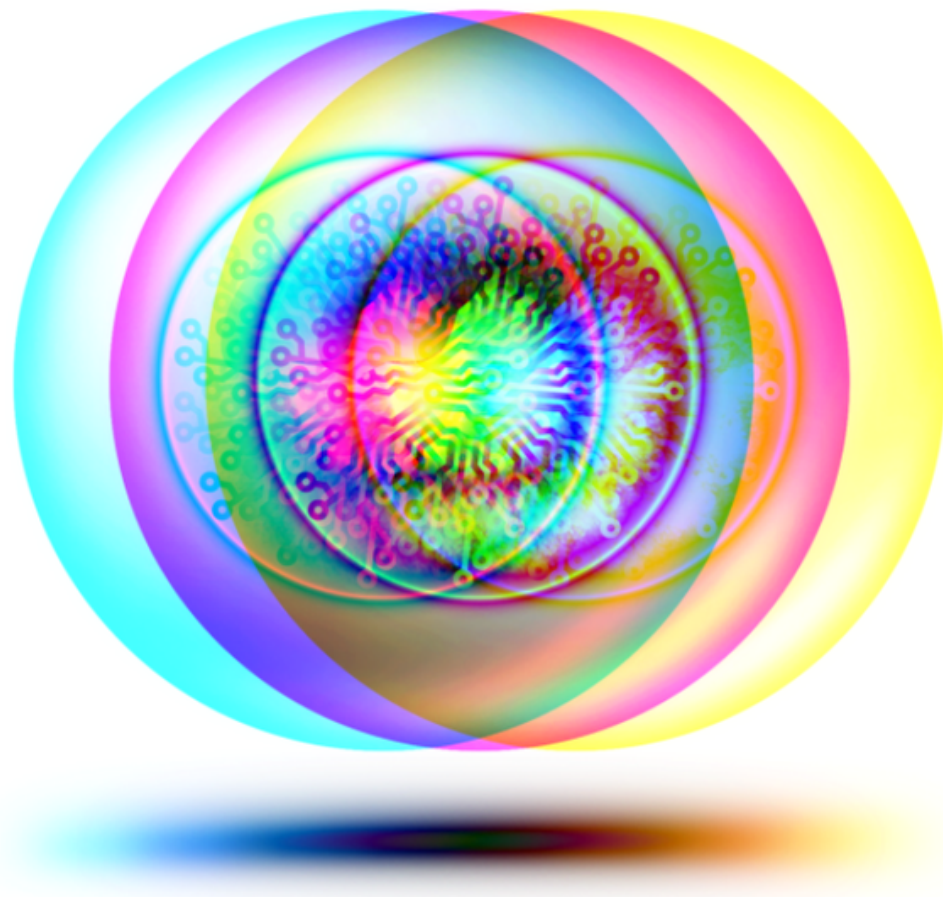




Empowering Industry Through AI

Using artificial intelligence to unlock the potential of Refineries

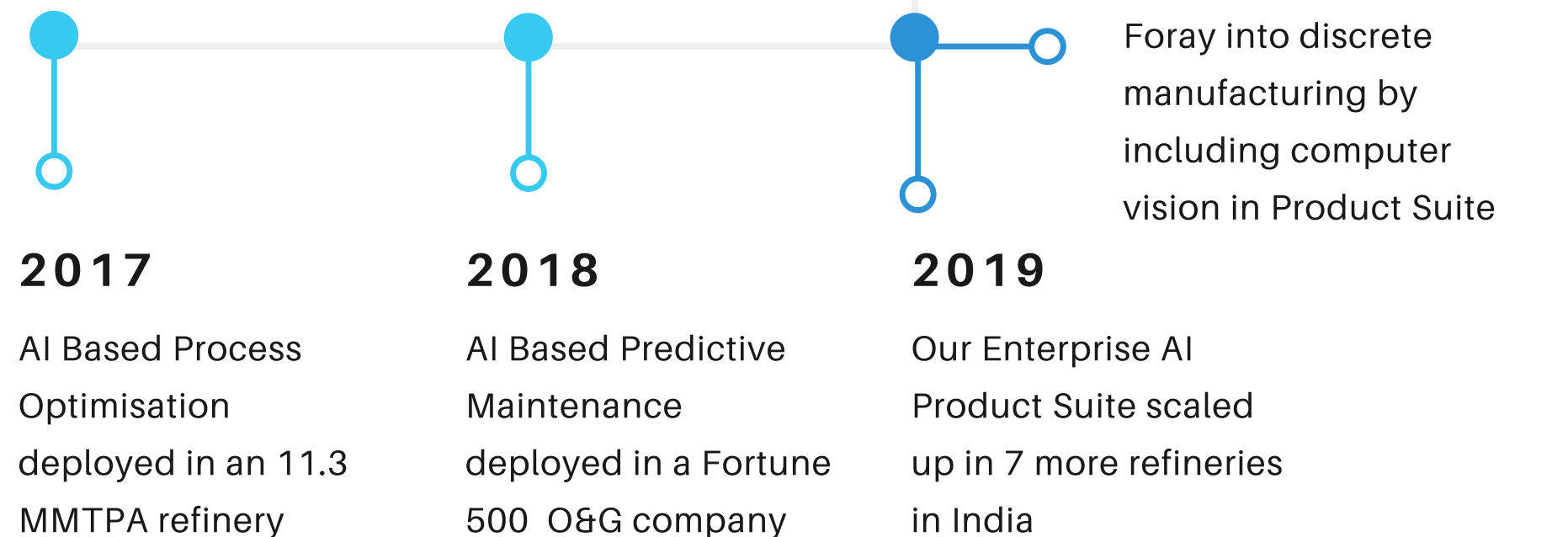


Eyes on the Future. Rooted in our Now.

Company Profile



Algo8: An Enterprise AI Company



Provide AI products that maximise overall productivity, availability, quality, safety, reliability and sustainability of operations through better decisions from data

6 AI R&D Labs Across India
Presence in India, Canada and USA
In the Top 20 Global Startups according to Vedanta Spark
Over 50+ clients including 6 Fortune 500 companies
Global channel reach with partners like IMPSA, Axess & Accenture



Nandan Mishra
CEO
Ex Citi, Google Maps



Himanshu Singh
CTO
Ex Cognizent



Nishish Jha
Chairman
Ex VP, HCL
Ex Chief Strategy Advisor, TechM



K.K. Jain
MD
Ex, IOCL



Praveen Kumar
CBO
Ex Founder Partner of two SAP
consulting companies

Our Management

Our Customers



Testimonial

"The technology has brought about a 360-degree turnaround that has solved the critical setbacks such as leakages, pressures, temperature, vibrations and unplanned breakdowns. We have observed op-ex cuts by reducing the failure quotient of the equipment."

Indian Oil

ASSISTING O&G COMPANIES IN THEIR DIGITAL TRANSFORMATION JOURNEY

DIGITAL MATURITY

1

DIGITAL INITIATOR

- Fragmented use of sensor and OT data
- Fragmented optimisation of operations
- Local Asset Monitoring

2

VERTICAL INTEGRATOR

- Real-time monitoring of asset performance
- Real time monitoring of process unit performance
- Integration of sensor and OT data

3

HORIZONTAL INTEGRATOR

- Multiple Assets optimisation
- Predictive analytics
- Semi-automated response

4

AI ASSISTED PLANT

- AI Based Prognostic Asset Management
- AI Based Process Optimisation
- AI Based Ops and OHS Monitoring
- NLP Based Scheduling Activities

5

AUTONOMOUS PLANT

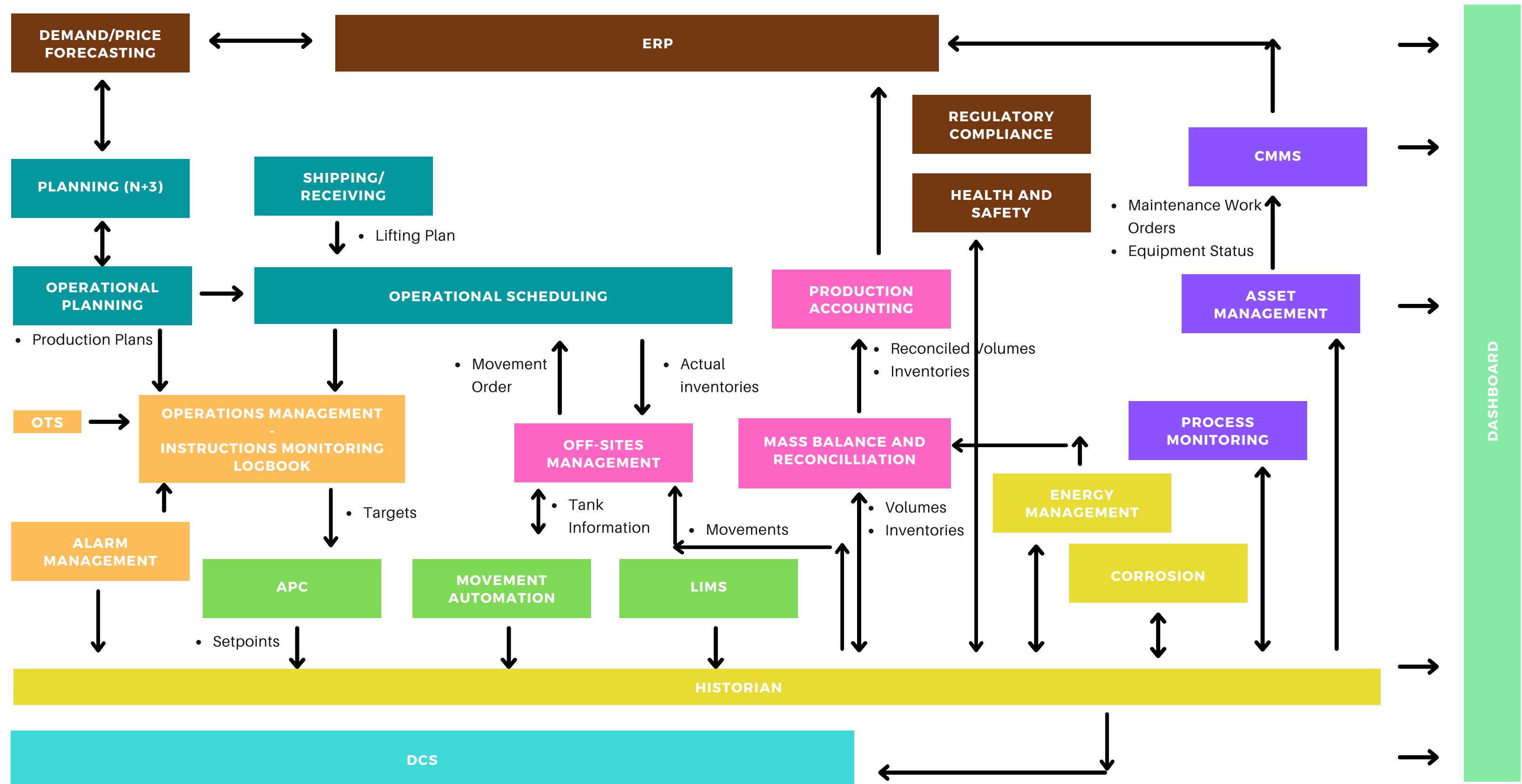
- Network optimisation of operations
- Predictive maintenance across assets
- AI assisted response



Algo8 Enterprise AI platform sits on top data sources linked to IT, IoT or OT infrastructure of a company to usher a new era of operations with increased efficiencies, accelerated production cycles, optimized processes, and well-coordinated and streamlined workflows

