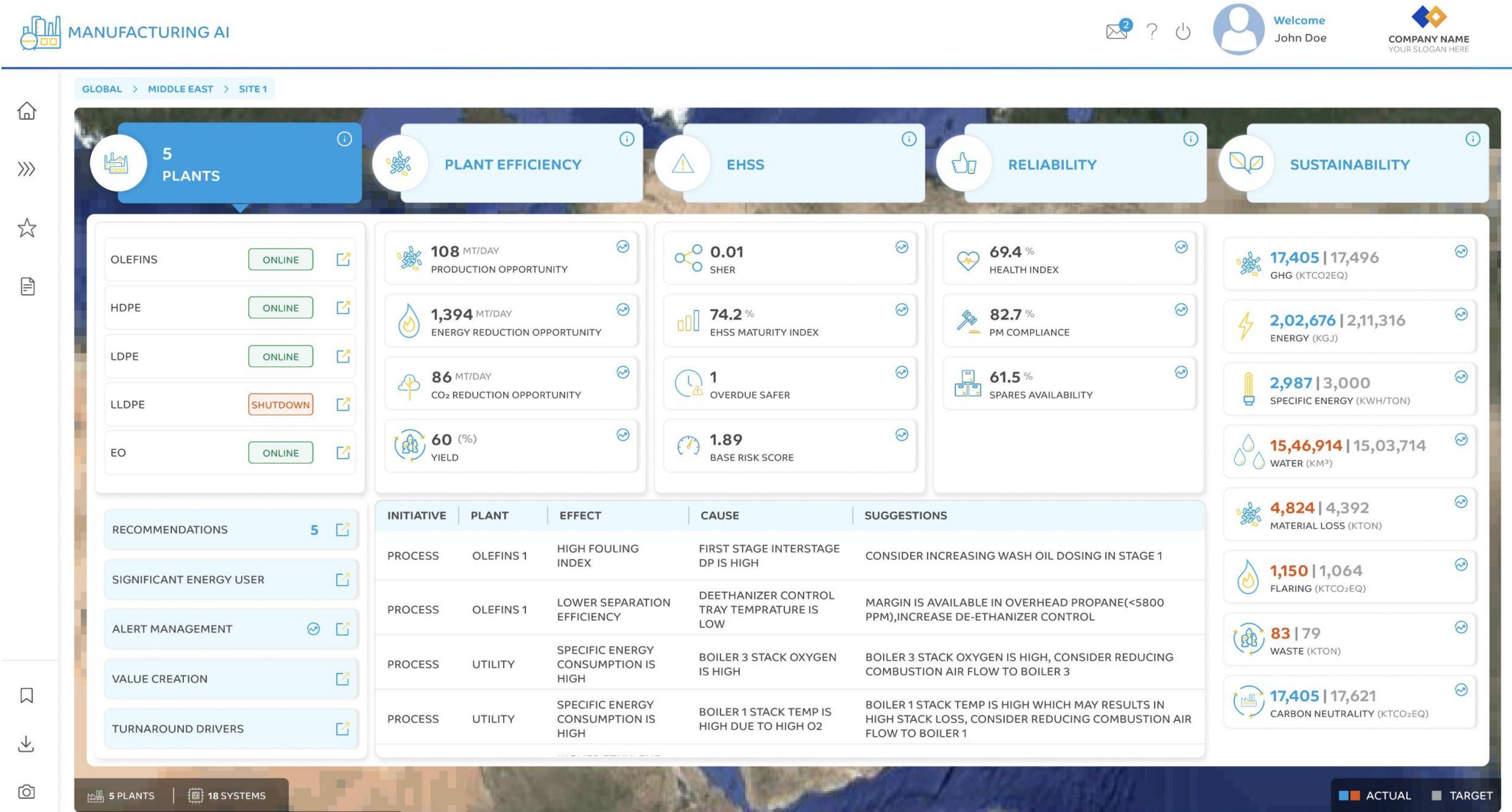


# Case Example - Enterprise View At A Glance



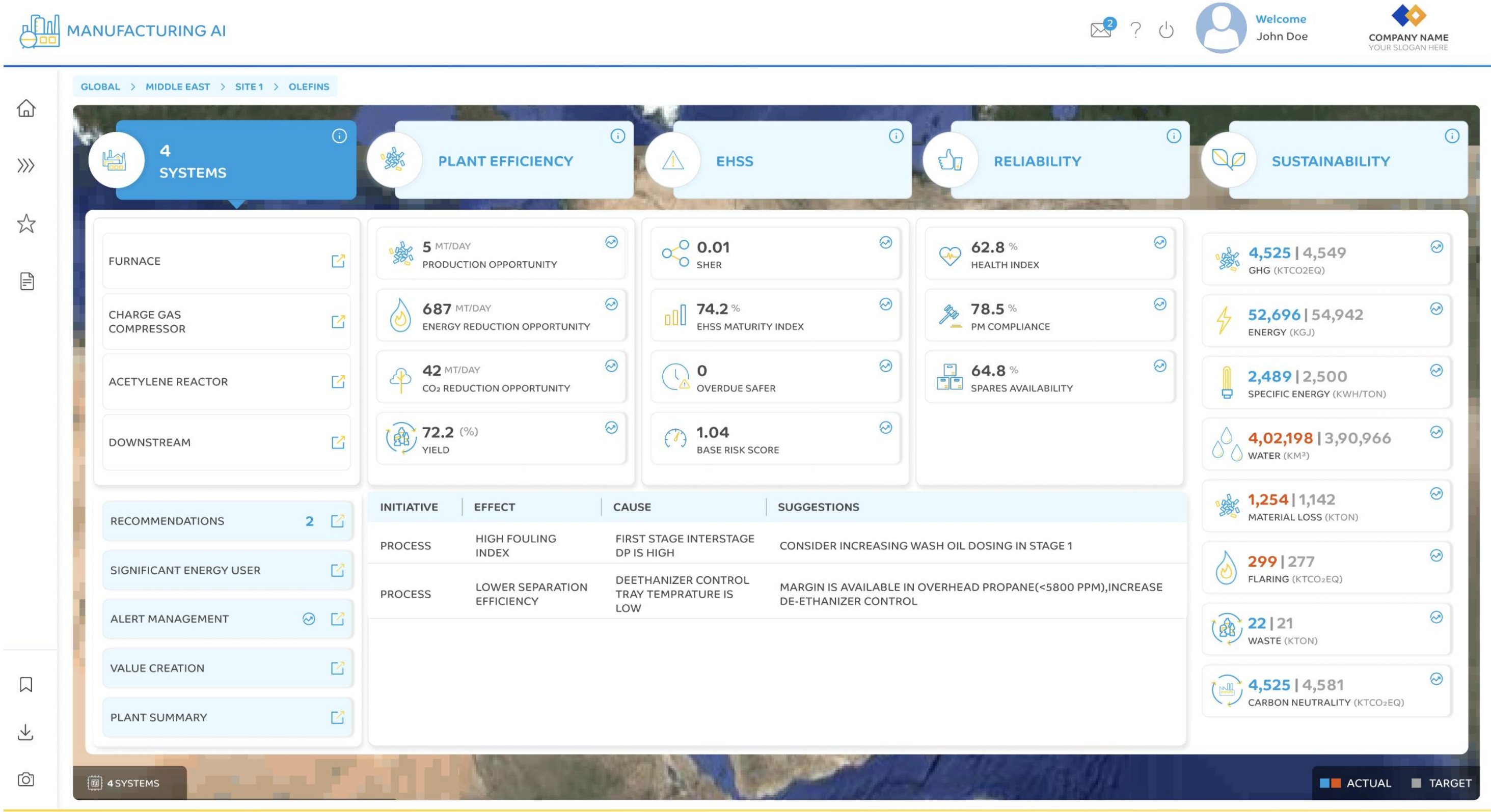


# Case Example – Site Drill Down View

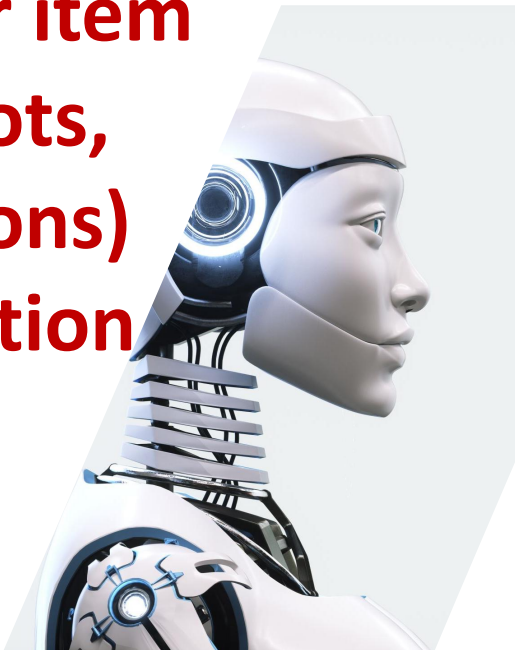




# Case Example – Olefins Plant Drill Down View



**Knowledge retriever**  
**GenAI based**  
**Chatbots answers**  
**a question or**  
**pulls up relevant**  
**screen or item**  
**(data, plots,**  
**calculations)**  
**by exception**





