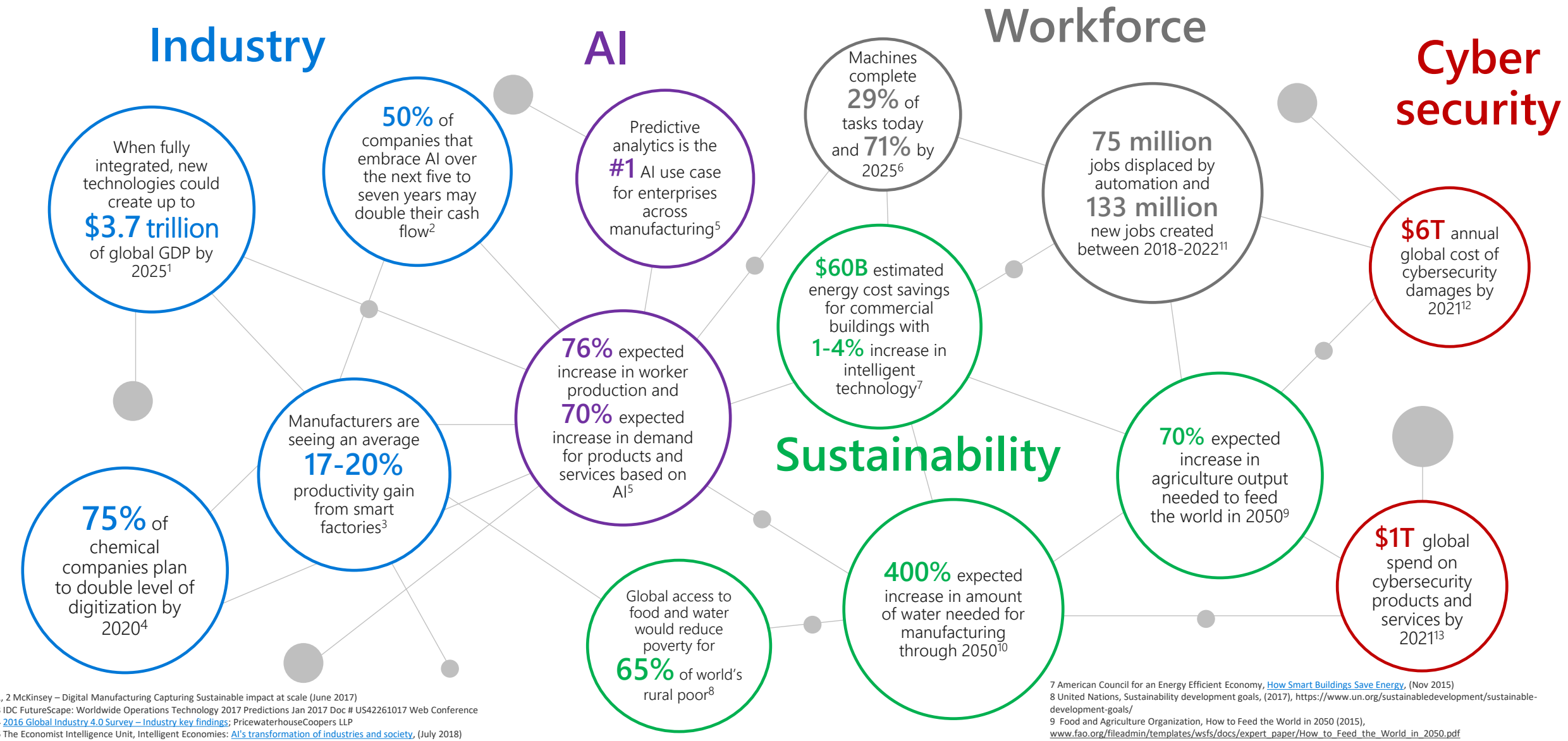
Microsoft | Capgemini

Webinar week 2020

How AI and IOT are Changing Manufacturing and help to control COVID19 on the factory floor

Live webinar starts at: 9:30 – 11:00 CEST

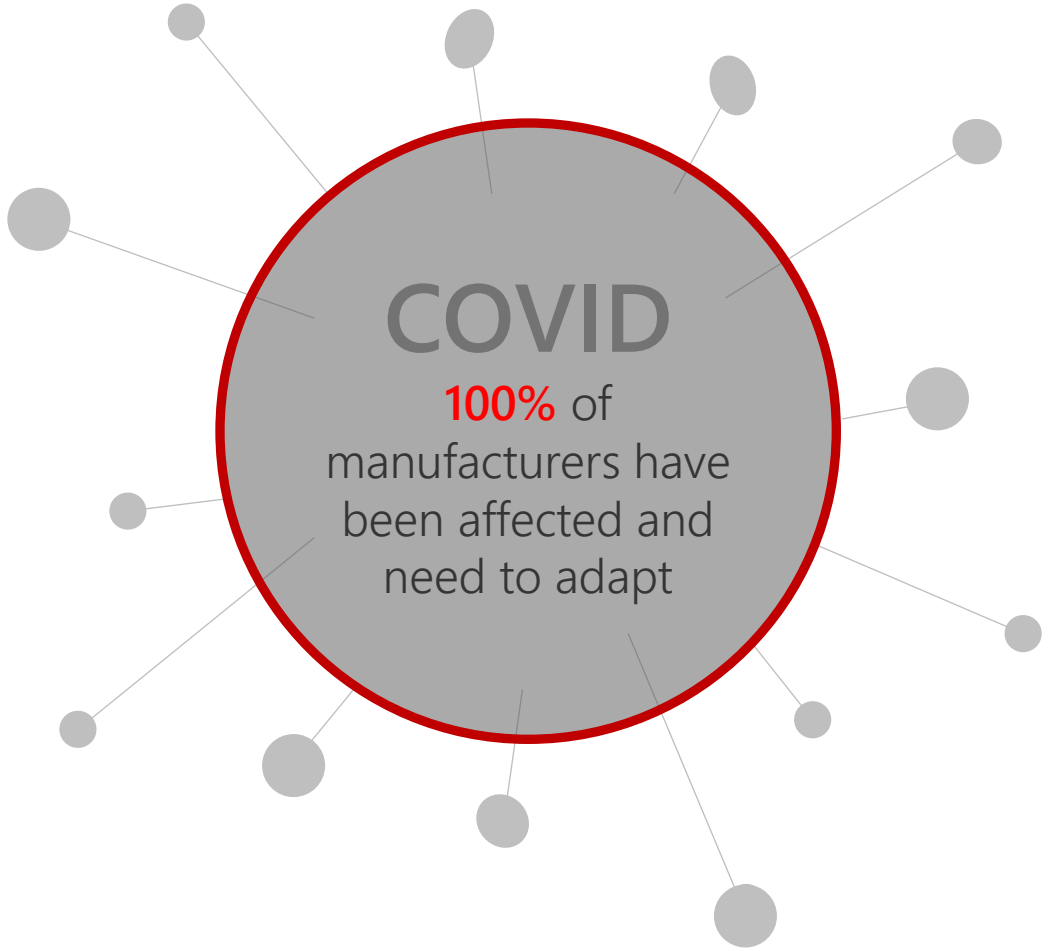
Creating new digital leadership imperatives



1, 2 McKinsey – Digital Manufacturing Capturing Sustainable impact at scale (June 2017)
3 IDC FutureScape: Worldwide Operations Technology 2017 Predictions Jan 2017 Doc # US42261017 Web Conference
4 2016 Global Industry 4.0 Survey – Industry key findings; PricewaterhouseCoopers LLP
5 The Economist Intelligence Unit, Intelligent Economies: AI's transformation of industries and society, (July 2018)
6, 11 World Economic Forum, Future of Jobs report 2018 (September 2018)

7 American Council for an Energy Efficient Economy, How Smart Buildings Save Energy, (Nov 2015)
8 United Nations, Sustainability development goals, (2017), https://www.un.org/sustainabledevelopment/sustainable-development-goals/
9 Food and Agriculture Organization, How to Feed the World in 2050 (2015), www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf
10 OECD, Water Outlook to 2050: The OECD calls for early and strategic action, (May 2012)
12, 13 IDG Communications, Top 5 cybersecurity facts, figures and statistics for 2018 (January 2018)

And then this thing happened



Navigating COVID in Manufacturing

Manufacturers are working hard to keep employees safe and support an increase in remote workers; minimize any operational disruption to keep manufacturing running smoothly for businesses and consumers; manage risk, manage cost to meet demand, and help those who need assistance the most.

TRANSFORM YOUR WORKFORCE

Enable remote collaboration and productivity, dramatically reducing travel costs and time spent in meetings, while also accelerating innovation needed to support Covid-19 responses

ENGAGE CUSTOMERS IN NEW WAYS

Reduce customer service costs while working remotely, and transitioning to digital engagement channels, and maximize cash flow during the crisis

BUILD MORE AGILE FACTORIES

Remotely assist those workers who are still needed on the manufacturing frontline, and to address cross skilling to deal with additional gaps being created by new processes needed for Covid-19

CREATE MORE RESILIENT SUPPLY CHAINS

Streamline operations to meet customer demand in contact centers and deliver an exceptional customer experience with consistent, personalized support.

Examples of working in the New Normal

Remote Working

During a crisis that could have cost ASML millions or even billions, a cross-functional team used Remote Assist to turn a potential problem into a new opportunity to help our customers remotely.

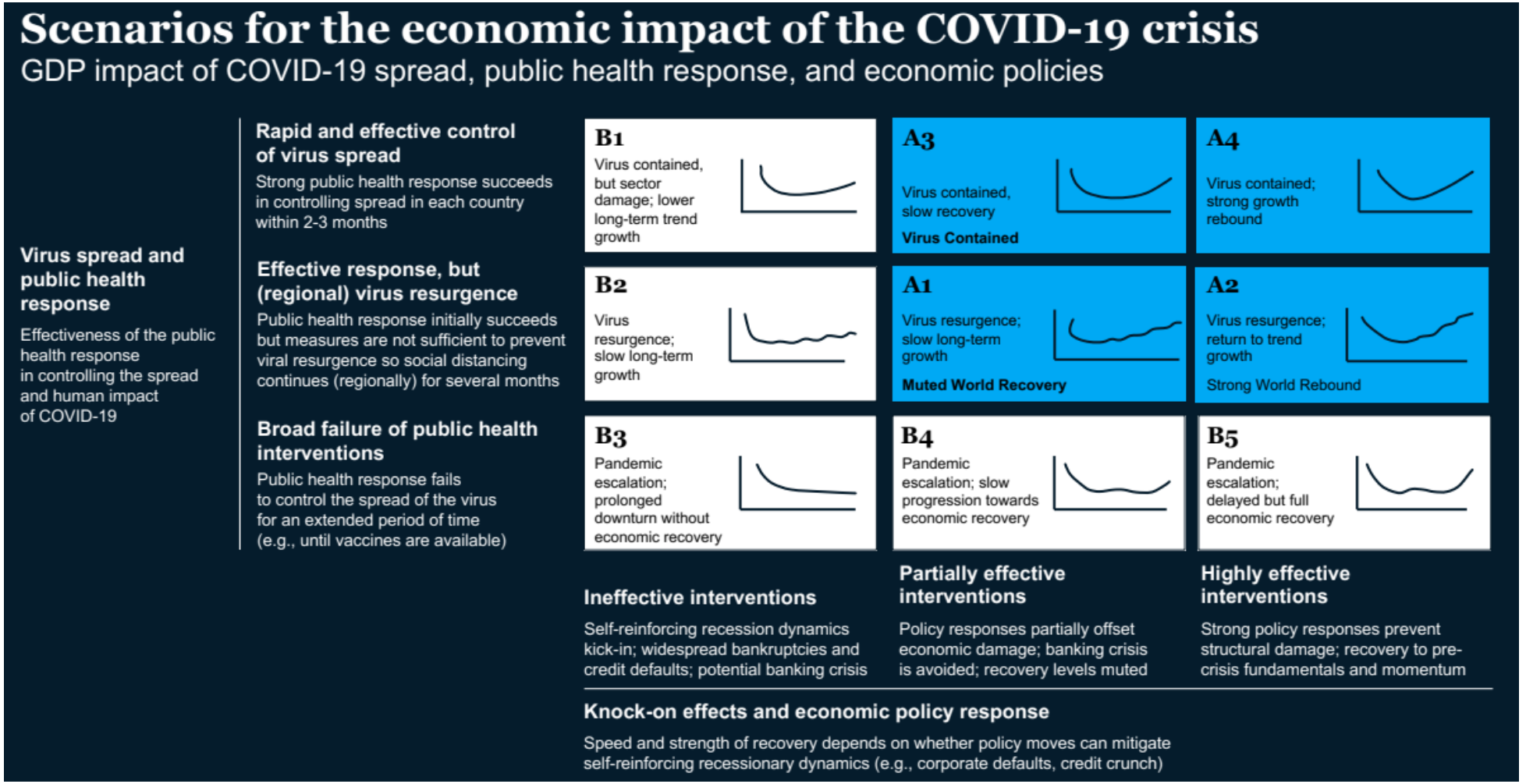
Collaboration

In 3 weeks time, a consortium of companies that had never worked together before, where able to design, source, make and delivery thousands of ventilators to the NHS.

