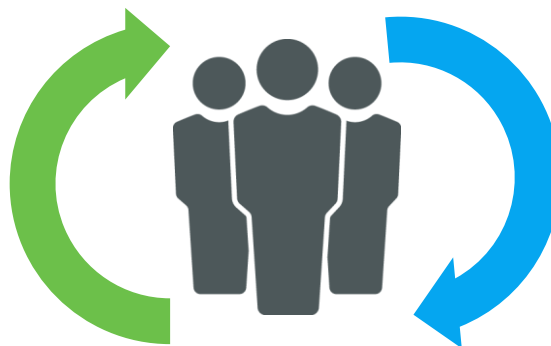# PTC and Microsoft
Breaking the boundaries

Patrik Sjöstedt, EMEA Regional Business Leader, Manufacturing and Resources
Clayton Fernandez, Global Director, Internet of Things

Microsoft and PTC have complementary strategies that enable digital transformation of the Enterprise
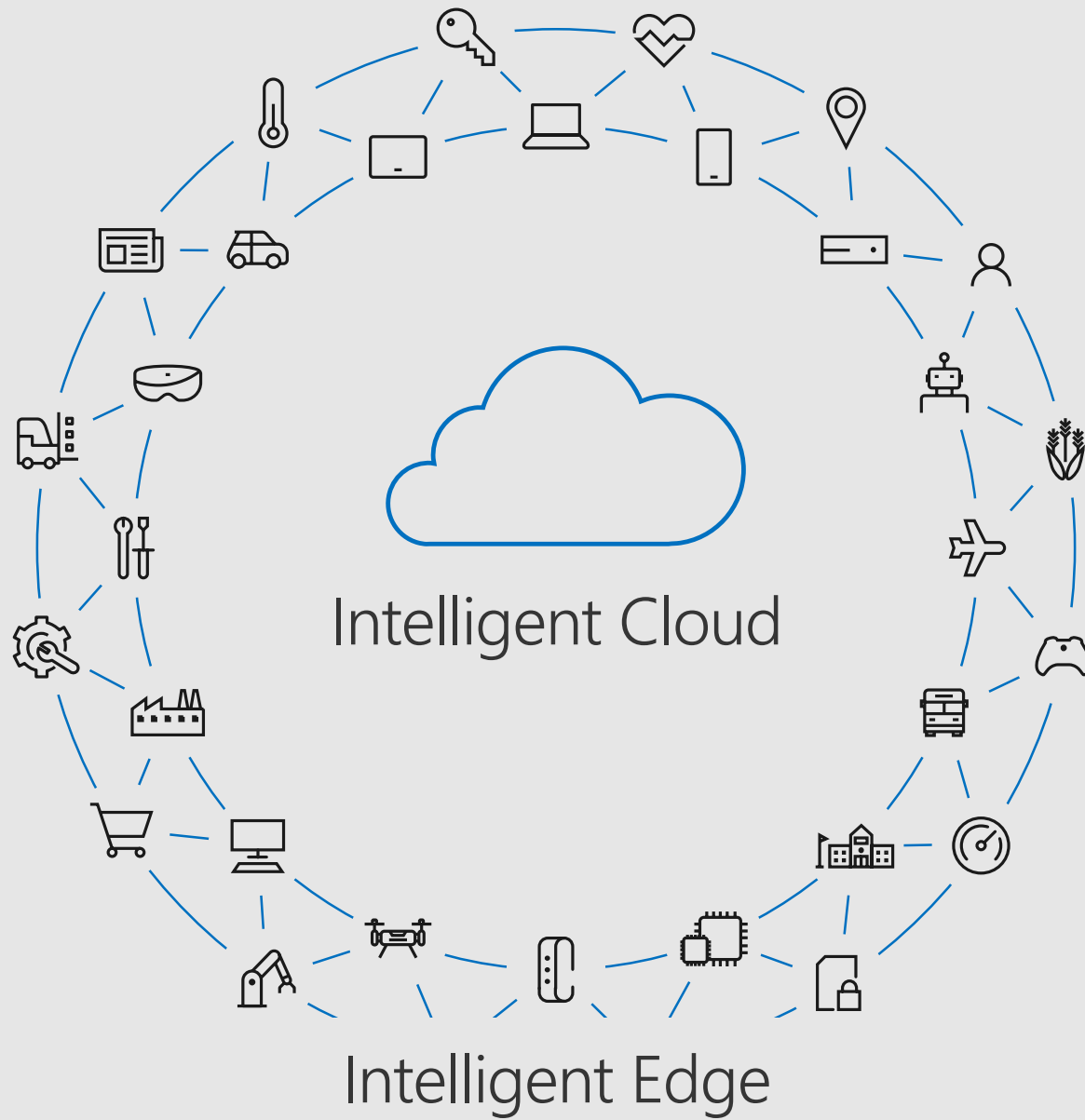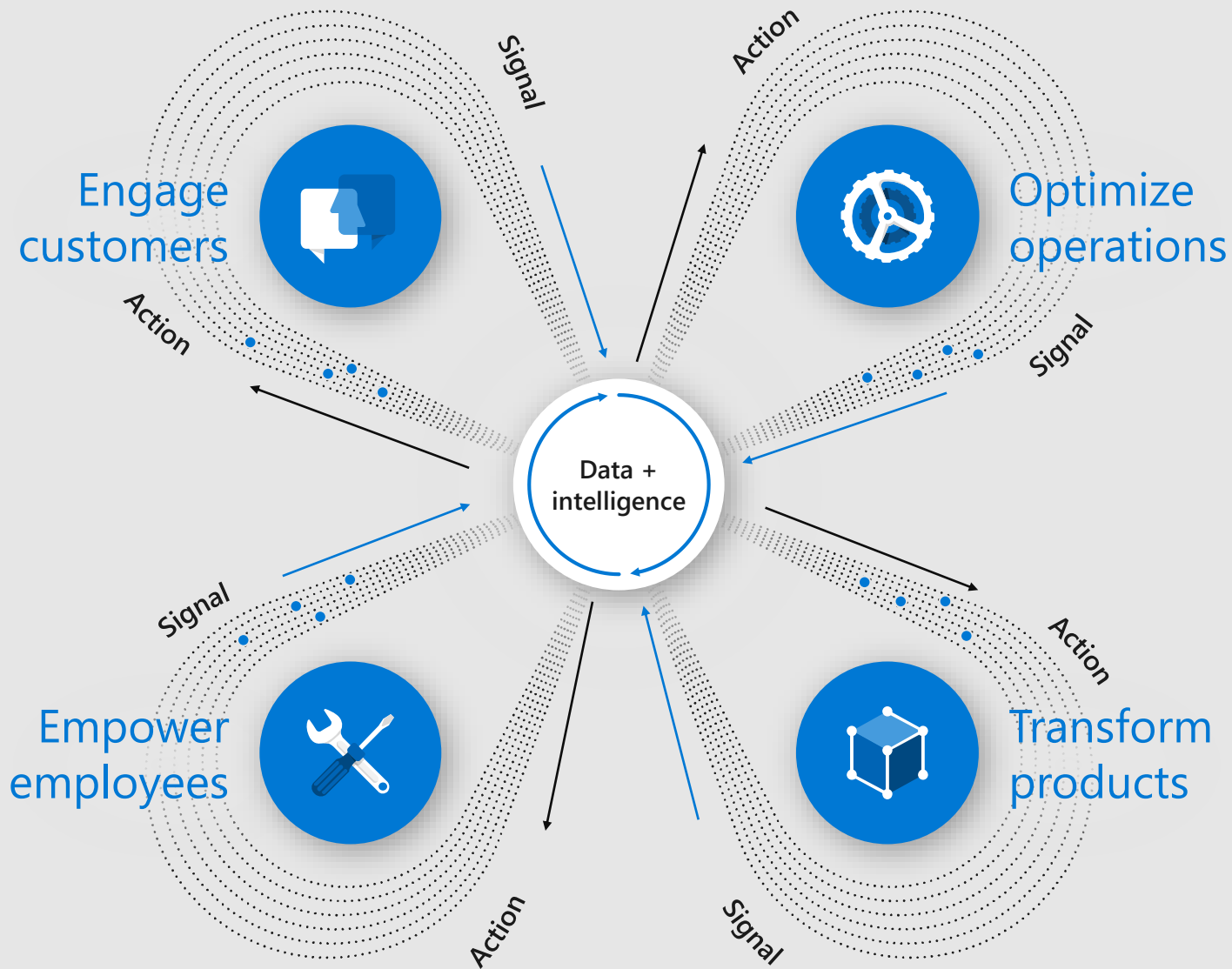
PTC enables Microsoft

