Engineering + Operations

Creating an Adaptive (Resilient) Industrial Enterprise

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WHAT TODAY'S LEADERS ARE UP AGAINST

Markets shift overnight.

Supply chains break without warning.

Talent is hard to find— and even harder to keep.

Yet most productions are still built for predictability, not volatility. And that gap is widening.

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We need *foresight*

And the *agility* to adapt

Before things go wrong

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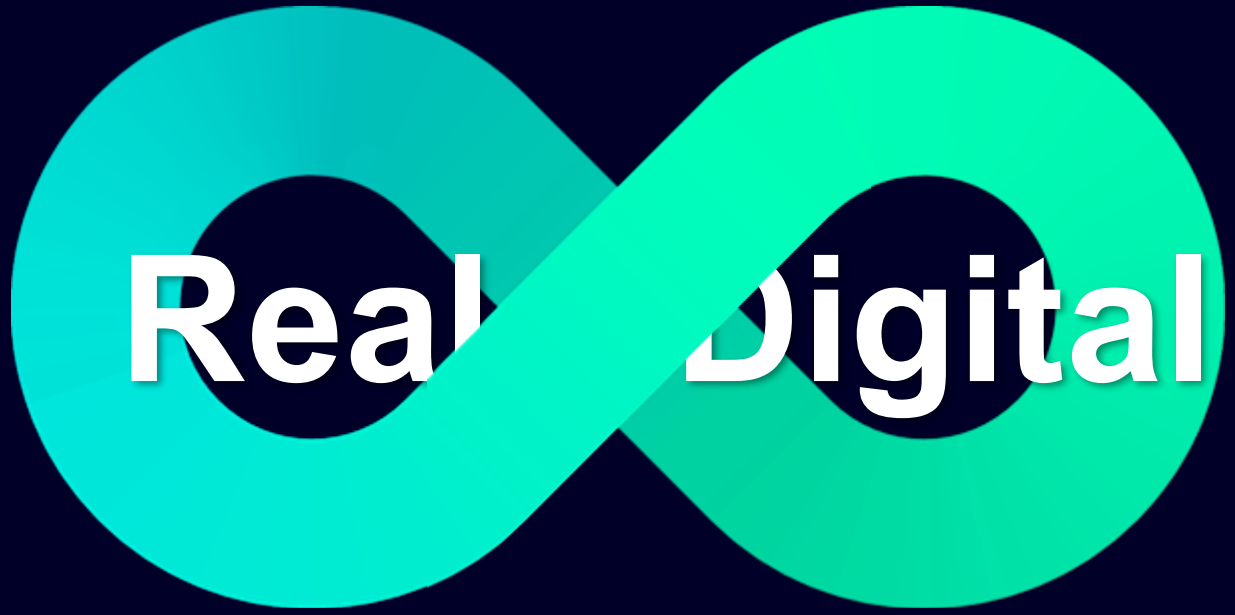
PROBLEM

Reality comes before Data…



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SOLUTION

Make a virtual world before you build anything

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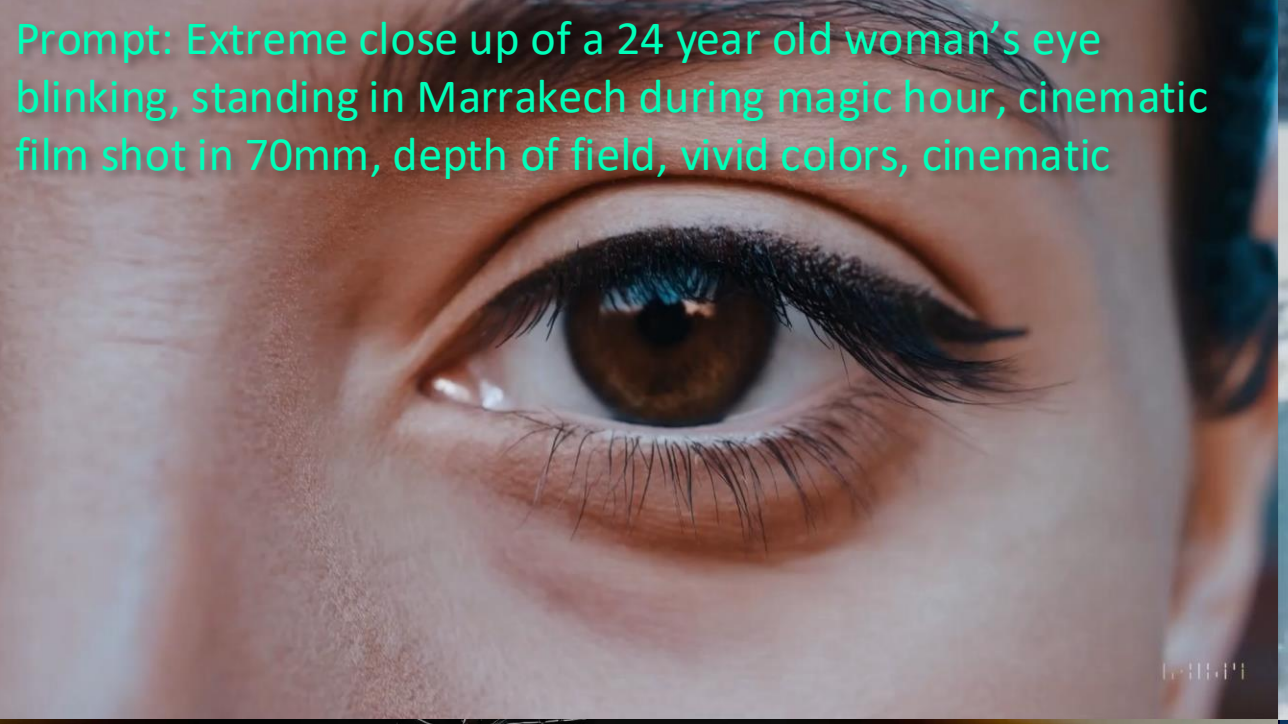