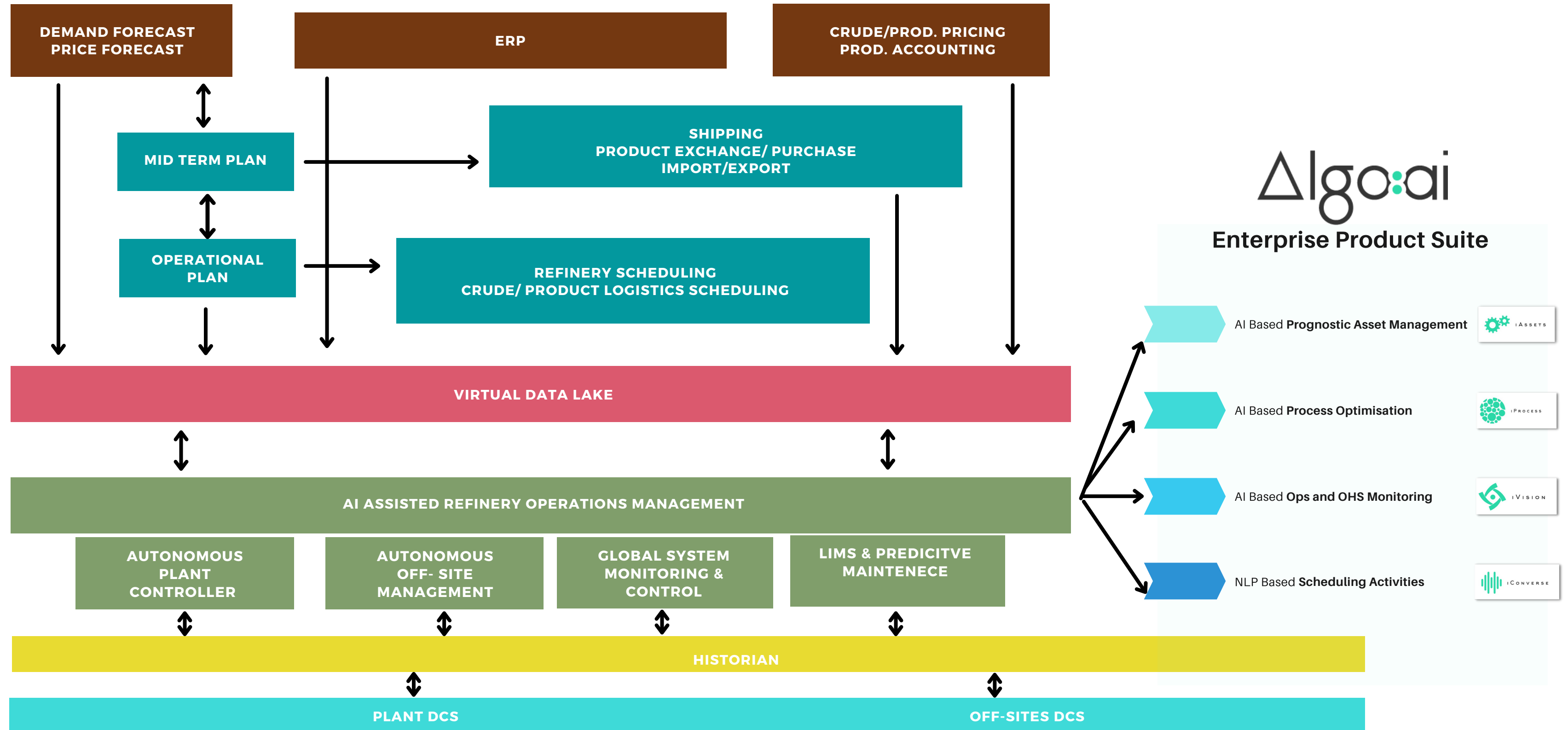
Current Refinery Process

Complex and Siloed



AI Enabled Refinery

Enterprise AI Product Suite For The Worker Of The Future



AI Based Prognostic Asset Management



AI Based Process Optimisation



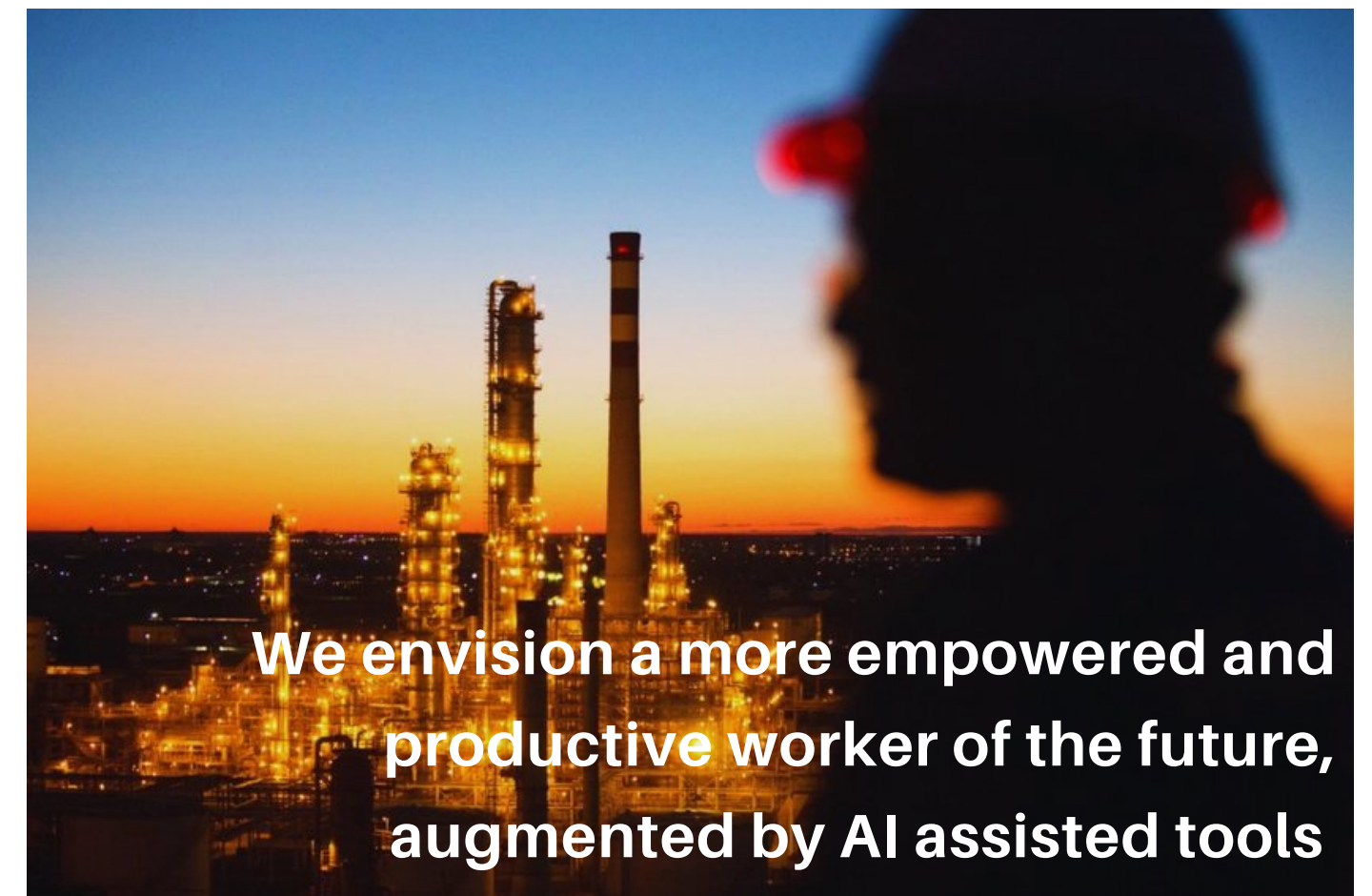
AI Based Ops and OHS Monitoring



NLP Based Scheduling Activities



AI-Assisted Worker Of the Future



Algo8's Enterprise Product Suite For PetroChem

Hardware agnostic, verticalized and replicable

iProcess

Quality Management
Throughput Improvement
Yield Improvement

iVision

Health, Safety & Security
Operations Monitoring
Quality Inspection

iAsset

Asset Performance Improvement
Asset Predictive Maintenance
Asset Spares Management

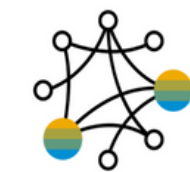
iConverse

Smart Scheduling
Data Extraction
Data Summarization



Before State

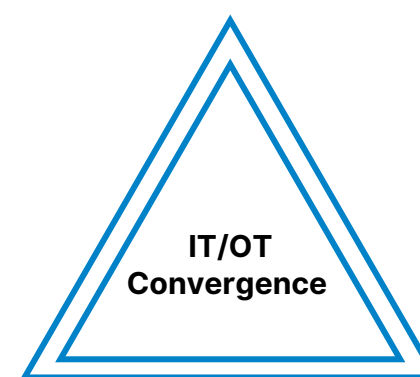
- Reliance on well-established legacy systems
- Based on “first principles” engineering insights such as direct monitoring of temperature or pressure deviations without predictive or pattern-recognition algorithms



IT/IoT Data



AI



IT/OT
Convergence



OT Data

After State

- Highly sensorized generating vast amounts of data which is continuously collected and stored.
- Algo8 Enterprise AI platform sits on top data collectors linked to IT, IoT or OT infrastructure of a company to usher a new era of operations with increased efficiencies

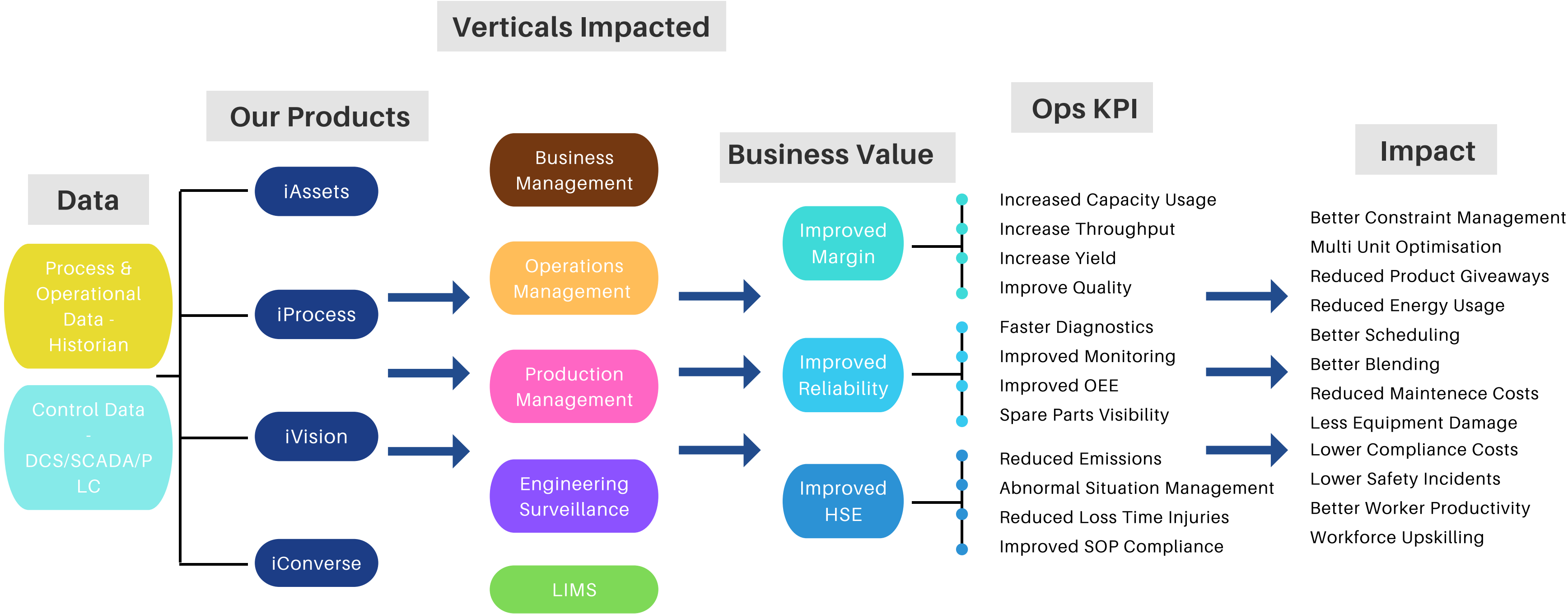
Algo8's Product Capability

We do not settle at just detecting constraints in your operations

Enterprise Product Suite	<div>1</div>	<div>2</div>	<div>3</div>	<div>4</div>
	Detect	Diagnose	Predict	Prevent
Algo8 iAsset	Yes	Yes	Yes	-
Algo8 iProcess	Yes	Yes	Yes	-
Algo8 iVision	Yes	-	Yes	Yes
Algo8 iConverse	-	Yes	-	-

Algo8's Business Impact

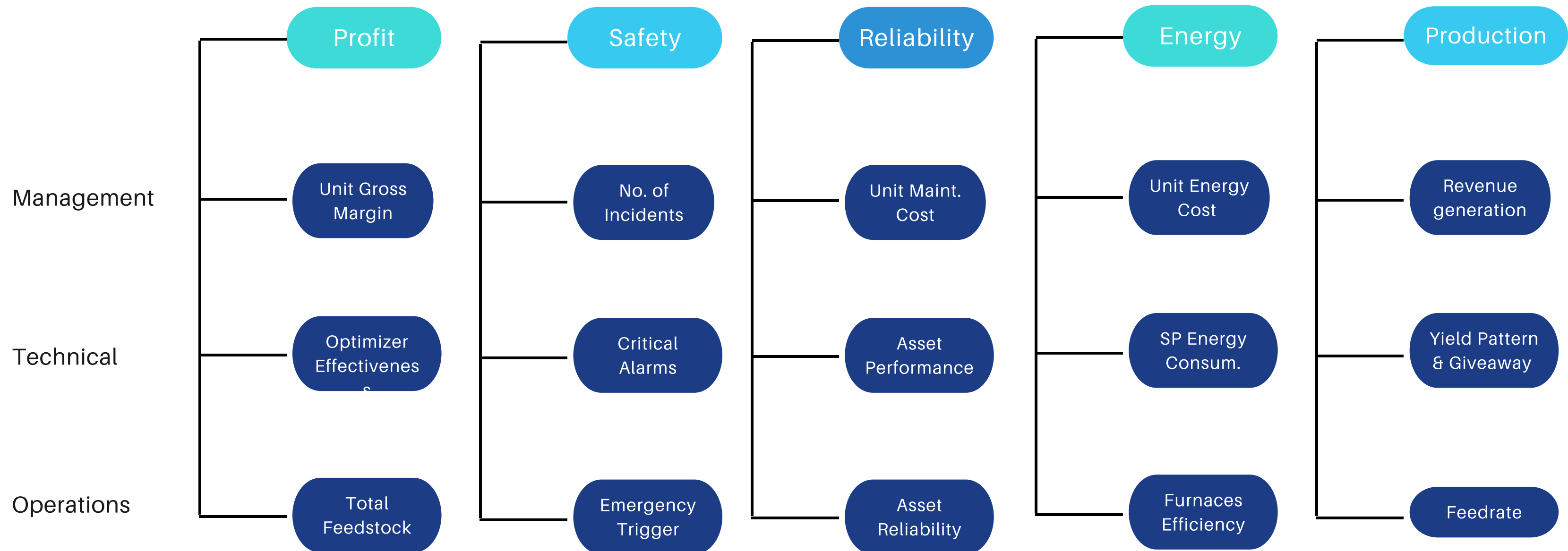
Our products impact your whole industrial value chain