Communicate

Customers have leveraged the PowerApps platform, including standard templates, Knowledge Search and Bot Framework, to create virtual agents that can communicate internally and with their clients

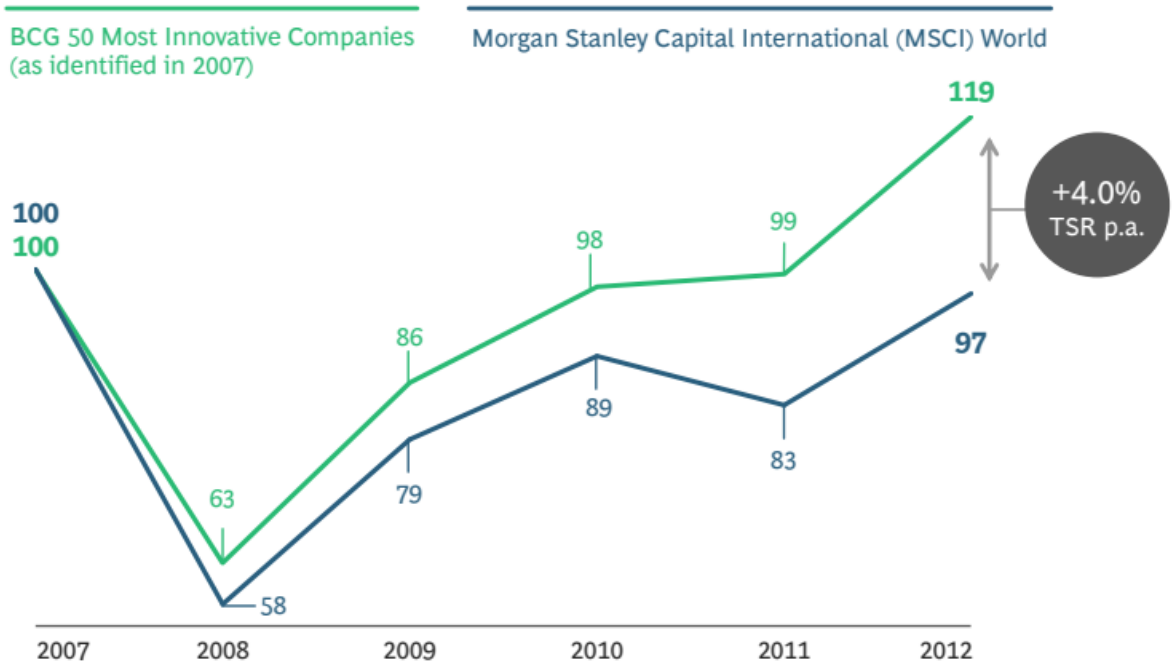
What to expected next ?



McKinsey – Global Health and Response report April 13 2020

Lessons from the past

Example based on companies that leveraged the 2008 crisis to innovate



Note: Chart compares TSR performance of publically listed MIC (Most Innovative Companies) 50 companies in 2007 (pre-financial crisis) and follows their TSR performance through the crisis until 31.12.2012;
Source: Accelerating out of the great recession book, BCG Innovation Journey Analytics Database; CapitalIQ

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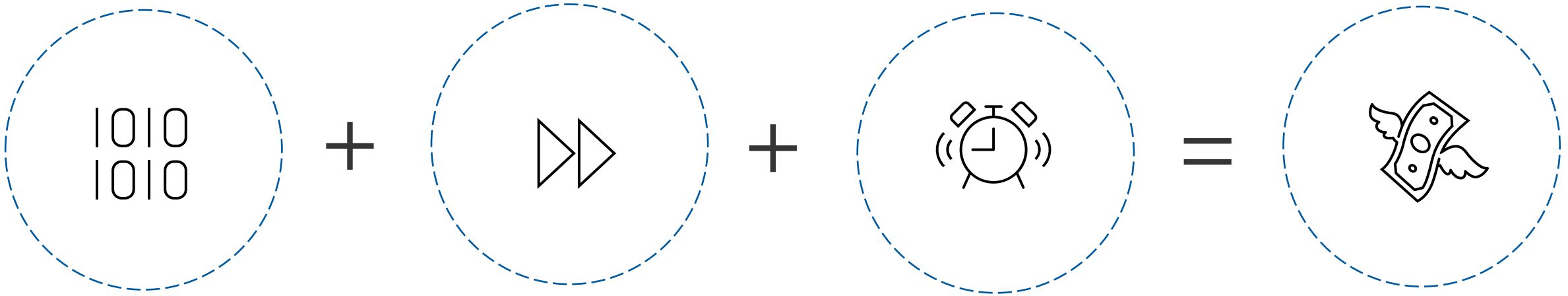
Reevaluate **portfolio strategy and restructure**	Adjust portfolio priorities to capture demand across key categories, over "Fight" and "Future" phases
Innovate across the value chain	Accelerate innovation—reimagine the system to scale value-creating ideas across the value chain and customer journeys *(e.g. Transform go-to-market approach)*
Evaluate **org. structure**; ways of working	Transform organization to enable strategic change—leverage 'future of work' models
Accelerate **E2E digitization**	Double down on shift to digital during COVID—embrace opportunities across all processes
Consider **inorganic opportunities**	Pursue attractive M&A options or other opportunistic moves during downturn—consider macro and company landscape

In uncertain times, responsiveness is key



IoT & Edge

Advanced Analytics

AI & Cognitive

Graph Technology

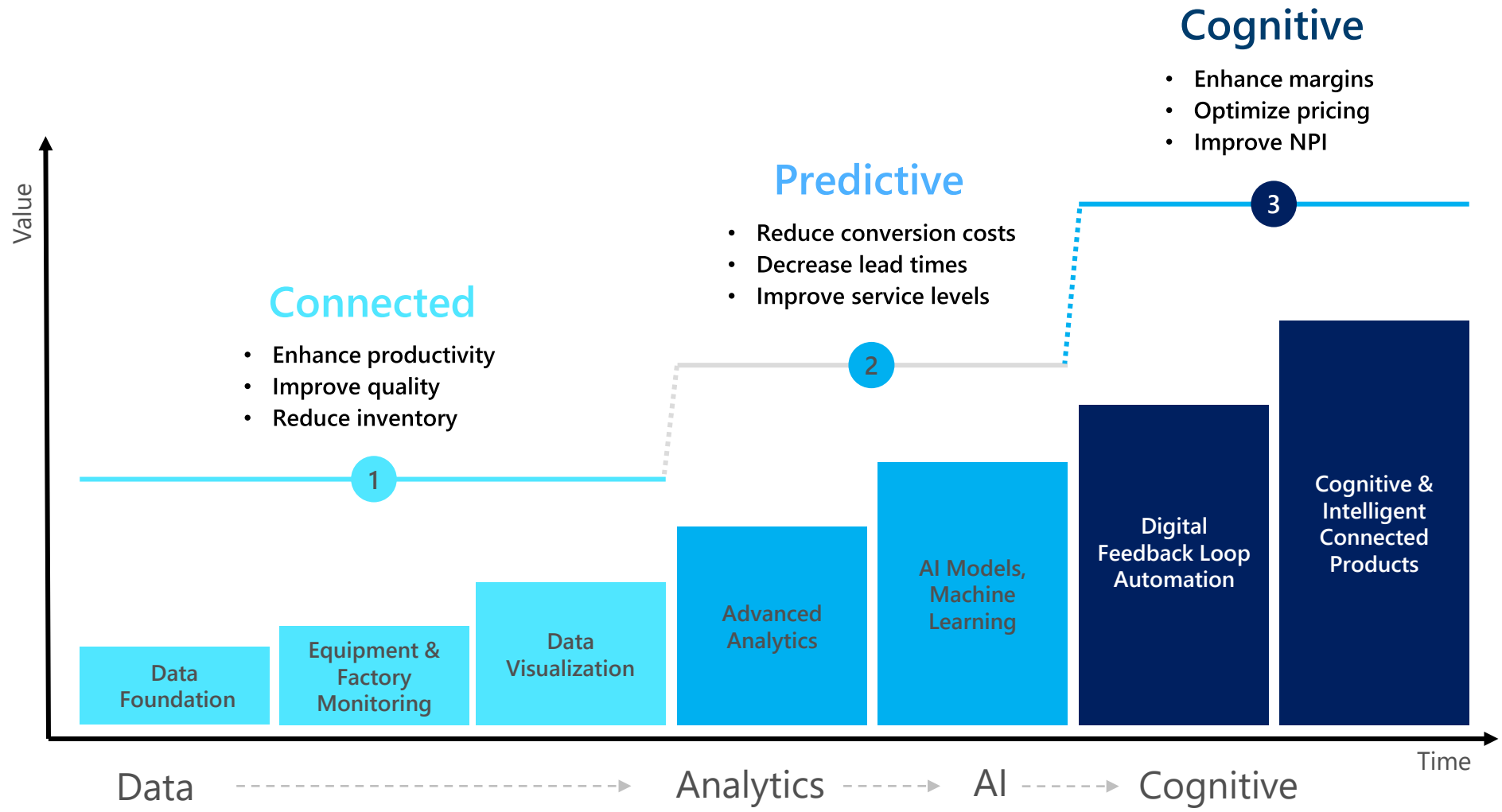
Blockchain

Digital Workplace

Mixed Reality

3D Printing

Data and AI Empowering Manufacturing

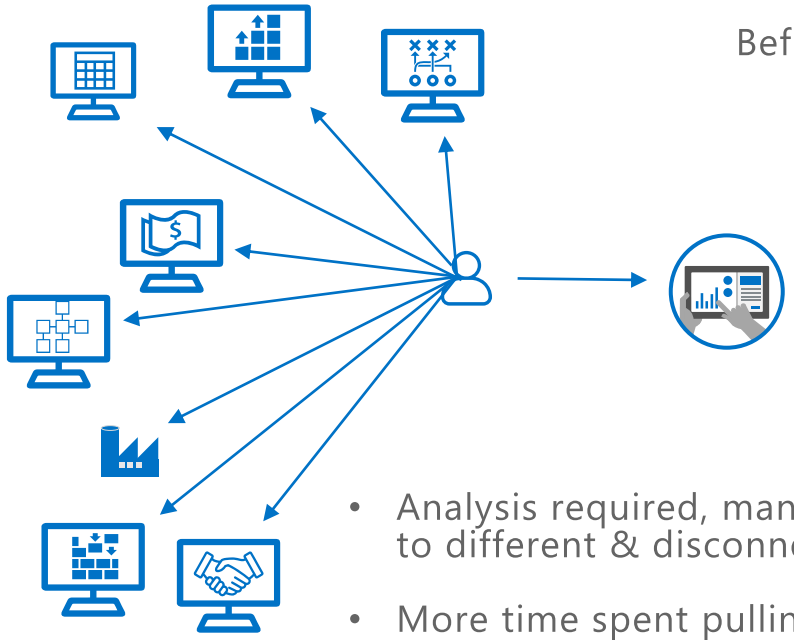


A customer's digital use case, Pilot, or Minimum Viable Product (MVP) can start at any phase of Factory of the Future journey:

- **Connected**
- **Predictive**
- **Cognitive**

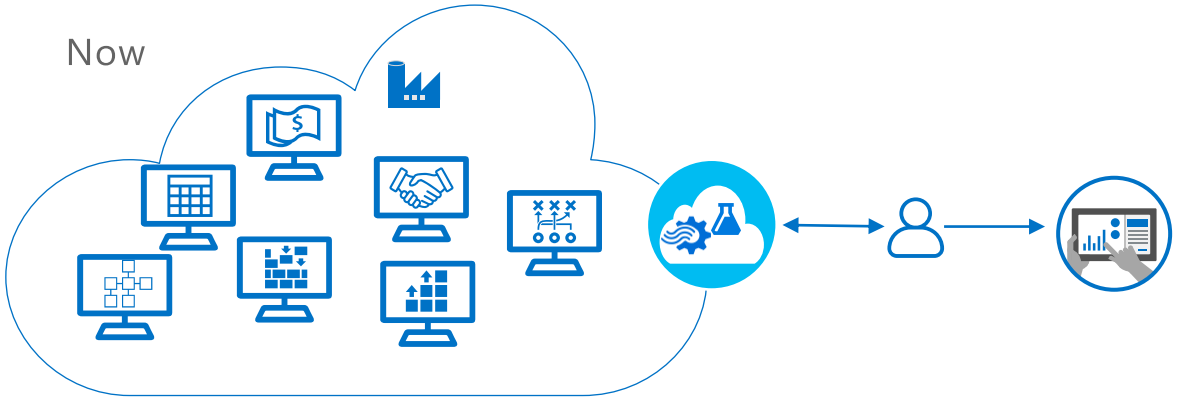
Timing is everything – access to data is critical

Before



- Analysis required, manually connecting to different & disconnected systems
- More time spent pulling & validating data, multiple sources of truth
- Complex analysis can take weeks

Now



- Data consolidated into 1 location in the cloud
- One version of the truth, a centralized taxonomy and master data connected to our ERP
- Complex analysis can be done in hours

Scalable & Accessible Data

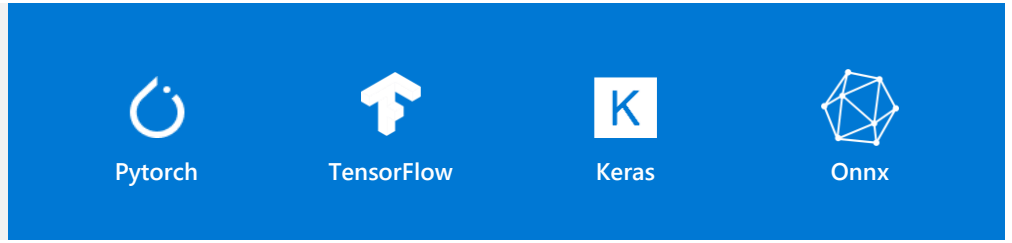
Azure Data Lake provides Microsoft Devices with a single source of truth. Devices' Data Lake sits in the cloud, connected to ERP workflow tools and Machine Learning applications.