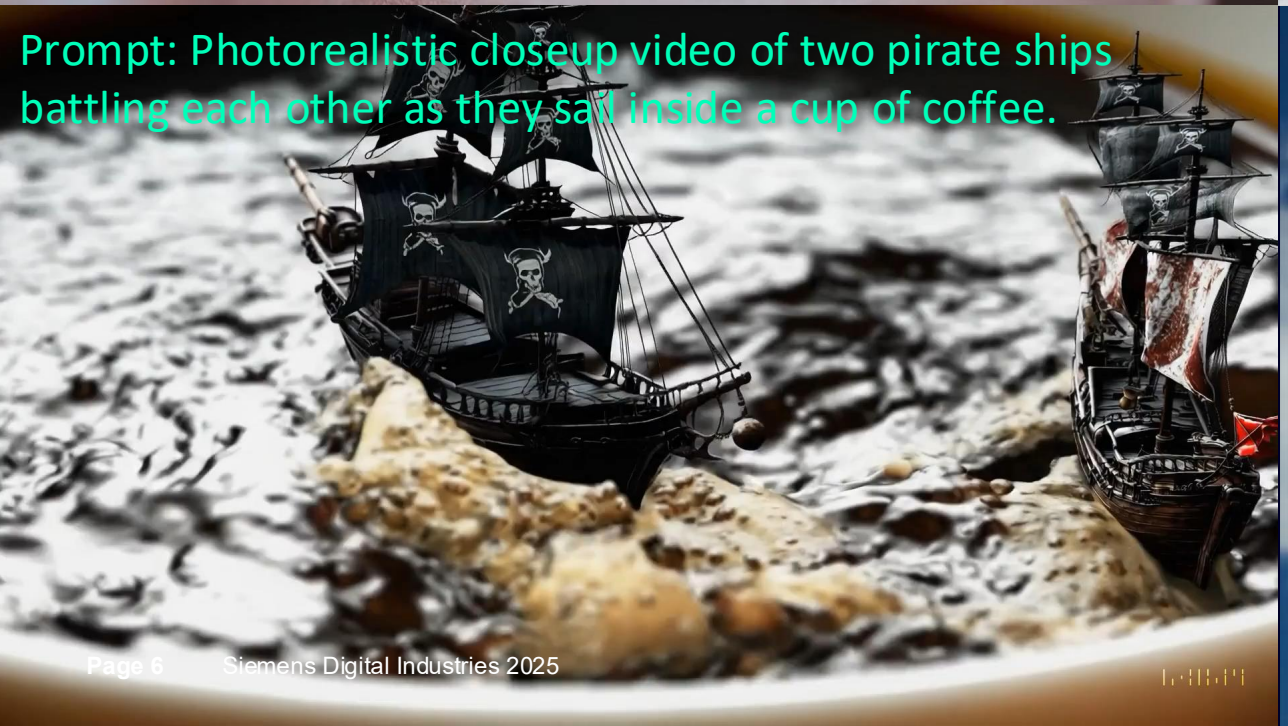

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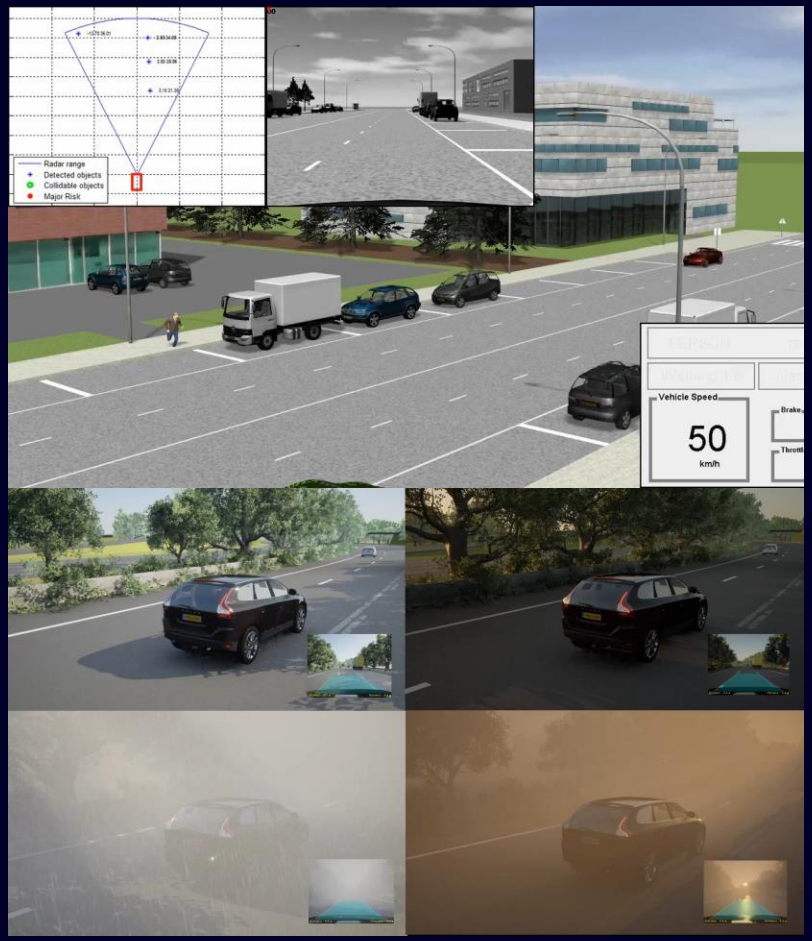
Physics is inferred,
not calculated

Digital world

We’ve spent >20 years learning how to simulate reality in a Digital World.

Multi-physics simulations that scale from quantum through molecular to complex systems across all disciplines



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Digital world

Our global leadership in Operations Technology allow us to connect these predictive models to the Real World, allowing us to *accelerate everything* and retain *digital agility* even as we pass from bytes to bits.

Real world

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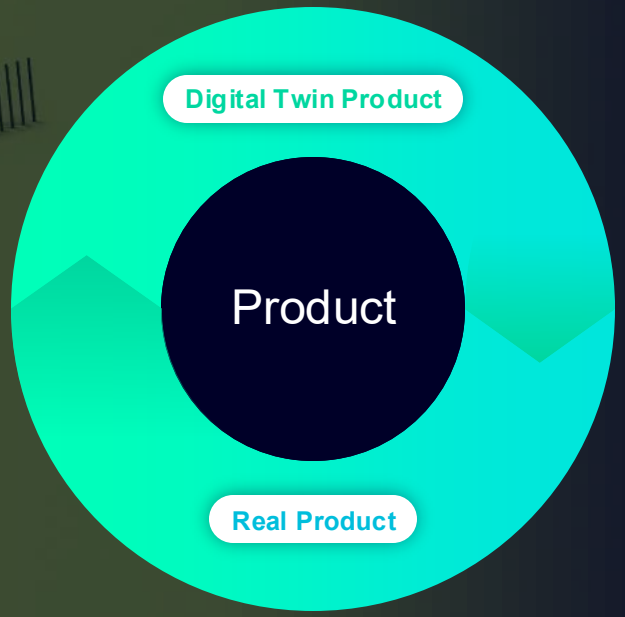
Digital world



We first applied this to product design, so our portfolio could engineer itself…

Real world

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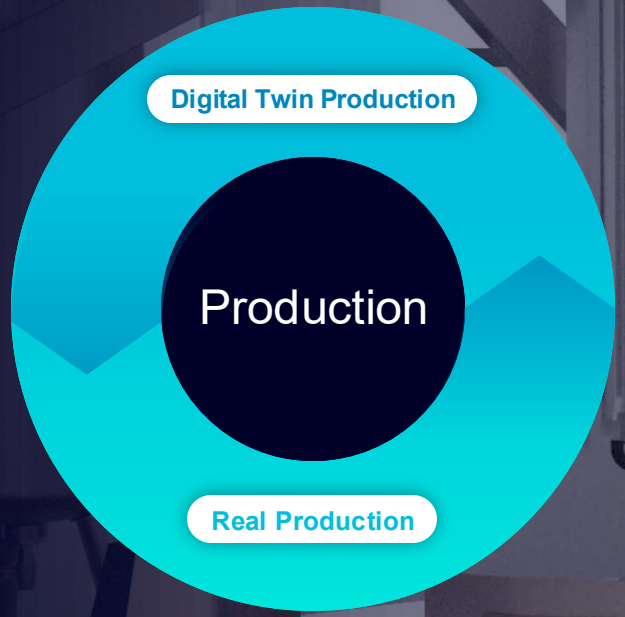
…and then we applied the same techniques to the equipment and processes on the shopfloor