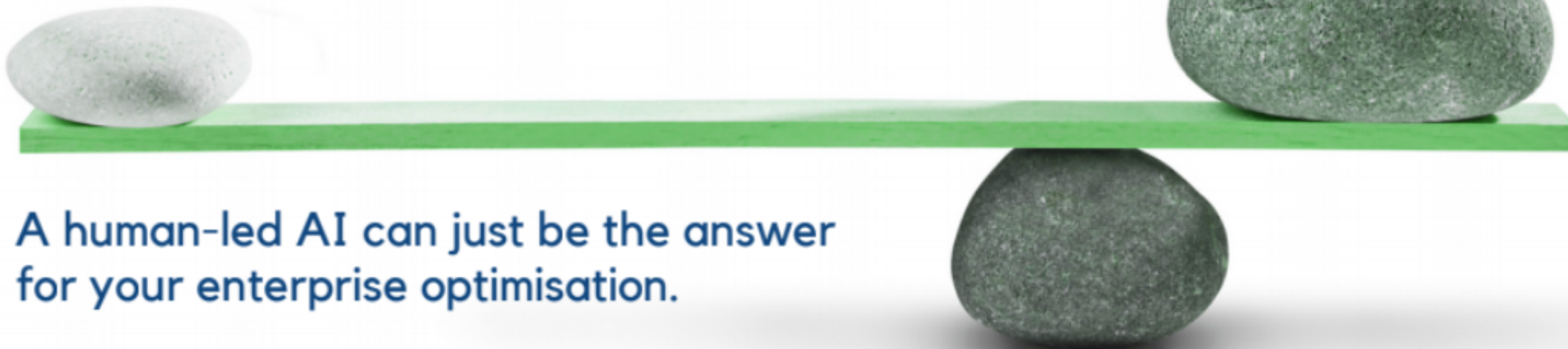
Algo8's Business Impact

Our products impact your whole industrial value chain

ALGO8 MANAGEMENT DASHBOARD



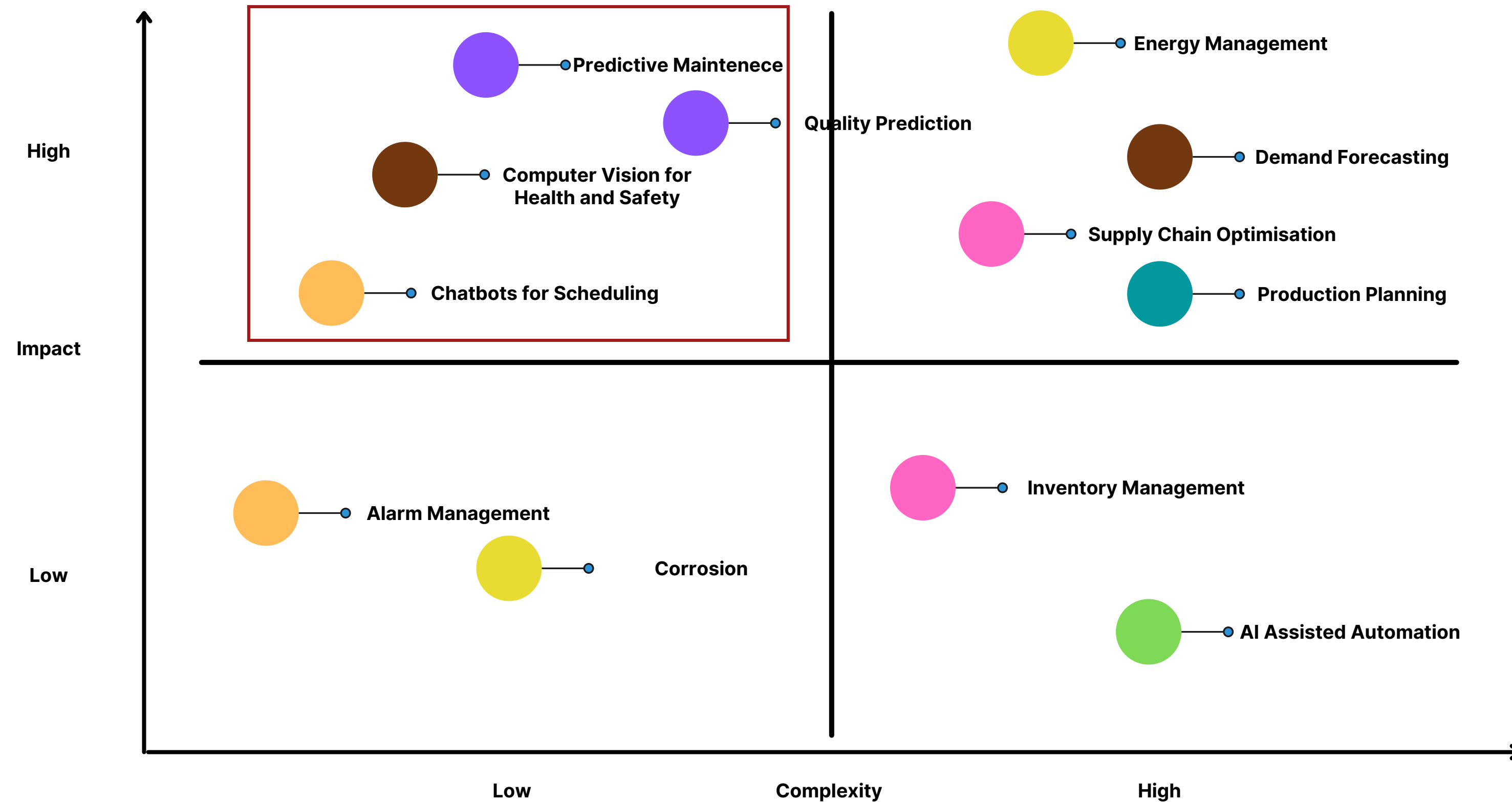
Use Cases for Refineries



A human-led AI can just be the answer
for your enterprise optimisation.

Complexity vs Impact

We want to focus on low complexity high impact cases for Refineries



Key Focus Areas for Refineries

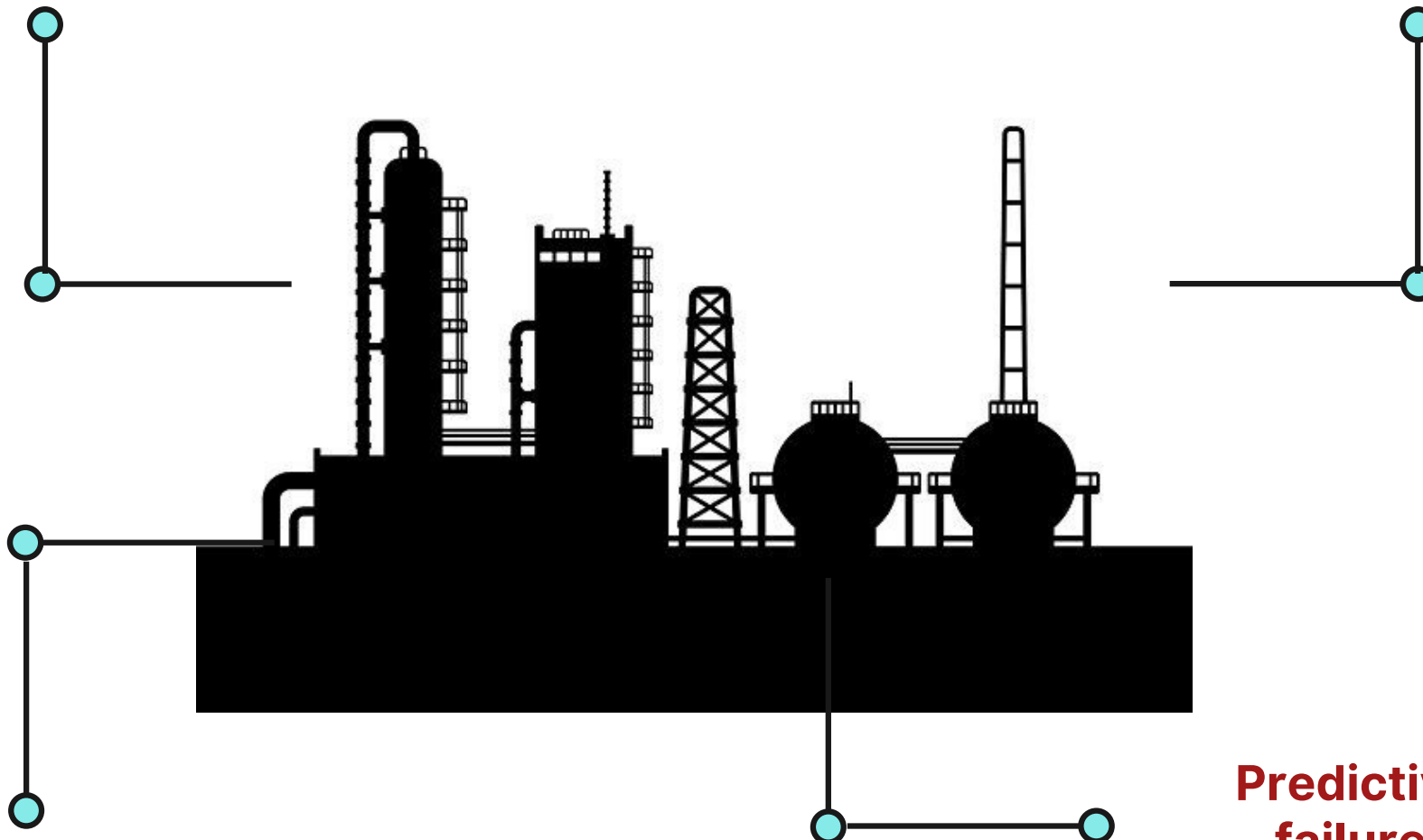
Transform data into actionable insights

**Predictive Maintenance of Main
Air Blower in the FCC unit**

**Predictive cleaning schedule and
maintenance for crude pre-heat
trains**

**Prognostic health management
for condenser fouling**

**Predictive Maintenance and
failure mode analysis for
compressor**



Key Focus Areas for Refineries

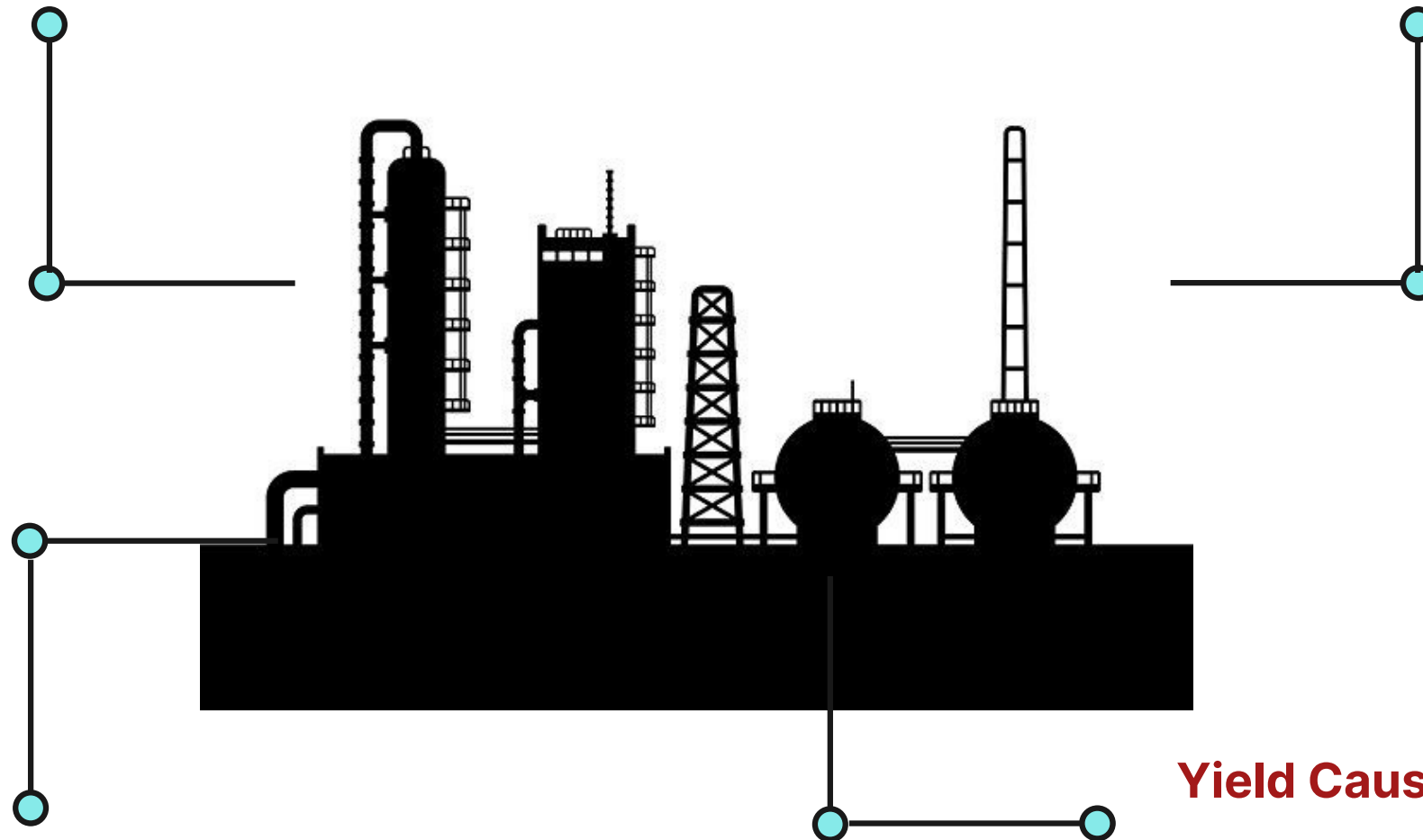
Transform data into actionable insights

Predictive maintenance of
Cooling Towers

Reducing SOX Emission & Lime
Consumption in CFBC Boilers

Catalytic reformer monitoring
and optimization

Yield Causality prediction of FCC
unit.



