



EXCELERATE '22

NO LIMITS

A New Vision: The Smart Connected MRO

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Today's Agenda

- PTC at a glance
- Key Takeaways
- Digital thread vision
- MRO ecosystem
- Building Blocks
- Digital closed loop concept
- Reference examples



- \$1.5B global software company, headquartered in Boston, MA
- ~\$330M Govt sector + A&D business
- Consistently Rated as Industry Best/Leading in:
 - Computer Aided Design (CAD) **Creo**
 - Product Lifecycle Management (PLM) **Windchill**
 - Industrial Internet of Things (IIoT) **Thingworx**
 - Augmented and Virtual Reality (AR/VR) Solutions **Vuforia**
- 28,000 active customers
- 6,000 employees
- Strategic technology partner to U.S. Govt
- NASDAQ: PTC - market cap ~\$13B



How Digital Transforms Physical

DIGITAL
Defines
PHYSICAL

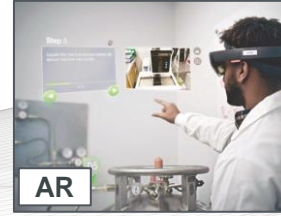
DIGITAL
Controls
PHYSICAL

DIGITAL
Manages
PHYSICAL

DIGITAL
Connects
PHYSICAL

DIGITAL
Augments
PHYSICAL

DIGITAL
Sustains
PHYSICAL



DIGITAL THREAD

Key Takeaways

MRO CHALLENGES



- **Worker shortage** and skill issues: Increased complexity, high demand, attractivity issues
- **Competitive environment:** new entrants, cost pressure
- **Shift toward availability type engagement:** how to optimize the balance price/risk
- Fragmented and **complex digital landscape**

WAY FORWARD



- **Better visibility** real time of maintenance production tool : optimize space, energy, resources, equipment etc.
- **Better failure** predictability and anticipation
- **Process automation**, real time interaction within the ecosystem, and right information right place right time
- **Digitized**, augmented and attractive working environment

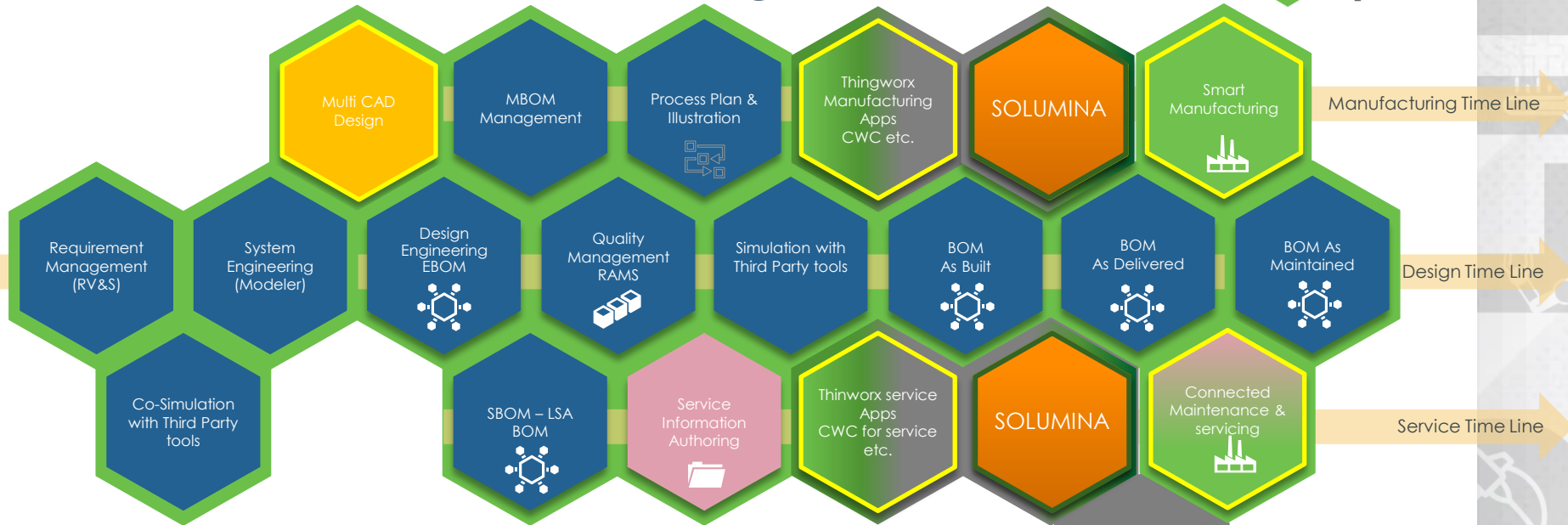
PTC-iBASEt SOLUTION



- **Enhanced work instructions** with Solumina powered by Windchill PLM connector
- **Real time status** with Solumina powered by Thingworx IIoT connector
- **AR-based** inspections and work instructions with Solumina powered by Vuforia - Thingworx