Digital world

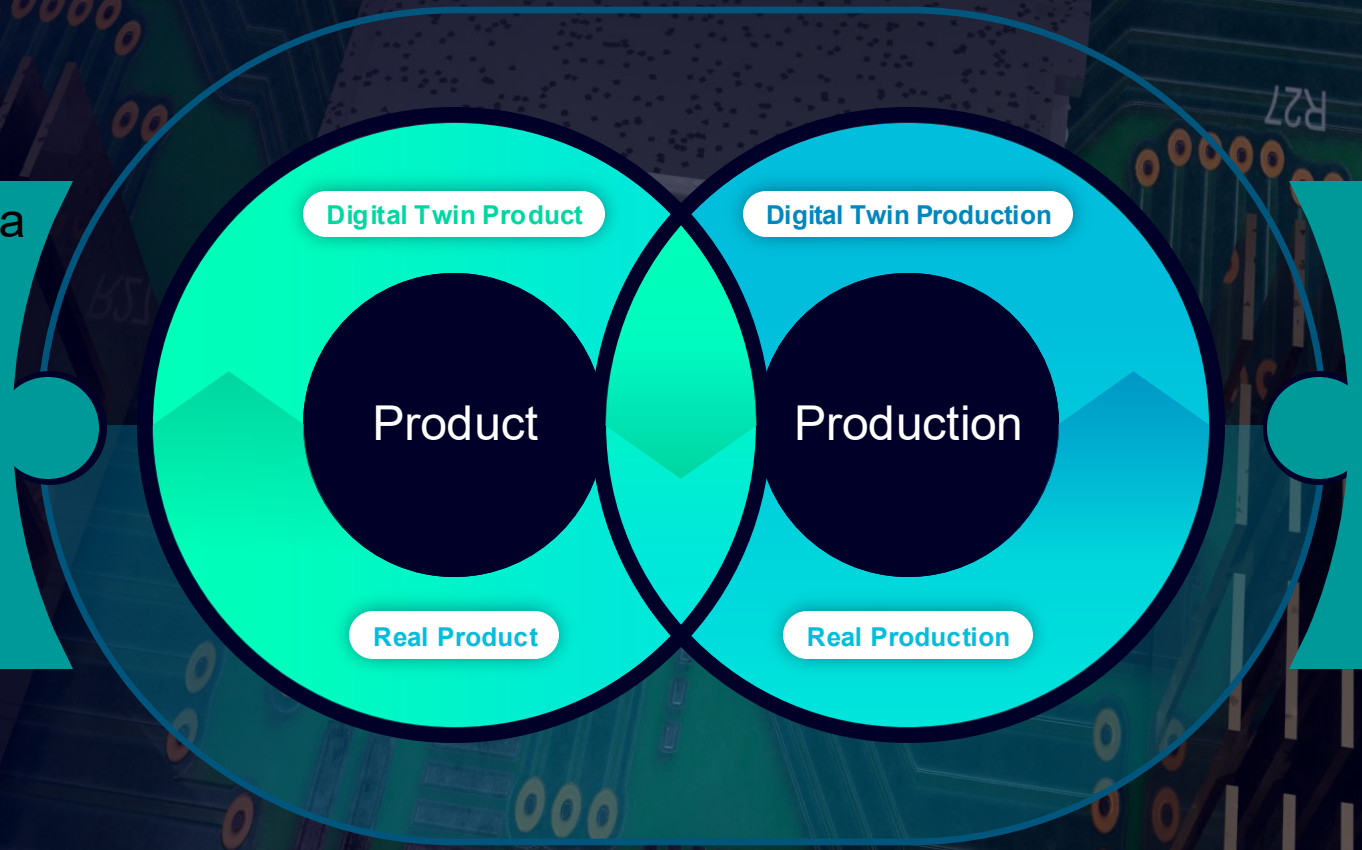


Real world

with synthetic data

Train / Tune Foundational Models

with real data



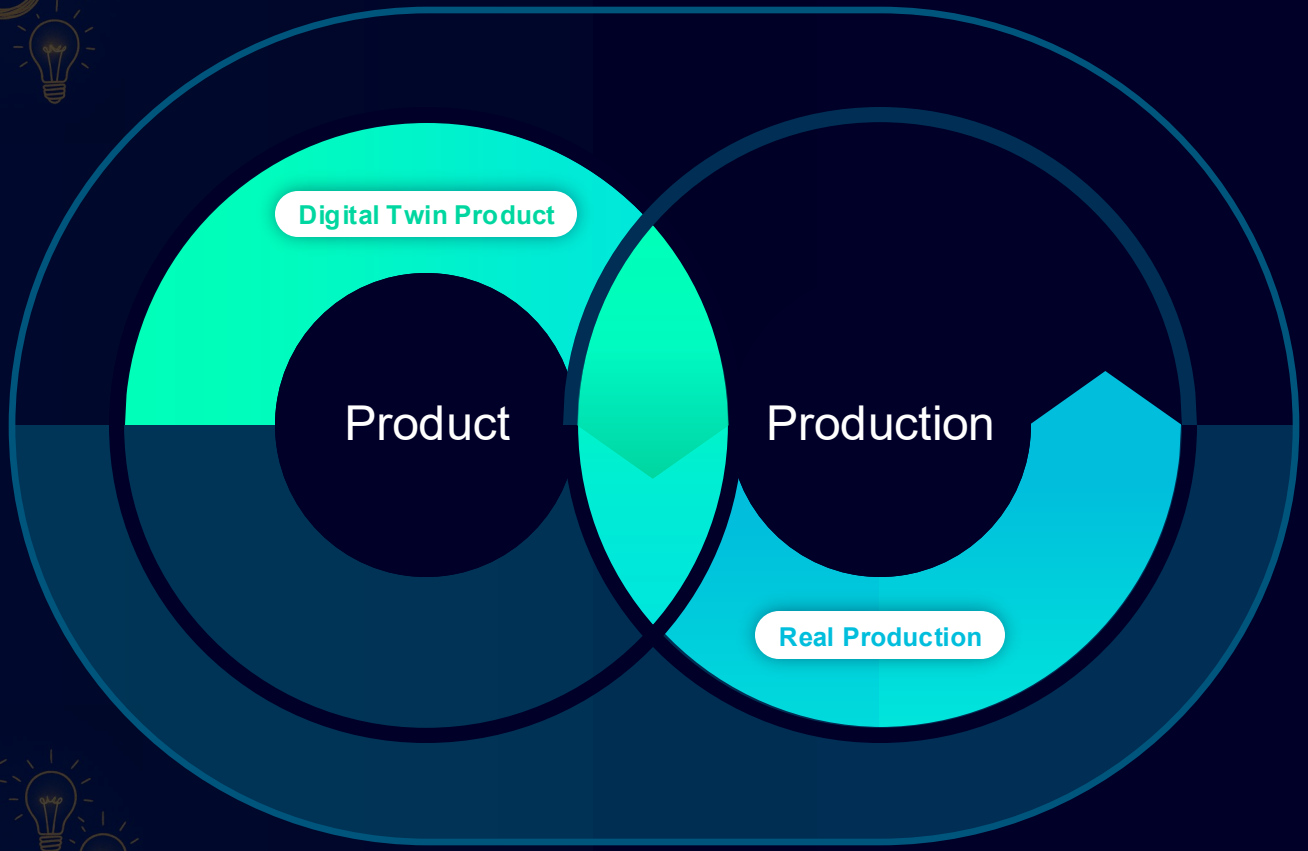
during design

Accelerate *everything*

during operation

What we've got

Infinite Ideas



What we need

Infinite Capability & Capacity

…and the ability to put them into action

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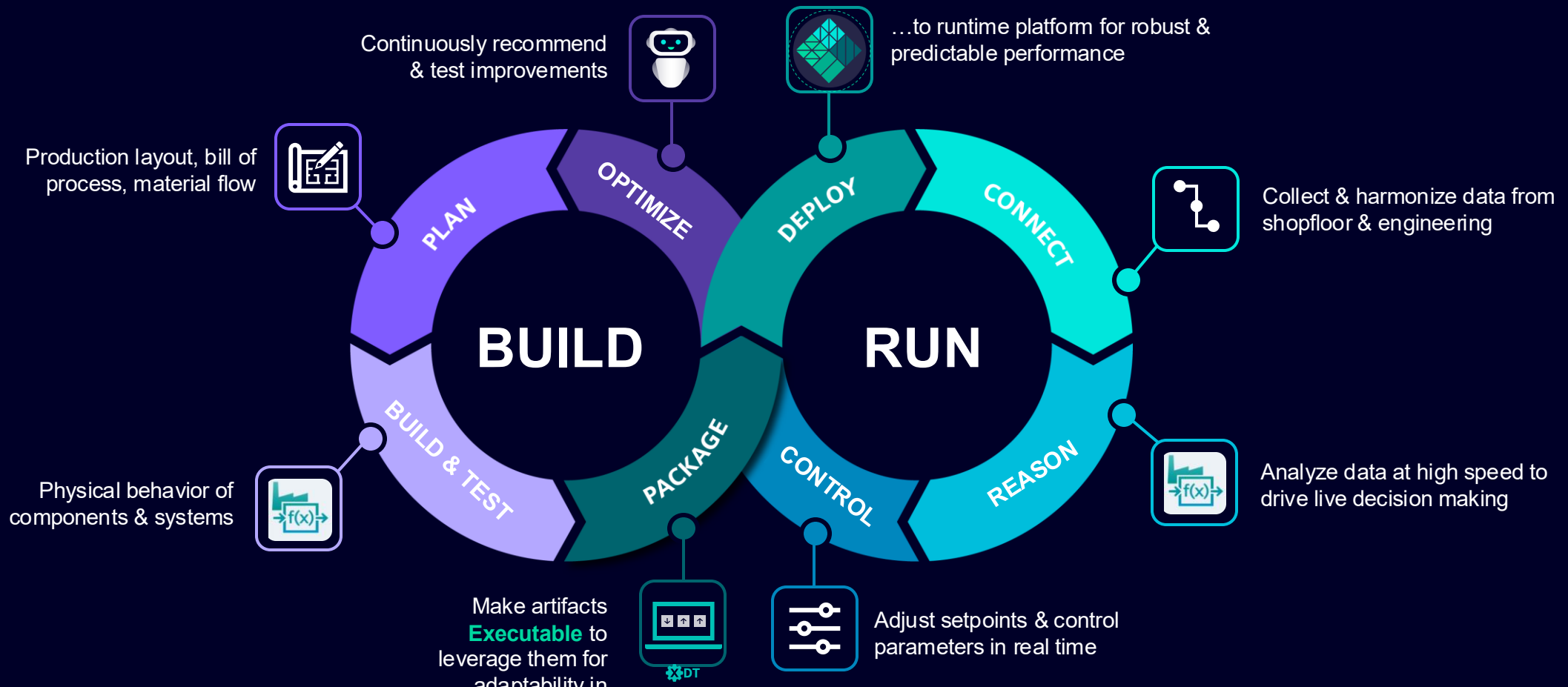
Where Engineering meets Operations