Key Focus Areas for Refineries

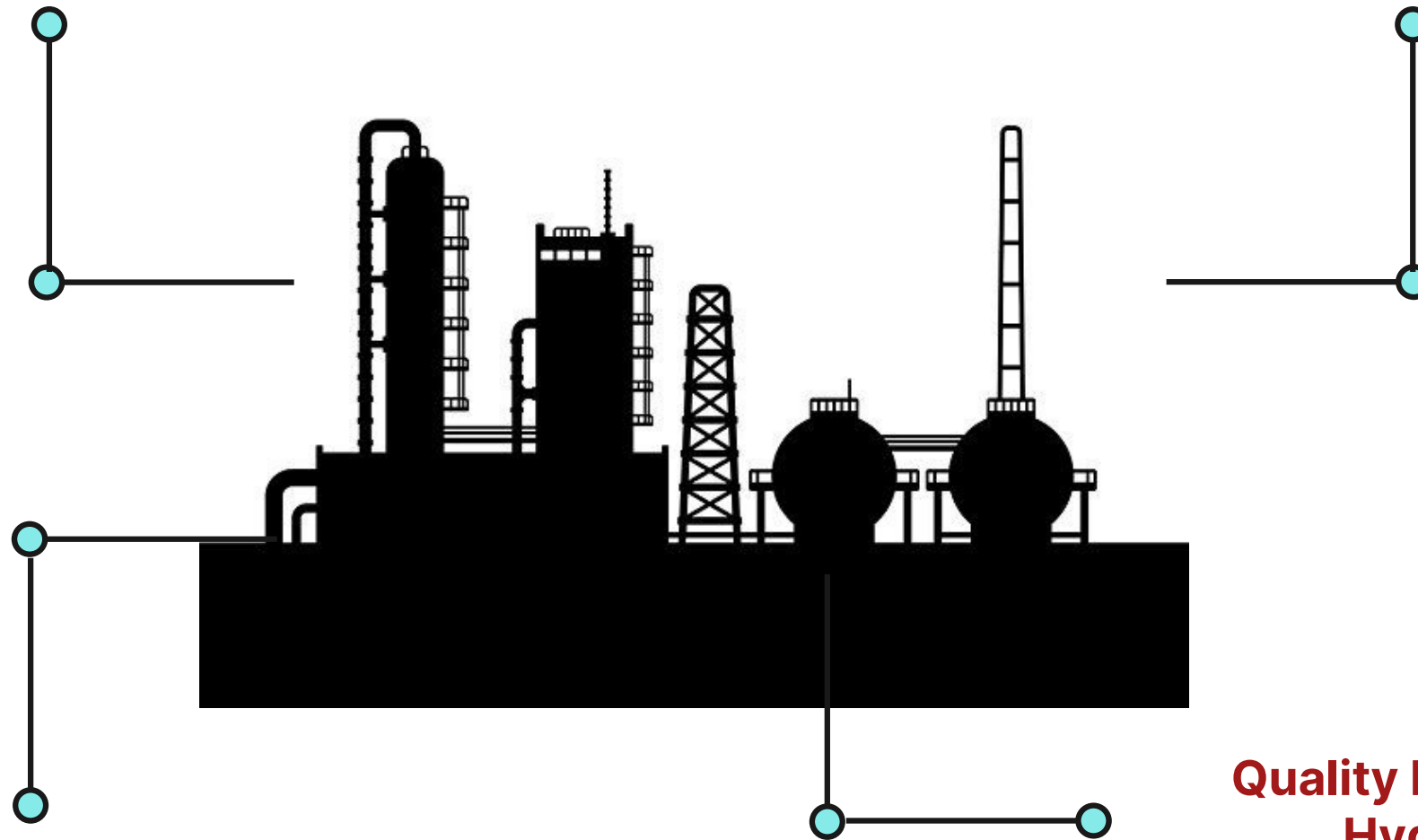
Transform data into actionable insights

Quality Prediction of VGO
Hydrotreater

Diesel Blending Optimization

Fuel Gas and Flare Management

Quality Prediction for Diesel
Hydrotreating unit

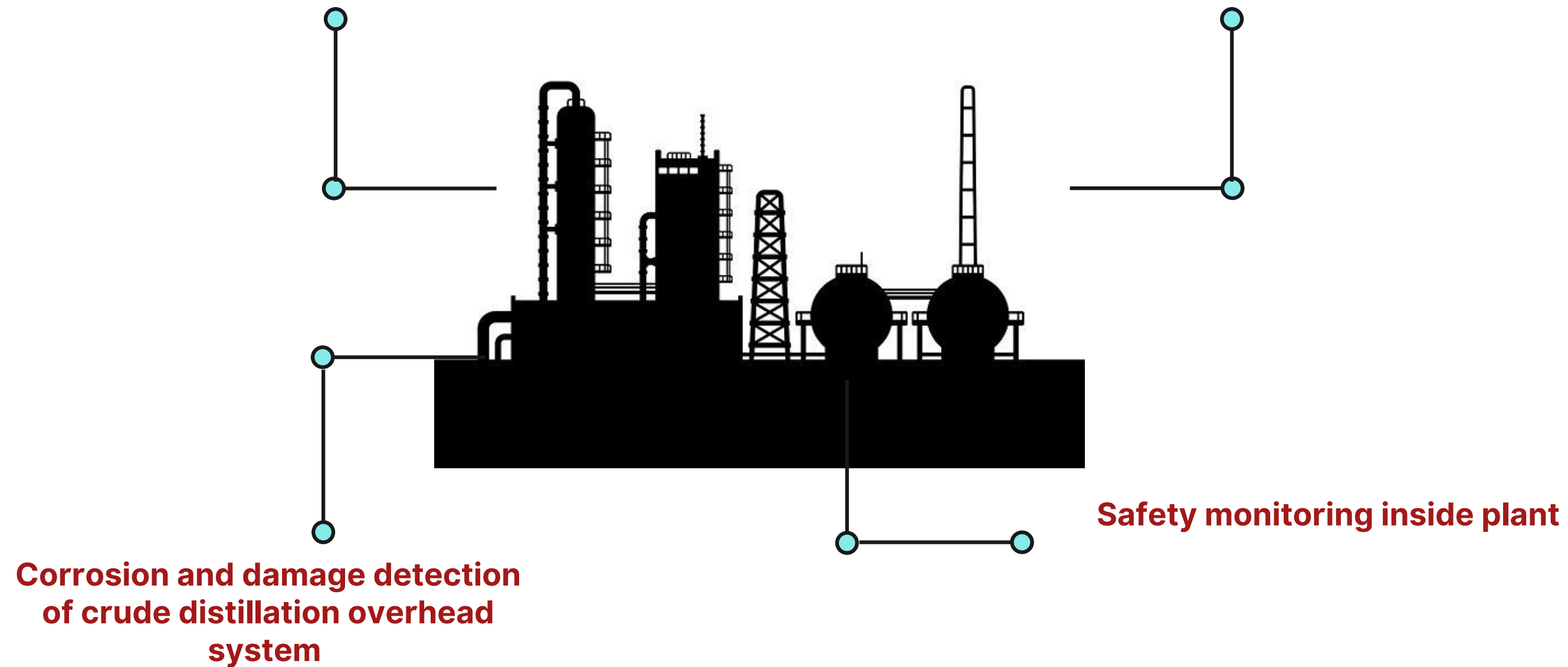


Key Focus Areas for Refineries

Transform data into actionable insights

Amine Network Optimization

Steam Network Management



Key Focus Areas for Refineries

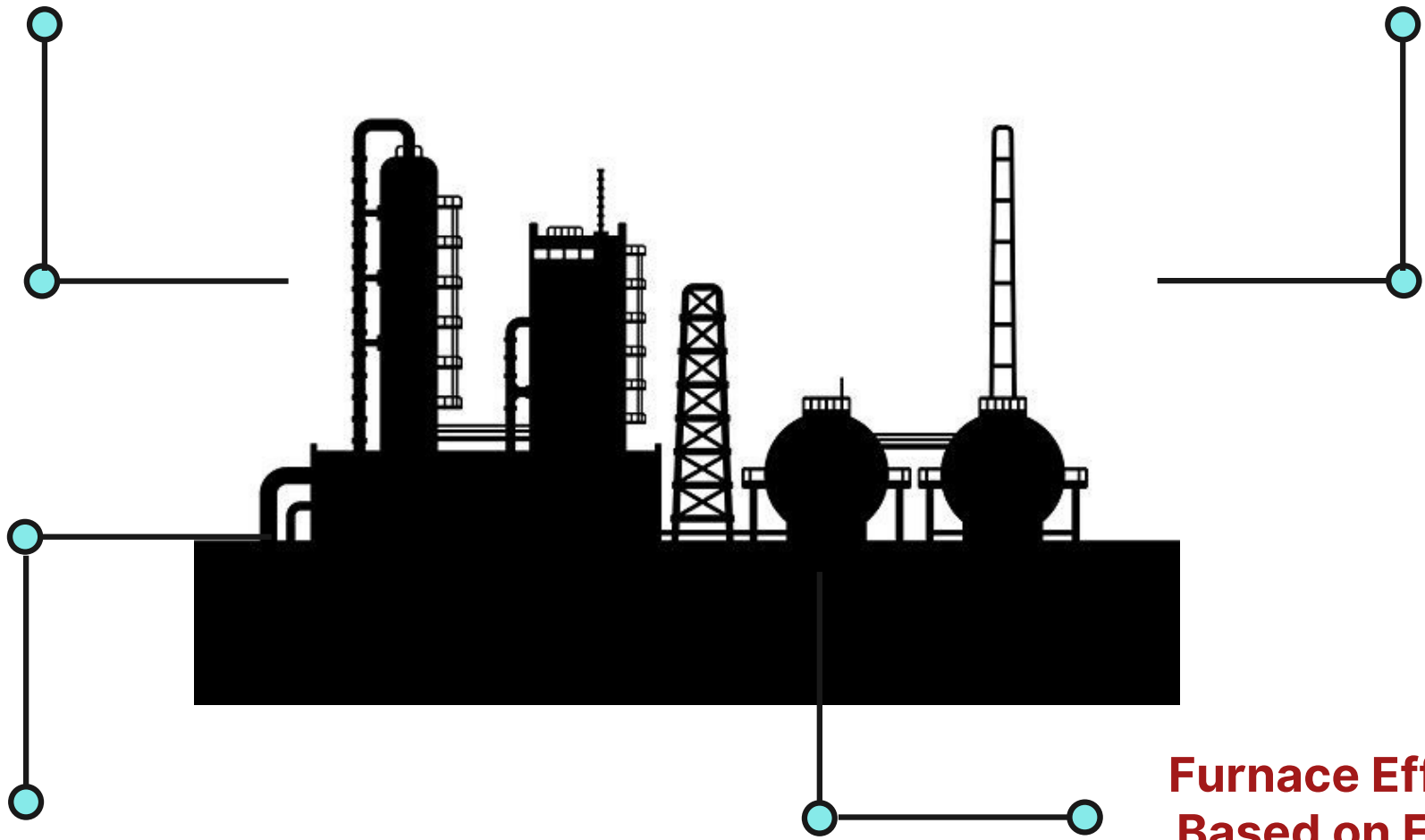
Transform data into actionable insights

Smart surveillance of the plant -
Including rust inspection

Yield Accounting
Material Balance
Loss Balance
Fuel Balance

Fouling Prediction: Asset
Cleaning Management

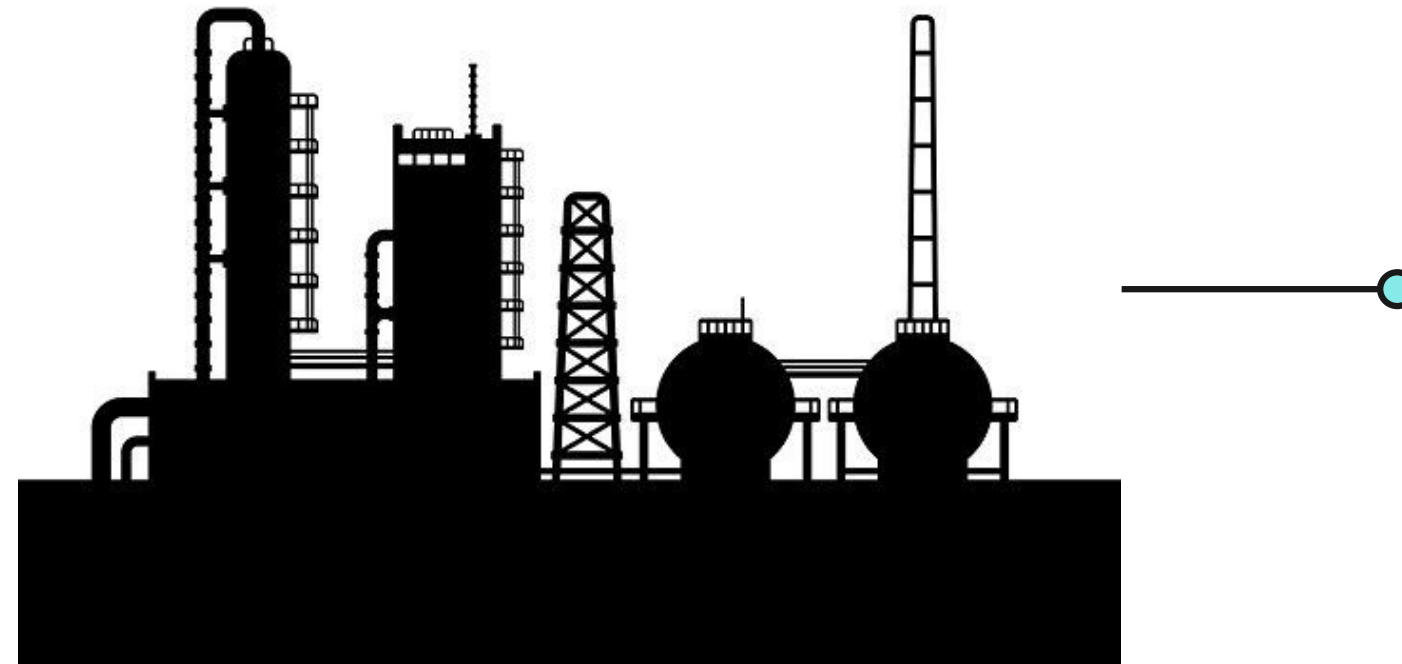
Furnace Efficiency Improvement
Based on Flue Gas Temperature
Optimisation



Key Focus Areas for Refineries

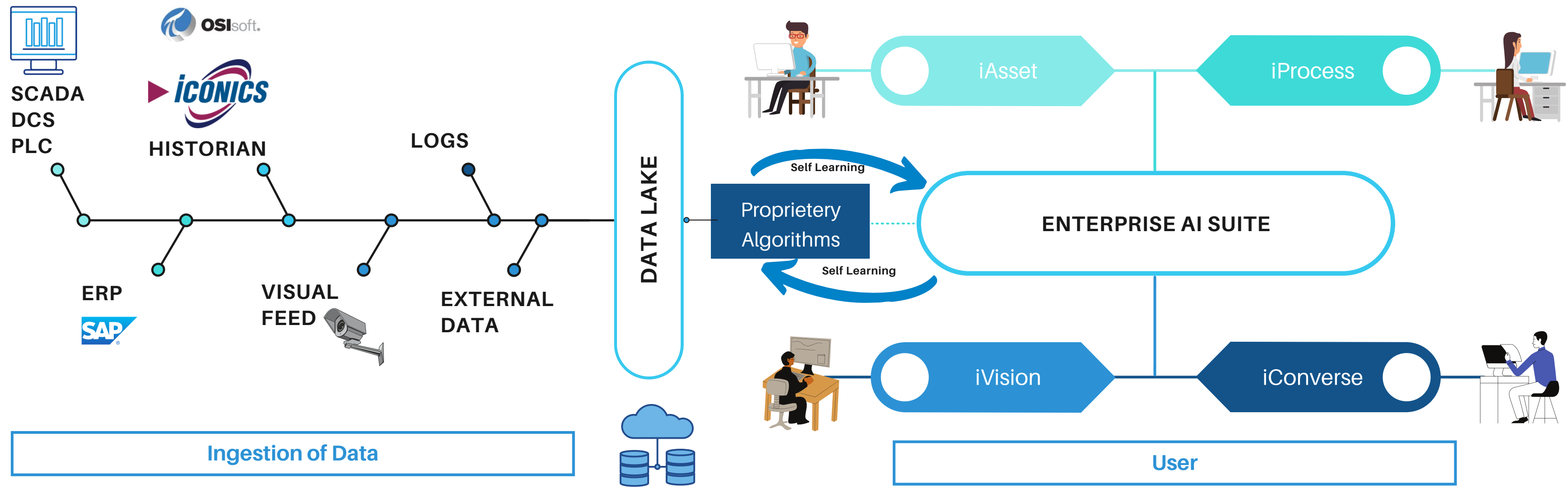
Transform data into actionable insights

Remaining Life Assessment



DHDT/DHDS
HCU
Isomerisation
LOBS
Naptha Hydrotreater
Hydrogen Unit
PENAX

Our Architecture



How we work



Diagnostics – Consulting – Plant Visits

We review relevant, available data to provide context and background information around the current process, pain points and opportunities



PoCs

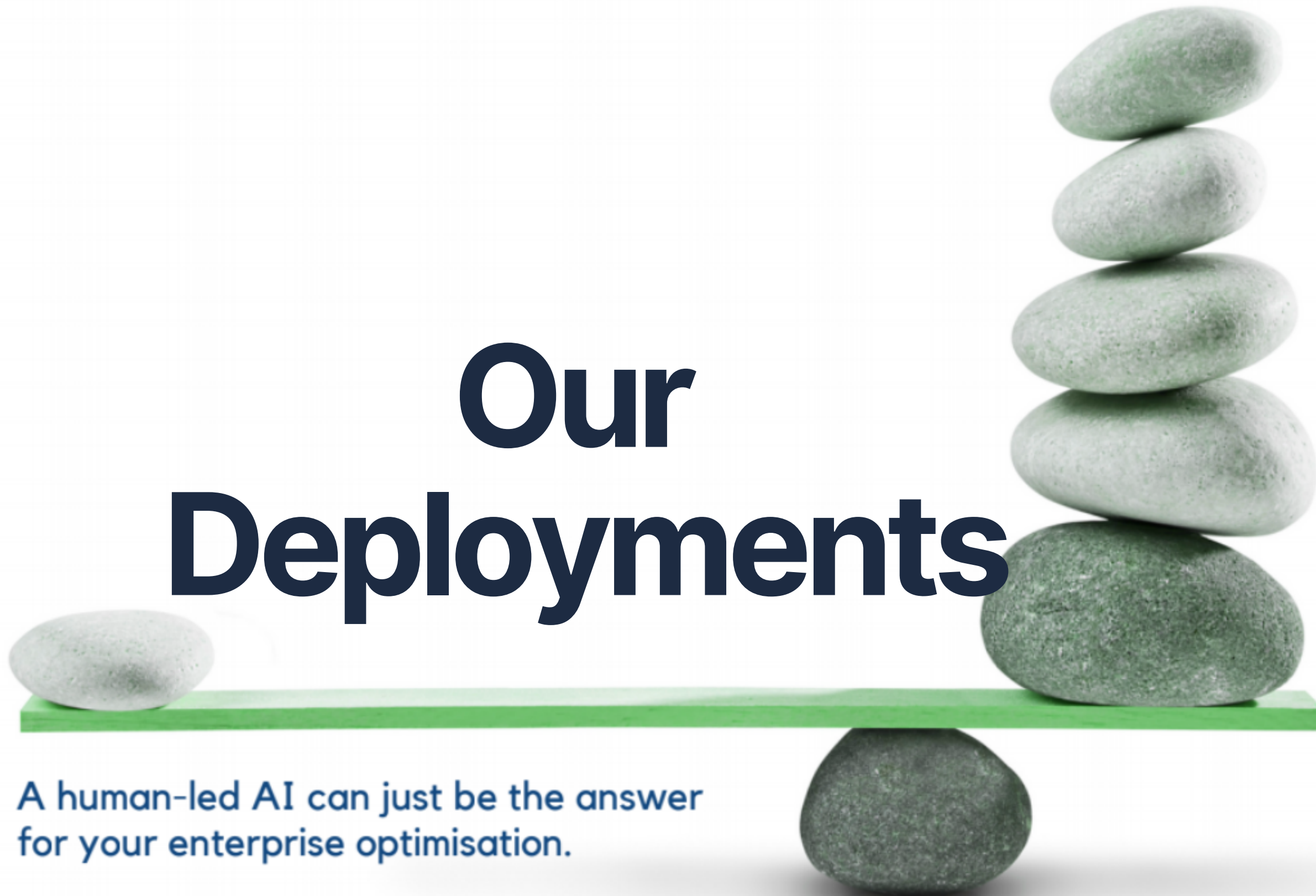
We list digital technology use cases for improving the KPIs prioritised as as a roadmap.
We estimate magnitude of impact and feasibility through PoCs



