



# How the Sustainability Imperative will Shape the Smart Plant of the Future

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# Aspen Technology Today

WORLD LEADER IN ASSET OPTIMIZATION FOR CAPITAL INTENSIVE INDUSTRIES

**2400+** CUSTOMERS  
WORLDWIDE

**\$59B** ANNUAL VALUE  
CREATED

**40** YEARS OF INNOVATION

ESTABLISHED GLOBAL  
PARTNERSHIPS

EPC – ENERGY – CHEMICALS – METALS  
& MINING – PHARMA – FOOD & BEV –  
POWER – PULP & PAPER

SAFETY – SUSTAINABILITY  
PROFITABILITY – INNOVATION

HISTORY OF FIRSTS

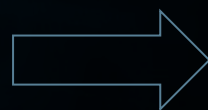
ADVISORY PARTNERS  
VALUE ADDED RESELLERS  
IMPLEMENTATION SERVICE PROVIDERS



- Flowsheet Simulator
- Desktop Planning Tool for Refineries
- Model Predictive Controller
- Adaptive Control Technology
- Concurrent Conceptual Engineering Workflows
- Unified Environment for Planning, Scheduling, and Operations
- Hybrid Models
- AIoT Hub



Data Insights  
Data Management  
AI/ML, Advanced Analytics



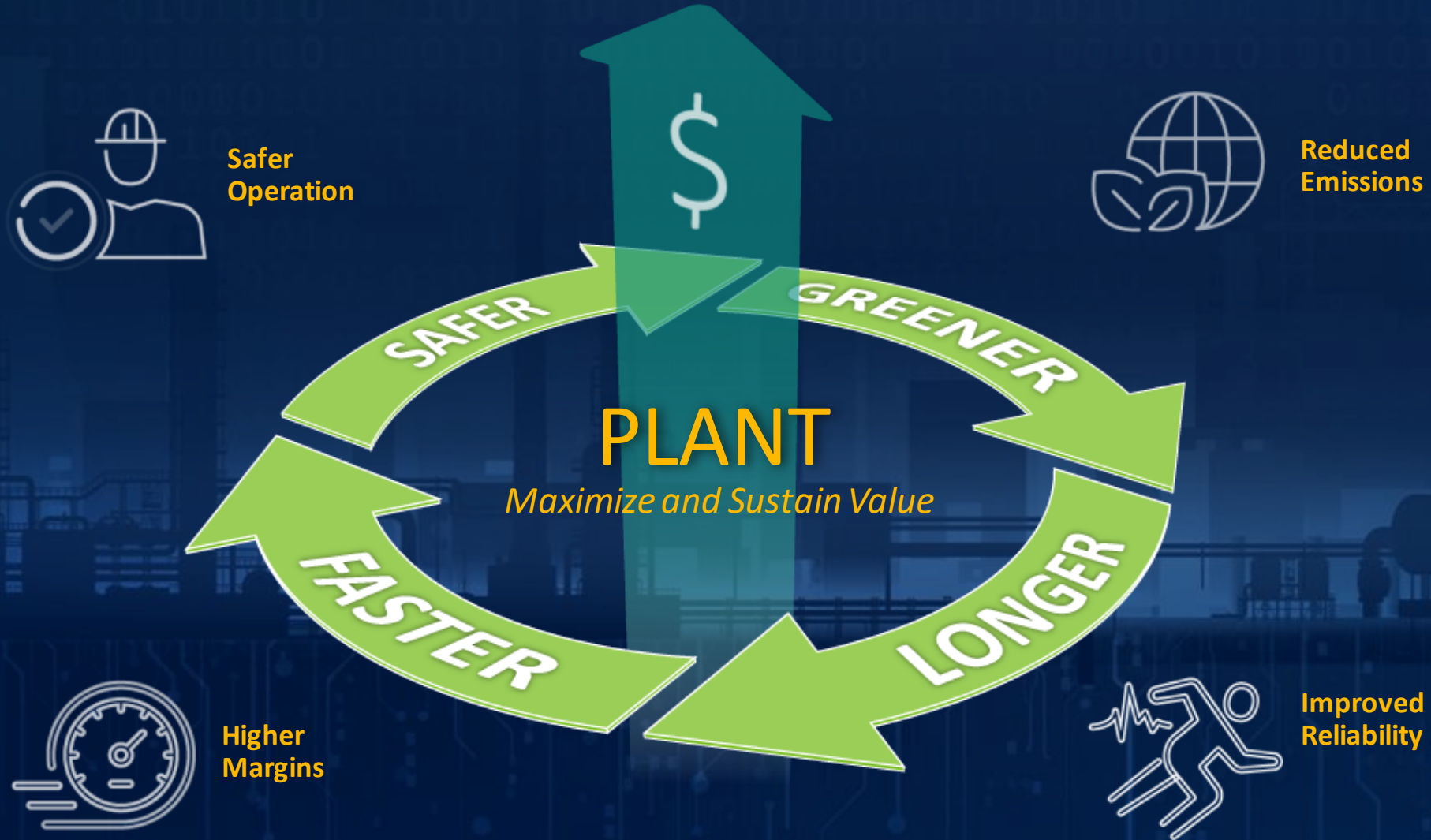
**Industrial AI**  
Insights | Guidance | Automation



Domain Expertise  
Engineering Fundamentals  
Industry Experience

# The Self-Optimizing Plant

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# Sustainability Drivers Survey: Energy, Downstream (including Chemicals) & Engineering Services