People Process Technology



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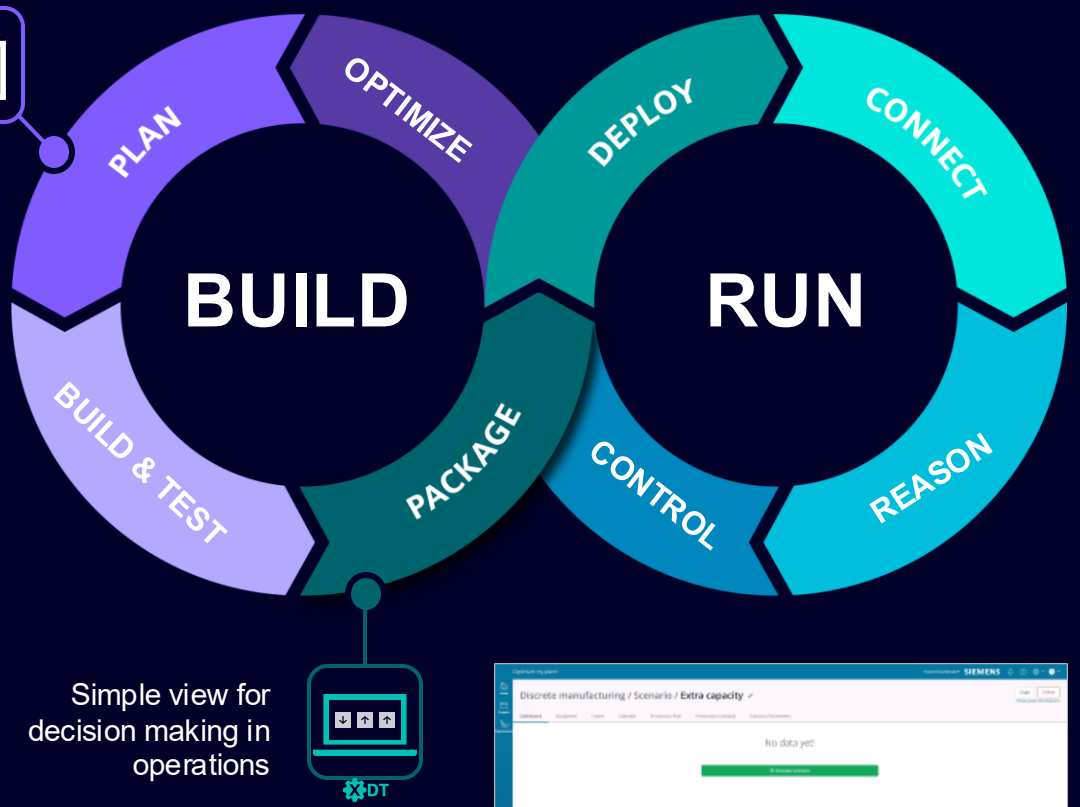
Reuse and simplification drive efficiencies

Ease of use

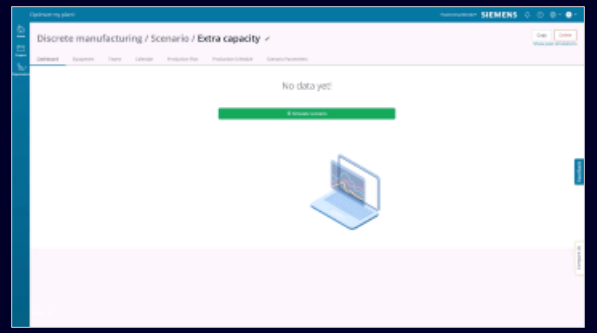
Reuse

Wrapping

Production layout & material flow in planning / engineering phase



Simple view for decision making in operations



01100101 01111000 01100101 01100011
01110101 01110100 01100001 01100010
01101100 01100101 00100000 01000100
01101001 01100111 01101001 01110100

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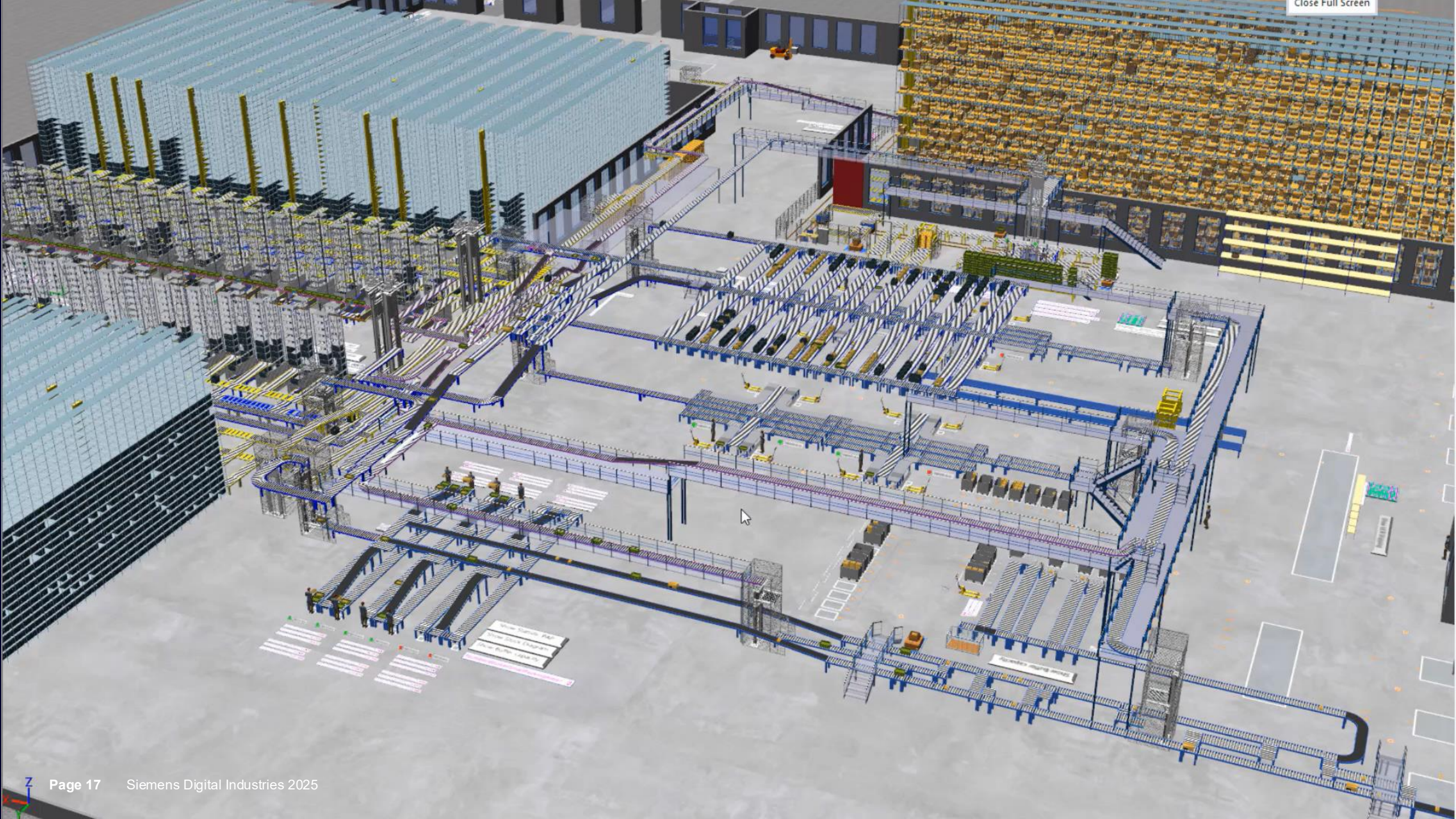

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Discrete manufacturing / Scenario / Extra capacity

Copy Delete
Show past simulations

No data yet!