Pilots and Scale Up

We replicate the learnings from PoC for multiple assets and processes for optimisation of your operations

Our Deployments



A human-led AI can just be the answer
for your enterprise optimisation.

iAsset

Pain Point



A single unplanned shutdown due to failure of a rotary equipment can cost a refinery USD 500K

Current Tech

Rule Based
Conditional
Maintenance

Our Solution

AI Based Predictive Maintenance
- We can predict failure of critical machines with a lead time of 70-100 days

Customer - Downstream O&G company

Market Cap - USD 70 Billion

Increase in availability of equipment - 10%

This has been successfully deployed for a Fortune 500 company and has reduced maintenance costs by 25%



I A S S E T S

iProcess

Pain Point



Output grade deviation in a reactor, leading to off-spec batch production and quality issues

Current Tech

Lab Testing of batch with a lag of 6 hours

Our Solution

AI Based process optimisation to predict batch quality with 95% accuracy using historical data

Customer - Downstream O&G company

Refinery Capacity - 11.3 MMTPA

Days of efficiency gained - 26 days

Our customer saved approximately USD 11 Million by preventing lumps during a reaction in PP Reactor and reducing off-spec production



I P R O C E S S

iVision

Pain Point



Human eye cannot always capture minute defects in the manufacturing process and SOP/Safety lapses

Current Tech

On-Site Manual Inspection

Our Solution

AI Based visual inspection of key equipments, processes and operational areas to reduce on site visits by 90%

Customer - Major FIBC Manufacturer

Production Capacity - 15 Million FIBCs

Improvement in Bottom Line - 20%

Our customer has digitally transformed its manufacturing process by reducing wastage by 30%



Other Use Cases

A human-led AI can just be the answer
for your enterprise optimisation.



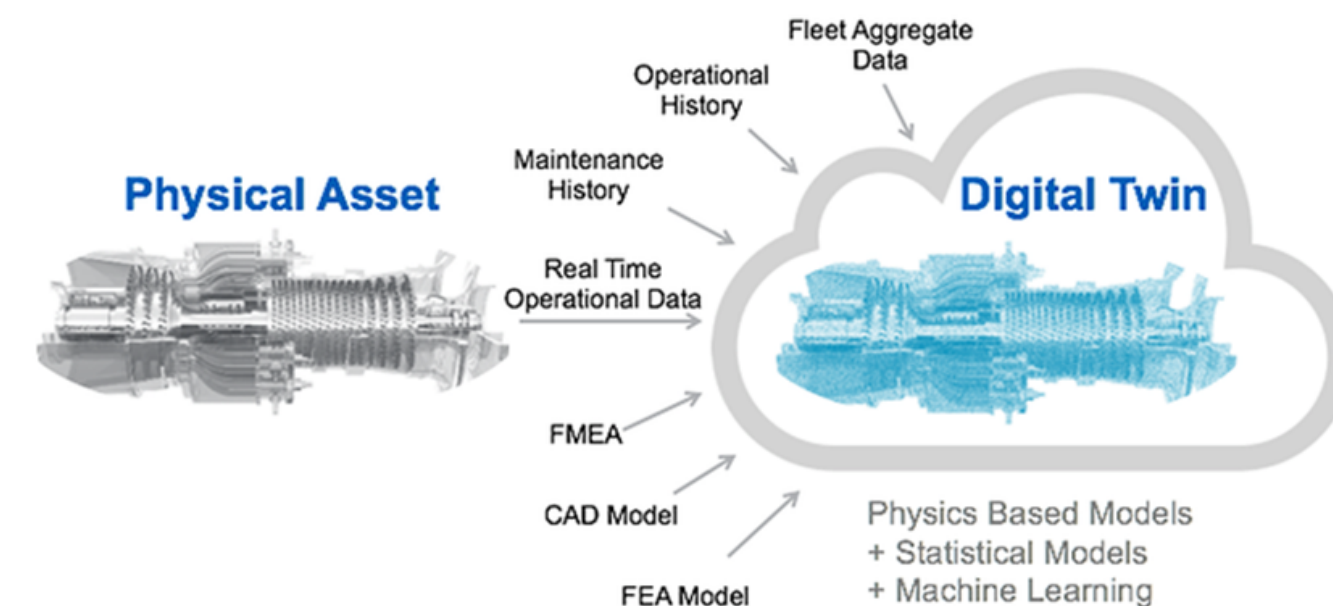
► Digital Twin of Critical Rotary Assets

Challenge

- There is no single view of assets. Centralized asset information is not available to make decisions. Managing complexities and linkage within systems-of-systems is difficult.
- Supercritical equipment's shutdown will lead to discontinuation of the refinery units which is unacceptable due to huge economical loss.
- Need to predictively track the asset health and performance

Value Created

- Visualizing products in use, by real users, in real-time.
- Building a digital thread, connecting disparate systems and promoting traceability.
- Managing complexities and linkage within systems-of-systems.
- Optimize their efficiency and reduce downtimes significantly.
- Improved predictive maintenance of equipment and testing load conditions
- Elimination of prototypes development for R&D purposes.
- Fault analysis, performance analysis etc.



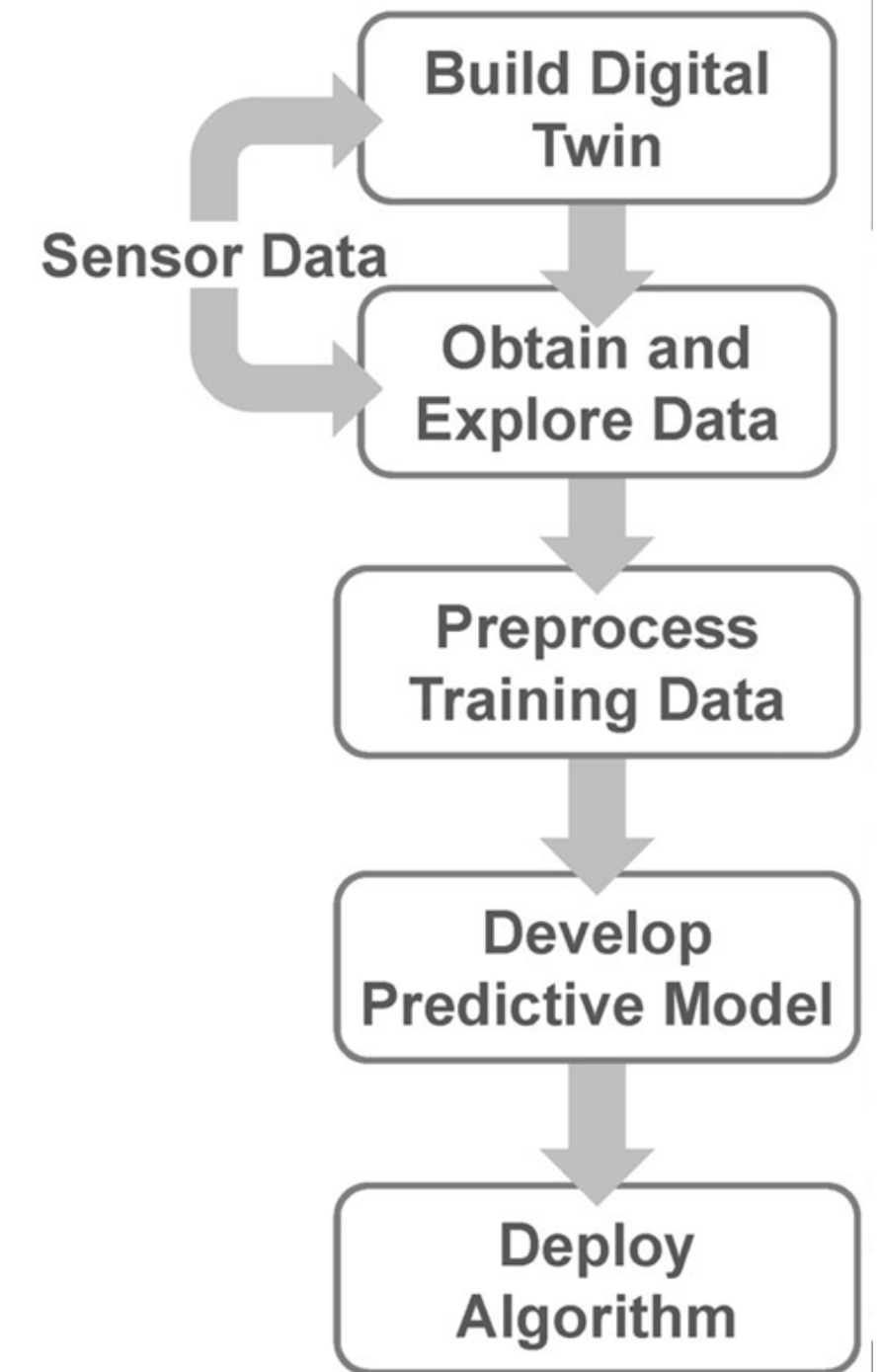
➤ Digital Twin of Process Unit

Challenge

- Modelling the complex chemical processes and related mass & energy balance and reaction kinetics of each unit.
- Managing complexities and linkage within systems-of-systems.
- Tuning of the combined full-scale virtual model.
- Variations in crude/ feed quality, yield requirements and operating conditions make it a highly dynamic system for modelling

Value Created

- Easily optimize each process unit's efficiency and reduce downtimes significantly.
- Testing of equipment and at diverse load conditions.
- Elimination of prototypes development for R&D purposes.
- Process Anomaly Detection and Fault analysis,
- Real-time Product quality prediction and unit performance analysis
- The life expectancy of the processing unit can be estimated.
- The dynamic behaviour of a processing unit can be incorporated into the model, providing better visibility of unit behaviour



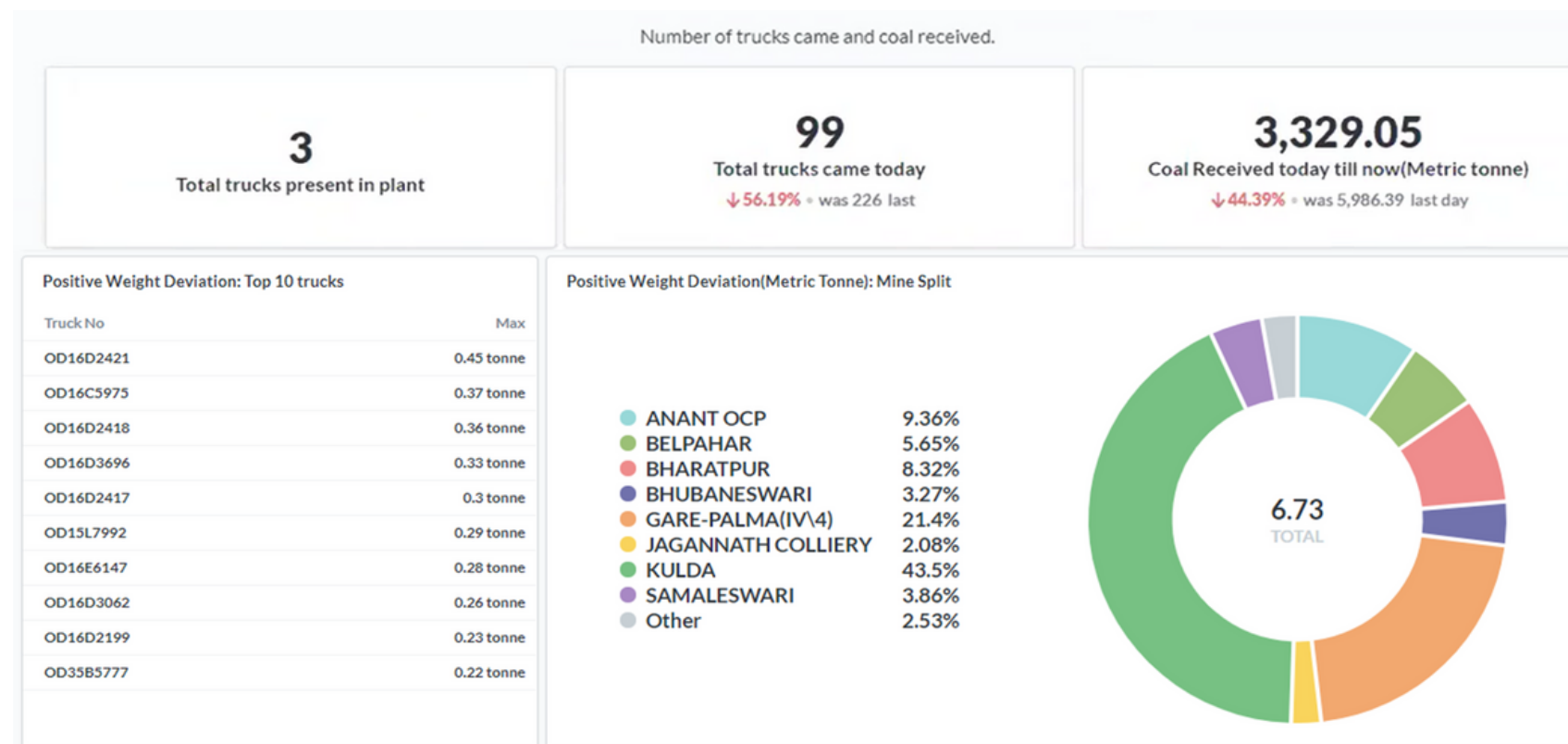
➤ Inbound Coal Management & GCV Prediction

Challenge

- Limited visibility on the coal supply chain for a captive power plant
- No integrated system to utilize data and records available to improve visibility

Value Created

- Real-time reconciliation as compared to 3 months earlier
- Periodic review of KPIs and factors causing deviation in incoming raw materials
- Improved visibility around the supply chain of the process