## Resource Efficiencies

Reduce usage of resources such as energy, water or feedstock



## Energy Transition & Decarbonization

Renewable/alternative energy sources, biofuels



## Circular Economy

Waste reduction, recycling, renewable feedstocks, innovation

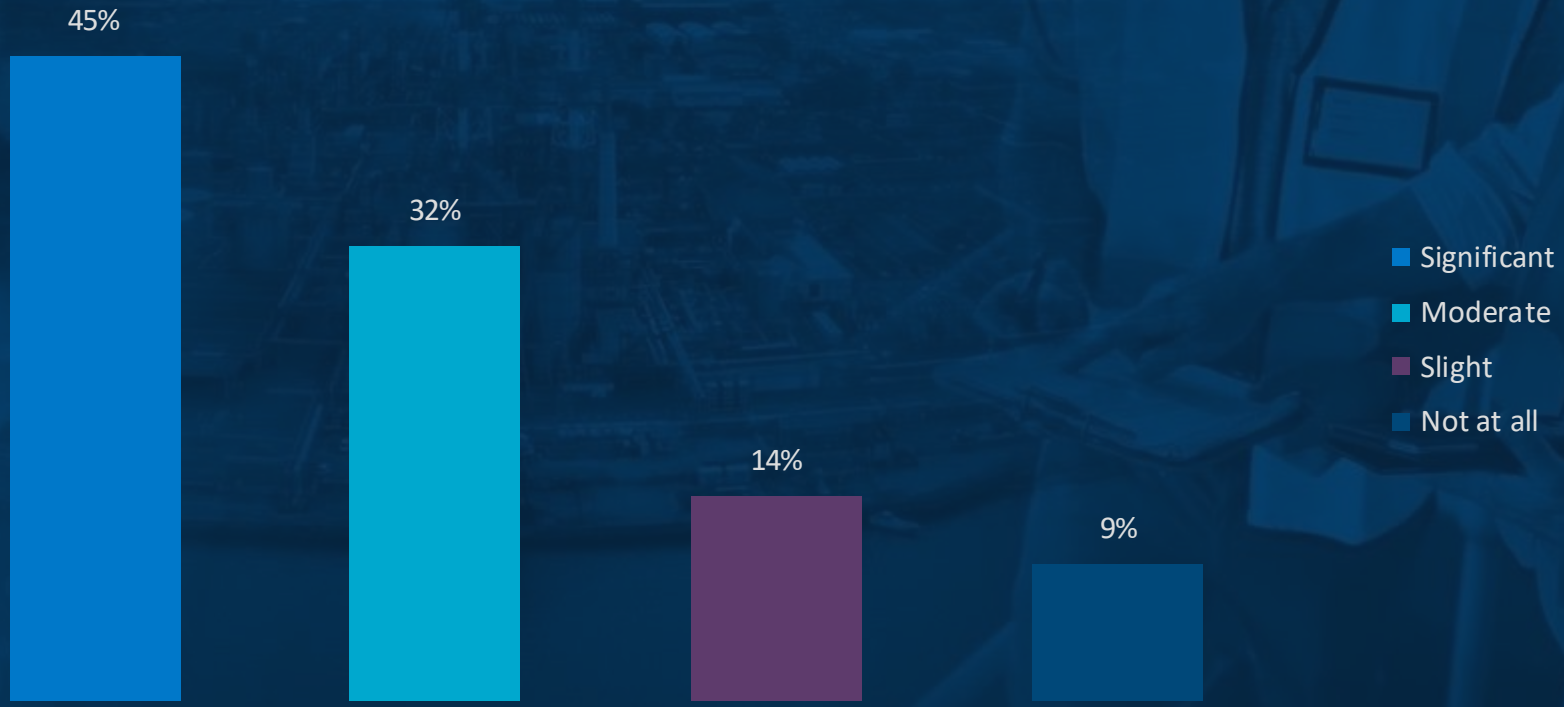
**360 Senior Respondents, all Regions, Multiple Verticals, June 2021**



# 77% See CO<sub>2</sub> Reduction as a Competitive Advantage

Question: *To what degree do you view your company's CO<sub>2</sub> reduction strategy as providing your company a competitive advantage?*