Simulate scenario

Full integration drives flexibility
Adaptive Asset Allocation

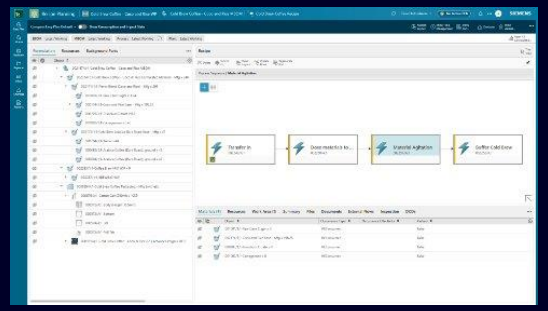
Optimize scheduling

Full integration & automation

Capability matching

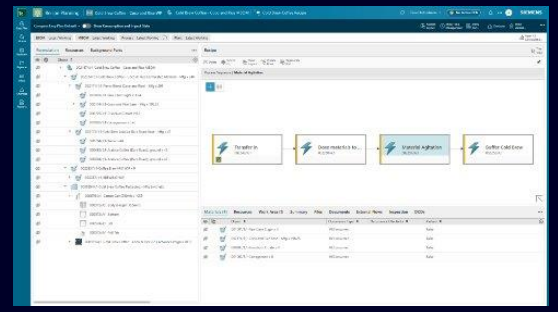
Adapt execution of recipes / BOP to equipment capabilities & availability

Define Bill Of Process (BOP) and/or recipes for new product (variants)



PLAN
OPTIMIZE
DEPLOY
CONNECT
BUILD
RUN
BUILD & TEST
PACKAGE
CONTROL
REASON

… based on standardized skill descriptions



Make artifacts **Executable** to leverage them for adaptability in Operations!

Steer AGV / AMR fleet for flexible production execution towards lights out manufacturing

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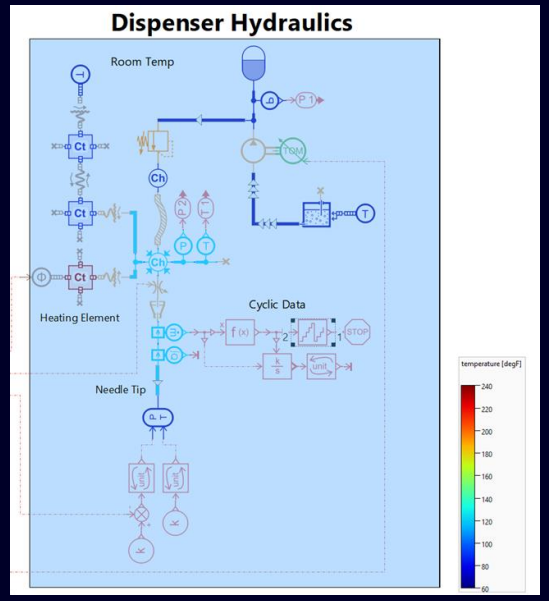
Reuse and optimization drive process quality

Tribal knowledge

Reuse

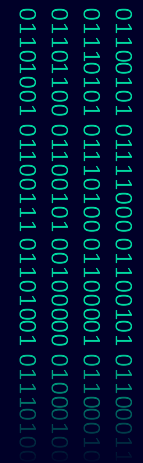
Live Executable Digital Twin



Leverage the model

PLAN
OPTIMIZE
DEPLOY
CONNECT
BUILD
RUN
BUILD & TEST
PACKAGE
CONTROL
REASON

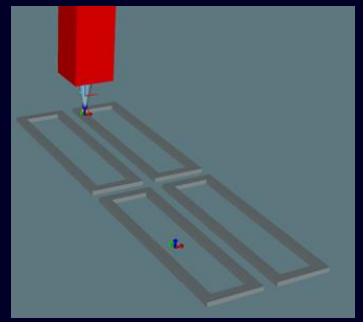
Extract in-service / operations data



Improve system design & commission / test virtually

Optimize the model

Improve glue dispensing control



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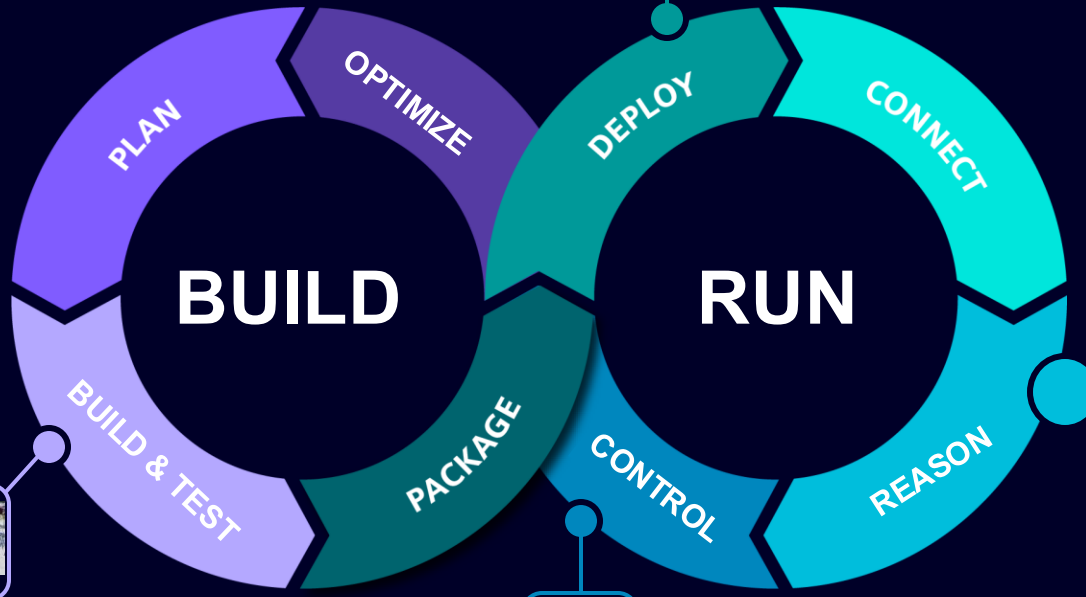
Organizations learn to trust AI with virtual validation