During Covid our operations run demand/supply planning simulations daily.

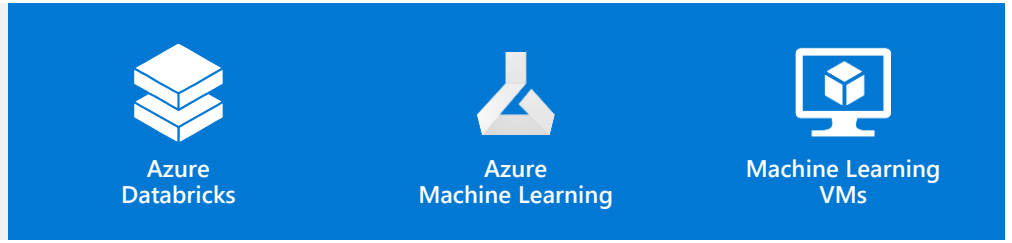
Machine Learning on Azure

Sophisticated pretrained models
To accelerate solution development with easy to use pretrained models

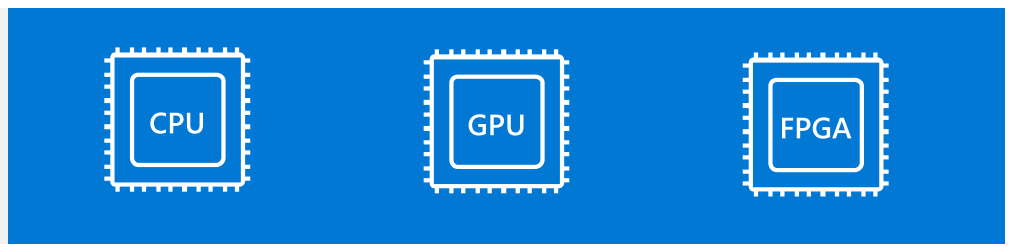
Popular frameworks
Build sophisticated deep learning solutions



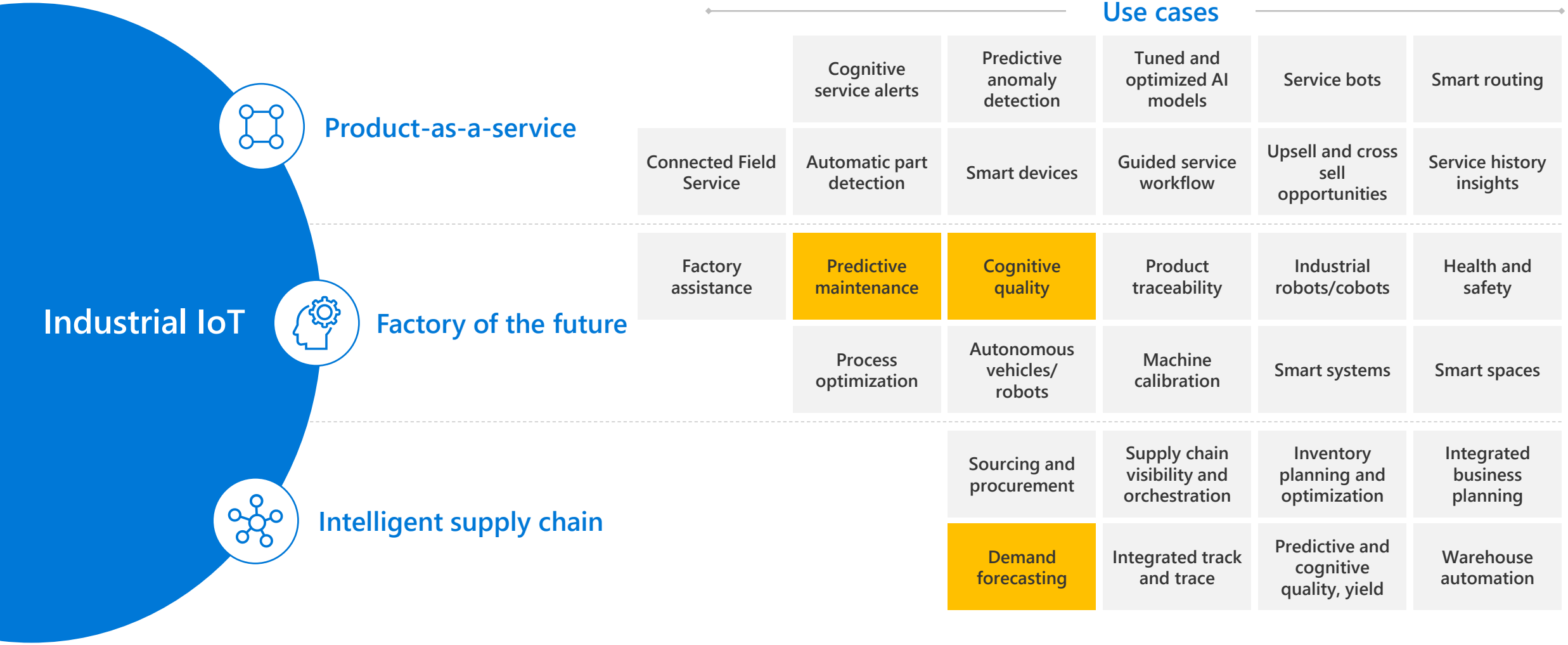
Productive services
Empower your development teams