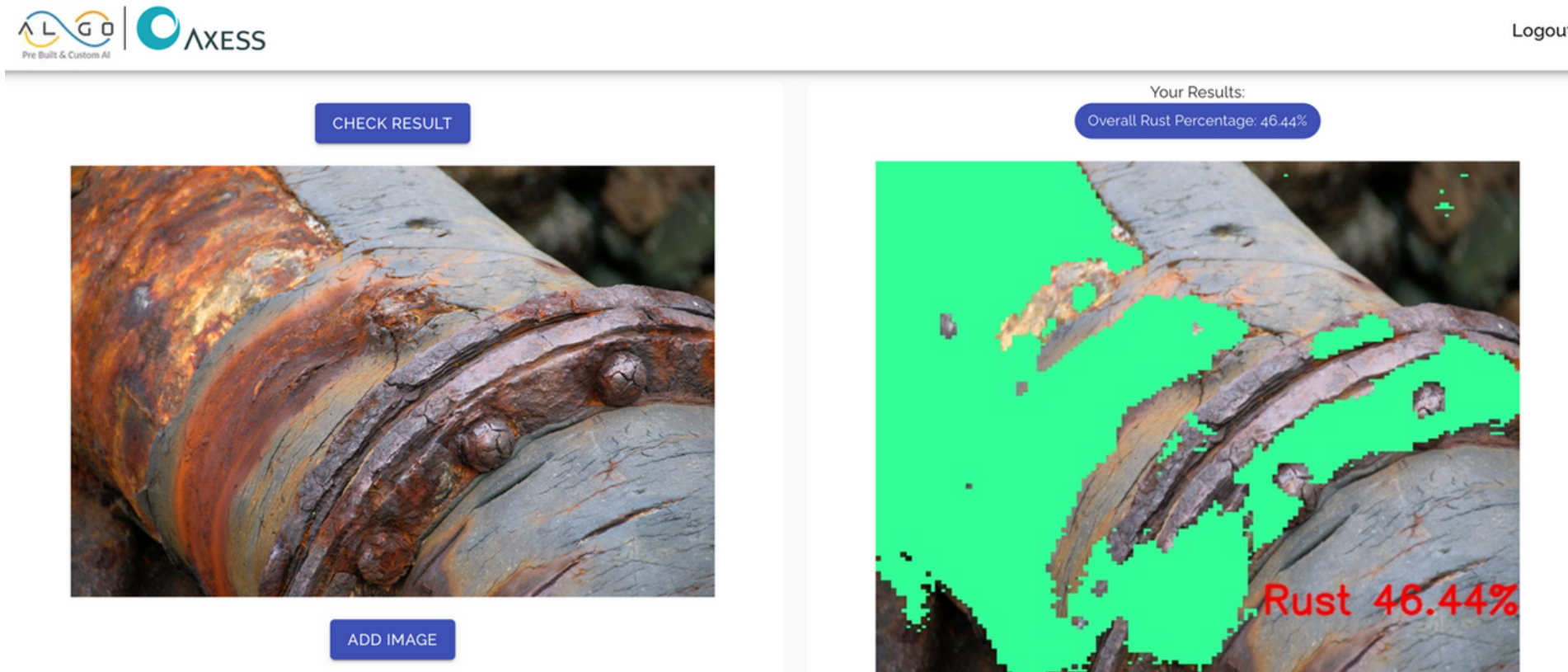
Corrosion Prediction

Challenge

- Corrosion affects every metallic structure in the oil and gas industry. They cause huge losses of revenues to the oil industry as a result of repairs of parts and maintenance which eventually leads to plant shut down and downtime

Value Created

- Optimizing the inner side corrosion by control and manipulation of other control variables
- Corrosion can be tracked both inside and outside of the unit



➤ Amine Network Monitoring & Online Guidance

Challenge

- Unwanted amine losses start takes place due to unusual draining & foaming.
- In addition, carbon dioxide and hydrogen sulfides cause corrosion.

Value Created

- Reduce amine losses up to 10%.
- Avoid breaching SO_x emission regulatory norms and reduce the chances of fatal accidents.



➤ Catalytic Reformer Monitoring & Optimization

Challenge

- Increasing Hydrogen production meeting the demand of refinery and consumers.
- The production of high-octane reformate for gasoline blending and high-value aromatics.

Value Created

- Reduce amine losses up to 10%.
- Avoid breaching SO_x emission regulatory norms and reduce the chances of fatal accidents.



► Research Octane Number (RON)

Challenge

- Significant delays in laboratory analysis of RON value.
- Real-time optimization of RON value.
- Optimum RON value of Gasoline for good drivability

Value Created

- Algorithm which takes these correlations into account and develops a weightage based learning
- Will help in the production of required fuel type.

► Min. SOX Emission & Lime Consumption in CFBC Boilers

Challenge

- Higher lime consumption in the boiler due to the varying Sieve size distribution of the lime going in the boiler. This has a direct impact on SOx emission.

Value Created

- Optimizing lime dozing by tighter SOx control and manipulation of other control variables
- The solution can potentially result in an annual saving of approx. **10 Crore+**

➤ Pigging Timeline Prediction for Delayed Coker

Challenge

- Pigging in DCU furnace is done every 3-4 months and requires 1.5 days of throughput reduction
- The process of pigging is planned 4-6 weeks in advance

Value Created

- Pushing the pigging activity even by 1 day increases the average productivity of the quarter by 1 cr+.

➤ Yield Causality Prediction in FCC

Challenge

- FCC plays an important role in the overall profitability of the refinery
- Business is looking to further increase yield percentage for high-value products

Value Created

- Maximizing the value-added product production resulting in maximizing the profit.



➤ Quality Prediction for VGO Hydro Treater

Challenge

- VGO plays an important role so much as that any significant non-conformance in terms of Sulphur and Nitrogen content will have a direct impact on PP yield

Value Created

- The solution will enable continuous Sulphur and Nitrogen value prediction
- Increased yield up to 1-2% of the desired output stream



➤ Condensate Quality Prediction

Challenge

- There are three types of condensates produced: Pure Condensate, Surface condensate, Suspect condensate
- The current process may lead to the presence of contamination in the surface & pure condensate which is undesirable

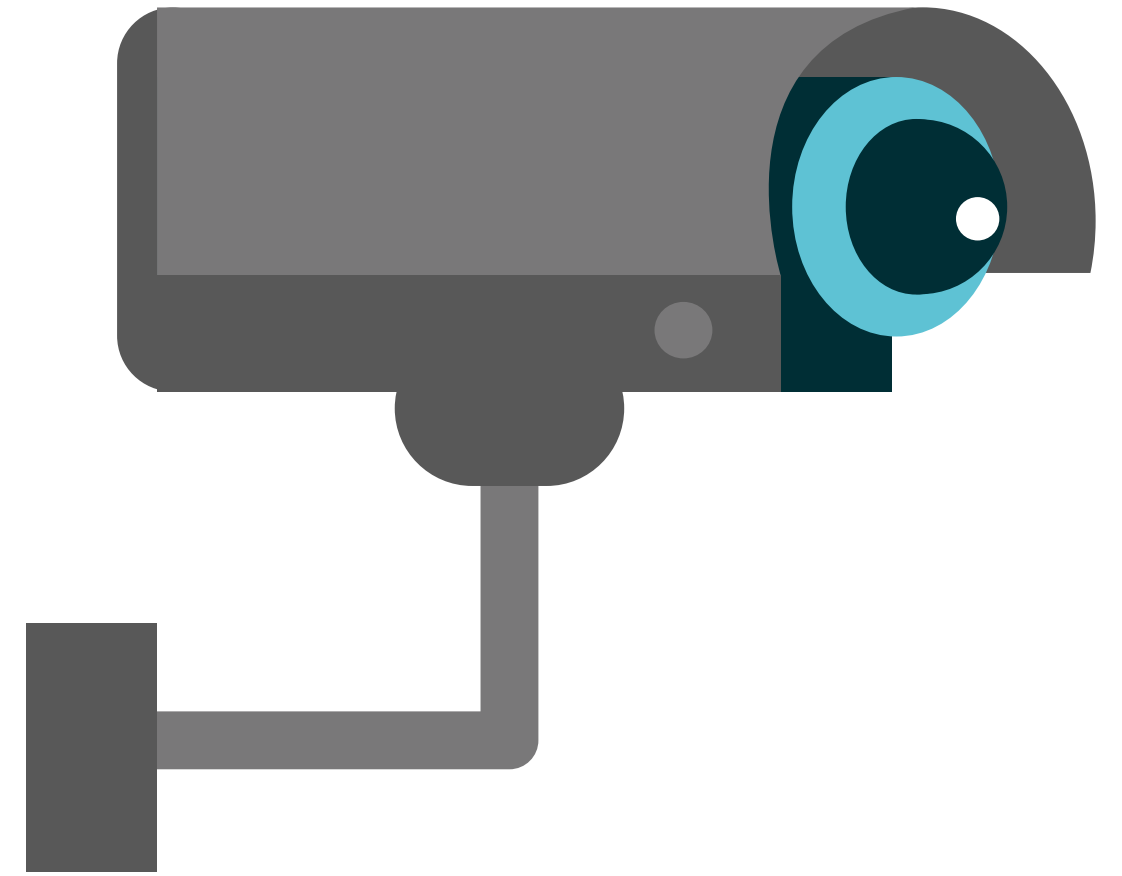
Value Created

- Reduce the quantity of raw material and energy consumed
- Recover useful material from waste streams
- Treat any residual waste to convert it to an environmentally acceptable form prior to disposal

Annex

Algo8 iVision

DETECT | RECOGNISE | ACT |
LEARN



Algo8 iVision

Automate tasks that the human visual system performs and power them with Artificial Intelligence (AI)

Algo8's iVision allows you to acquire, process, analyze, and understand visual data using deep learning to maximise efficiency of your operations.

In a nutshell, Algo8 iVision helps improve operational efficiency, product quality, on-site safety and security better than ever before.



CONVERT REACTIVE CAMERAS INTO PROACTIVE

Reliable

Unlike human operators, cameras and AI algorithms can function perpetually at maximum efficiency, without the risk of tiring out

Flexible

The human eye has just one focal point; AI on the other hand has the freedom to focus on multiple objects within the same frame, at the same time

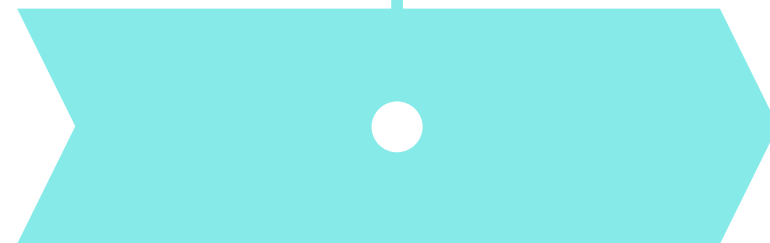
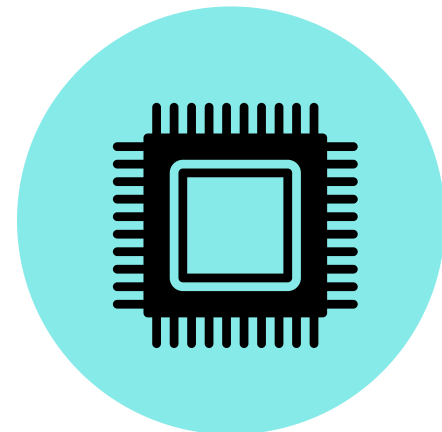
Insightful

The processing capacity of AI systems is superior to traditional methods; it can reveal key information that lies just below the surface

Scalable

Multi-Locational intelligence, integrated with multi-dimensional sources and deep learning algorithms provide a 360 degree view of your operations

Why iVision ?



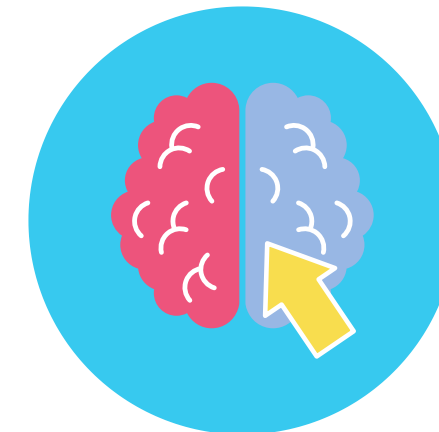
GEO-LOCATION SENSITIVE

GEOSPATIAL INTELLIGENCE
BUILT ON TOP OF OUR
ENGINE CAPTURES BOTH
"WHERE" AND "WHY" OF AN
INCIDENT



BUILD NEW MODELS

OUR INDUSTRIAL GRADE
COMPUTER VISION CAN BE
USED TO BUILD NEW
MODELS AND PROCESSES
FOR YOUR OPERATIONS

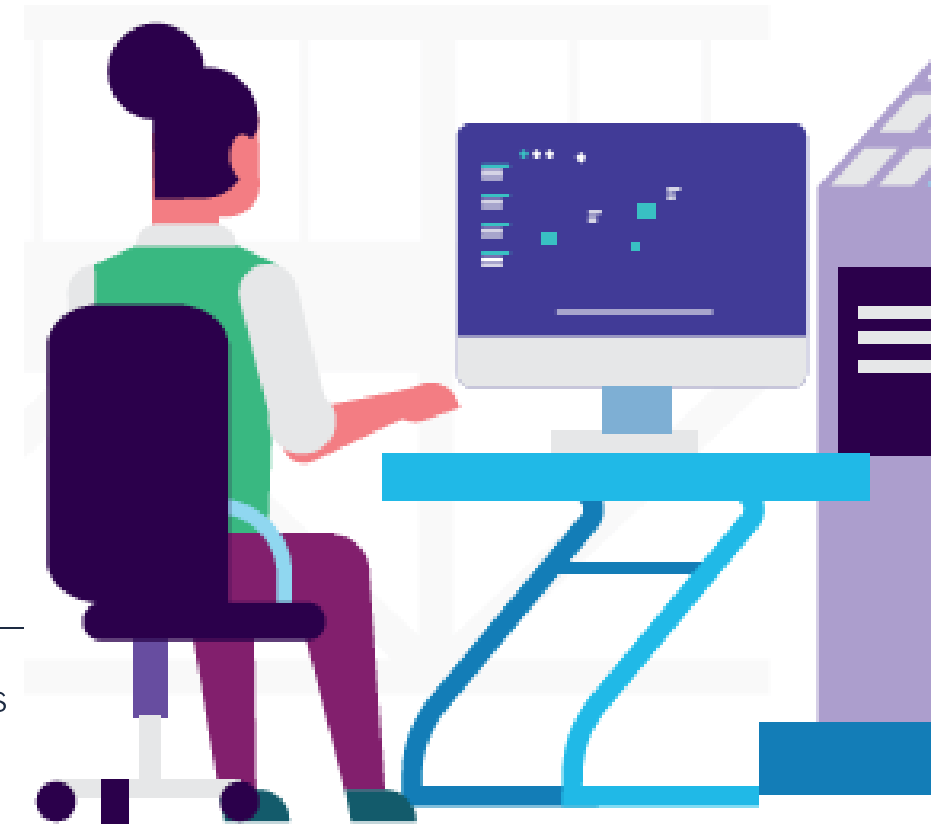


SELF LEARNING

THE CORE ENGINE OF OUR AI
PLATFORM LEARNS FROM
THE NEW DATA BEING
ABSORBED FROM THE
VISUAL FEED

Key Benefits of iVision

RELIABLE AT ALL TIMES



Maximize ROI

Operational benefits due to enhanced quality, improved standard conformity, elimination of production disruptions and higher productivity