# Case Example Of Enterprise-Wide Benefits

Benefits being realized on an average from an Applied AI deployment across multiple facilities for a petrochemical major client

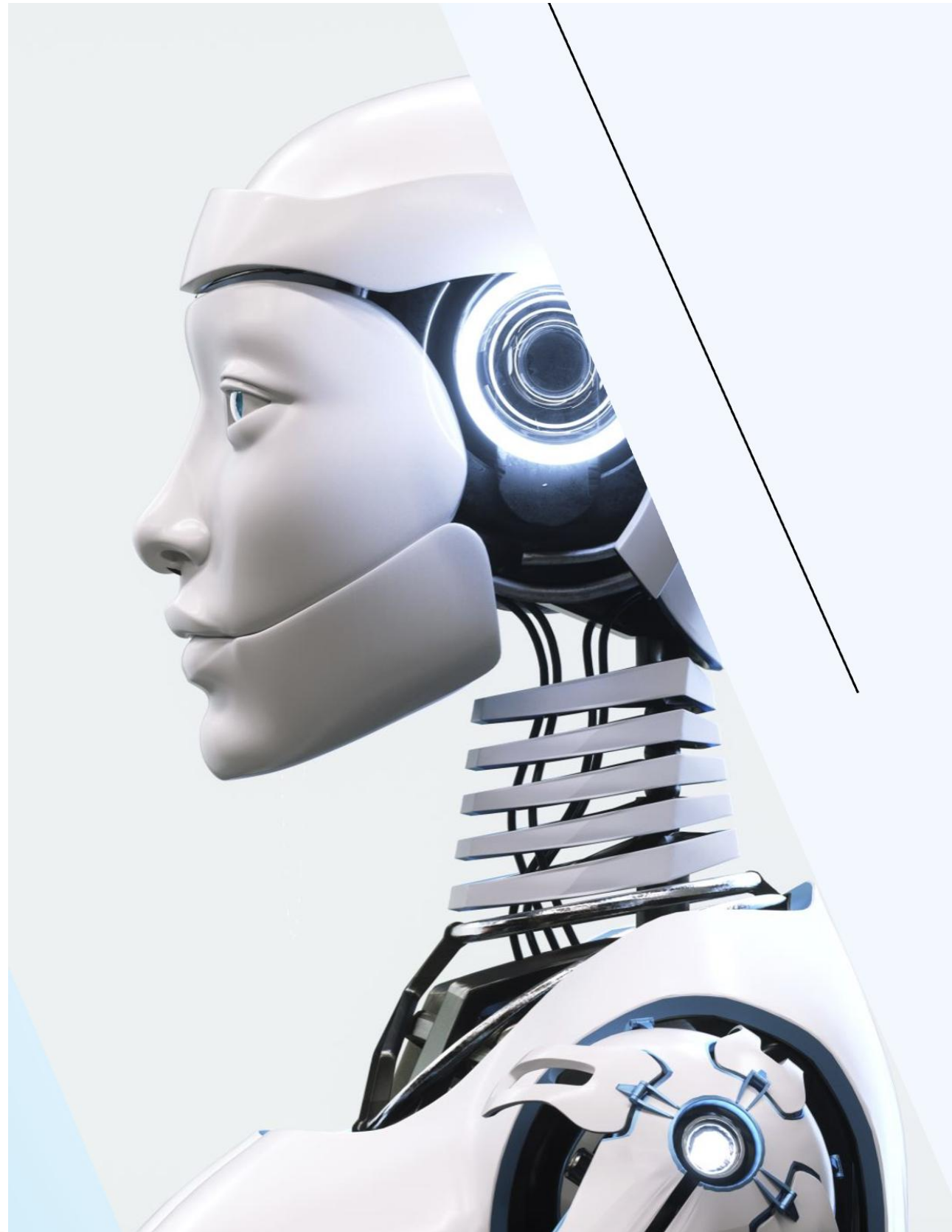
PRODUCTION	ENERGY	EMISSIONS	RELIABILITY & SAFETY	SUSTAINABILITY
134 KTA	2475 GBTU/yr	164 KTA of CO <sub>2</sub> Reduction	3 Incidents Of Unplanned Shutdown, Identified Early	3% Reduction In Overall GHGs