Trust

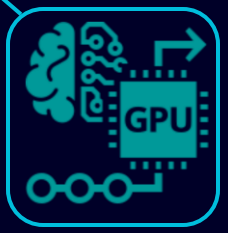
Shift left

Industrial Data & AI

Create an unbiased, reliable and efficient AI model



Reject defective products



Execute the AI model in high performance

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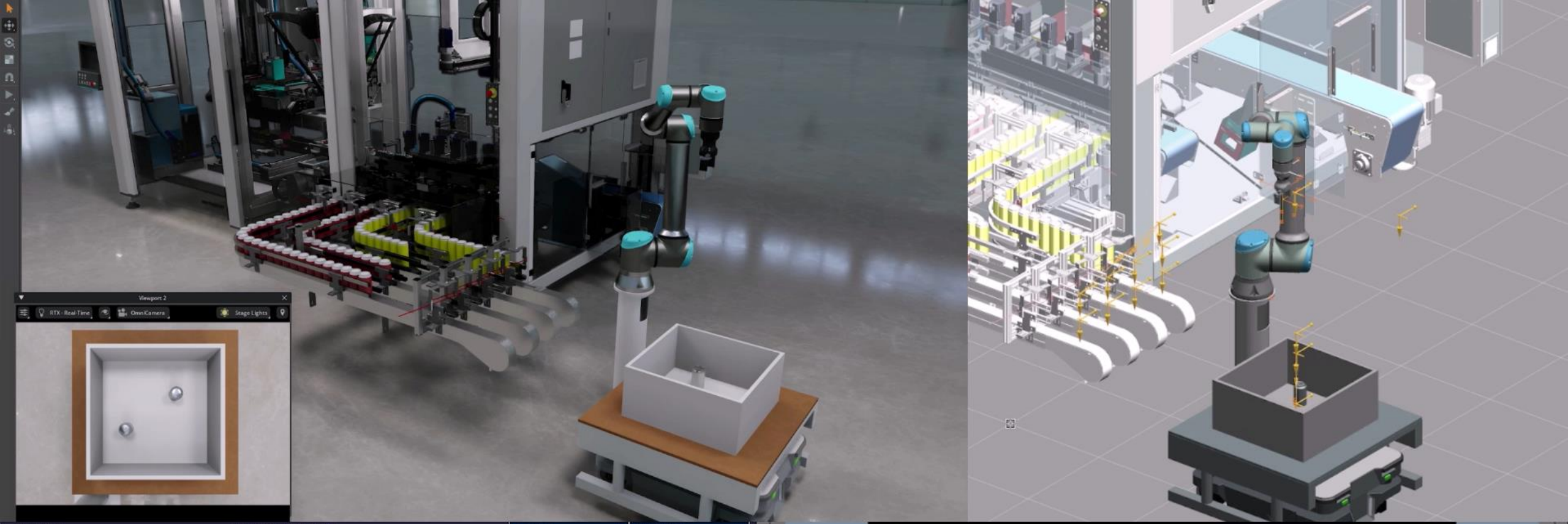

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SIMATIC Robot Pick AI

Operator

English (US)

Camera Connected

PLC Connected

Pick Calculation Error

Pick Point

Focus View

Color

Depth

Pick Calculation Status

Error

Estimated pick point is above the bin.

1) Verify the bin content and clean it up.

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License: SIMATIC Robot Pick AI Pro - Developer License, expires in 112 day(s), non-production use

Application Version: 1.1.0 Neural Network Version: ov_model_rgbanm_1.2 GUI Version: 1.1.0

F1 F3 F5 F7 F9 K1

SIMATIC Robot Pick Ai | Application Example

SIMATIC Pick AI Application

Robot Robot 1

Ready

AutExt

In Sync

Tool: 1

Frame: 0

Prim Seq

Override 1 %

Operator siemens

Home

Param

Operation Mode

Manual

Run Application

Start

Stop

RESET

Abort

Application Status

Busy

Wait for pick point

Error

Pick AI Status

Busy

Bin Empty

Calculation Successful

Error 0000

State FB_STATE_DISABLING

Power Move Position List Teach Path Move Path Configuration Messages

F2 F4 F6 F8 F10 K2

Production Copilots make sense of lots of data to reduce downtime

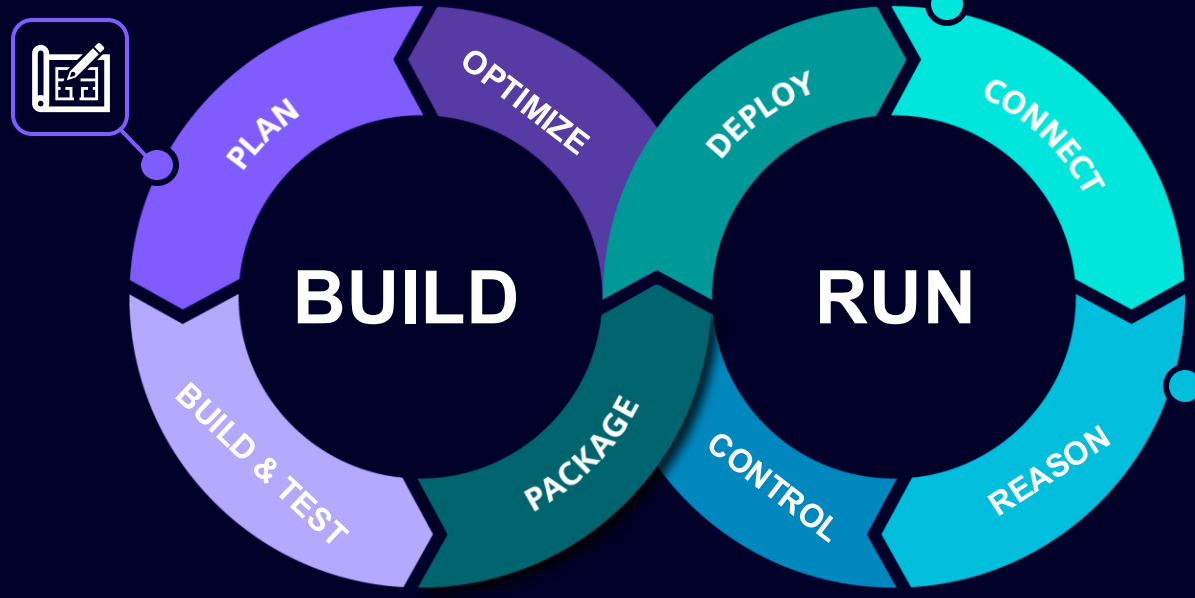
Concrete actions

Insights throughout

Operations Copilots

Retrieve static data from design stages (e.g. manuals

Retrieve dynamic machine / equipment data



Live chat with the operator in plain english!

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And soon, Production Copilots will optimize operations

Lack of insights

Closed Loop

Operations Control

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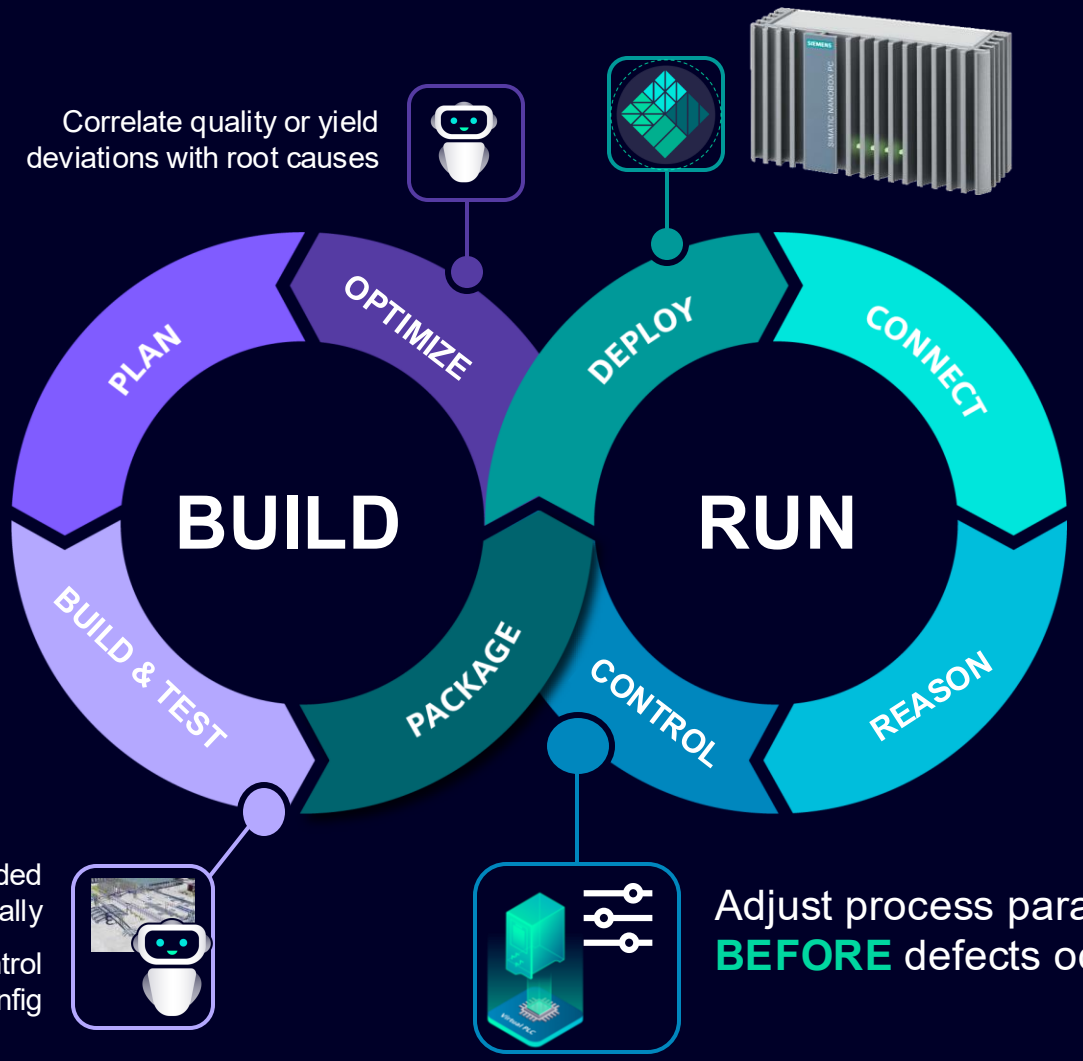
Correlate quality or yield deviations with root causes