Powerful infrastructure
Accelerate time to value



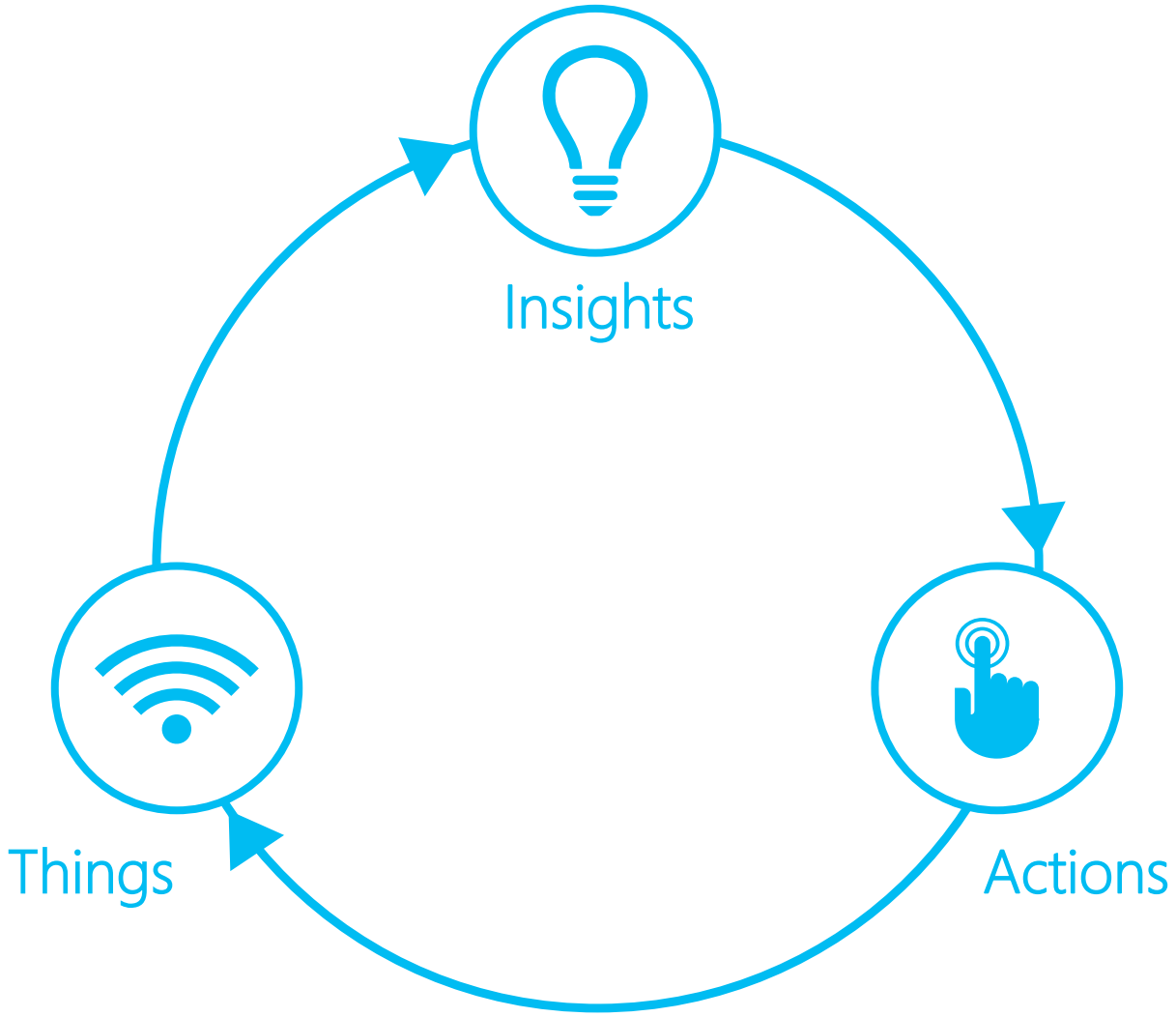
AI in Manufacturing use cases



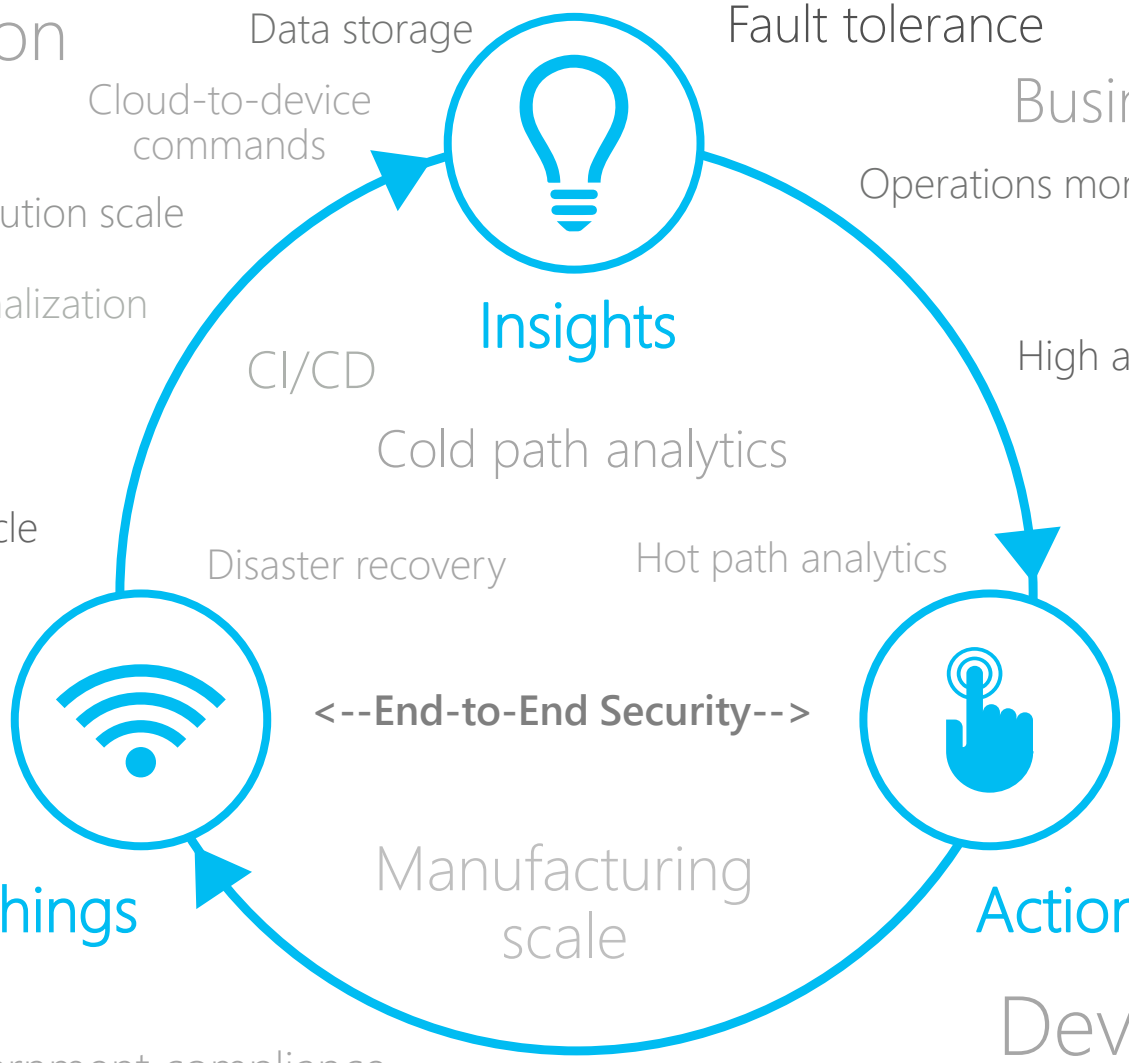
Despite the great technology

60% of all initiatives stall at the PoC stage

A Simplified View of an IoT Solution



Enabling the Digital Feedback Loop Can Be Challenging



Enterprise integration

Data storage

Fault tolerance

Cloud-to-device commands

Business process integration

Device recovery

Solution scale

Operations monitoring

Cost management

Internationalization

CI/CD

High availability

Updating devices

Cold path analytics

Provisioning devices

Device lifecycle

Warm path analytics

Disaster recovery

Hot path analytics

Device commercialization

Data ownership

On device analytics

Transport protocols

HW certification

Data visualization

Manufacturing scale

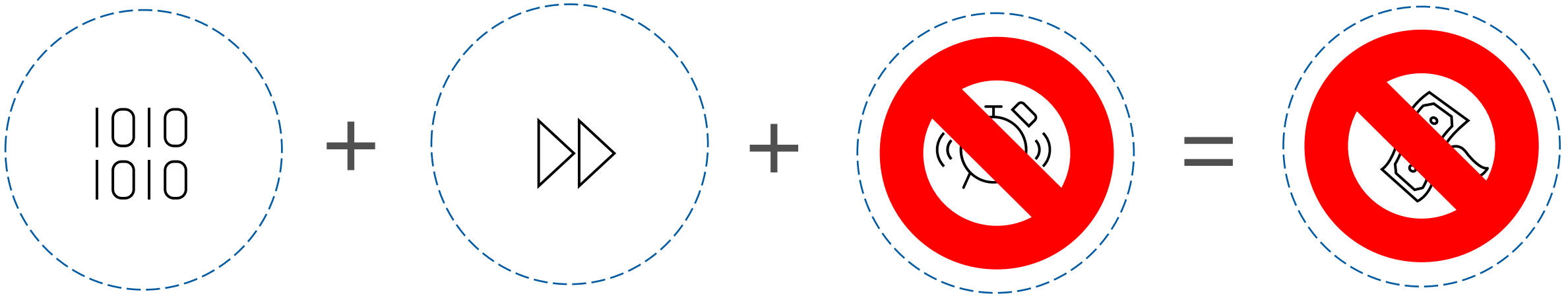
Securing data

Drivers

Industry and government compliance

Device updates

In uncertain times, responsiveness is key



IoT & Edge

Advanced Analytics

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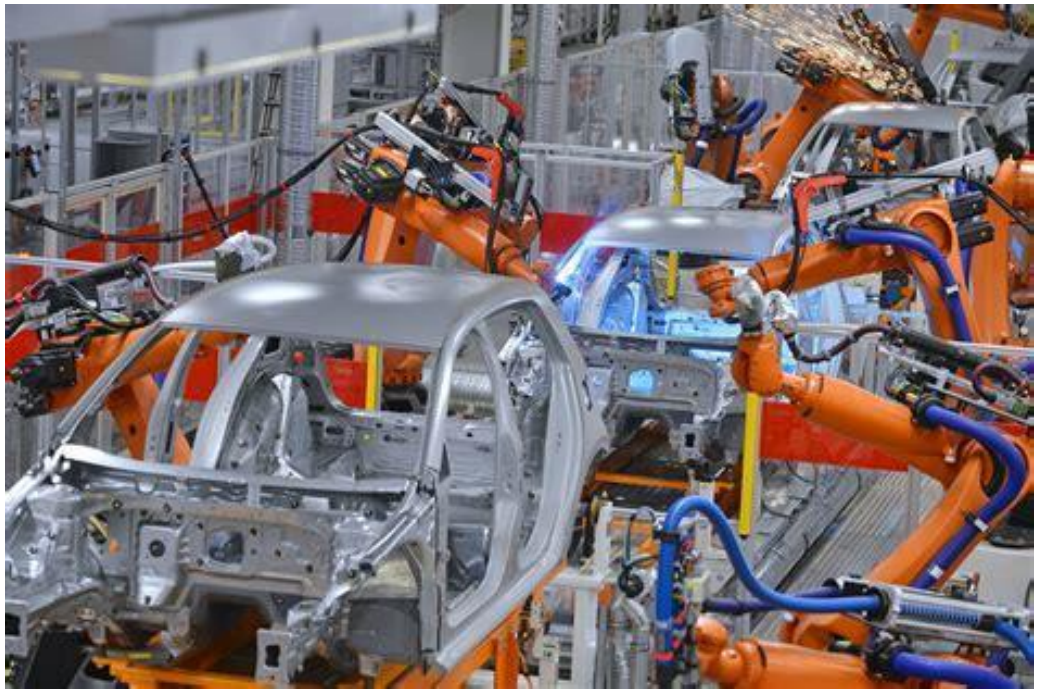
Blockchain

Digital Workplace

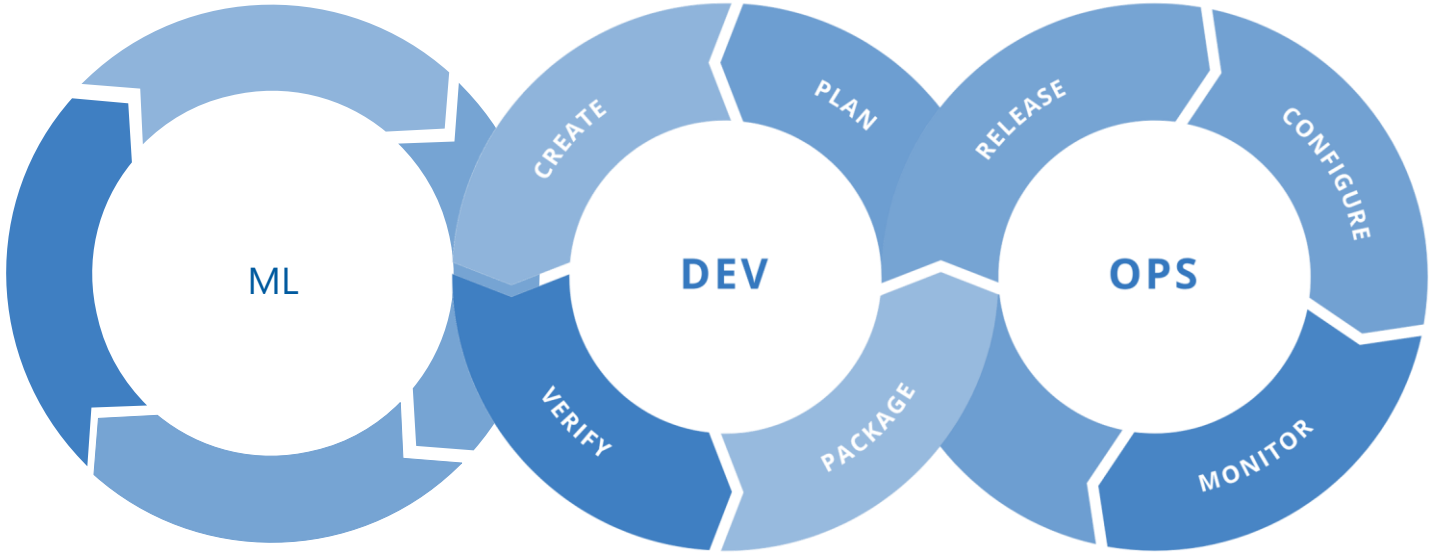
Mixed Reality

3D Printing

From Data Science to Data Production



MLOps = ML + DEV + OPS



Experiment

Data retrieval
Business understanding
Initial modeling

Develop

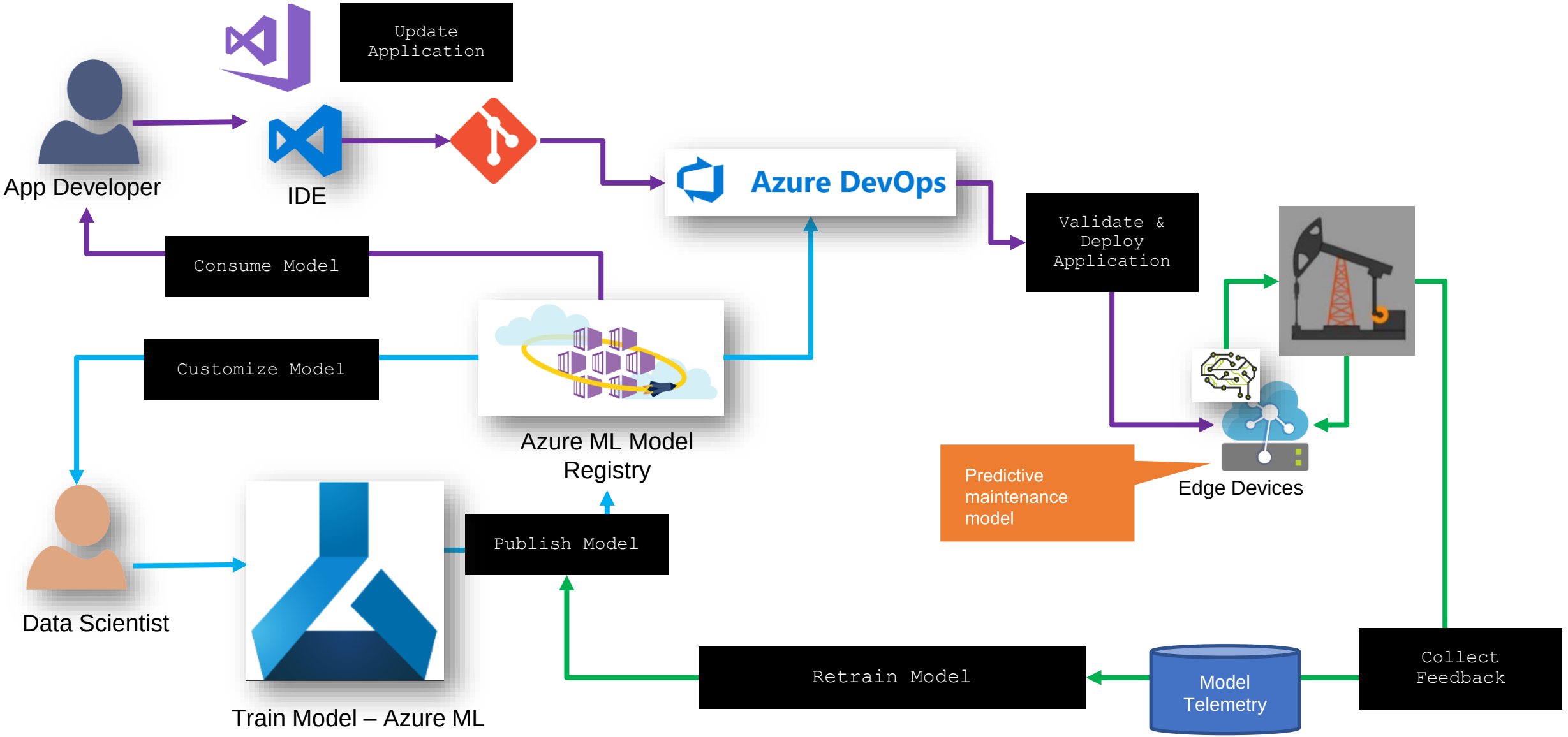
Testing
Continuous Integration
Continuous Deployment

Operate

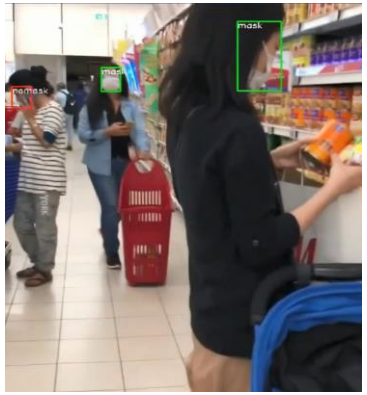
Continuous Delivery
Data Feedback Loop
System + Model Monitoring

ML DevOps Process – Schneider (Realift)

"Automate the E2E model lifecycle."