customers to connect their business processes to industrial applications

Microsoft enables PTC

customers to connect industrial applications to Enterprise Processes

Intelligent Cloud

Intelligent Edge

Engage customers

Optimize operations

Empower employees

Transform products

Data + intelligence

Signal

Action

Action

Signal

Signal

Action

Action

Signal

80B
Connected "things" by 2025 generating 180ZB of data

$130B
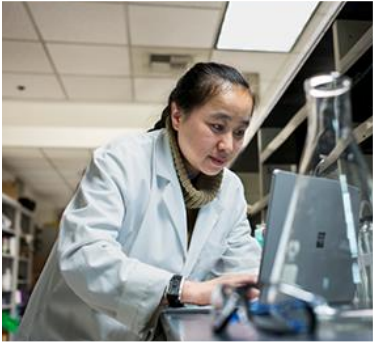New monetization avenues due to IoT-related services

80%
Companies that increased revenue as a result of IoT implementation

$100M
Average increase in operating income (avg. 8%) among the most digitally transformed enterprises
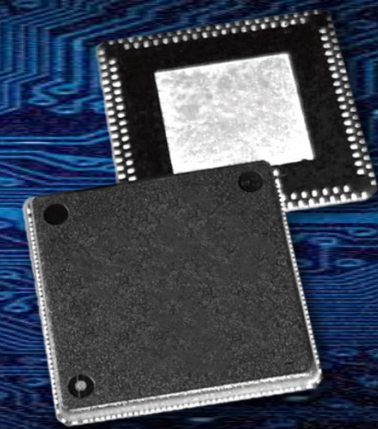
MICROSOFT INVESTS $5 BILLION IN IOT

Our goal is to give every customer the ability to **transform** their **businesses**, and the world at large, **with connected solutions**

Azure Sphere

A new **Azure Sphere class of MCUs,** from silicon partners, with built-in Microsoft security technology provide connectivity and a dependable **hardware root of trust**.