Embed Solumina MRO Execution Process & Capabilities within IT/OT Ecosystem

PTC – IBASET Joint Offerings

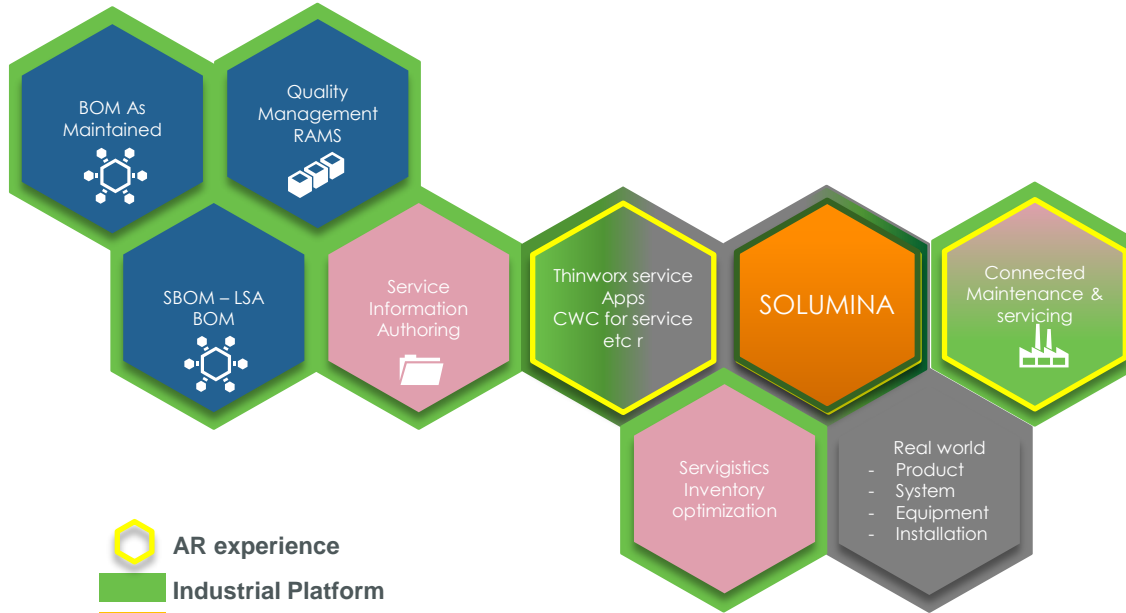


- Applies to : Products, Systems, Programs, equipment, facilities
- Enables full extended enterprise + Partners & Supply chain collaboration environment
- Promotes architecture openness and enables real data powered AR experience

