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Enabling the Tool-agnostic Digital Thread for a Digital Twin Configuration

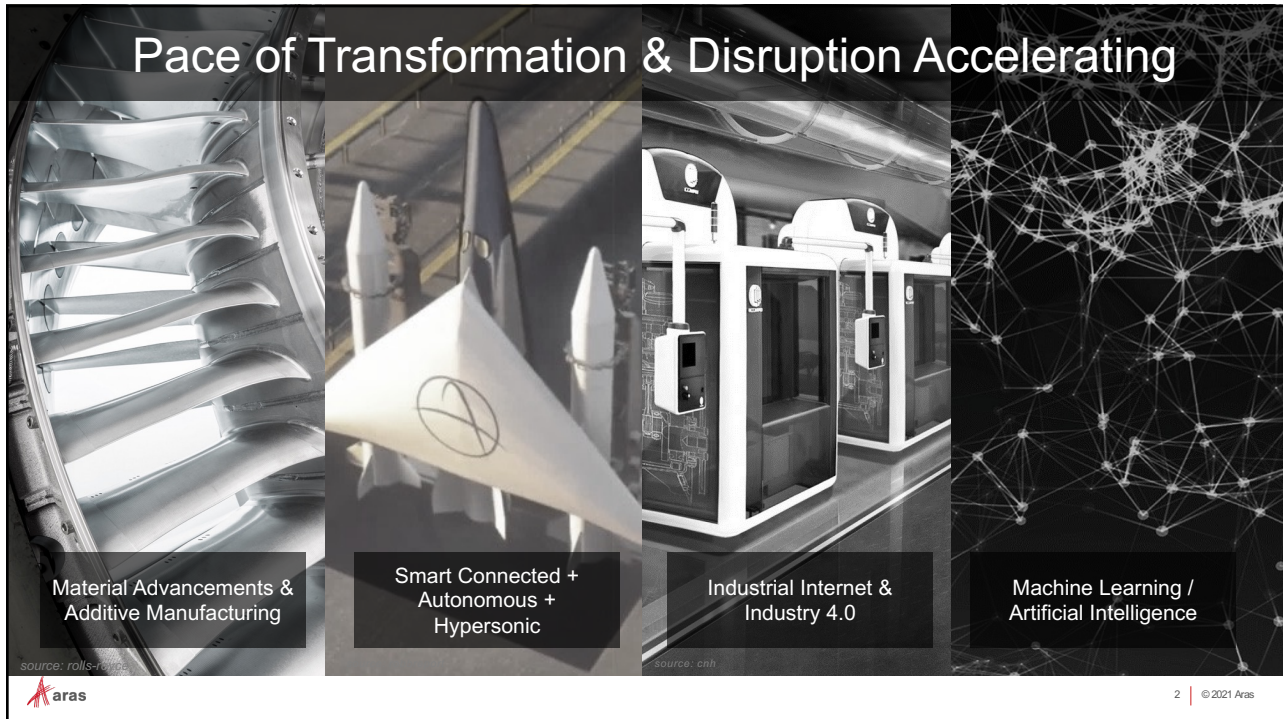
Marc Lind | Aras

PLM Road Map™ @ GPDIS 2022
Digital Transformation and PLM – a call for PLM professionals to re-define and re-position the benefits and value of PLM
September 27

source: nasa

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Pace of Transformation & Disruption Accelerating



- Material Advancements & Additive Manufacturing
- Smart Connected + Autonomous + Hypersonic
- Industrial Internet & Industry 4.0
- Machine Learning / Artificial Intelligence

source: rolls-royce source: cnh

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Increasing Context Problem

TIME SERIES DATA

- Airspeed
- Altitude
- Barometric Pressure (electronic/aneroid)
- Outside Air Temperature (OAT)
- Fuel pressure (x number of engines)
- Fuel flow (x number of engines)
- Cabin air pressure (psihg)
- Cargo air pressure: doors, bulkheads
- Cabin temperature: doors, bulkhead
- Cargo temperature
- Fuel temperature: fuel tanks, fuel pumps
- Radar air traffic - TCAS