A new **Azure Sphere OS** secured by Microsoft for the devices 10+ year lifetime to create **a trustworthy platform** for new IoT experiences

The **Azure Sphere Security Service** guards every Azure Sphere device; it **brokers trust** for device-to-device and device-to-cloud communication, **detects emerging threats**, and **renews device security**

Secured MCU

Secured OS

Cloud Security
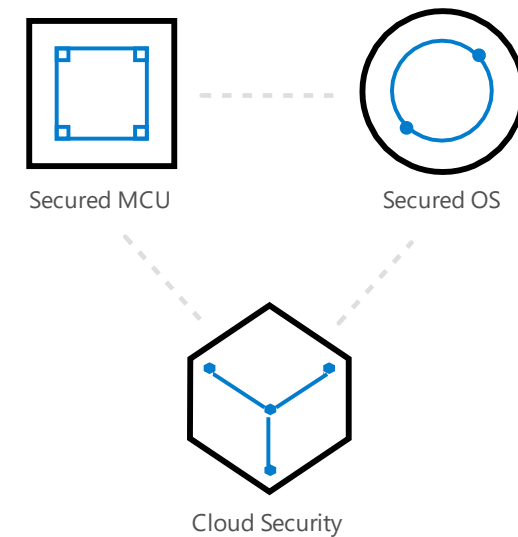
Aligned approaches to meeting market needs

Microsoft
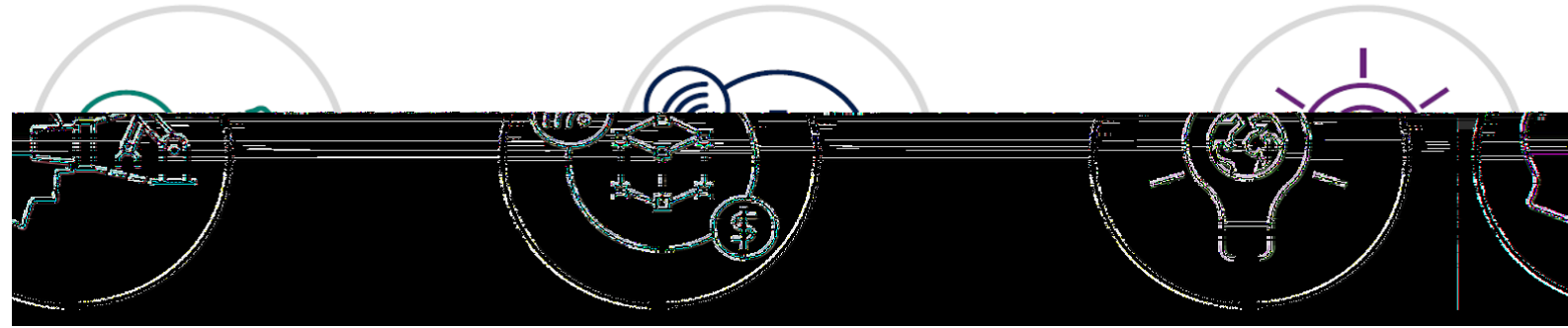
Factory of the Future	Product-as-a-Service	Intelligent Supply Chain
WITH	WITH	WITH

ptc
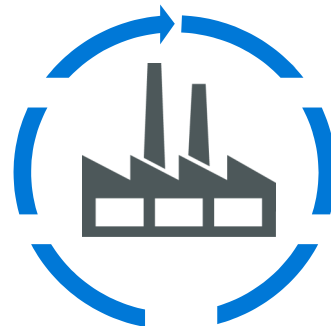
Smart Connected Operations

Smart Connected Products
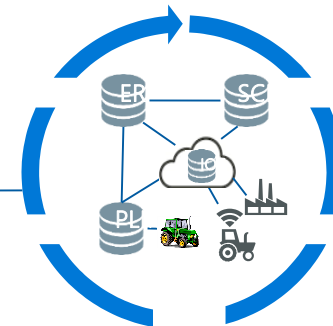
Smart Connected Systems

Joint solution for industrial enterprises

ThingWorx Industrial Innovation Platform deployed
on Microsoft Azure Cloud Services
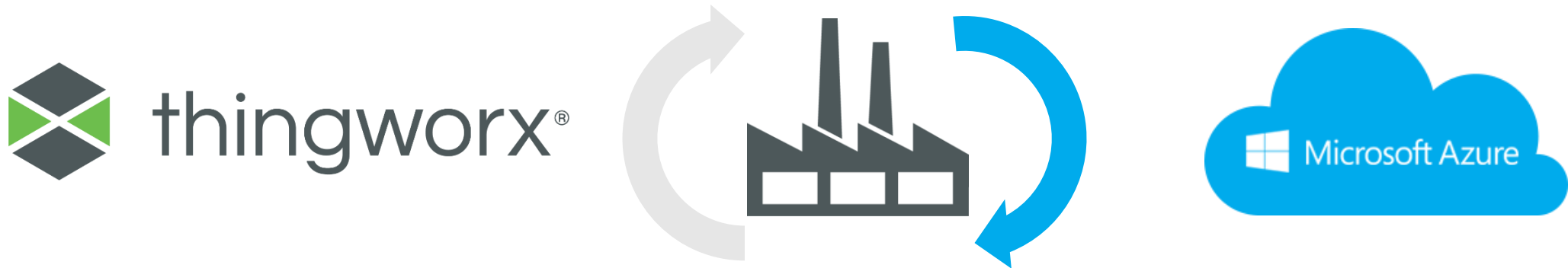
PTC provides ThingWorx
Industrial Innovation Platform

to simplify and accelerate the
development of robust industrial IoT applications and
augmented reality experiences