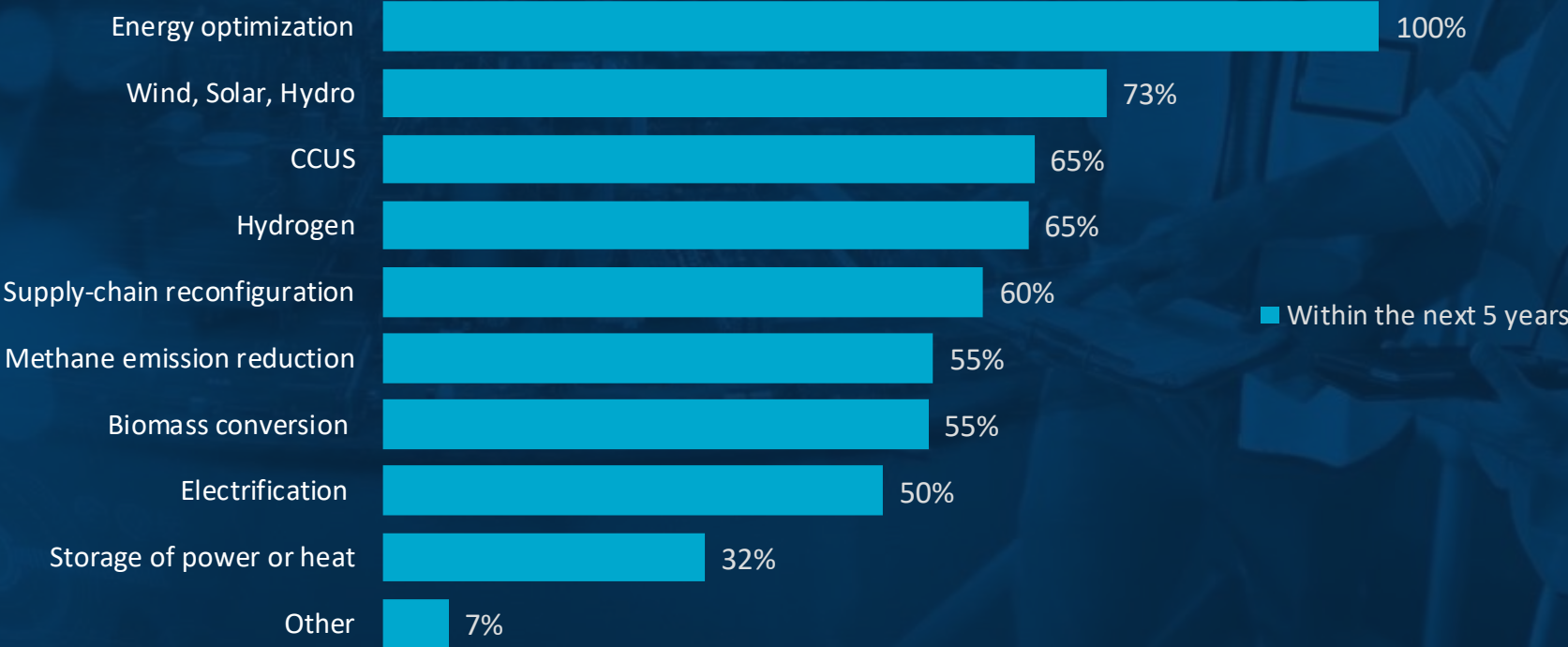
Companies expect to gain competitive advantage with CO<sub>2</sub> mitigation strategies



# Sustainability Investments Over Time

Question: *Which technologies is your company investing in or planning to invest in to address greenhouse gas emissions?* (all that apply)

Top investments:  
energy optimization,  
renewables, H<sub>2</sub>, CO<sub>2</sub>