- AR experience
- Industrial Platform
- CAD
- Enterprise PLM
- SLM



Smart Connected MRO Overview

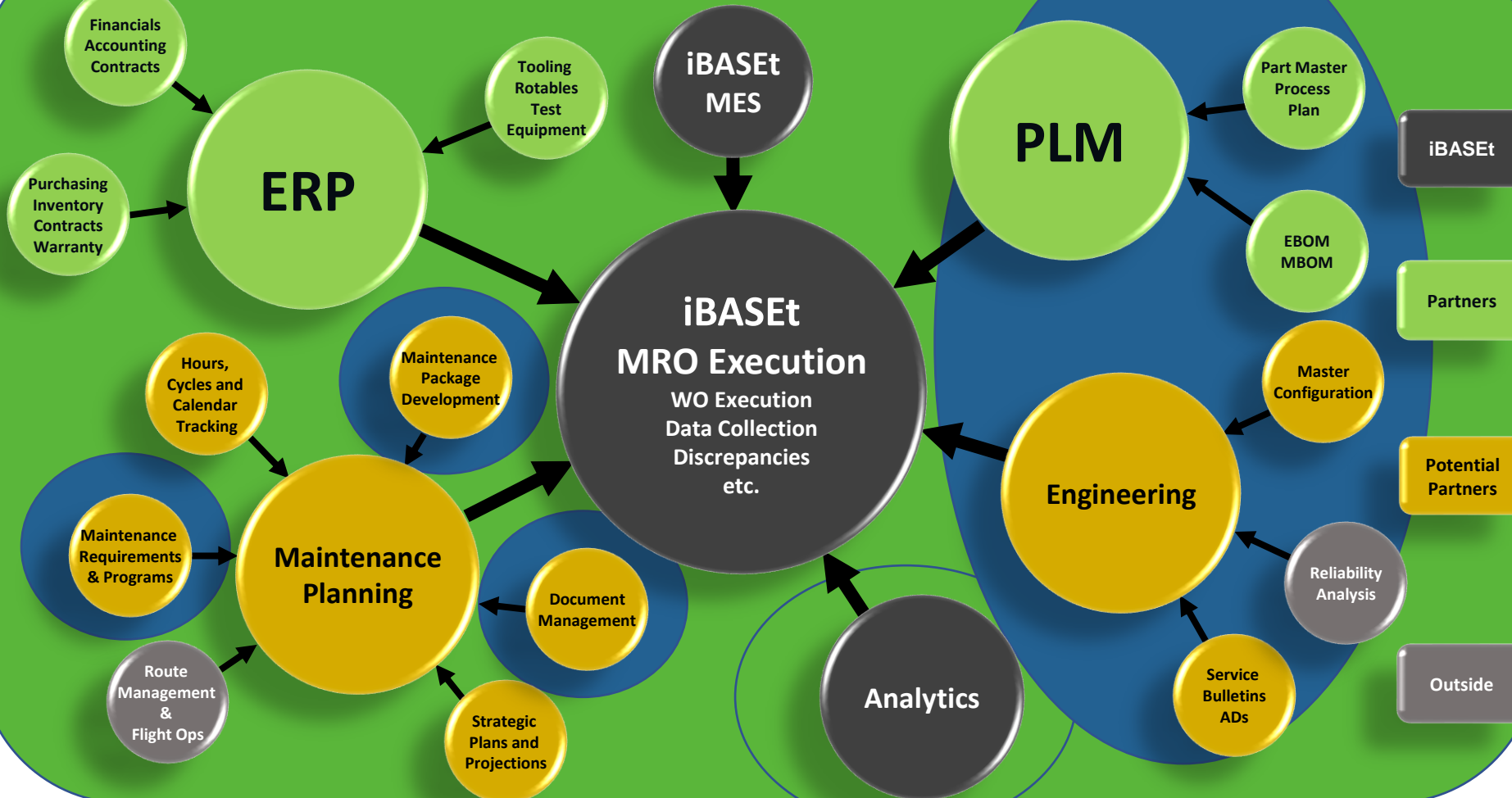


Interoperability between:

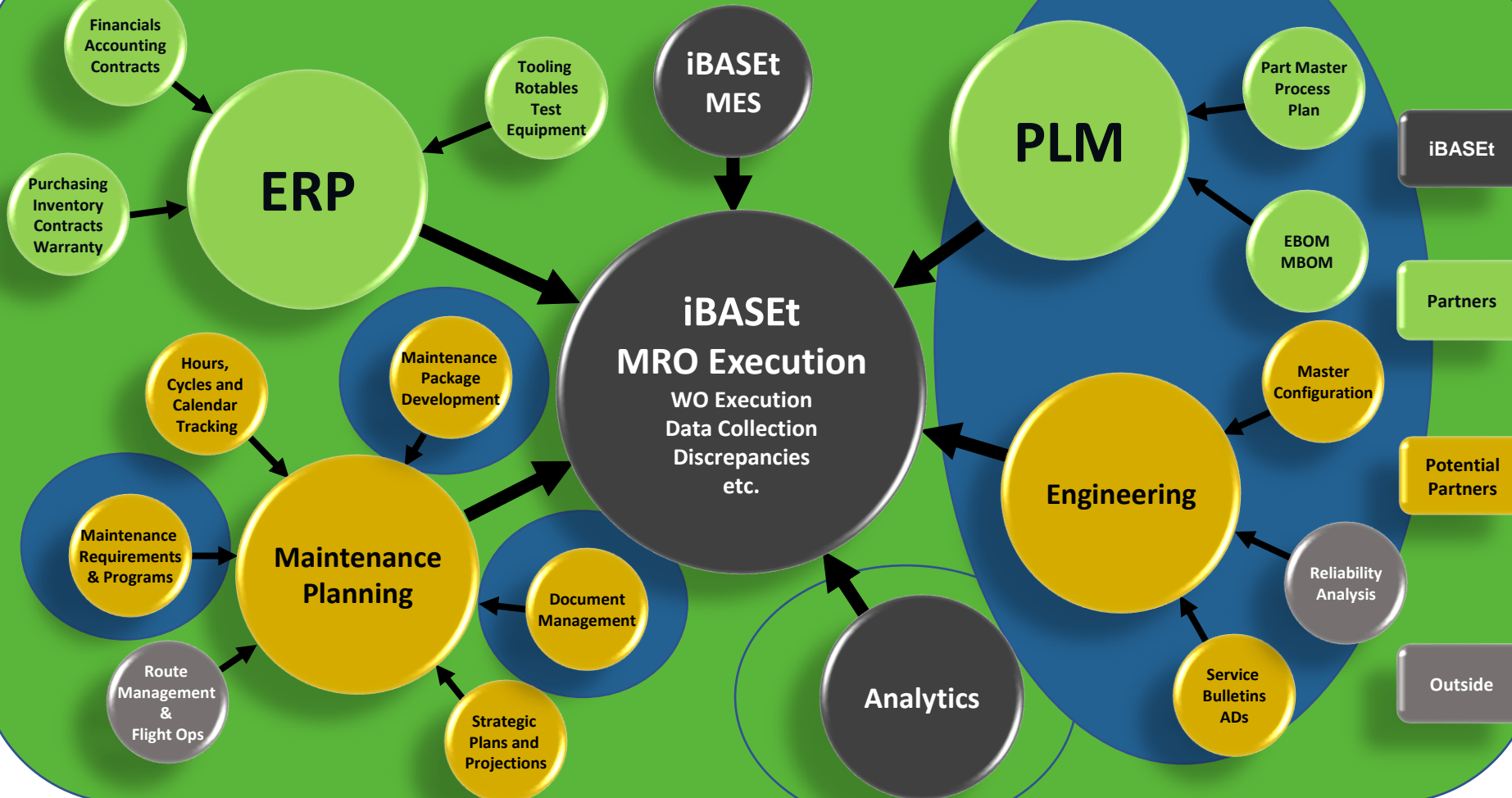
- *MIS – Solumina*
- *Reliability, Quality, FRACAS and Risk Mgt. systems*
- *Depot, Repair and Stock*
- *PLM Systems for E-BOM, M-BOM and In-Service BOM management*

- Solumina orchestrates MRO operations
- Thingworx connects all sources of information when available
- Thingworx analytics identify trends and anticipate failures
- Thingworx user based interfaces render intuitive and role based displays