Social Distancing and Safety






Use cases

- Identification of Personal Protection Equipment (including masks)
- Proximity alert
- Crowd detection in restricted areas
- Man down identification

Technology

- Cognitive Services on top of Camera / Surveillance systems
- Smart Safety Tags

Partners

ROBOVISION

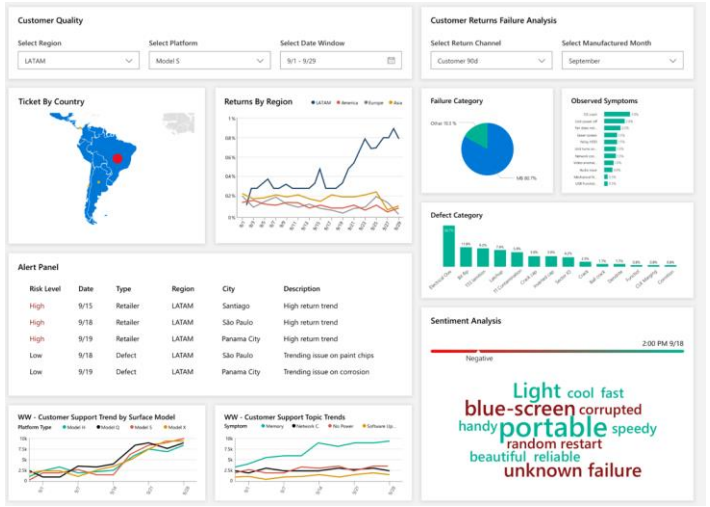
BOSCH

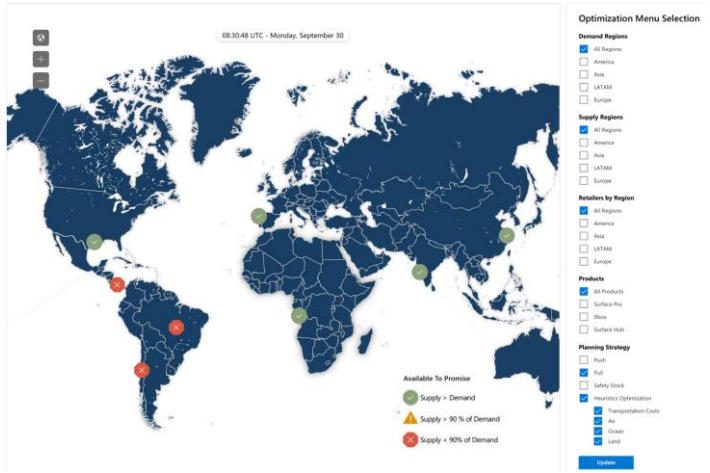
GUARDHAT

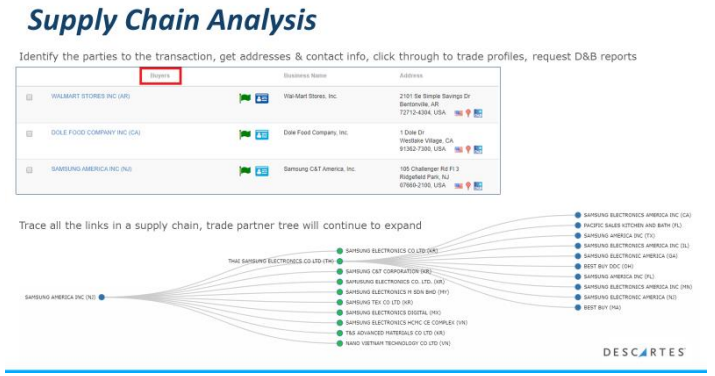
4WARD

delaware

...







Supply Chain Visibility Dashboards

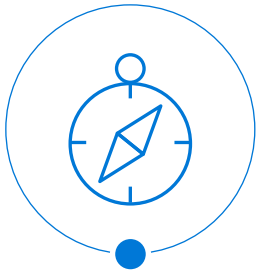
- Being well informed in these times of constant changes in critical for Supply Chain operations. Reducing the time it takes to present insights that can help in making informed decisions is key. Whereas it was OK before to spend hours (or even days) to collect data in spreadsheets and power-points before meetings, these insights need to be available immediately in order to become more responsive to the changes.

- Based on the concepts of the Crisis Communication Apps, one of our customers has refocused this from internal communications only, towards providing essential information in real-time to support their supply chain operations. In 2 weeks' time they have developed an extensive visibility and drill-through dashboard that will be used in the daily alignment calls between their demand managers and plants.

Next steps

Business Outcome Workshop

Engage with Microsoft Services in a 1:1 workshop to scope innovative solutions, architectural design, and next steps



Deeper Solution Design Session

Explore any of our solution areas in a more detailed session

Proof of Concept

Begin a POC with support of key engineering teams and partners

1 REPSOND

Navigating the Now

Rapid Response to immediate challenges to continue operations

2 REBOUND

Planning the Comeback

Rebound from shutdowns and restart operations to scale quickly

3 REIMAGINE

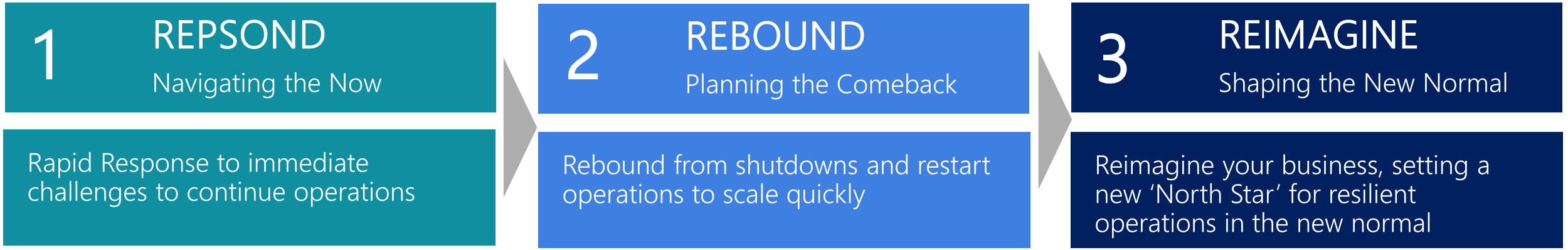
Shaping the New Normal

Reimagine your business, setting a new 'North Star' for resilient operations in the new normal

More Information

Microsoft Manufacturing Community aka.ms/manufacturing

Patrick van Loon patrick.vanloon@microsoft.com



AI and IoT in Manufacturing

Reopen and Stay Open

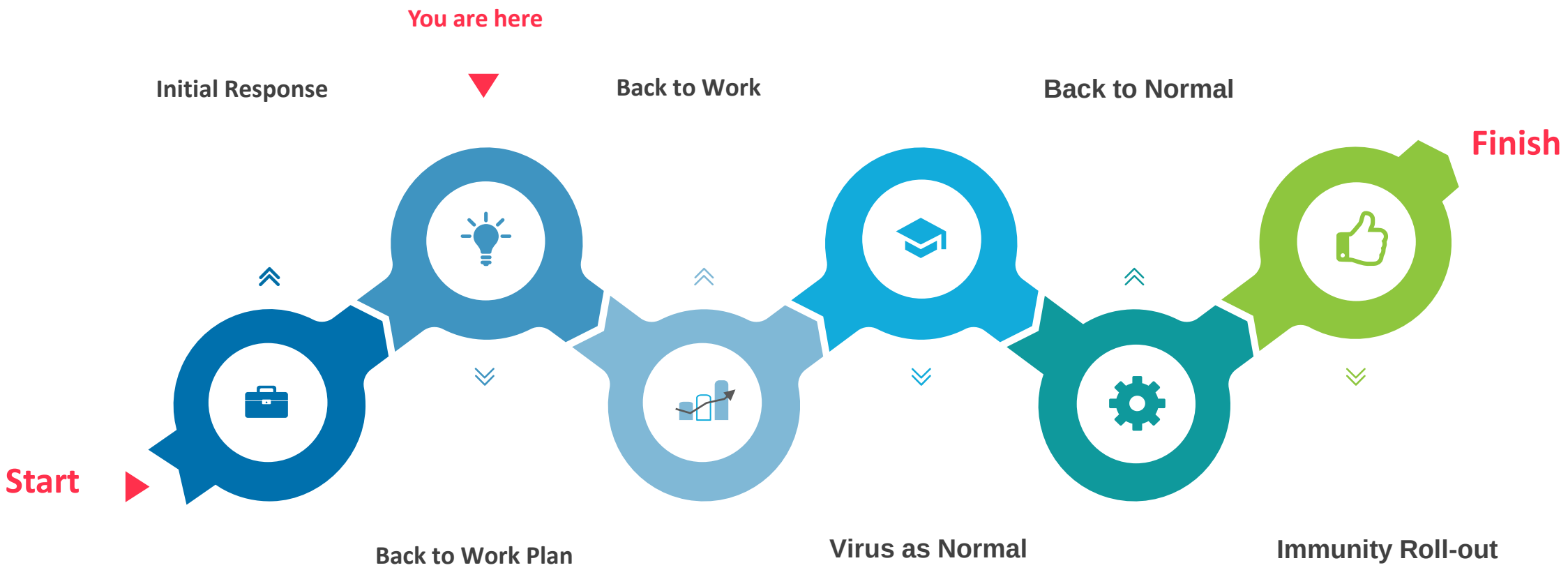
Sergey.Patsko@Capgemini.com
Sergey Patsko, PhD
VP AI & Analytics

Capgemini

Perform AI

Artificial Intelligence.
Real World Solutions.

The challenge of COVID19 for Manufacturers



Why Manufacturers need COVID Control

1 unidentified case

Unidentified location

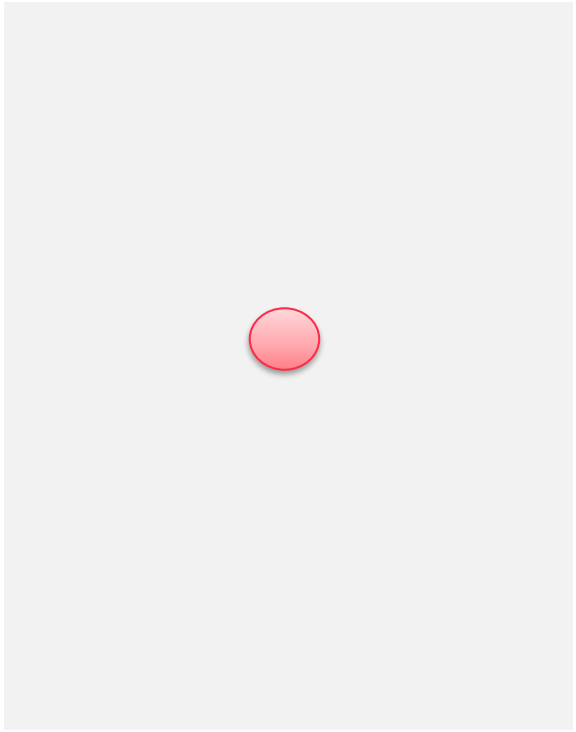
- **A Closed Factory**
- **An Isolated & at Risk Workforce**
- **Lost Revenue**
- **Unmanaged HR Costs**

Without Contact Tracing a manufacturer risks multiple unplanned outages, an at-risk workforce