Source: AspenTech Sustainability Global Survey, June 2021

# Asset Optimization Strategy for Next Level Value Creation

## *Self-Optimizing Plant Vision Powered by Industrial AI*

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# Industrial AI

Insights | Guidance | Automation

# Industrial AI



# AspenTech is the Industrial AI Company – Uniquely Positioned

**Data  
Insights**

Data Management  
AI/ML, Advanced Analytics

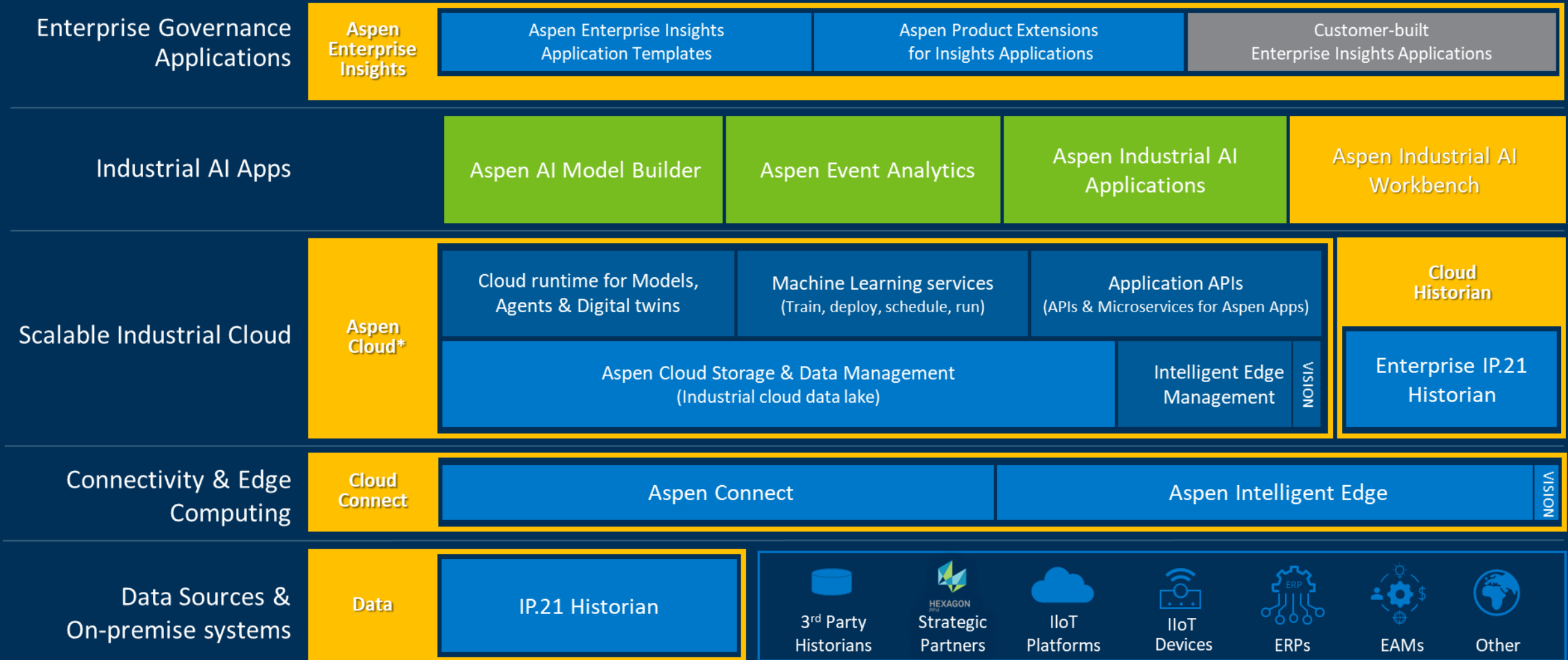
**Domain  
Expertise**

Engineering Fundamentals  
Industry Experience

# Industrial AI

Insights | Guidance | Automation

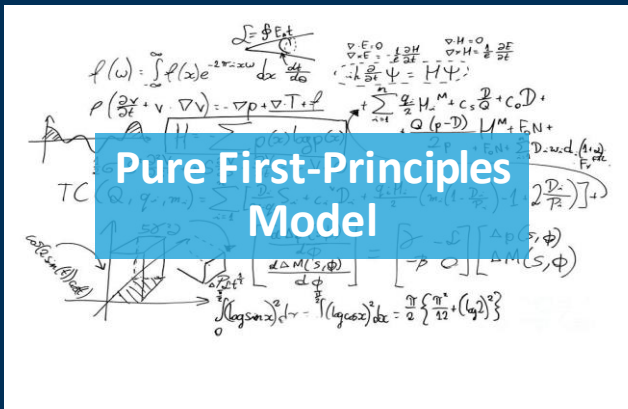
# Industrial AI Infrastructure Bridges IT and OT: AIoT Hub



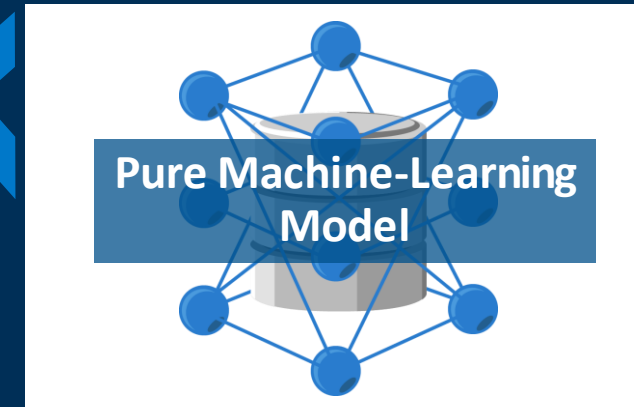
\*Cloud platform to host and manage Industrial AI Applications (Not licensable)