ANALYZE & SIMULATE

CONTEXT

Digital Twin + Digital Thread configuration traceability

source: airbus

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2 Parts to Digital Twin

Digital Twin Configuration

- Monitor
- Alerts
- Analyze
- Simulate

Digital Twin Performance

Data Lakes IoT Sensor Data

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Risks Without Digital Twin + Digital Thread Context

Ramifications	Risks
Misdirected Actions	Loss of Life
Inaccurate Conclusions	Safety Issues
Misinterpretations	Liability
	Brand Damage
	Regulatory Actions
	Operational Shutdowns
	Lost Revenues
	Customer Frustration
	Unnecessary Rework / Repairs

Risks increase exponentially with artificial intelligence

source: airbus



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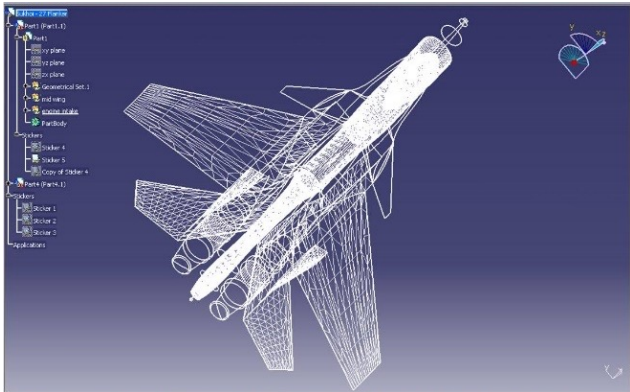
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What is the Digital Twin Configuration?

General representation of a family of products?

Just Mechanical?


As-Designed?