Generate & validate recommended adjustments virtually

Automatically update control logic & automation system config

Adjust process parameters **BEFORE** defects occur

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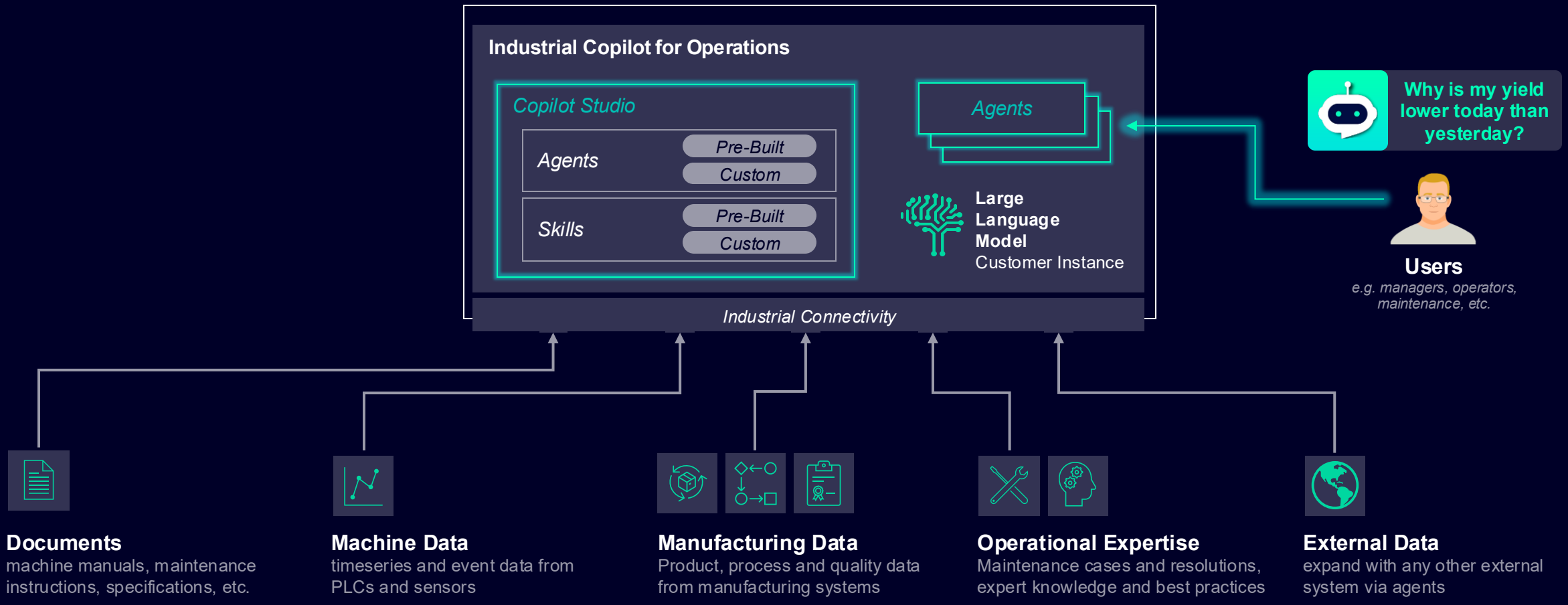
AI-powered Agents in Action:
Support day-to-day operations by integrating multiple data sources and skills



Documents
machine manuals, maintenance instructions, specifications, etc.

Machine Data
timeseries and event data from PLCs and sensors

Manufacturing Data
Product, process and quality data from manufacturing systems

Operational Expertise
Maintenance cases and resolutions, expert knowledge and best practices

External Data
expand with any other external system via agents

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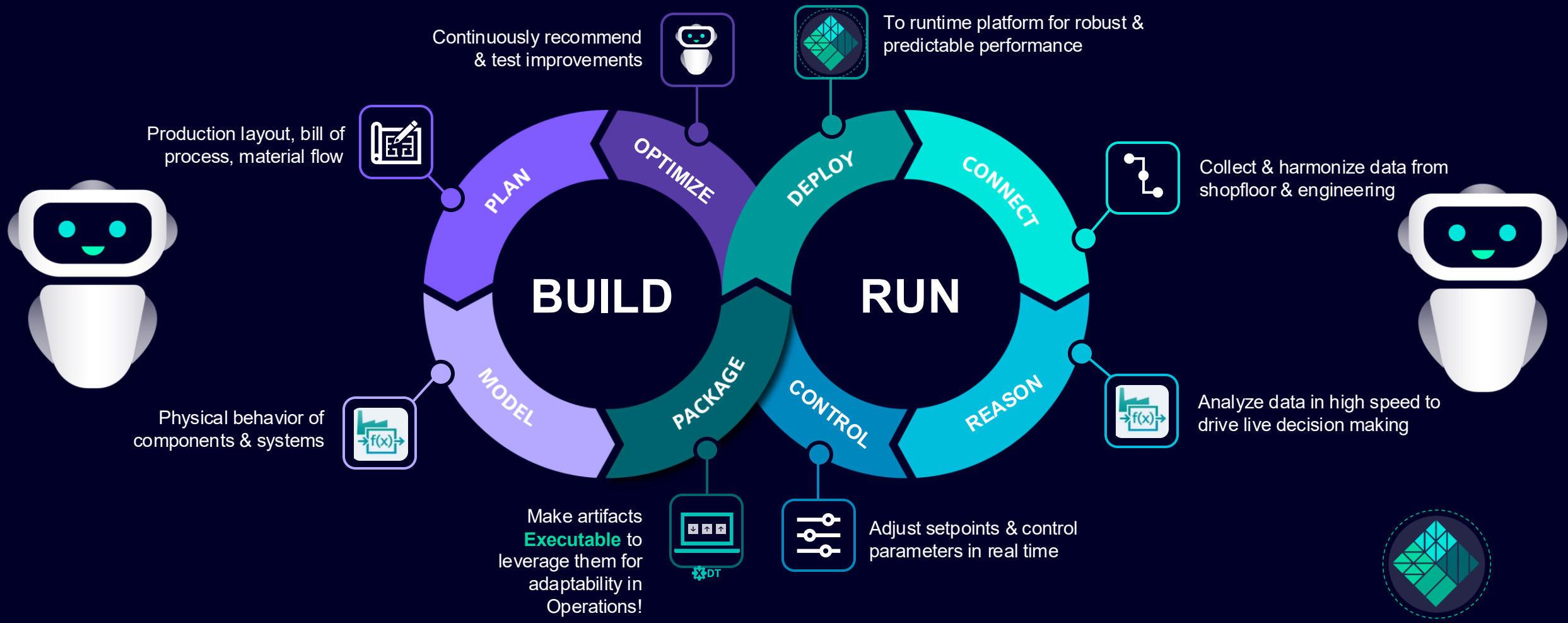
Engineering and Operations Copilots will revolutionize industrial value generation

Skills, fun & efficiency

Full integration

Copilots everywhere



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Creator

Don’t quote me on this…

We can no longer rely solely on the Defense Industrial Base. We must distribute production to US SMEs in order to 100x our military output.

Our centralized production paradigm means 3 month lead times, 25 ton MOQs, and a supply chain that costs more and generates more carbon than our production facilities.