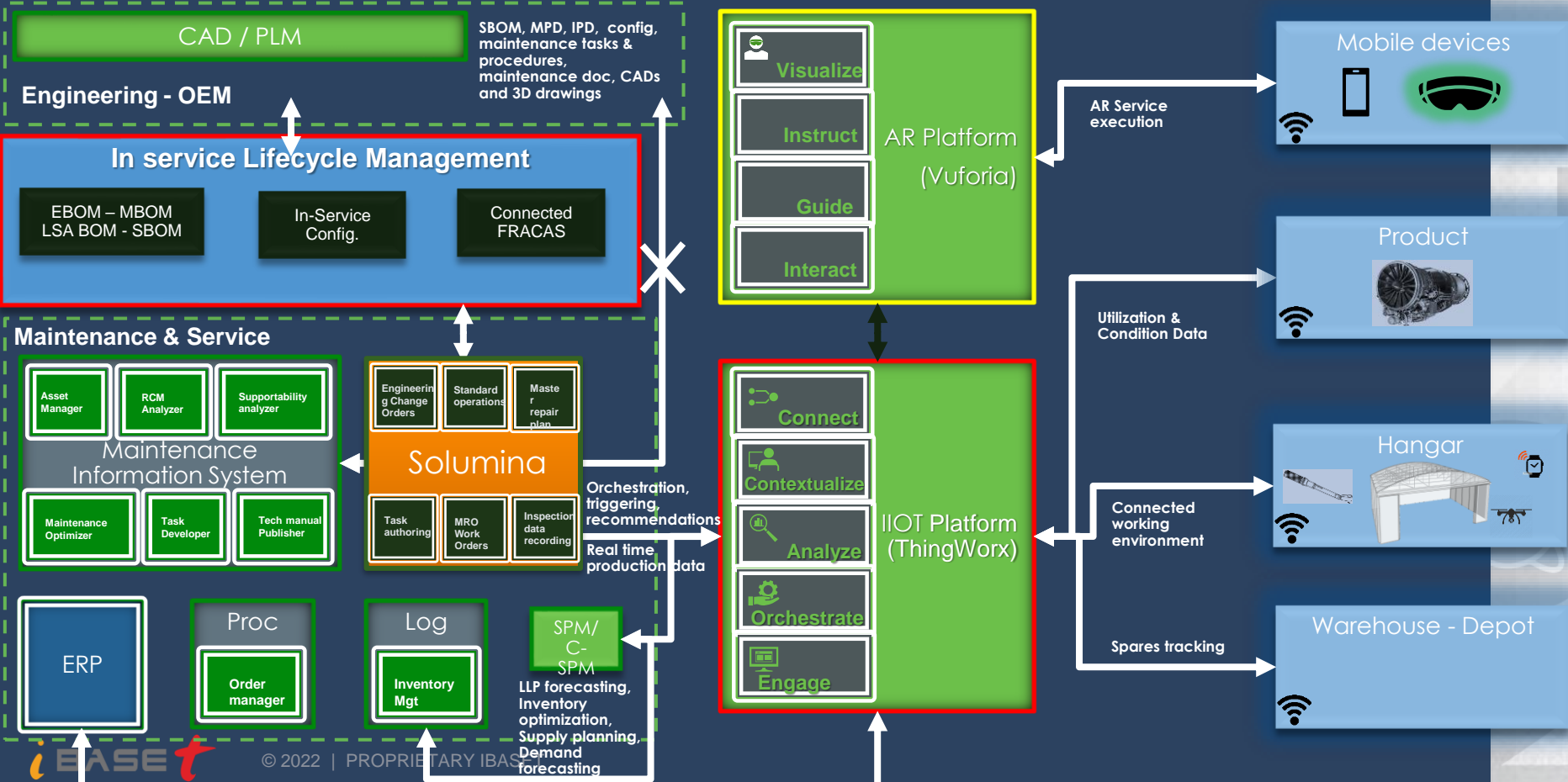
MRO Landscape



MRO Landscape



BUILDING BLOCKS



THE INFRASTRUCTURE OF CONNECTED MRO



Interaction Systems



thingworx Apps

Traceability

Reporting

Processes

Tasks

ThingWorx Flow

Analytics

Servigisti

MPM Link

ODATA

REST API

IT/OT Connector

REST API

Inventory management

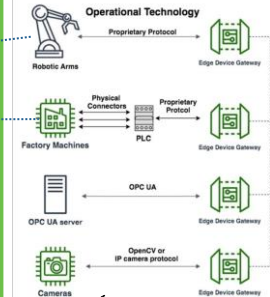
Hangar operations system

Tech doc viewer

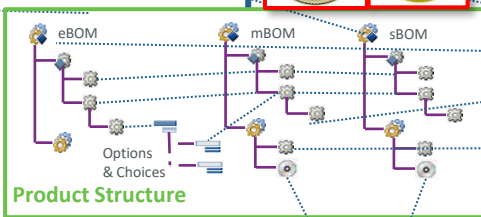
Software Structure

SOLUMINA

MRO system



Third Parties



ABS Group

AIRMES
Airline maintenance optimisation

NORTHROP GRUMMAN

IAI

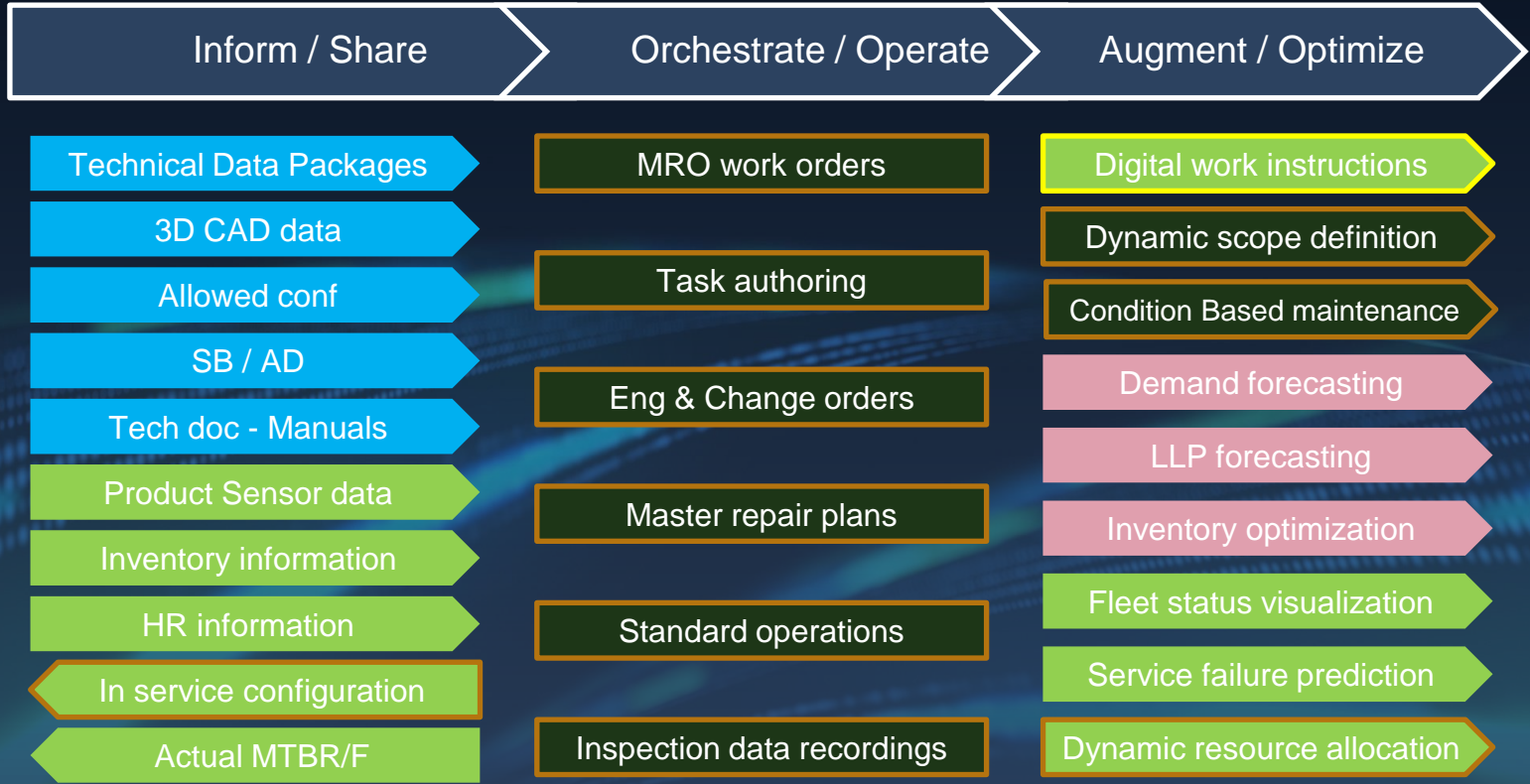
Lufthansa Technik

Data Recording Systems

Digital closed loop workflow



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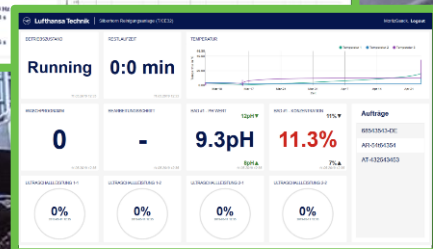


PLM Servigistics
IIOT Solumina



DRIVING DIGITAL TRANSFORMATION ON THE SHOP FLOOR

A THINGWORX & KEPCARE CASE STUDY



Created a fully connected shop floor for real-time asset health monitoring and predictive maintenance to improve quality and speed of maintenance, repair, and overhaul services




Lufthansa Technik

Connected Work Cell sbergner ▾


Work Order: JO_20211014080000_D11... | Serial Number: 2021-10-14 08:00:00 [D11... | Product: D11 Engine Fan Assembly | Start Time: 2021-10-14 11:32 | Planned End Time: 2021-10-14 06:00 | Station: Engine Fan Assembly S...

Process Flow: Secure Fan Motor (✓) → Position Mount Bracket (✓) → Fasten Bolt in Mounting Hole 1 (✓) → Fasten Bolt in Mounting Hole 2 (✓) → Fasten Bolt in Mounting Hole 3 (5) → Place Fan

Fasten Bolt in Mounting Hol... | Fasten Bolt in Mounting Hole 3



Details



ATTRIBUTE	VALUE
1 Last Applied Torque P1	4.8 Nm ✓

Note:

Complete the step

ptc





THANK YOU

QUESTIONS?