# Aspen Hybrid Models™ - Industrial AI in action

## Step 1. Build Hybrid Model

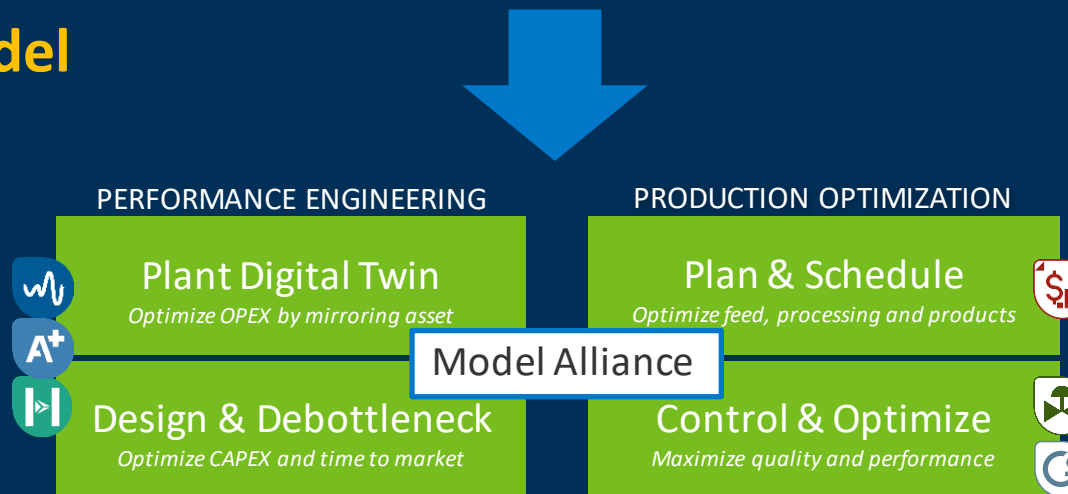


Hybrid Model  
Aspen AI Model Builder



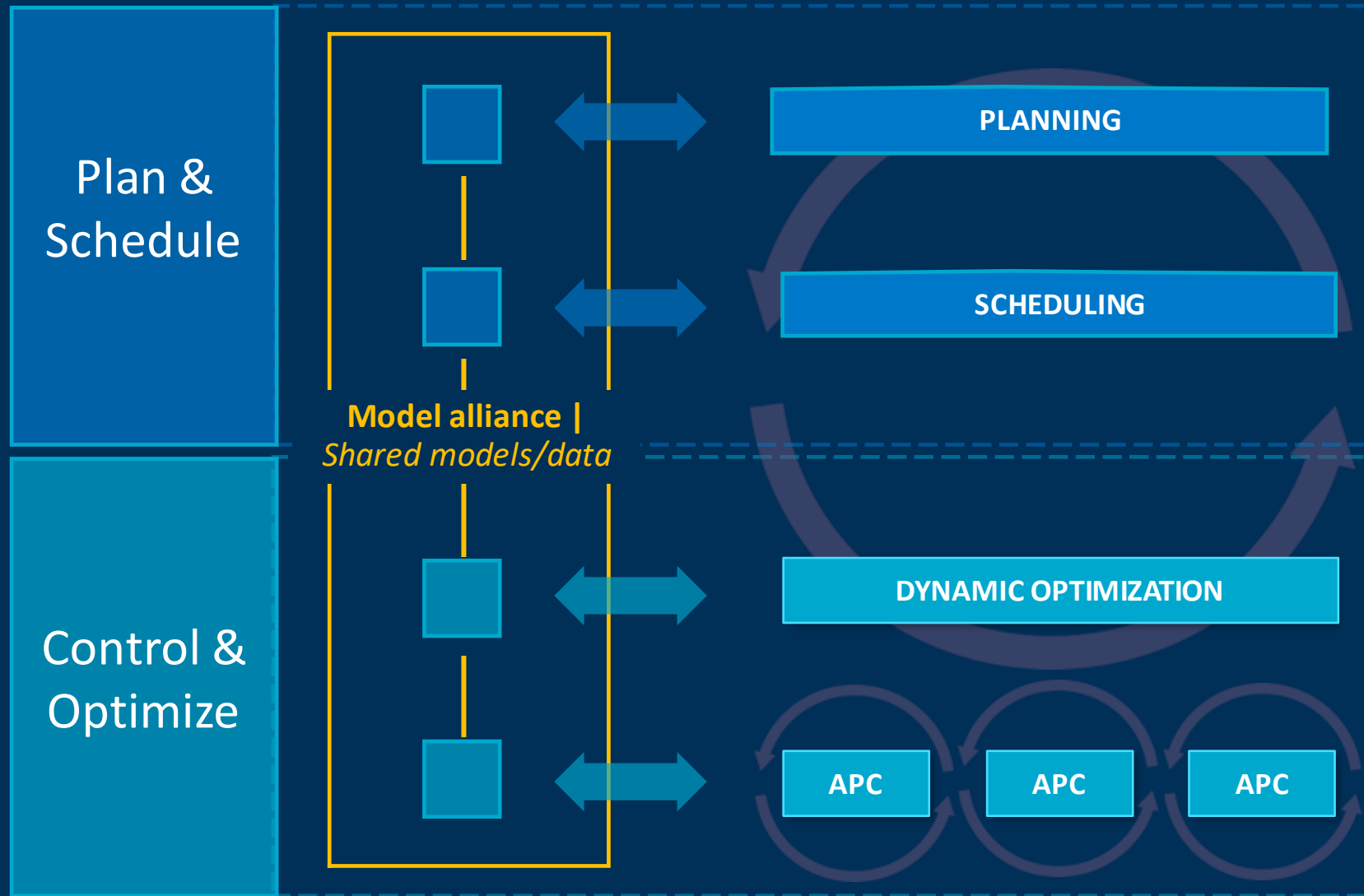
## Step 2. Deploy Hybrid Model

V12 AI Driven & Hybrid Models  