PRODUCT FAMILY
Olefins
Methanol
Ammonia
EO-EG
LDPE/ LLDPE/ HDPE
Utilities



# GenAI Application Modules

Ingenero solutions include GenAI applications, to improve the User Experience



## INGENERO's GenAI Applications

1

Document Query Bot

2

Smart Dashboard Assistant

3

AI Plot Mate

4

Equipment Spec Parser

5

P&ID Parser



# Agentic AI – The Next Frontier

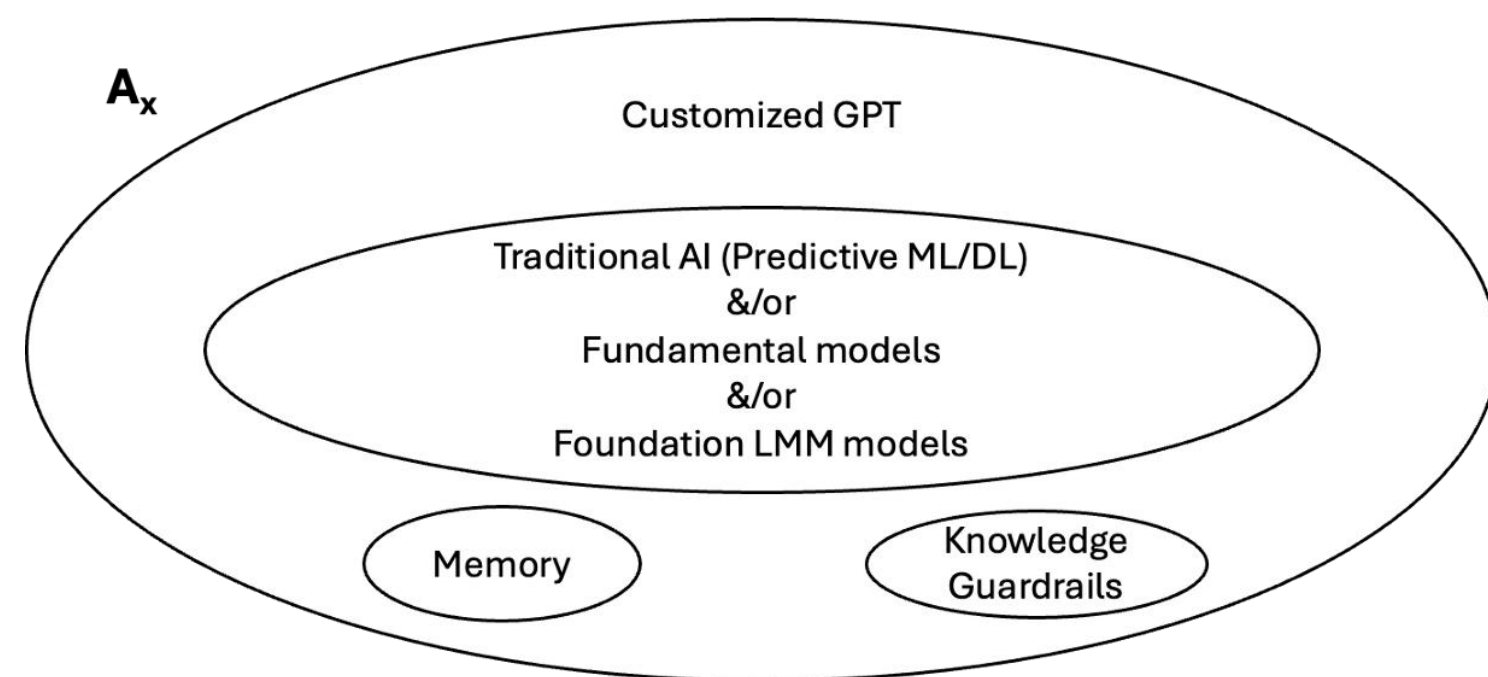
Agentic AI is a step towards enabling the strategic use of customized tools, efficient workflows, and robust evaluation methods