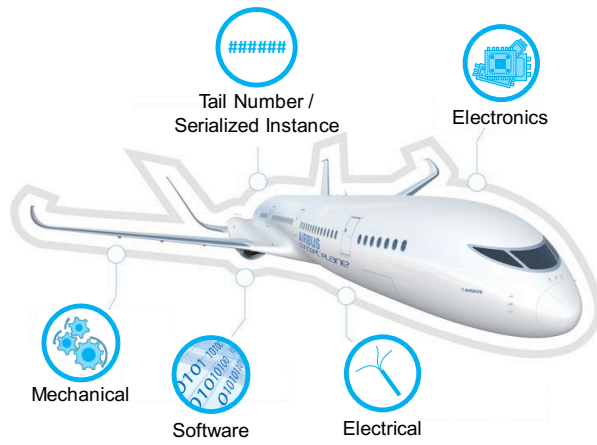


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Digital Twin Configuration



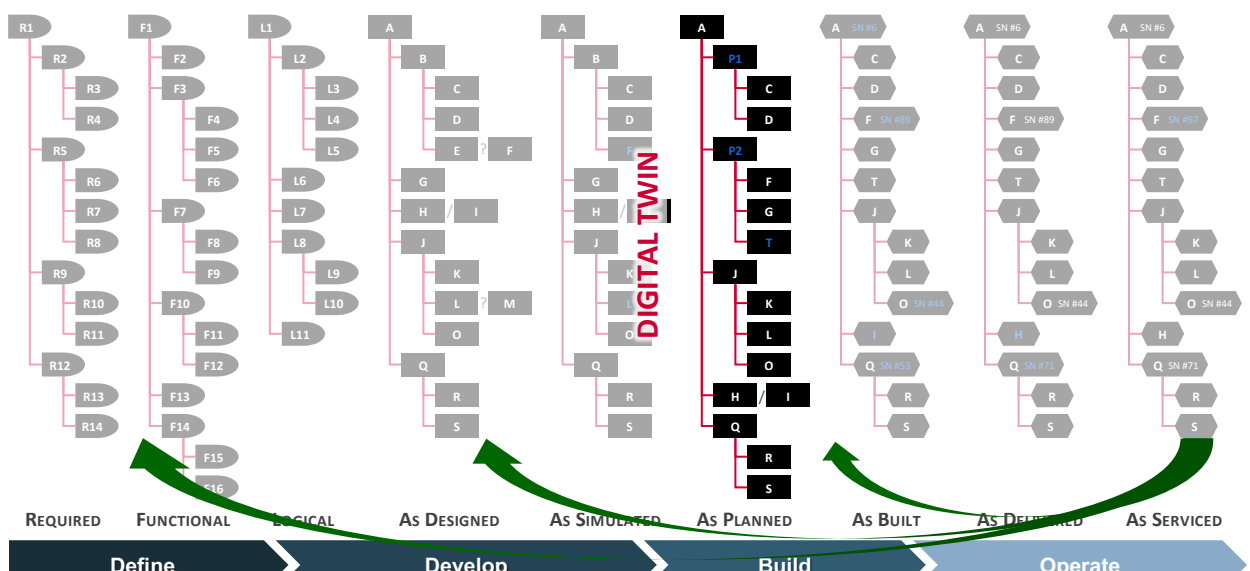


exact digital representation of the physical asset right now


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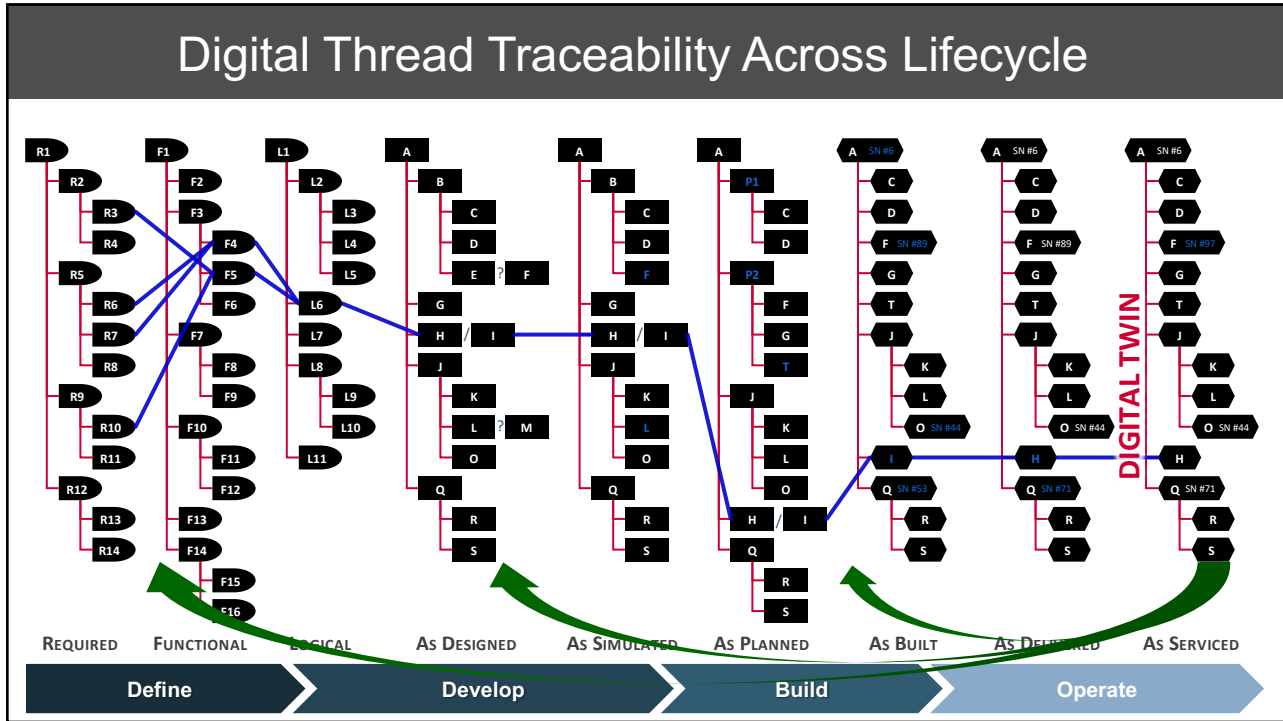
Digital Twin Configuration Over Lifecycle



REQUIRED FUNCTIONAL LOGICAL AS DESIGNED AS SIMULATED AS PLANNED AS BUILT AS DELIVERED AS SERVICED

Define Develop Build Operate

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What is the Digital Thread?

Meaningful Relationship Connections

Meaningful relationship connections between all of a product’s digital assets – and their revisions over the lifecycle – across the multiple domains in the lifecycle within and throughout an enterprise including the supply chain.