Control

Removing bottlenecks due to manual inspection can reduce non-conforming products, equipment jams, costly maintenance expenses and production downtime

Dynamic

As new processes, products or equipments are introduced in the industrial value chain, computer vision can adapt to such changes more quickly than human resources

90%

REDUCTION IN TIME
SPENT ON MANUAL
INSPECTION OF
CRITICAL EQUIPMENTS

95%

ACCURACY IN
DETECTING DEFECTS
AND DISTINGUISHING
ANY PROCESS
ANOMALY

60%

REDUCTION IN
WASTAGE BY
DETECTING DEFECTS
BEFORE FURTHER
PROCESSING

60%

REDUCTION IN
IN-PERSON SITE
VISITS FOR SAFETY
INSPECTION

50%

REDUCTION IN
EXPOSURE TO
HEALTH CARE COSTS
BY PREVENTING
WORKPLACE
INJURIES

Algo8 iVision Modules

01

QUALITY

Classify Conform and Control your product quality through continuous monitoring and reduce human errors by 95%

02

INSPECTION

Reduce on-site visits by 50% and prevent downtimes through constant inspection of machine health

03

SAFETY

Prevent Loss Time Injury (LTI) by ensuring on-site safety for your employees

04

SECURITY

Prevent theft, pilferage and unauthorized access by ensuring a 24*7 vigilant security for your assets and employees

05

OPERATIONS

Monitor worker efficiency and machine productivity to increase throughput and SOP compliance

06

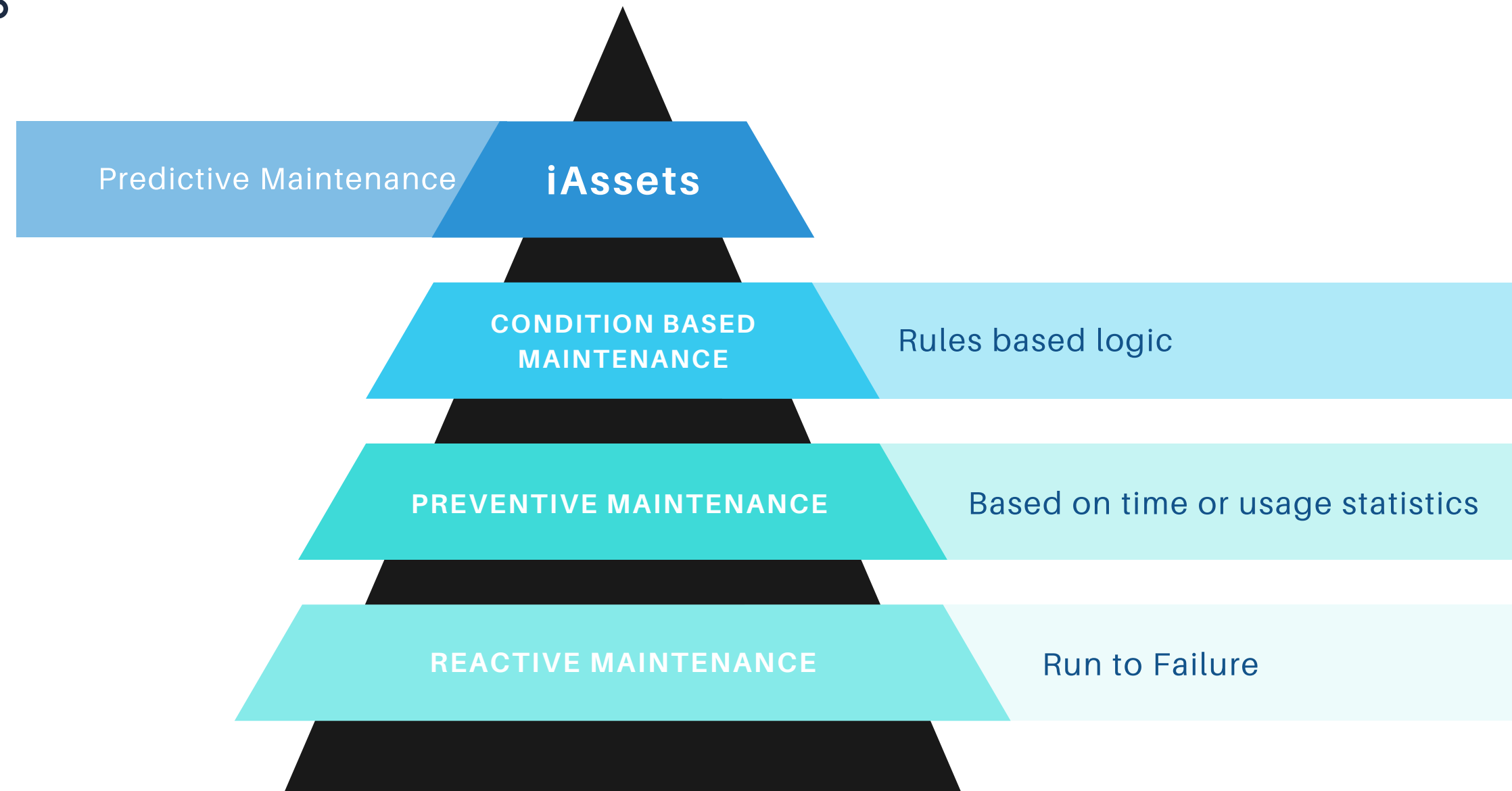
TRAFFIC MGMT

ANPR + Real time management of vehicular traffic for better compliance



Avoid unplanned downtimes with proactive monitoring of industrial assets and maximize equipment health, longevity, and operational efficiency;

iAssets is an AI-based decision-making tool for end-users in industries facilitating improving visibility around "unforeseen" events for equipment to minimize downtime and maximize equipment availability. The AI-powered solution enables predictive maintenance setups that offer multi-faceted long-term and short-term benefits.



Why iAssets ?

Today
Use of Maintenance Strategy*

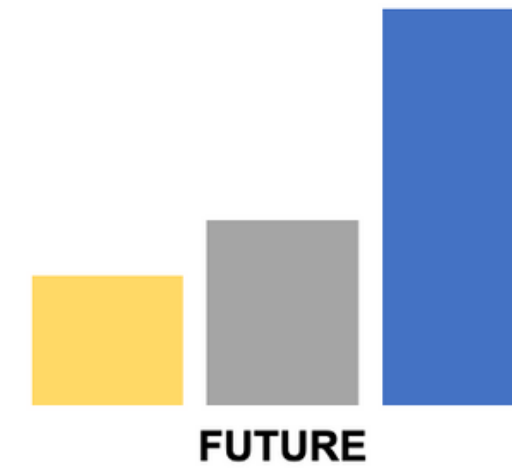


Although still relevant, **preventative** maintenance typically results in over-maintaining assets and high cost

Run to Failure Preventative Predictive & Prescriptive

Future
Use of Maintenance Strategy*

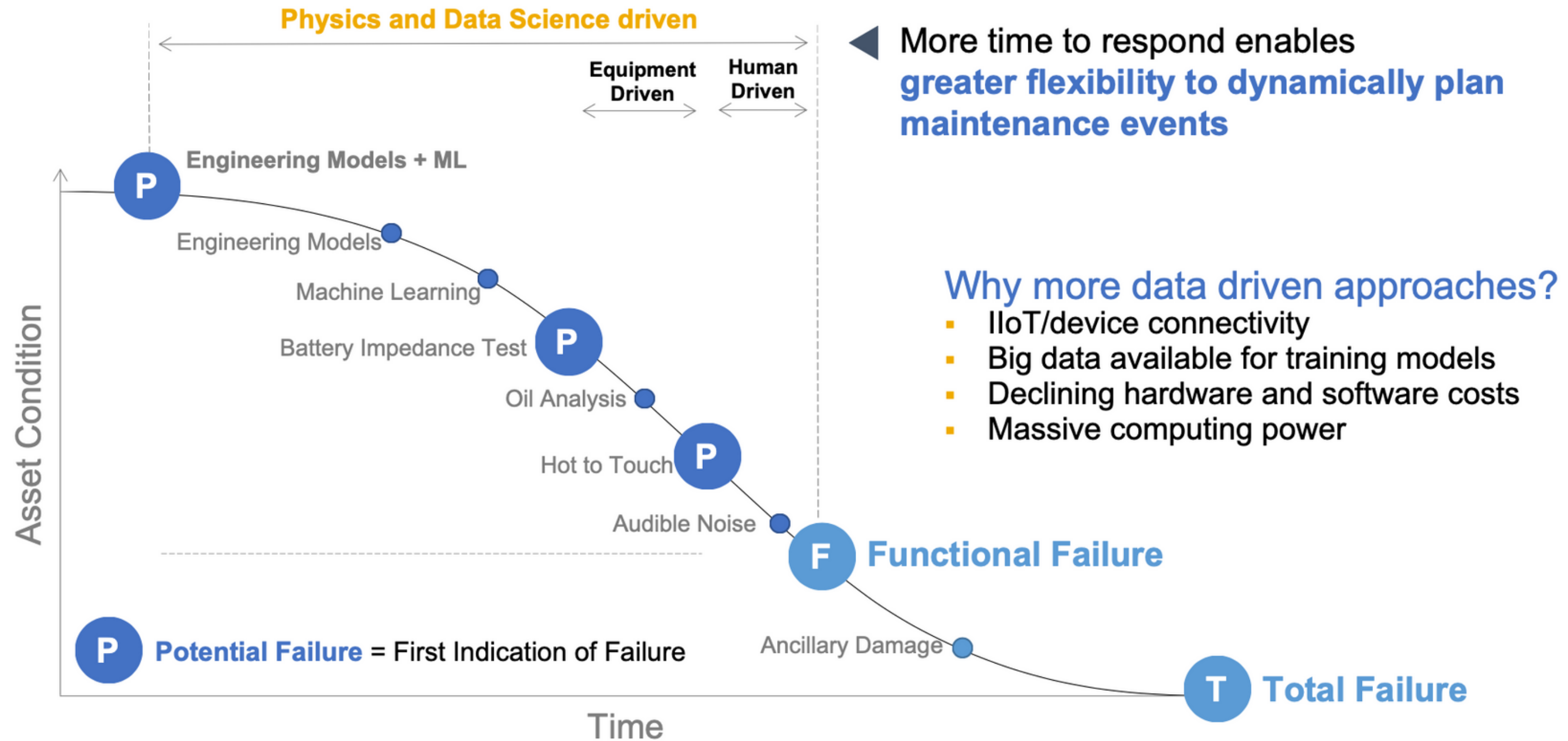
Reduced Costs and Risk; Increased OEE and Performance



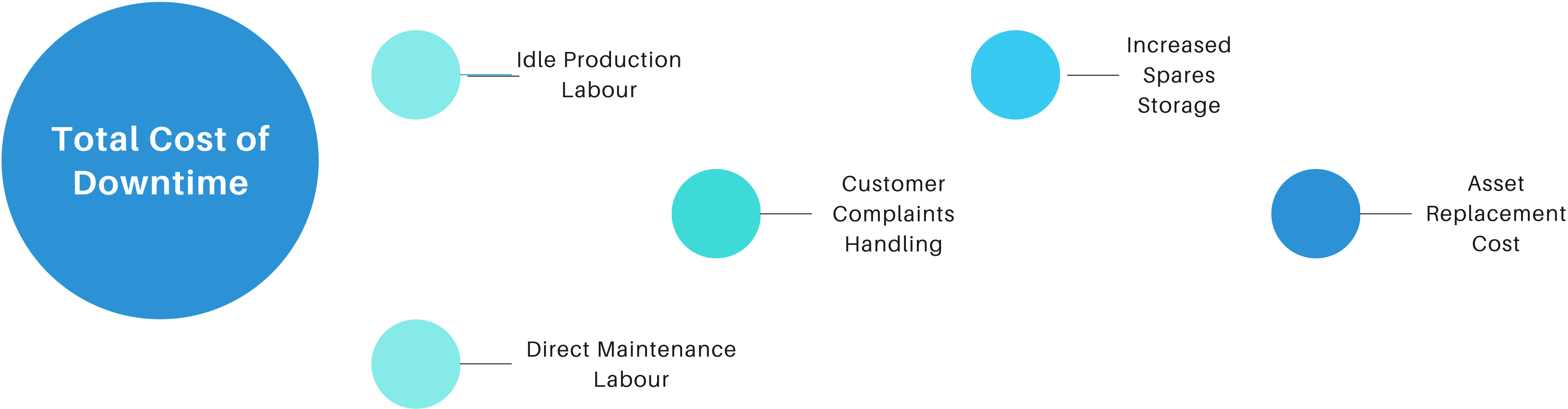
The goal is to enable more **Predictive** & **Prescriptive** approaches to maintenance with machine learning and deep learning engineering simulations to reduce unplanned failures and the number of maintenance actions

AI/ML is leading to an increased use of **predictive** maintenance

Why iAssets ?



Negative Impacts of unplanned downtime extend beyond productions losses



Key Benefits of iAsset

RELIABLE AT ALL TIMES

Equipment Focus

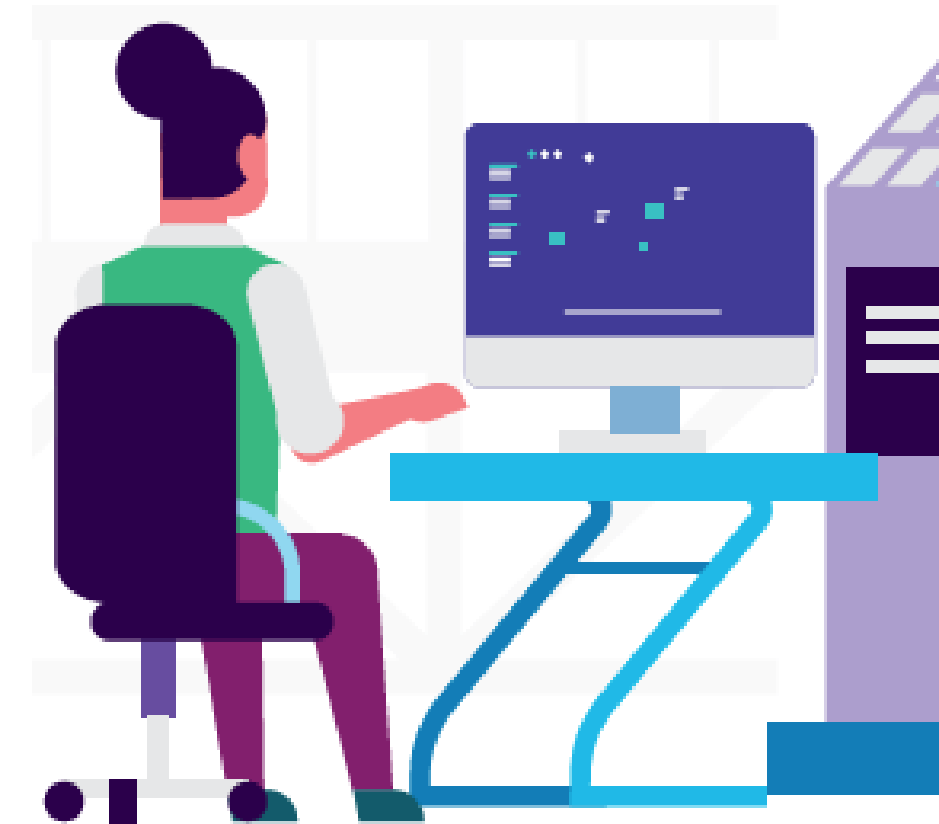
We have focused equipment wise modules - for both static and rotary equipments

Vendor Agnostic

We can connect to any historian, SCADA and PLC for data analysis

Contextualised

Our product has been shaped according to relevant use cases in asset heavy sectors



30%

REDUCTION IN
MAINTENANCE COST

25%

IMPROVEMENT IN
ASSET UTILIZATION

25%

REDUCTION IN
UNPLANNED
DOWNTIME

20%

INCREASE IN
PRODUCTION

Algo8 iConverse



AI Powered Human to Machine Interaction using Natural Language Processing

Our Natural Language Processing (NLP) modules enable your business operations with cognitive intelligence.