Microsoft provides
Azure and Azure IoT Hub

that provide global coverage and access to
devices out of the box providing a wealth of
data for ingestion

Reference Architecture (customer example)

Device Connectivity and Management

- IP capable devices — IoT Client
- IoT-ready devices — IoT Client
- Low power devices
- Gateway (Kepware) — IoT Client

Data Processing, Analytics and Management

- Cloud Gateway
- Provisioning API
- Device Registry
- Device State Store
- App Backend
- Stream Processors
- Storage
- Analytics & Machine Learning

Presentation & Business Connectivity

- Solution UX
- Business Integration Connectors
- Personal mobile devices
- Business systems

Legend:
- → Data Path
- Optional solution component
- Azure IoT solution component
- PTC Thingworx solution component

Customer benefits with this partnership

| Faster time to value | Accelerate application development on global scale | Better decision making via more data sources | Combined expertise to support any use case |
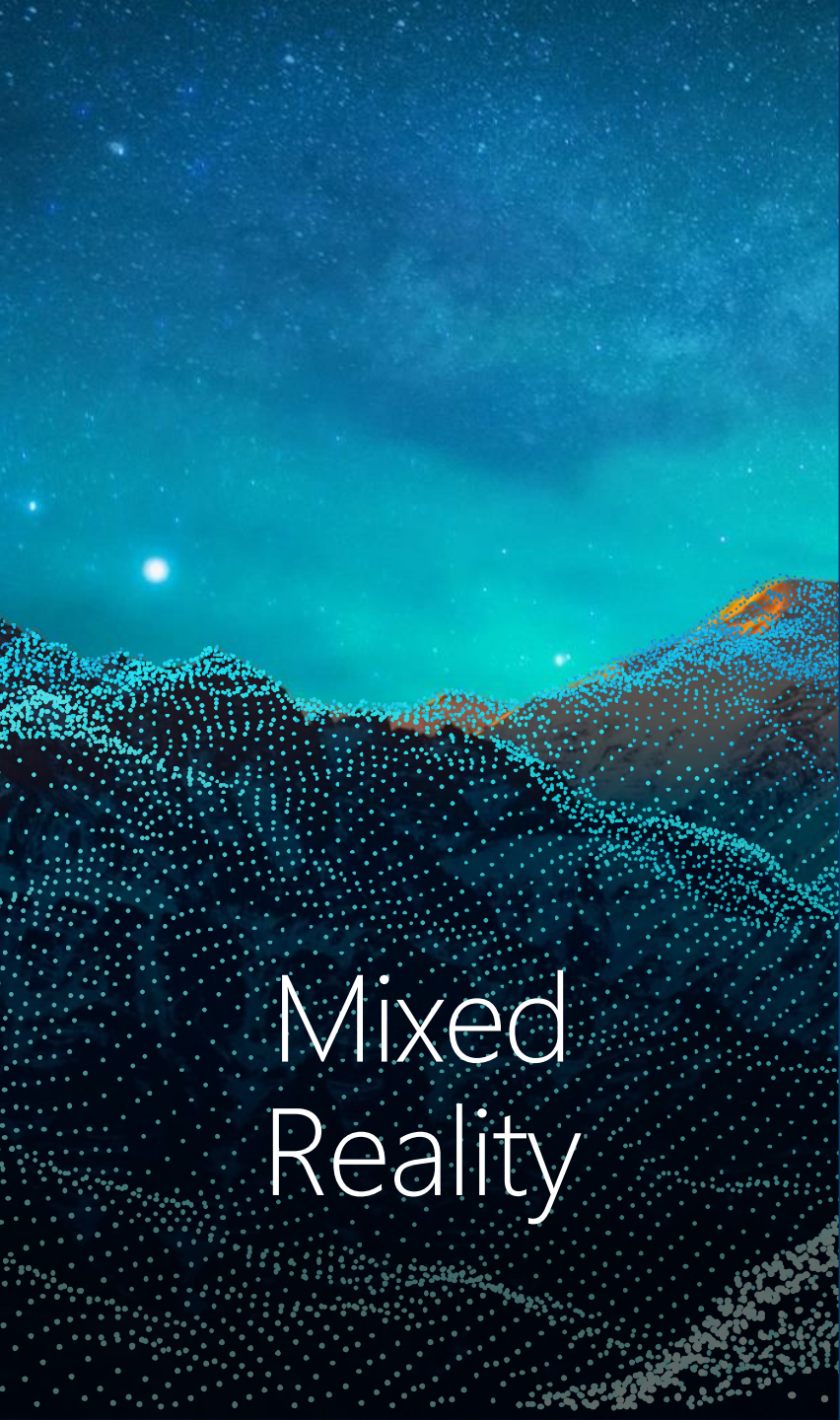
Mixed Reality