Buyer

COST, CARBON, COMPLEXITY

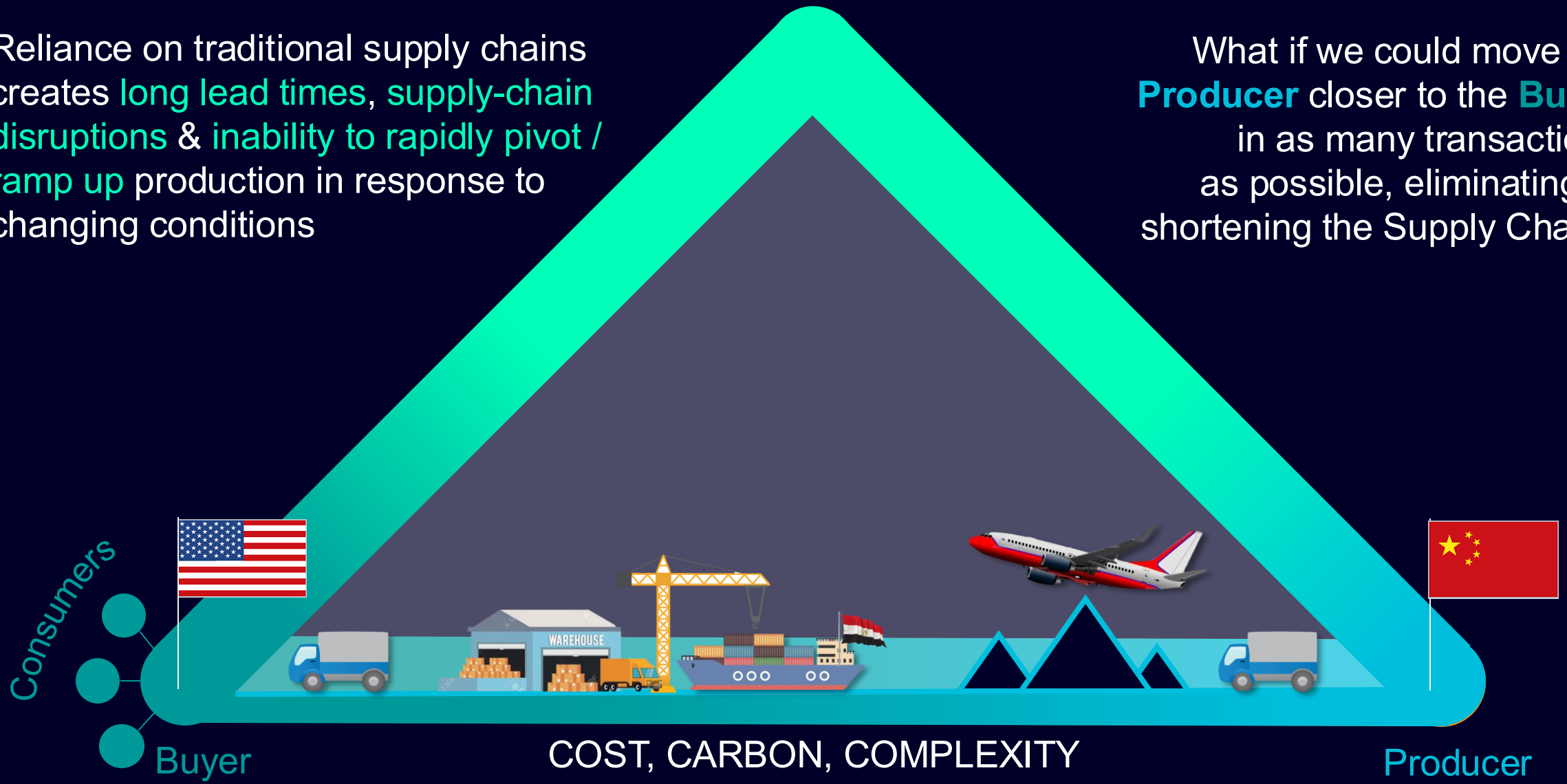
Producer

Problem

Reliance on traditional supply chains creates long lead times, supply-chain disruptions & inability to rapidly pivot / ramp up production in response to changing conditions

Solution

What if we could move the **Producer** closer to the **Buyer** in as many transactions as possible, eliminating or shortening the Supply Chain?



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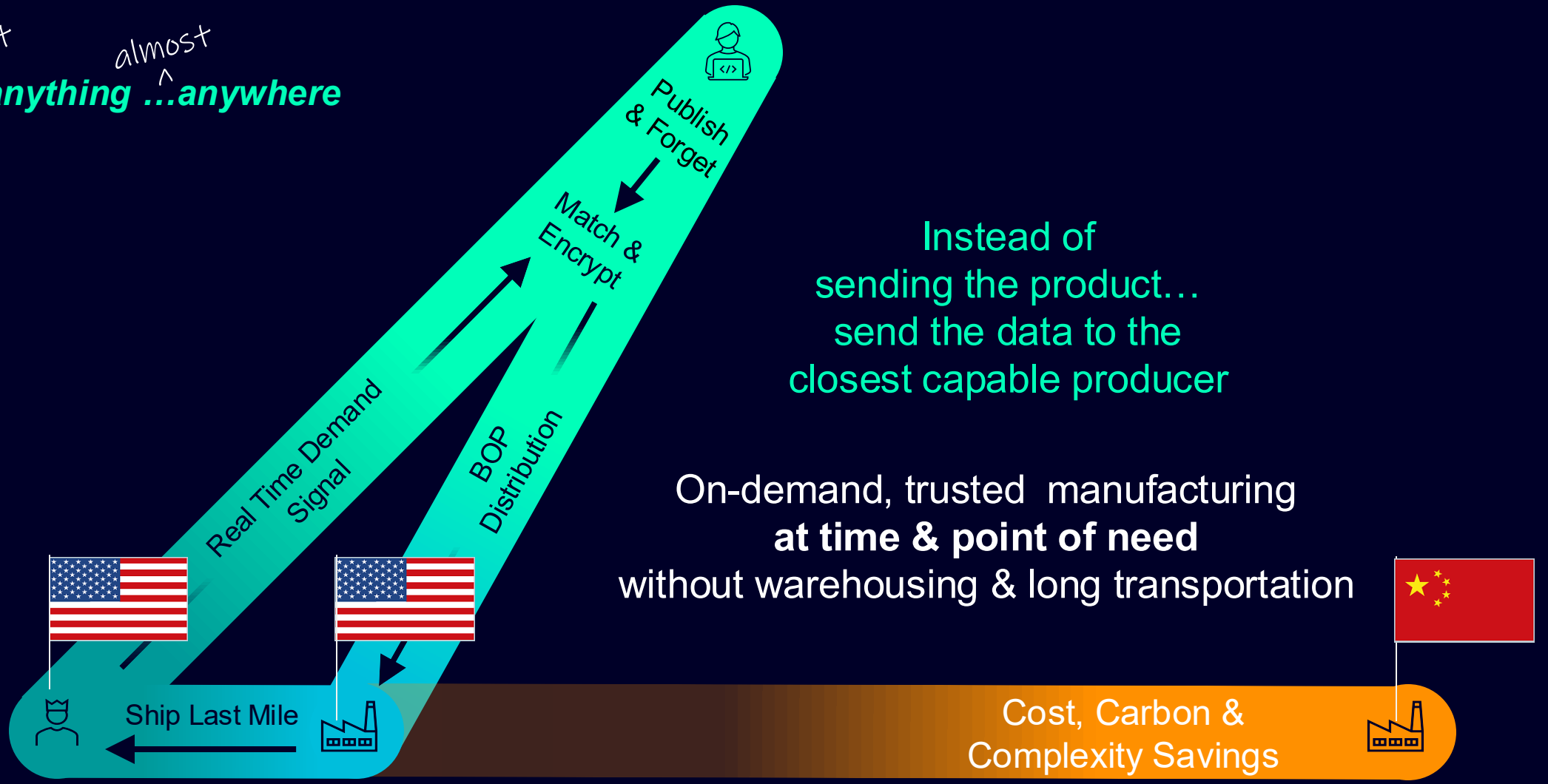
Distributed Manufacturing

almost ^ almost ^

make …anything …anywhere

SM



Instead of
sending the product…
send the data to the
closest capable producer

On-demand, trusted manufacturing
at time & point of need
without warehousing & long transportation

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Thank you!

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