Digital thread connect data elements of products, bills of material, parts, software, electronics, CAD models, documents, requirements, simulation & analysis data, verification & validation data, supplier specifications, technical data pack (TDP) contents, manufacturing process plans, inspection & test plans, quality records, service manuals, maintenance records, and many other digital assets.

Digital thread is an attribute of an enterprise’s information architecture as opposed to a software system that is purchased, and exists both within and between data elements in different tools and systems from a wide range of vendor providers.

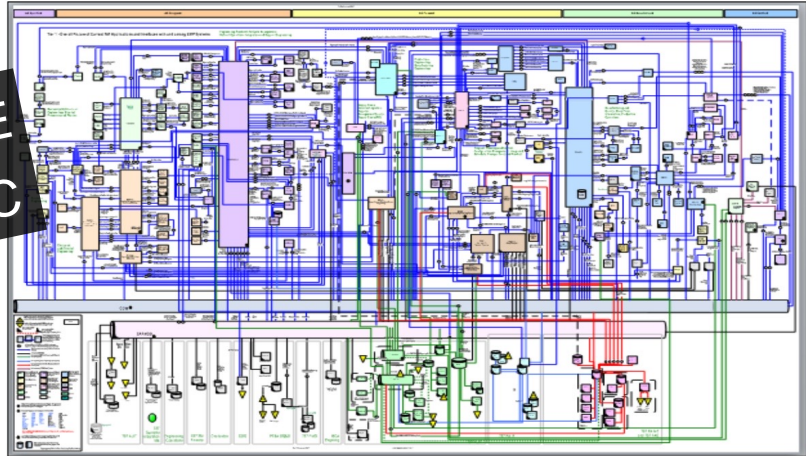

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Are Digital Twin & Digital Thread Achievable?

Thousands of Existing Systems & Petabytes of Data
Users around the World

**RIP & REPLACE
NOT REALISTIC**

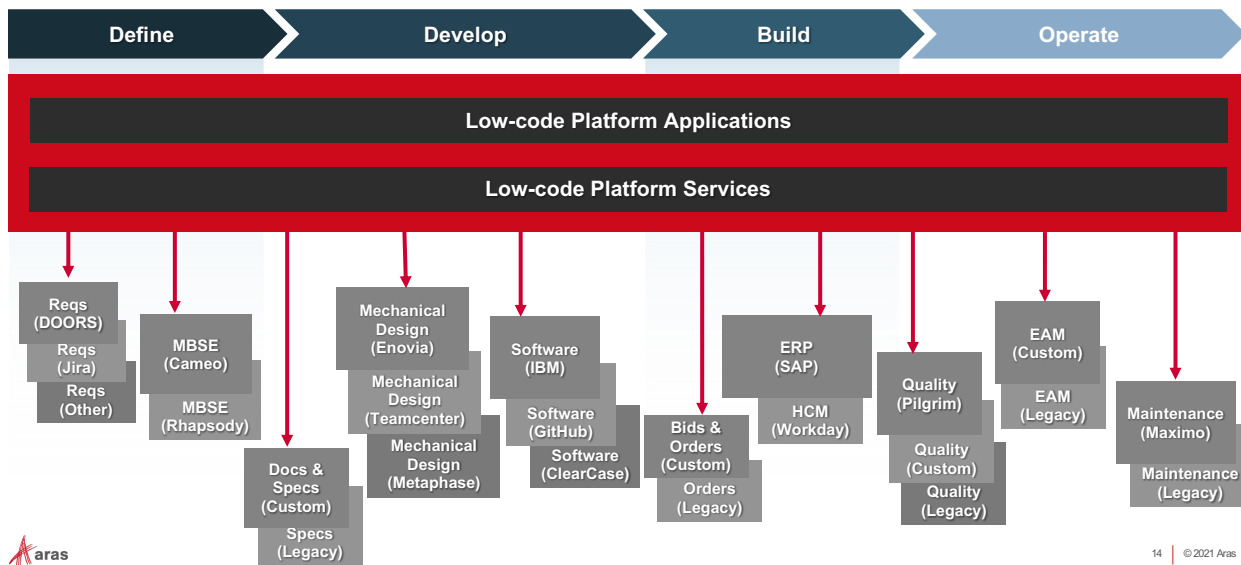


source: gpd's 2015

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Platform Overlay Approach



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Platform Requirements for Tool-Agnostic Digital Thread