V12.1 1st Principles Driven Hybrid Models



V12 Hybrid Models in PIMS-AO  
V12.1 Hybrid Models in Unified PIMS and GDOT

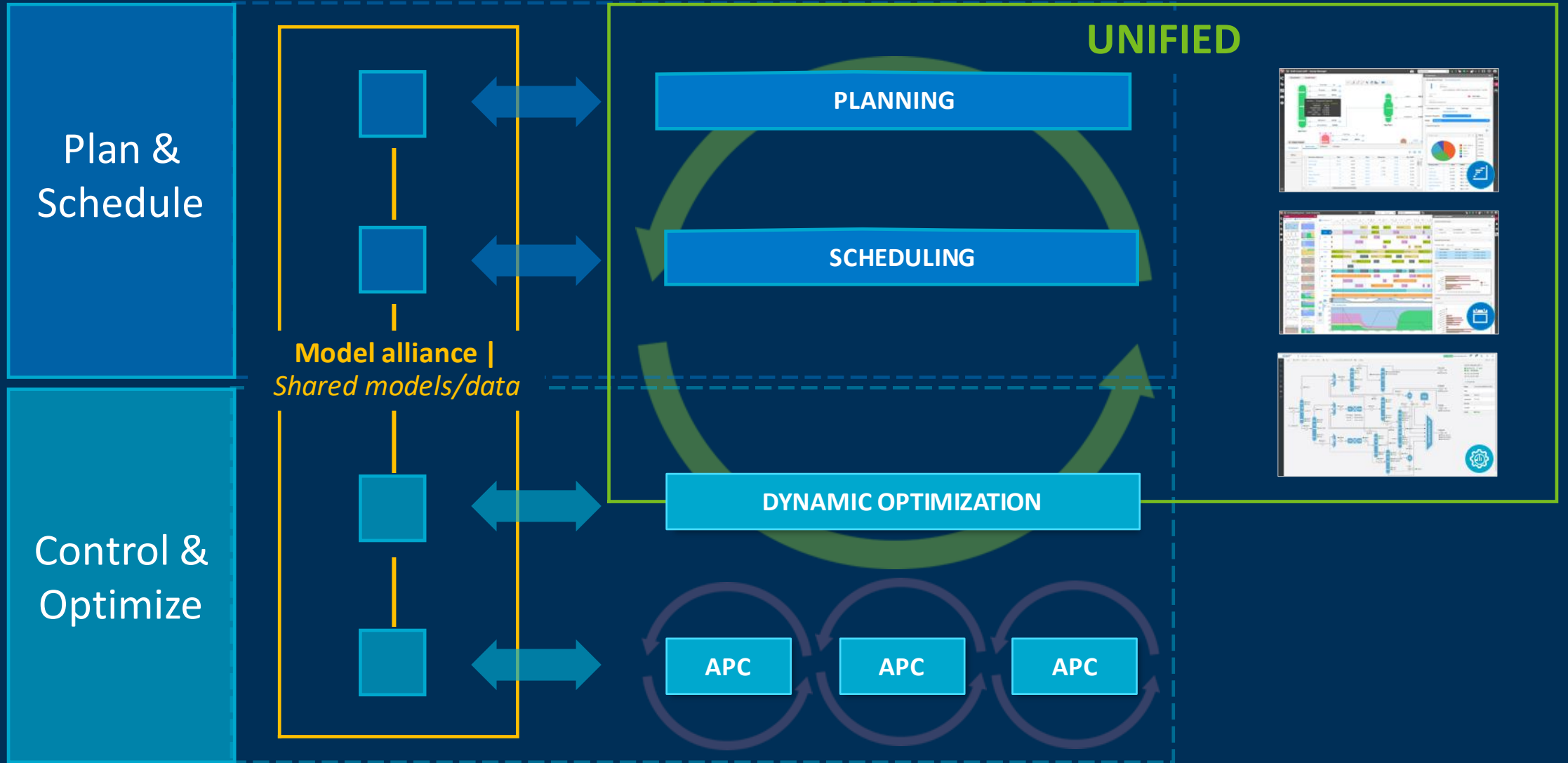
# Foundation for Autonomous Production Optimization