Why a manufacturer needs COVID operations

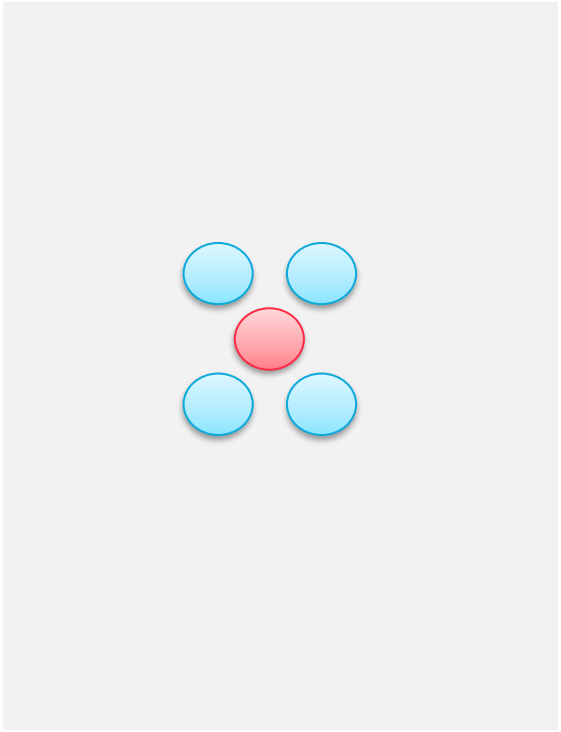
Get Back to Work and Stay Safe – plan locations to support separation

Close a Machine



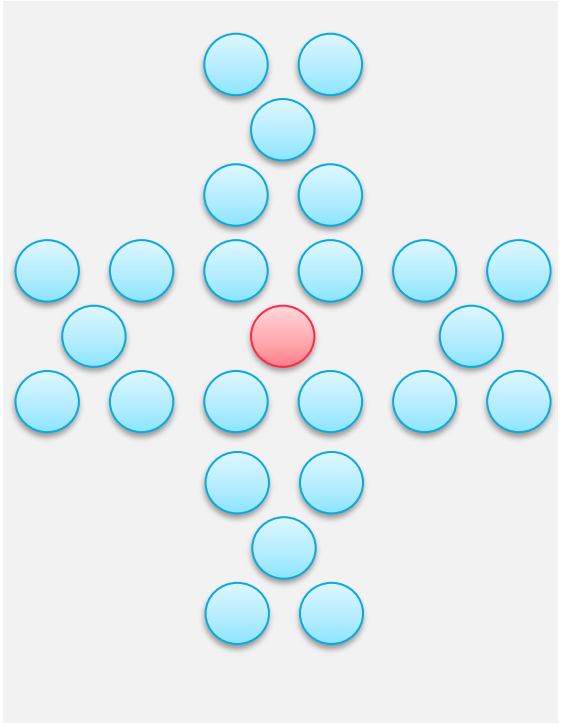
1 unidentified case

Close a Section



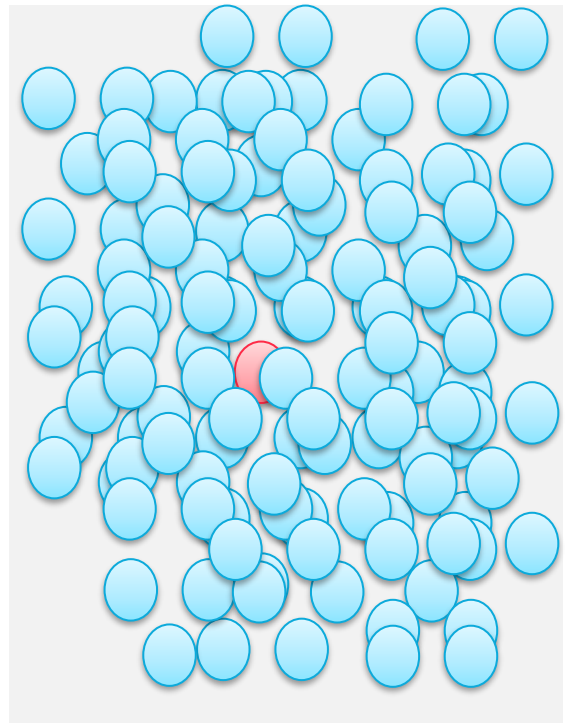
1 at Risk Team

Close a Line



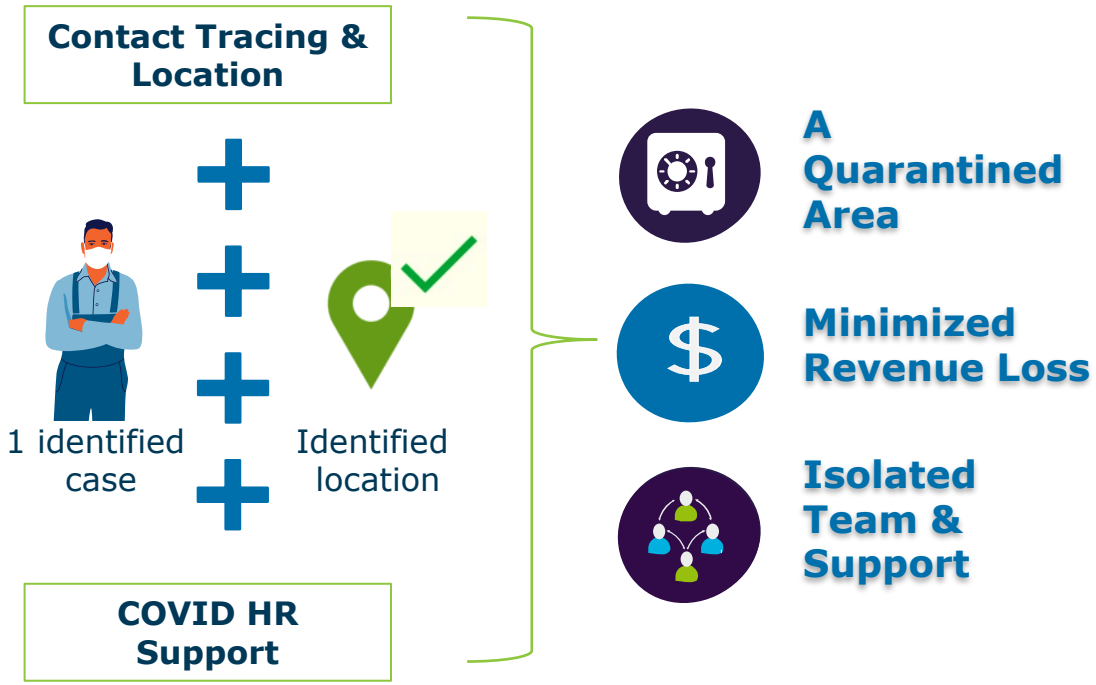
1 at Risk Shift

Close a Building



1 at risk Factory

Why Manufacturers need COVID Control



With Contact Tracing and active COVID HR support risks are isolated faster, the scope of the impact is reduced, and HR, testing and other costs are minimized

Capgemini’s back to work, stay at work plan for manufacturers

Protect your workers and clients with tech for social distancing and contact tracing

People

Dedicated COVID Process Support & Call Center

COVID HR Support

- COVID19 processes planning
- Proactive Staff Isolation
- Testing Management
- Disinfecting and location management

Process

Enterprise Command Center

Social Distancing and Contact Tracing Analytics

- Social distancing analytics
- AI-driven COVID19 exposure risk assessment
- Immediate incident management
- Economic impact assessment
- Enterprise & local authorities policies alignment

Technology

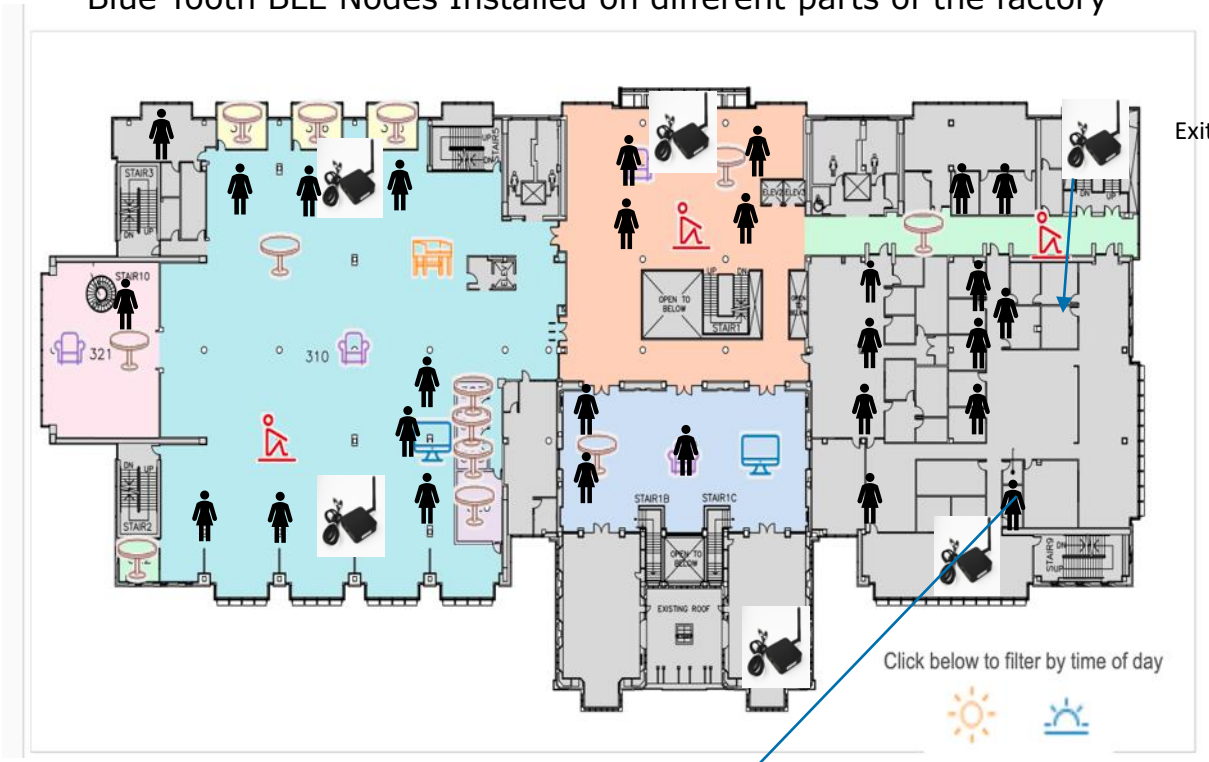
Social Distancing Monitoring and Contact Tracing Rollout with location risk support

Facilities, staff and field contact tracing

- Factory Floor and facilities Social Distancing monitoring
- DP-3T work badges & location tags
- Contact Tracing Console

Making Locations Workers Aware

Blue Tooth BLE Nodes Installed on different parts of the factory



Blue Tooth BLE Devices (Wearables) or Smart Phones tagged uniquely to the employees

People Aware Locations

Worker A and B cross paths

Worker A Mobile — Worker B Mobile

Worker A works at mnfct line

Worker A Mobile — Mnfct Line Tag

Worker C works at mnfct line

Mnfct Line Tag — Worker C Mobile

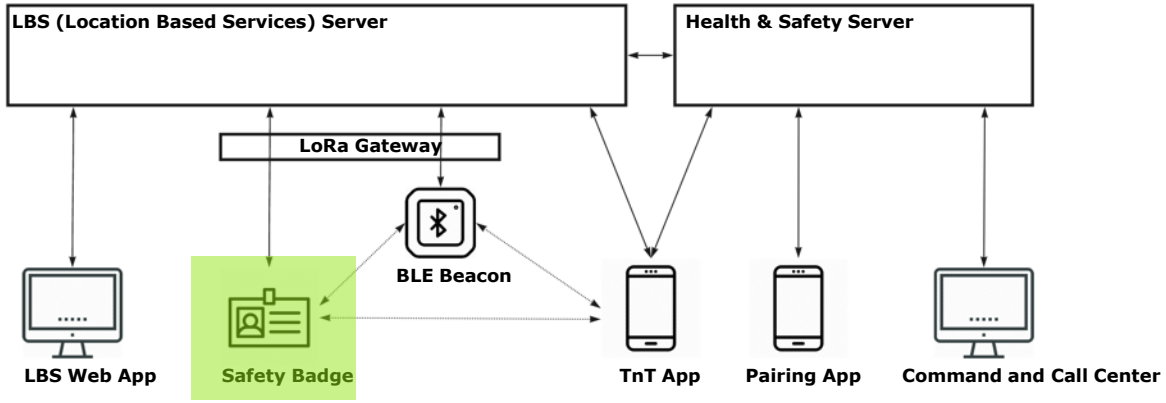
Worker A tests positive for COVID-19

Worker A Mobile — Mnfct Line Tag, Worker B Mobile, Worker C Mobile

Business and people informed

The Safety Badge provides a simple, robust, wearable proximity sensor, proven in industrial settings

Photo shows previous version with larger form factor – new version ready from mid-May.