PLATFORM REQUIREMENTS	CANNOT HAVE	MUST HAVE
 <p>Ability to ingest data through API and Services</p>	<p>Proprietary Closed APIs</p>	<p>FULL + Open APIs</p>
 <p>Integration ability to manipulate processes and data through exposed API / Services</p>	<p>Proprietary Data Models</p>	<p>Open Data Model</p>
 <p>Ability to exfiltrate data out of API / Services</p>	<p>Obfuscated Data</p>	<p>Open Data Access</p>
 <p>Extensibility ability to build / extend functionality leveraging COTS framework</p>	<p>Static / Hard Coded Data Model</p>	<p>Dynamic Data Model</p>

source: <https://www.cimdata.com/en/aerospace-and-defense/publications/obsolescence-management-a&d-pim-action-group-platform-requirements>


must be able to openly connect to numerous tools & systems


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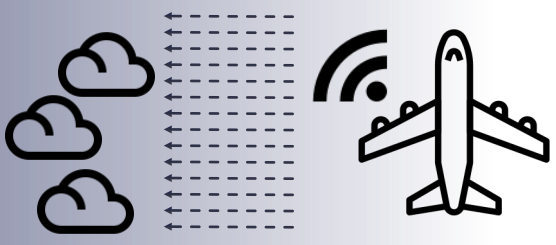
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Attributes of Digital Twin Configuration