## What does it enable?

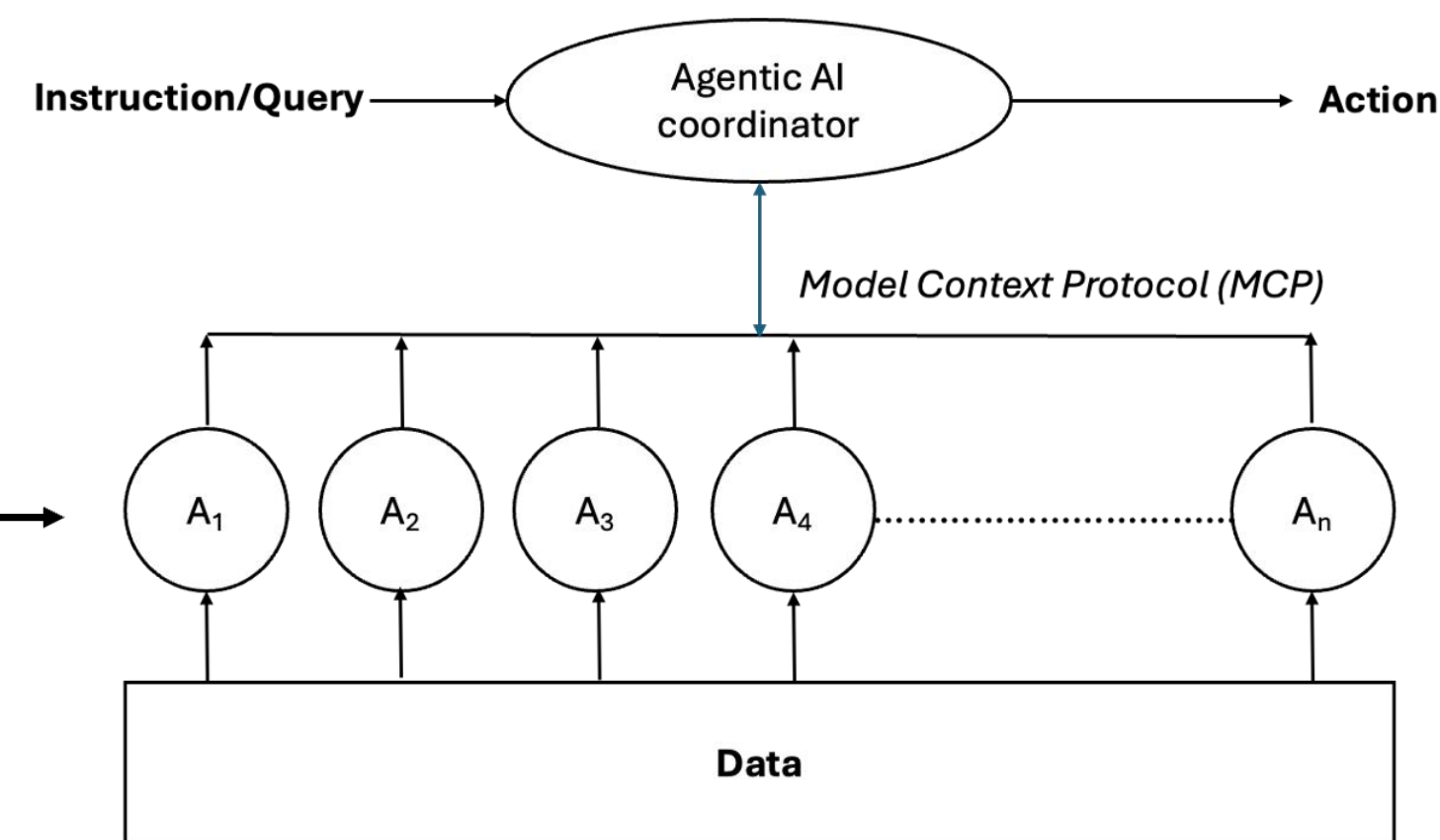
- Evolution from predictive models and copilots → autonomous, goal-driven systems in enterprises
- Autonomous systems, capable of planning, executing, and delivering results
- Enhanced functionality and adaptability
- Effective outcomes across applications

## What does it do?

- Autonomous information gathering and analysis
- Operates in real time, navigating the web and specialized databases, processing diverse data types
- Utilizes a variety of tools and foundational models to meet objectives
- Optimizes these elements



Functional Agent



Agentic AI coordinator uses various customized “Functional Agents” to follow through from query to action in an autonomous workflow



## TO KNOW MORE ABOUT **OUR SOLUTIONS** VISIT OUR BOOTH



### Optimal Asset Effectiveness

- Throughput
- Yield
- Availability
- Cost
- Sustainability



### Engineering/Projects

- Capital Projects
- Process Design
- Brownfield Projects
- Value Engineering



### Safety Engineering

- PSM Compliance
- Risk-Based Process Safety (RBPS)



### Sustainability Solutions

- Carbon Utilization and Storage (CCUS)
- Hydrogen Solutions (H<sub>2</sub>)
- Digital Tracking & Reporting
- Value Engineering



### AI based Digital Solutions

- Digital Twin
- Big Data Analytics
- Generative AI
- Applied AI
- IoT/P
- Digital Agents