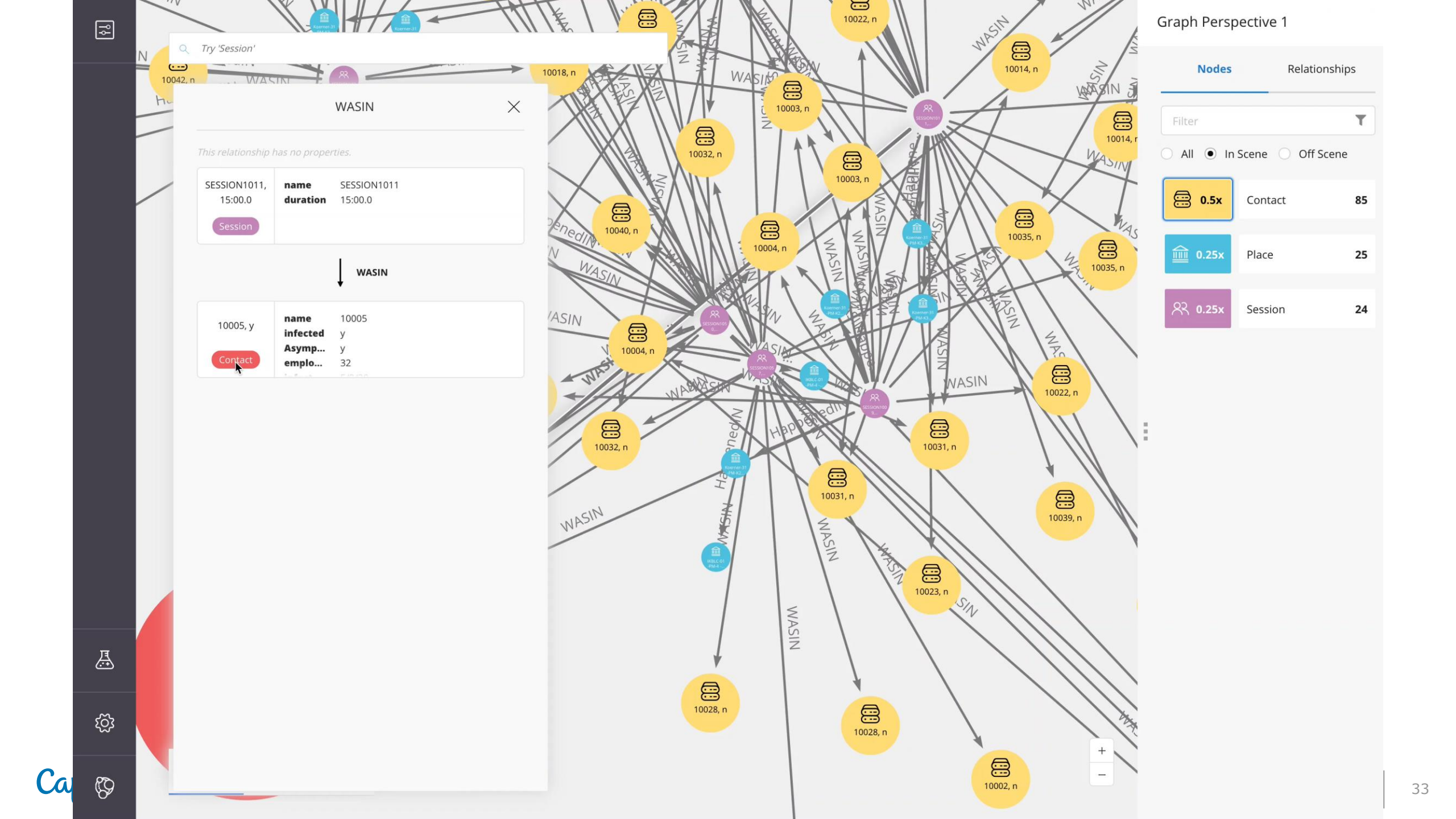


Device Characteristics

- BLE and LoRa communication

Functions

- Real-time (scan every 400ms) proximity alerts and recording using BLE advertise/scan protocols.
- Supports indoor Geolocation using BLE Beacons if required, to trace zone presence.


Try 'Session'
WASIN
This relationship has no properties.
SESSION1011, 15:00.0
Session
name SESSION1011
duration 15:00.0
WASIN
10005, y
Contact
name 10005
infected y
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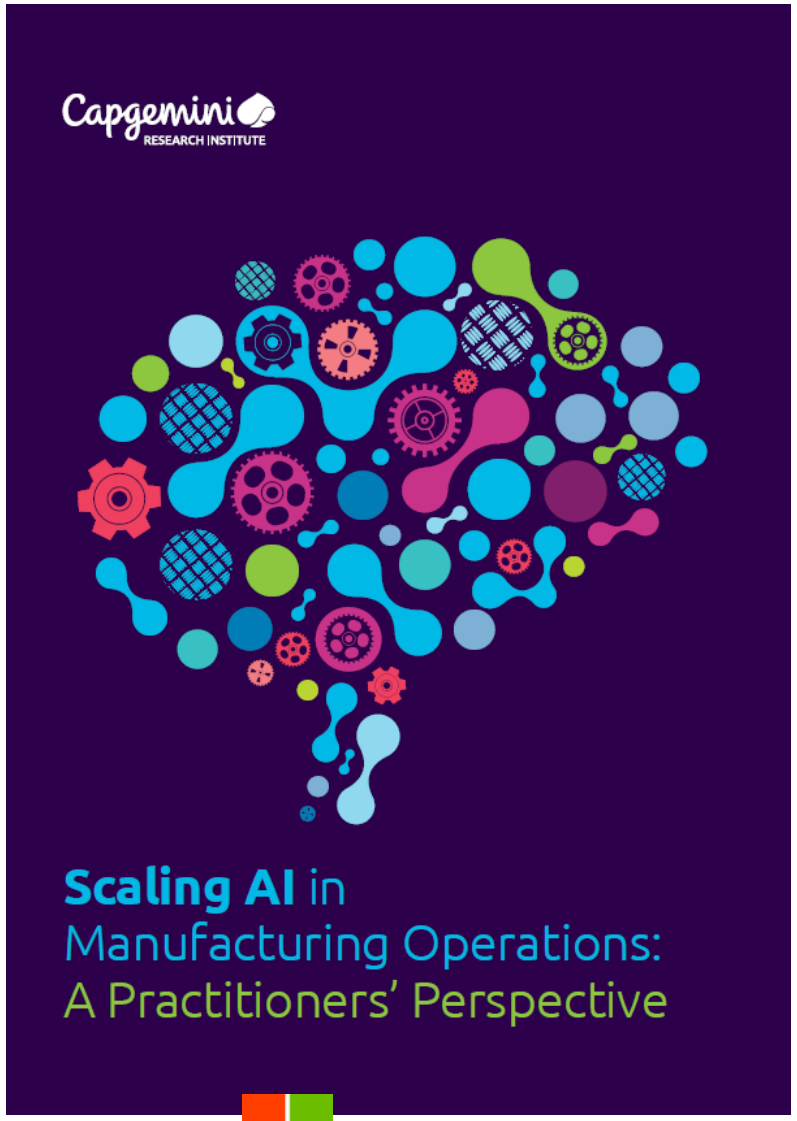
emplo... 32
Graph Perspective 1
Nodes
Relationships
Filter
All
In Scene
Off Scene
0.5x
Contact 85
0.25x
Place 25
0.25x
Session 24

The transformation of manufacturing by AI has already started



52% Of the European manufacturers are implementing AI solutions

47% Of French manufacturers are implementing at least one AI use case in manufacturing (Germany: 69%)

30% reduction in lost sales achieved by Danone by using machine learning to predict demand

Main elements to focus on

Key criteria for choosing where to focus first

1. Relative ease, cost and delay of implementation
2. Clear business value and quantifiable benefits (KPIs)
3. Availability of ressources: data, expertise, infrastructures
4. Capacity to add explanations and visibility to ease adoption

Use cases to focus on

PREDICTIVE MAINTENANCE

Technique to predict the future failure point of a machine component, so that the component can be replaced, based on a plan, just before it fail.

QUALITY CONTROL

System of maintaining standards in manufactured products by testing a sample of the output against the specification.

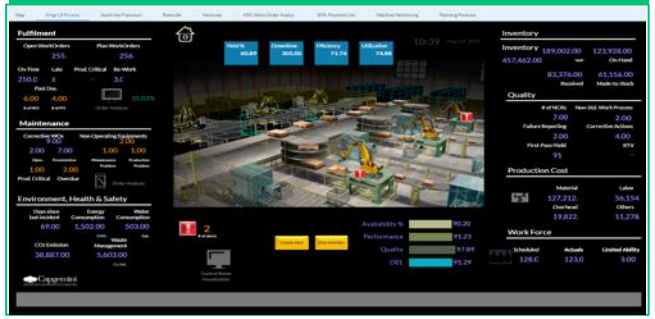
DEMAND PLANNING

Process of forecasting the demand for a product or service so it can be produced and delivered more efficiently and to the satisfaction of customers.

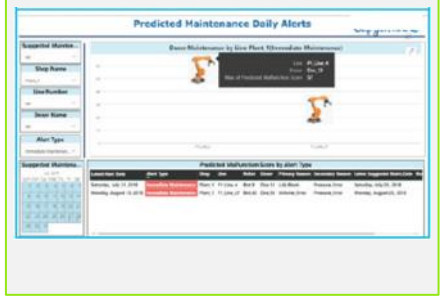
Capgemini Accelerators to improve Manufacturing Operations and reduce COVID19 Risks

Demand Forecasting & Inventory Planning

Digital Control Room / OEE



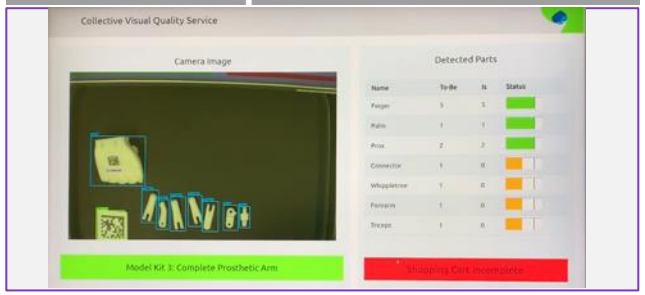
Predictive Maintenance



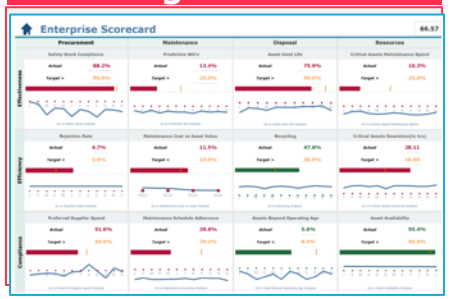
Worker Safety & COVID19

Supplier performance evaluation

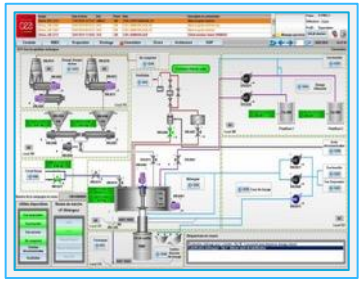
Quality-as-a-Service / Visual Inspection