## Value

- Reduce margin leakage
- Close the gap between planning, scheduling and operations
- Increased capability and agility
- Plan more aggressively
- Setting the stage for greater autonomy

# Foundation for Autonomous Production Optimization

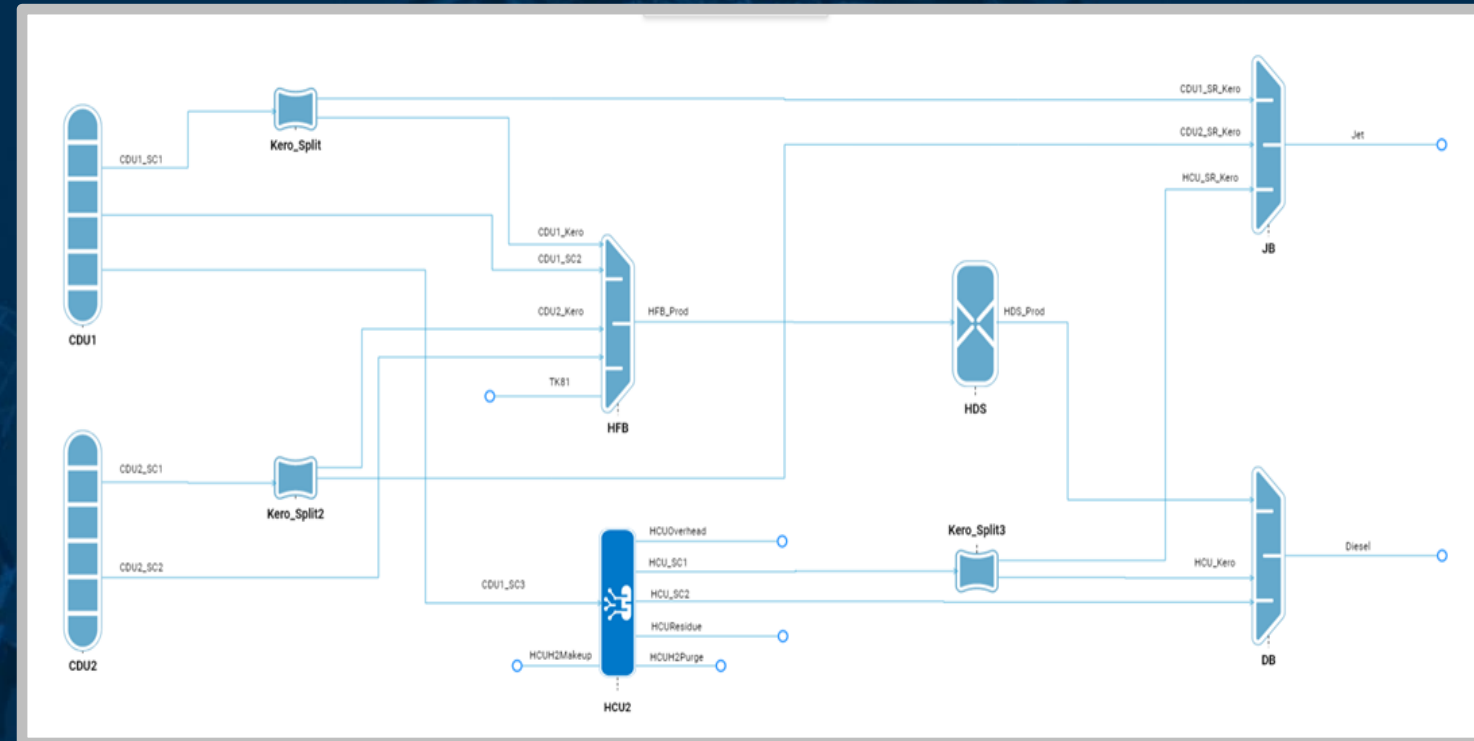


# Hybrid Models can be embedded in GDOT Envelope Optimizer

Hybrid Model



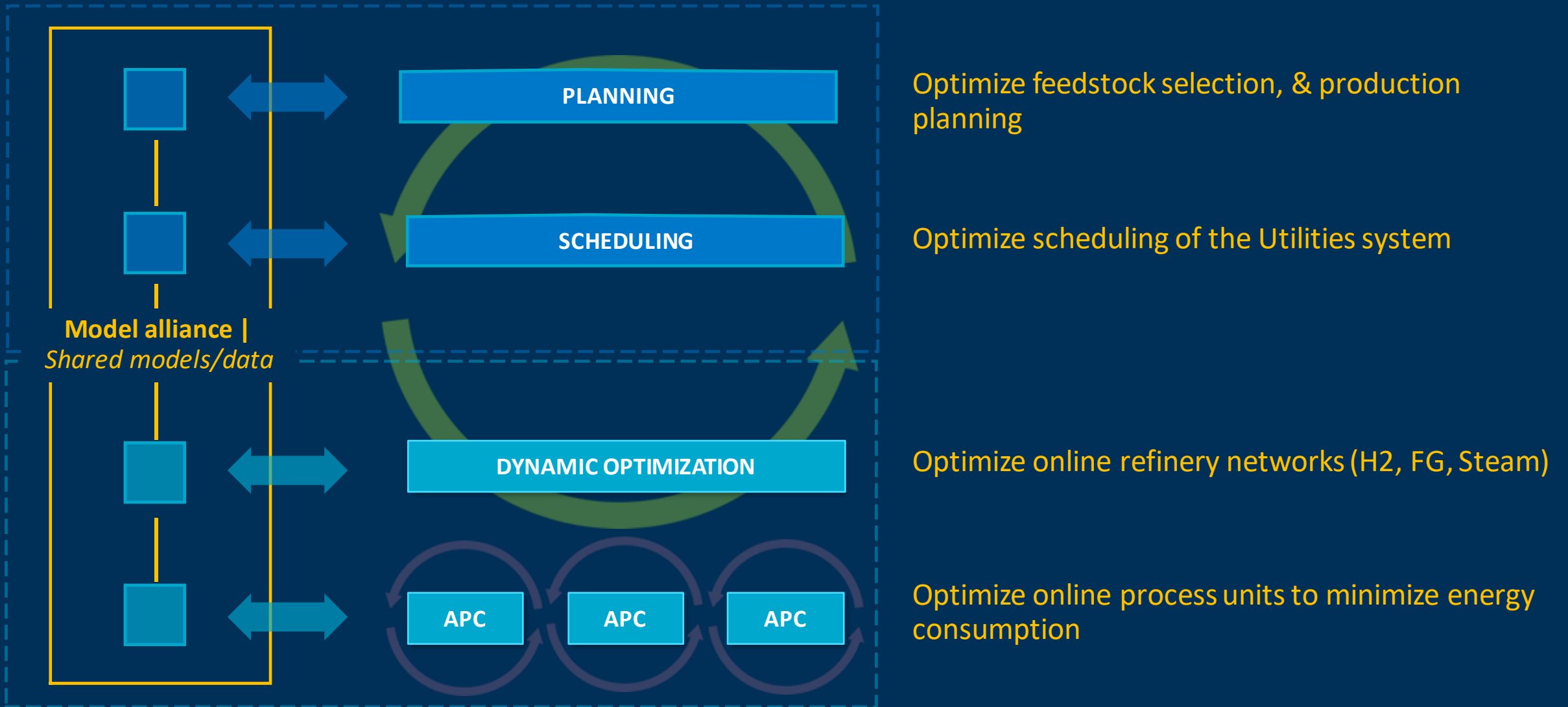
GDOT Envelope



- **Covers wider operating range** with highly accurate ROM predictions for envelope & site wide optimization
- Fit-for-purpose Reduced Order hybrid Models **run quickly & efficiently online**

# Foundation for Autonomous Production Optimization

*Model CO<sub>2</sub> emissions in decision making process and track planned vs actual emissions*



# Vision for the Self-Optimizing Plant and the Smart Enterprise



# Key Areas for Innovation in the Self Optimizing Plant

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## Broader set of Template Models

For SOP and Smart Enterprise



## Hydrogen Supply Chain

Intersections with Electrical Networks



## Plastic Feedstocks

Plastic feed being added to conventional  
feedstocks



# Visualization and Actionable Insights in the Self-Optimizing Plant

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# Vision to Support the Smart Enterprise