Artificial Intelligence

Elevation
25,643'

Temperature
-22°C
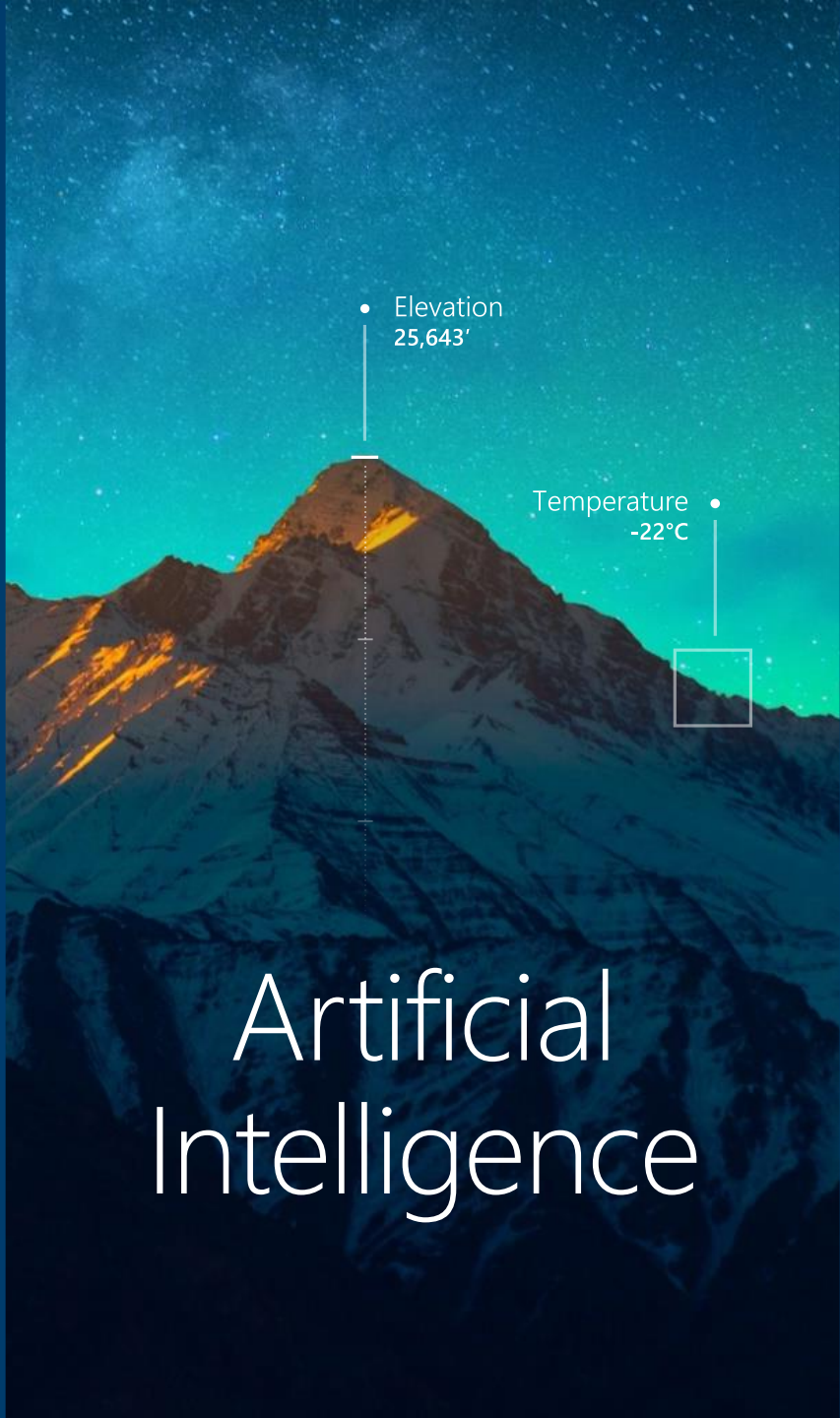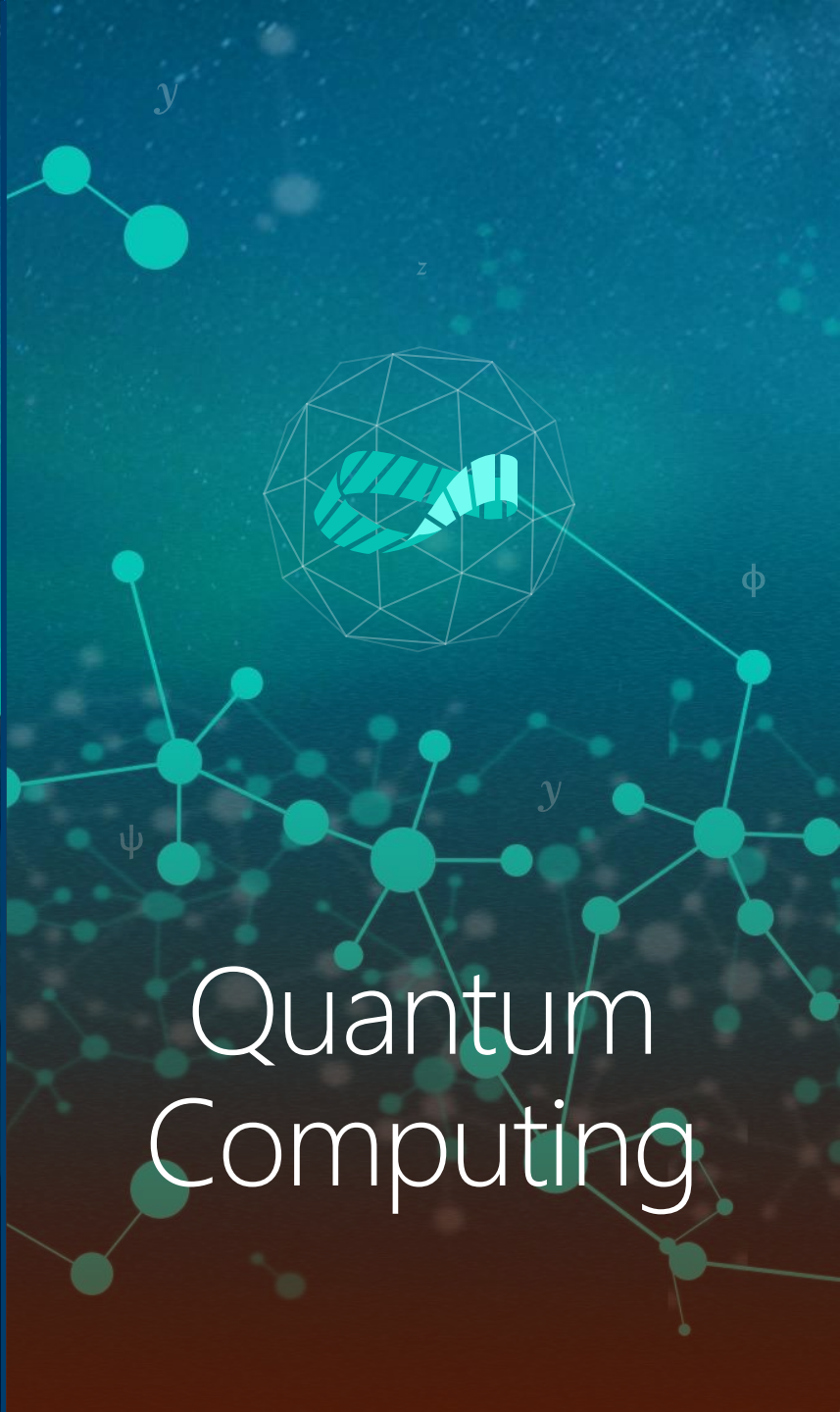
Quantum Computing