Digital Twin Configuration




Digital Twin Performance

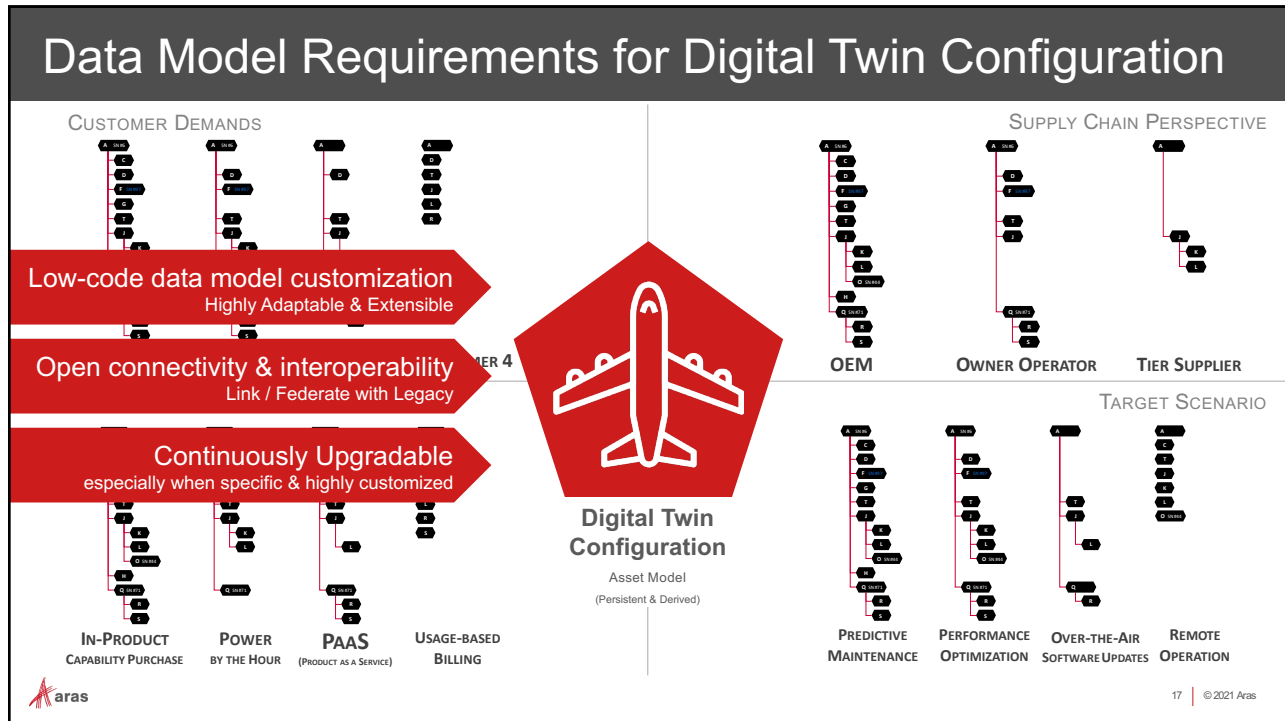


Data Lakes

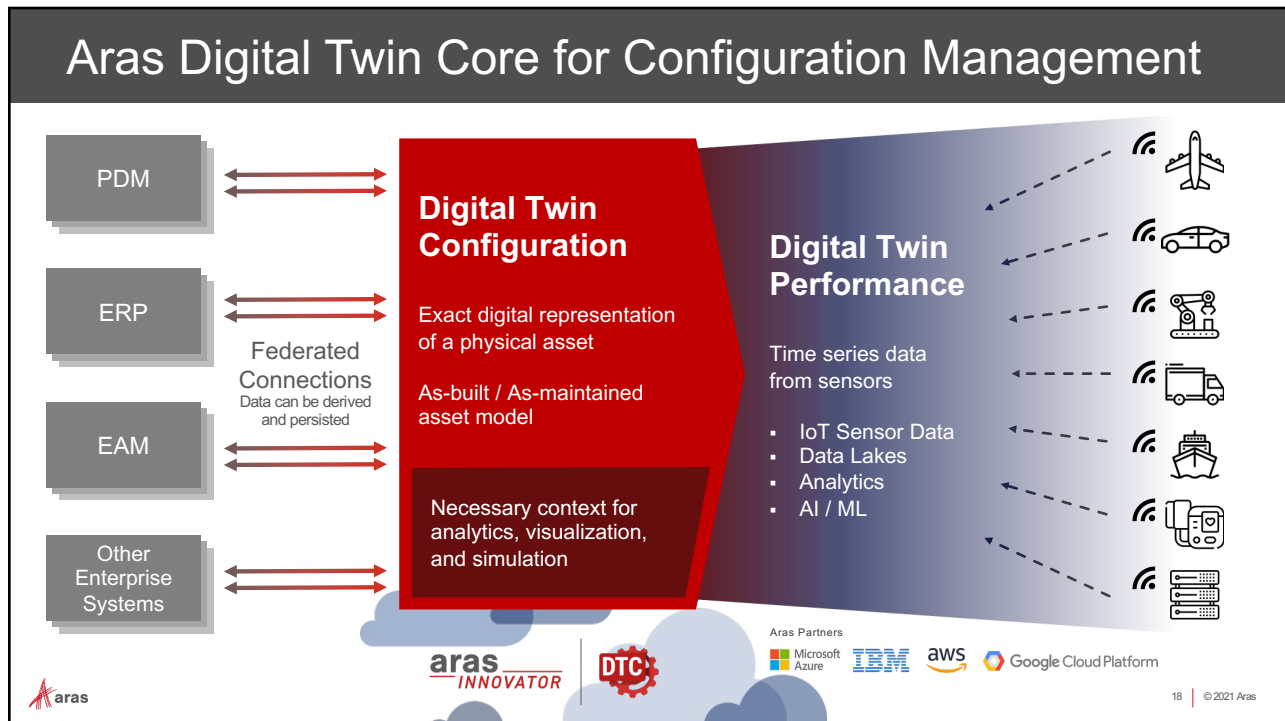
IoT Sensor Data


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Why are Digital Twin & Thread Required?

Smart Connected
Technology

Industrial Internet &
Industry 4.0

Artificial Intelligence /
Machine Learning

Context is Critical for Interpretation & Action

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MORE INFO

Digital Thread – [Digital Thread with Aras | Connect Everything](#)

eBook – [Unlocking Productivity Gains: The Case for a Digital Thread](#)

Case Study – [Kawasaki Heavy Industries](#)

Video – [Lifecycle Traceability and the Digital Thread](#)

Digital Twin – [Digital Twin Core from Aras | Create, Manage, and Sustain Context](#)

eBook – [Managing Product as a Service with the Digital Twin](#)

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