In your industrial setup, we help you to enhance the communication and interaction between human beings and computers. The solution enables AI-powered cognitive intelligence for business operations via custom chatbots, voicebots, and more.

GAIN INSIGHTS INTO UNSTRUCTURED HUMAN-GENERATED, NATURAL LANGUAGE DATA

Industrious

Unlike human operators, NLP algorithms can go through endless documents and unstructured data saving a lot of time and resources

Error Free

While reading through documents and unstructured data, humans are prone to errors. NLP approach

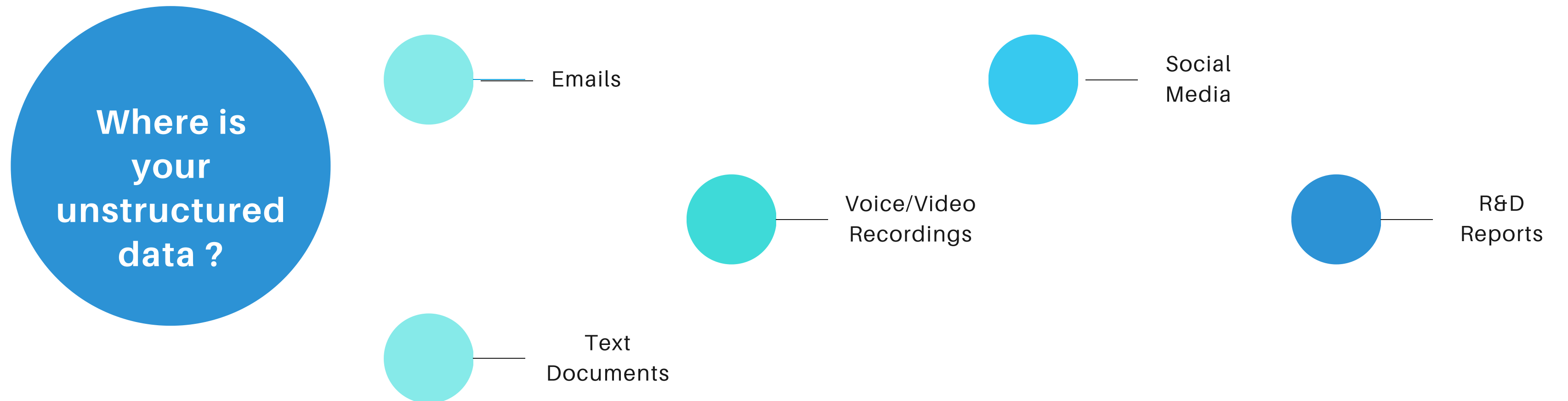
Security

Ensures data stays within the organisation and every user is connected to the most relevant resources while maintaining data security

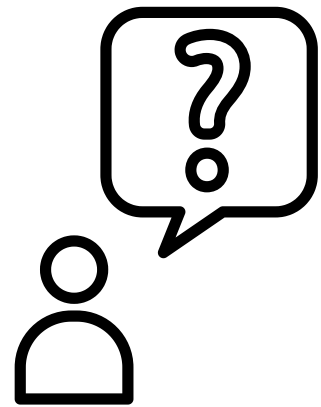
AI/ML Driven

AI technologies like machine learning (ML), deep learning, OCR, and cognitive search now power NLP

80% of Enterprise Data is unstructured and is much less accessible



Emergence of NLP in Enterprises



Query Driven

- Provide better, more targeted responses by understanding the user's questions and intent
- Identify out-of-scope requests and present intelligent alternatives



Content Driven

- Extract business entities from text documents to identify key content
- Identify and understand the meaning of natural language content – documents, reports, emails, etc. – to provide natural language answers

Enterprises need to go beyond traditional search to maximise the usage of unstructured data for their decision making process

Key technologies that will impact your business

- IoT – Applying technologies, such as real-time analytics, machine learning (ML), and smart sensors, to manage and analyze machine-generated structured data
- Computer Vision – Using digital imaging technologies, ML, and pattern recognition to interpret image and video content
- Document Understanding – Combining NLP and ML to gain insights into human-generated, natural language unstructured data

NLP Capabilities

Sort Text into specific categories



Text Categorization

Group text or documents based on similarities in content



Text Clustering

Find meaningful information in unstructured text



Info Extraction

Extract names, places or defined labels



Named Entity Extraction

Decode meaning behind human language



Sentiment Analysis

Key Benefits of iConverse

RELIABLE AT ALL TIMES

Reduced Task Time

40%

Reduced task time for workers focusing on text analysis and search of key data points

Minimal Training

3 Hrs

Workers will see the benefit of using iConverse within 3 hours of using it

Return on Investment

1 Yr

Recover your investment cost by replacing costly legacy systems and improving the productivity of workers

iConverse - Multiple Languages Supported

Scripted Bots

These bots rely on scripts and pre-defined dialogue, which limits their capabilities significantly

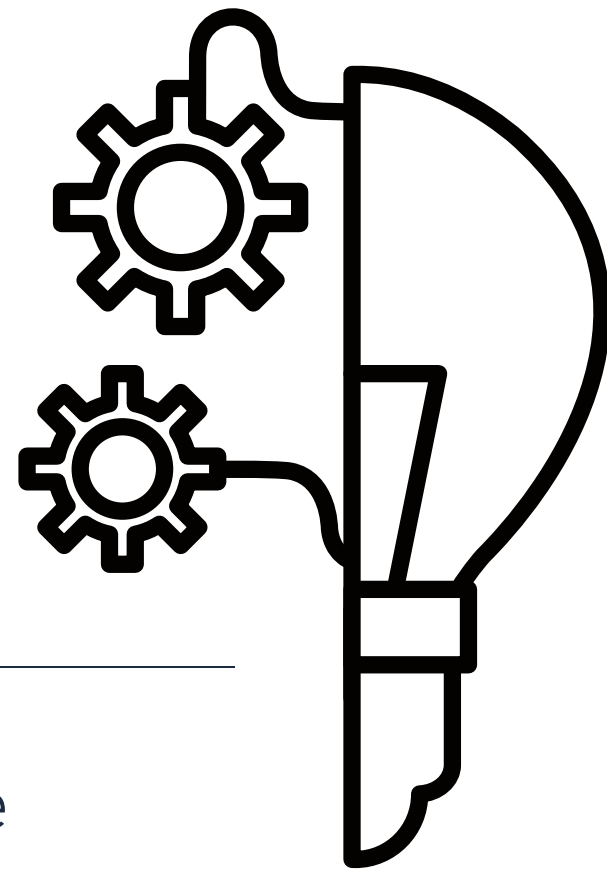
Conversational Bots

With growing NLP capabilities, bots were able to develop the capability to determine intent in singular interactions

Cognitive Bots

These are sophisticated bots with far more advanced NLP modules, conversational, and cognitive capabilities

Algo8 iProcess



Predict product quality in real time based on process data along with 360-degree monitoring of industrial operations

Build a predictive model that transforms the necessary quality of the final product from an output of the process into an input, that guides decision making at every step of the production process. Understand root causes of product quality issues and make informed decisions

DEPEND ON AI TO ASSOCIATE RAW MATERIAL CHARACTERISTICS WITH QUALITY OUTCOME

Dynamic

Simulate the production process in a simplified and dynamic way to generate scenarios that change with each process variable

Optimal

Propose optimal equipment settings to achieve production plant or reactor's output targets while maintaining product quality

Cognitive

Allow system to learn and improve with each experience. Make data driven predictions or decisions without being reprogrammed

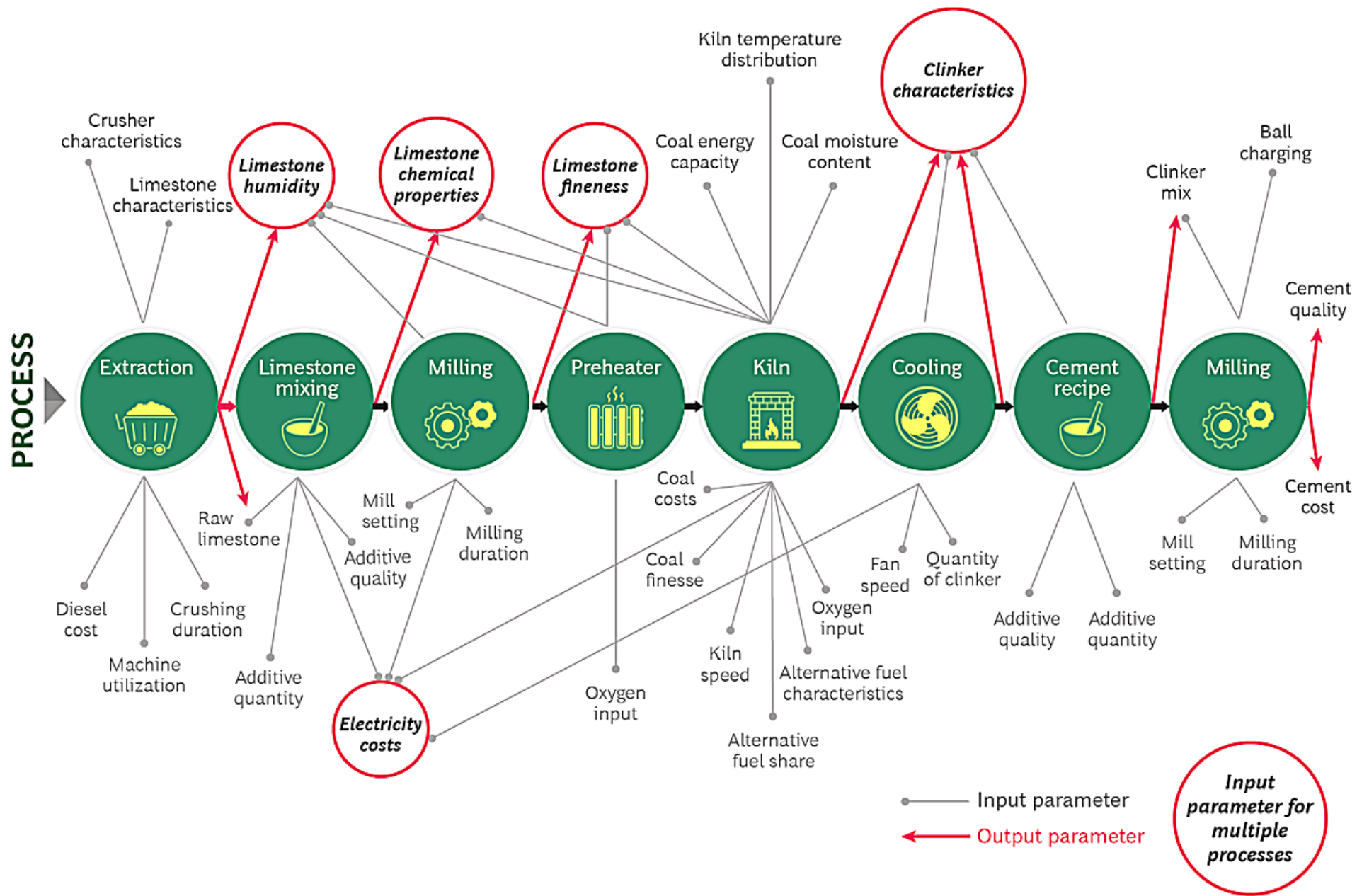
Correlate

Use predictive models to correlate each production batch with relevant production parameters to predict product quality

Previously the industries relied on operators and engineer's experience and historical data to achieve higher operational efficiency

Lack of real-time visibility into current quality causes significant lag time between orders. Miscalibration in product quality can cause entire orders to fail quality testing, leading to millions of dollars of lost revenue.

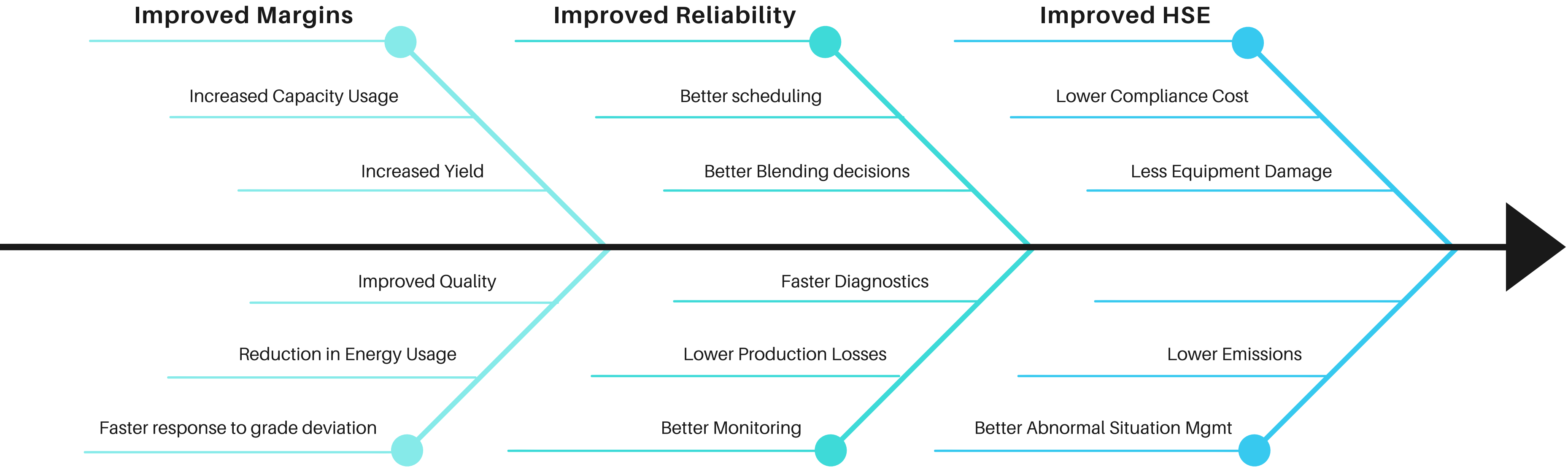
Now extensive real time data, historical data sets and advance artificial intelligence models are being used to predict and manage various operational KPIs



For Example:

Dozens of variables come into play in the cement production process. Optimization across all various is only possible through artificial intelligence

Key Benefits of iProcess





Start your
AI Journey
with us

Email

info@algo8.ai

Phone

+91 - 96549 09318

Website

www.algo8.ai

LinkedIn

[https://www.linkedin.com/company/
algo8/?originalSubdomain=in](https://www.linkedin.com/company/algo8/?originalSubdomain=in)