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Volatility



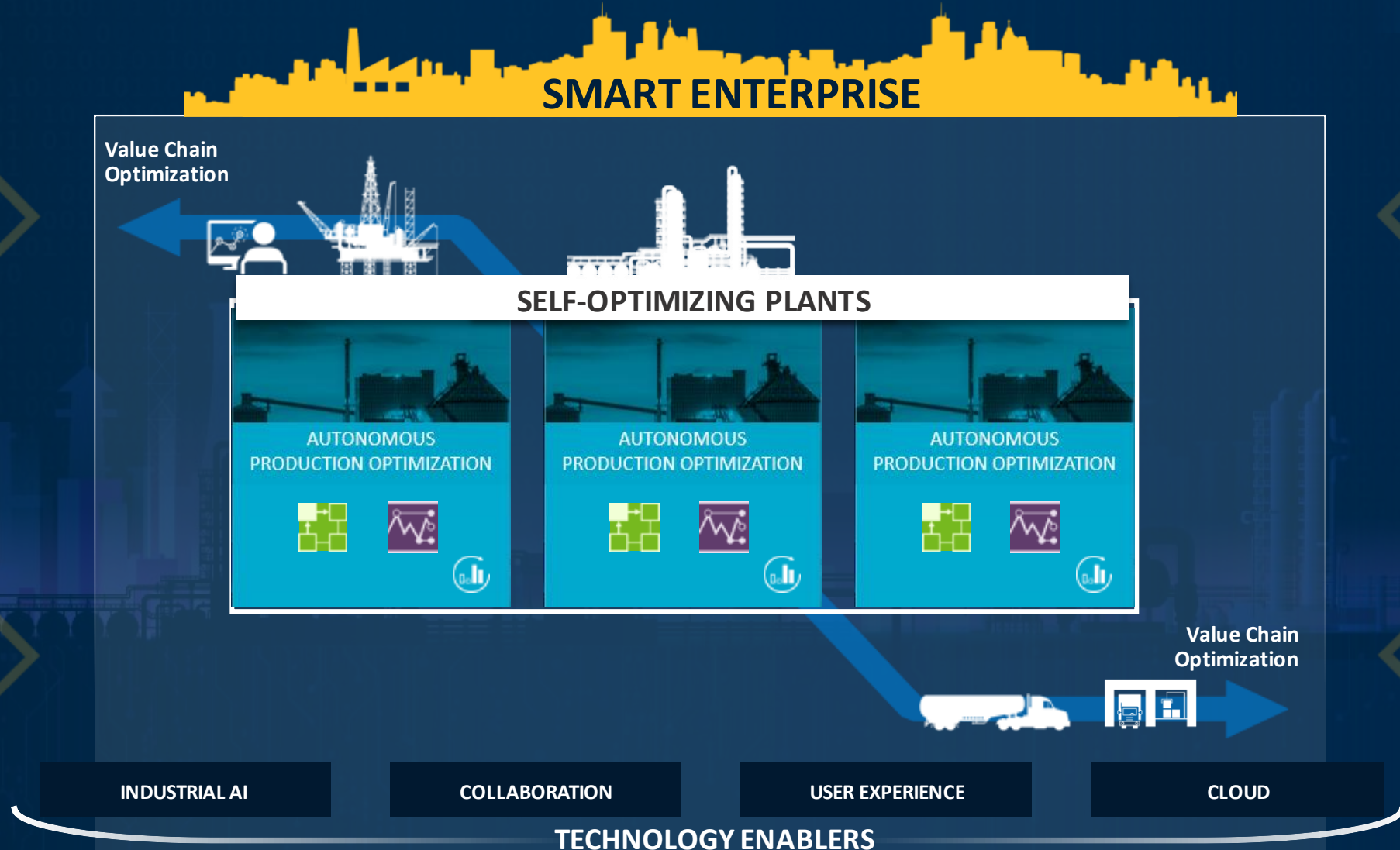
Workforce



Sustainability



Technology

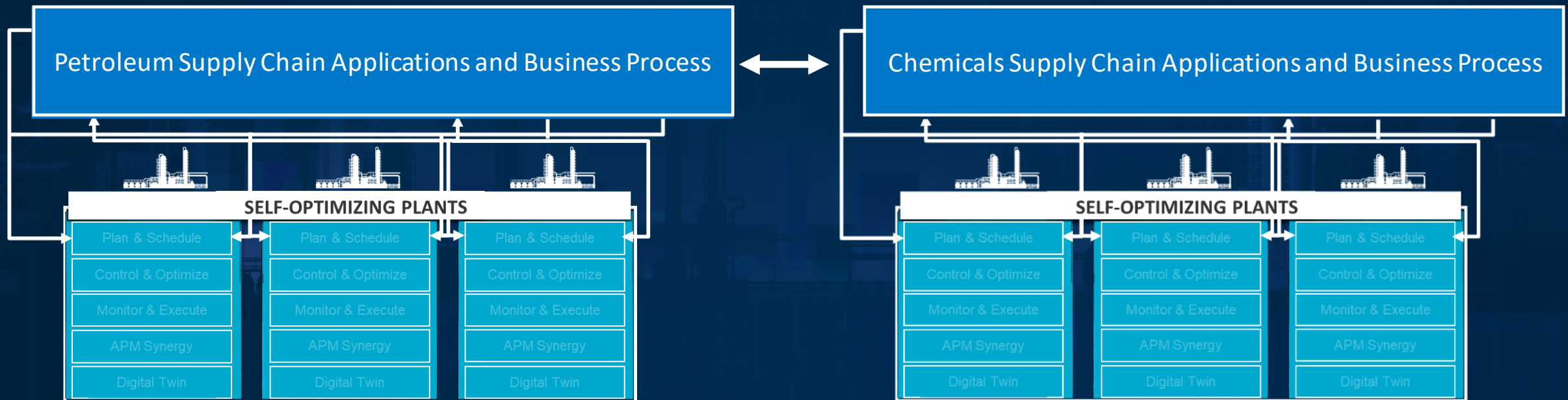


# Vision to Support the Smart Enterprise – Oil to Chemical Value Chain Optimization

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ENTERPRISE

## Oil to Chemical Value Chain Optimization



# Value Chain Control Tower

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Visibility into CO<sub>2</sub> impact



Governance and information across the value chain

Optimization of value chain performance and sustainability





# Asset Optimization Powers the *Smart* Enterprise