Mixed reality in manufacturing

Leverage cutting-edge mixed reality technology to transform creativity and communication

Transform product design

Enable Smart Factory
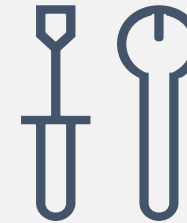
Equip field technicians with new capabilities

Revolutionize training

Revolutionize Training & Knowledge Transfer

vuforia®

ptc   Microsoft

VISUALIZE   **INSTRUCT/GUIDE**   **INTERACT**
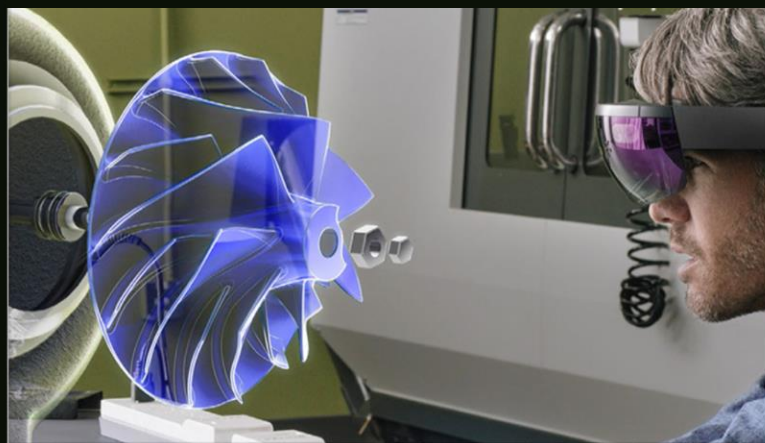
The Factory of the Future is infused with Artifical Intelligence

Factory Assistance
Virtual agents verbally provide operators with information from IT systems upon request.

Cobots
Robots use image recognition to automatically adapt to the changing location

Ambient Intelligence
Worker Health and Safety

Smart Systems
Transmit information to the partner (e.g., OEM) and to field service engineers for process automation and optimization.

Demand Forecasting
AI system accurately predict future demand for products by learning from patterns in demand and environmental data.

Mixed Reality
MR guided worker assist

Additive Manufacturing
AI augmented design and prototyping

Design
AI assisted design provides the next generation of innovative designs and an accelerated design cycle.

Autonomous Vehicles/Robots
AI system dynamically optimize warehouse utilization

Cognitive Quality
AI systems detect quality defects through image recognition and other parameters

Guided Service Workflow
Beaconing guides the worker and knowledge graph brings information into context for the service worker.

Predictive Maintenance
Condition-based maintenance to eliminate machine down-time and increase throughput.

Product Traceability
AI systems allow end to end tracking and monitor conditions during transport and storage

Integrated track & trace

Artificial Intelligence in Manufacturing

Elekta Implements PTC's ThingWorx on Microsoft Azure for Next Generation Remote Service

"

Elekta IntelliMax, powered by PTC ThingWorx and Microsoft Azure, enables automated alerts predicting parts failures, proactive calls to customers to resolve issues that may cause interruptions, and immediate responses to customer service requests.

"

**– Daniel Kingham,
Remote Service Program Director, Elekta**

Elekta

What happens next?

Impact of design/engineering in manufacturing company

Design/Engineering
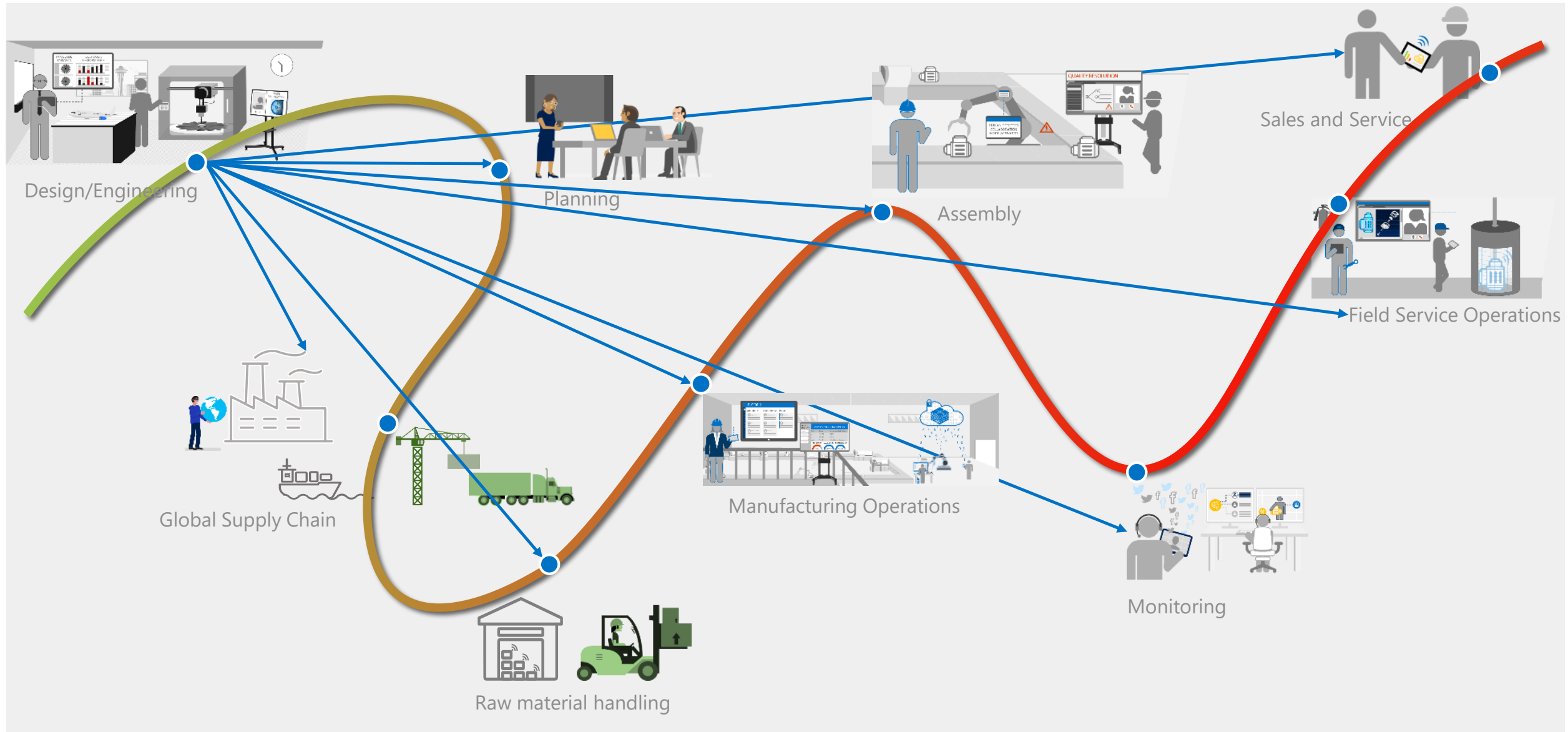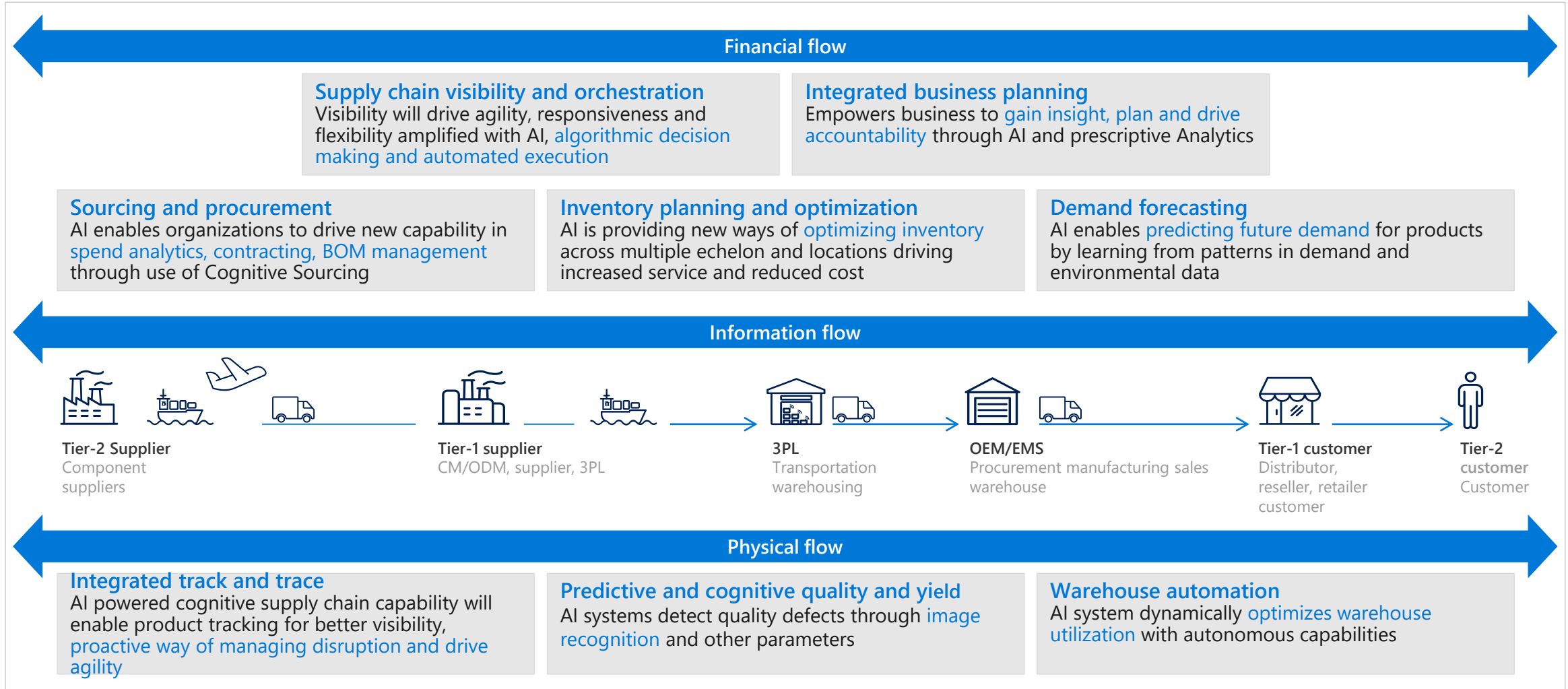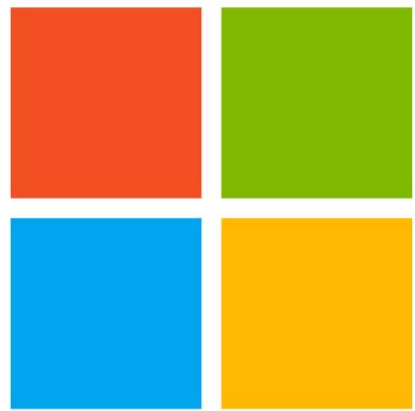
Planning

Assembly

Sales and Service

Field Service Operations

Global Supply Chain

Manufacturing Operations

Monitoring

Raw material handling

AI powering Intelligent Supply Chain

Financial flow

Supply chain visibility and orchestration
Visibility will drive agility, responsiveness and flexibility amplified with AI, algorithmic decision making and automated execution

Integrated business planning
Empowers business to gain insight, plan and drive accountability through AI and prescriptive Analytics

Sourcing and procurement
AI enables organizations to drive new capability in spend analytics, contracting, BOM management through use of Cognitive Sourcing

Inventory planning and optimization
AI is providing new ways of optimizing inventory across multiple echelon and locations driving increased service and reduced cost

Demand forecasting
AI enables predicting future demand for products by learning from patterns in demand and environmental data

Information flow

Tier-2 Supplier
Component suppliers

Tier-1 supplier
CM/ODM, supplier, 3PL

3PL
Transportation warehousing

OEM/EMS
Procurement manufacturing sales warehouse

Tier-1 customer
Distributor, reseller, retailer customer

Tier-2 customer
Customer

Physical flow

Integrated track and trace
AI powered cognitive supply chain capability will enable product tracking for better visibility, proactive way of managing disruption and drive agility

Predictive and cognitive quality and yield
AI systems detect quality defects through image recognition and other parameters

Warehouse automation
AI system dynamically optimizes warehouse utilization with autonomous capabilities

High-Tech Industry Example

What if...when?

RSA-2048
Challenge
Problem

Classical

Quantum

1 billion years

1 second

Microsoft

Thank you