Asset Performance Management



Energy Saving as A Service

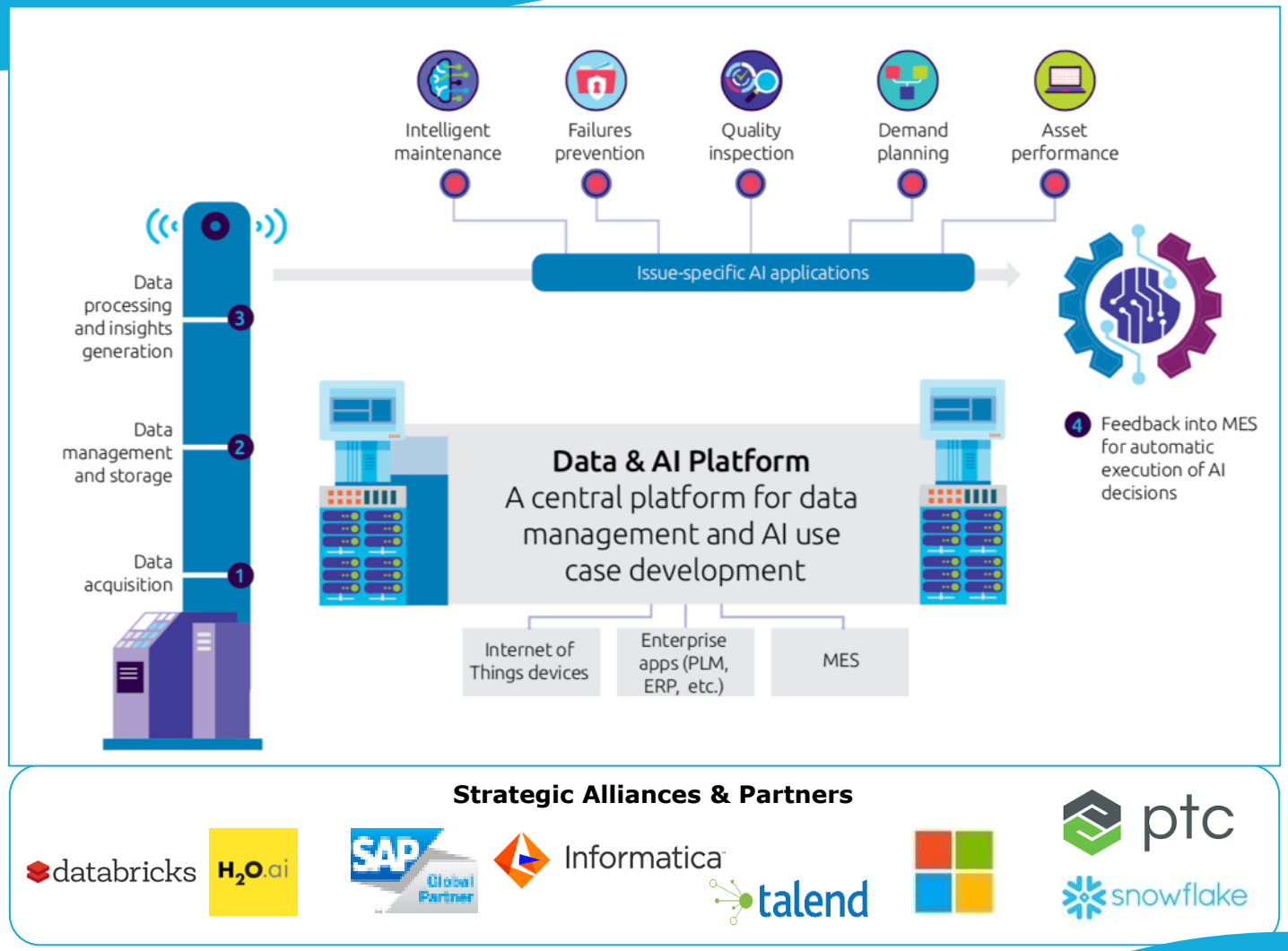


- Training Time ~ 5 pt ↓
- Maintenance Cost ↓
- Yield ~ 1.3 pt ↑

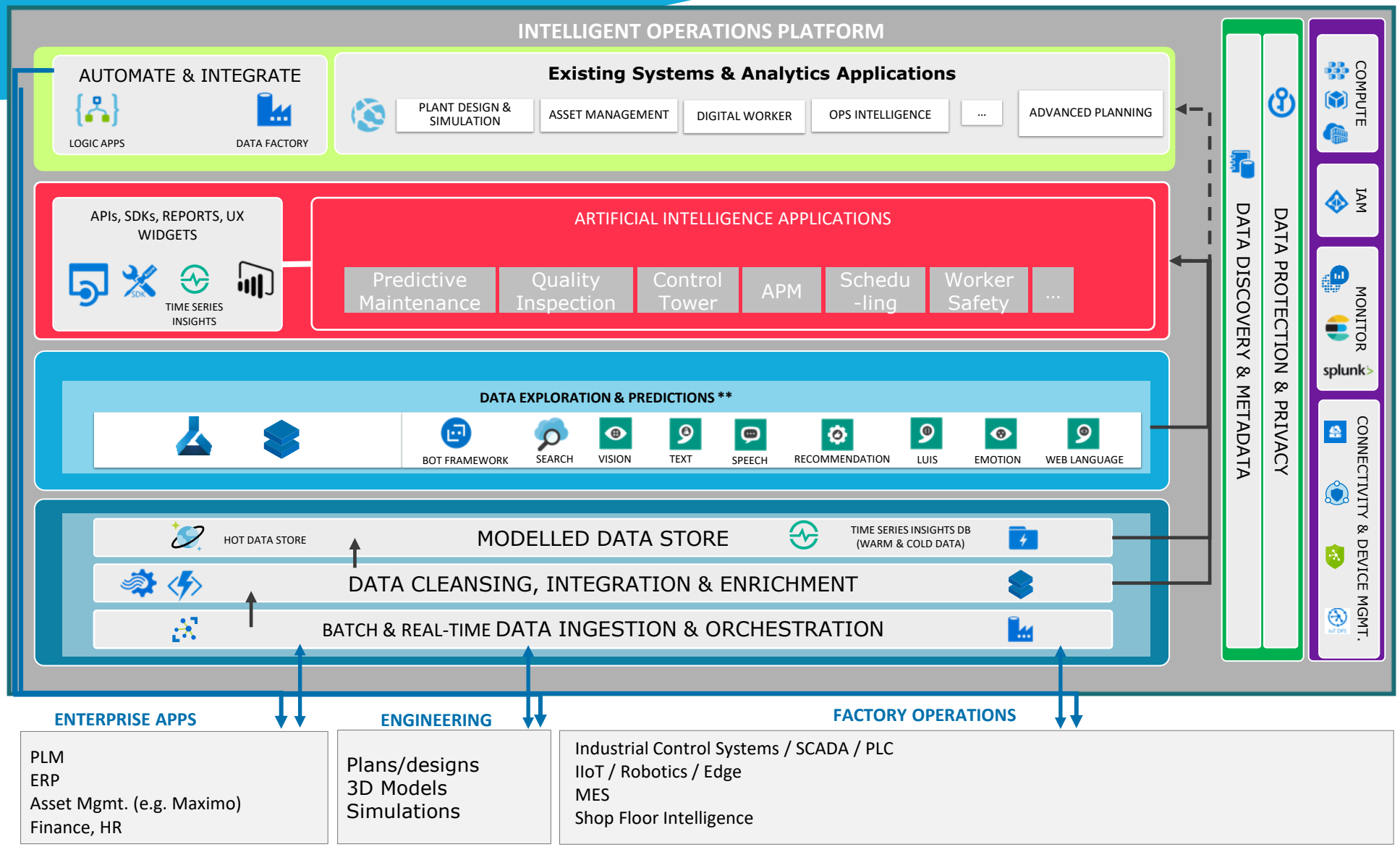
BENEFITS BENCHMARK

- Productivity ~5.7% ↑
- Energy ~ 6.5% ↓
- OEE ↑
- MTBF ↑
- Spend Visibility ↑

Capgemini Intelligent Operations Platform for Manufacturing



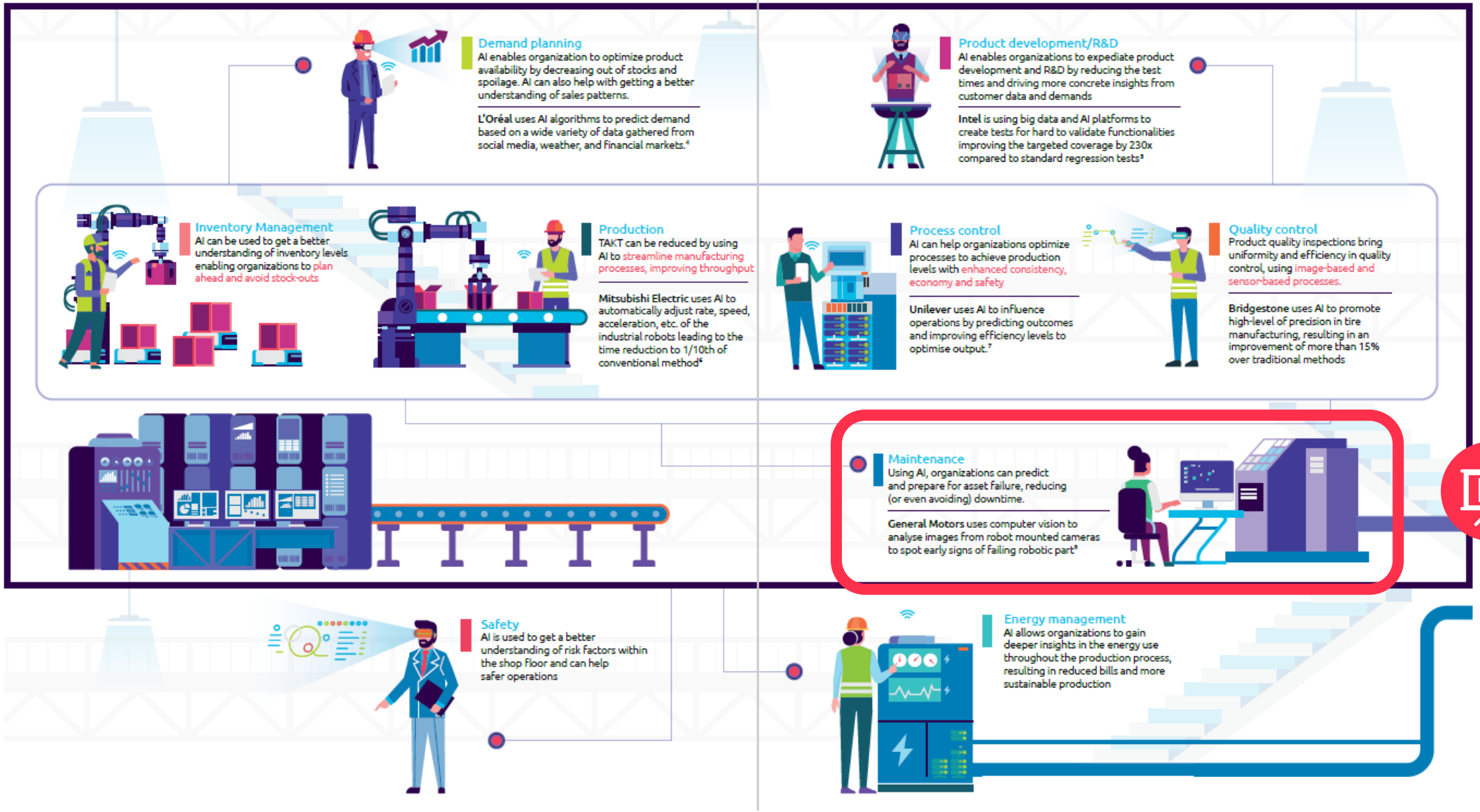
Capgemini Intelligent Operations Platform for Manufacturing: Microsoft Azure



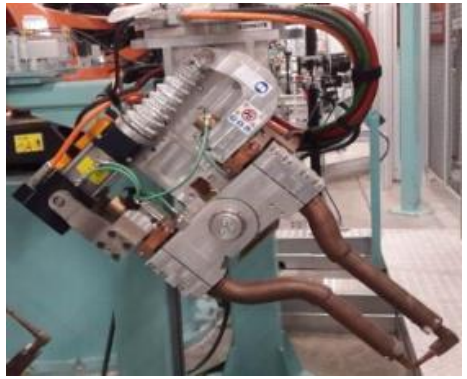
- Activation
- AI & Analytics Execution
- AI & Analytics Foundation
- Data Centricity Foundation
- Data Trust
- Platform Foundation

Real Life Customer Stories

AI potential accross the breadth and depth of manufacturing operations

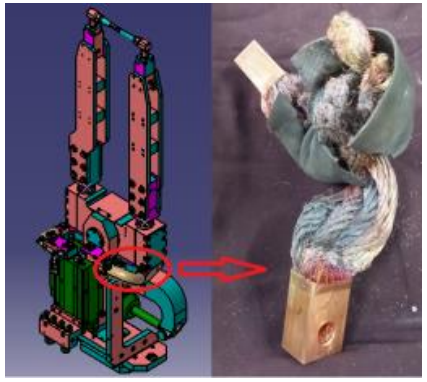


3 use cases from Car Body Shop



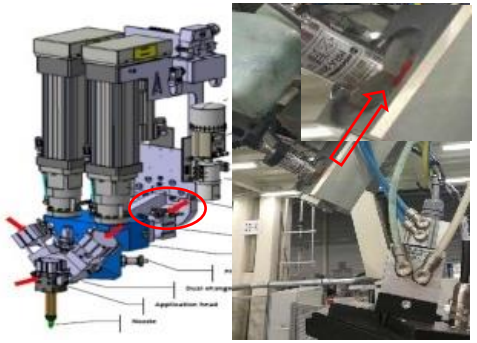
Equipment Failure Prediction

Equipment includes Welding Robots, Tip Dresser, Servo Motors, etc.



Flexible Cable Burn Out Prediction

Data includes welding process data, welding set up data, fault & failure history



Glue Leakage Prediction

Leakage includes filling & application head of greasing robots & dosers.

Predictive Maintenance of Machines/Robots

Context

Client: German automotive leader

Goal: Develop industry 4.0 platform

Why? Optimize machines & equipment availability in factory:

- Reduce machine down time
- Reduce machine breakdowns
- Reduce disruptions

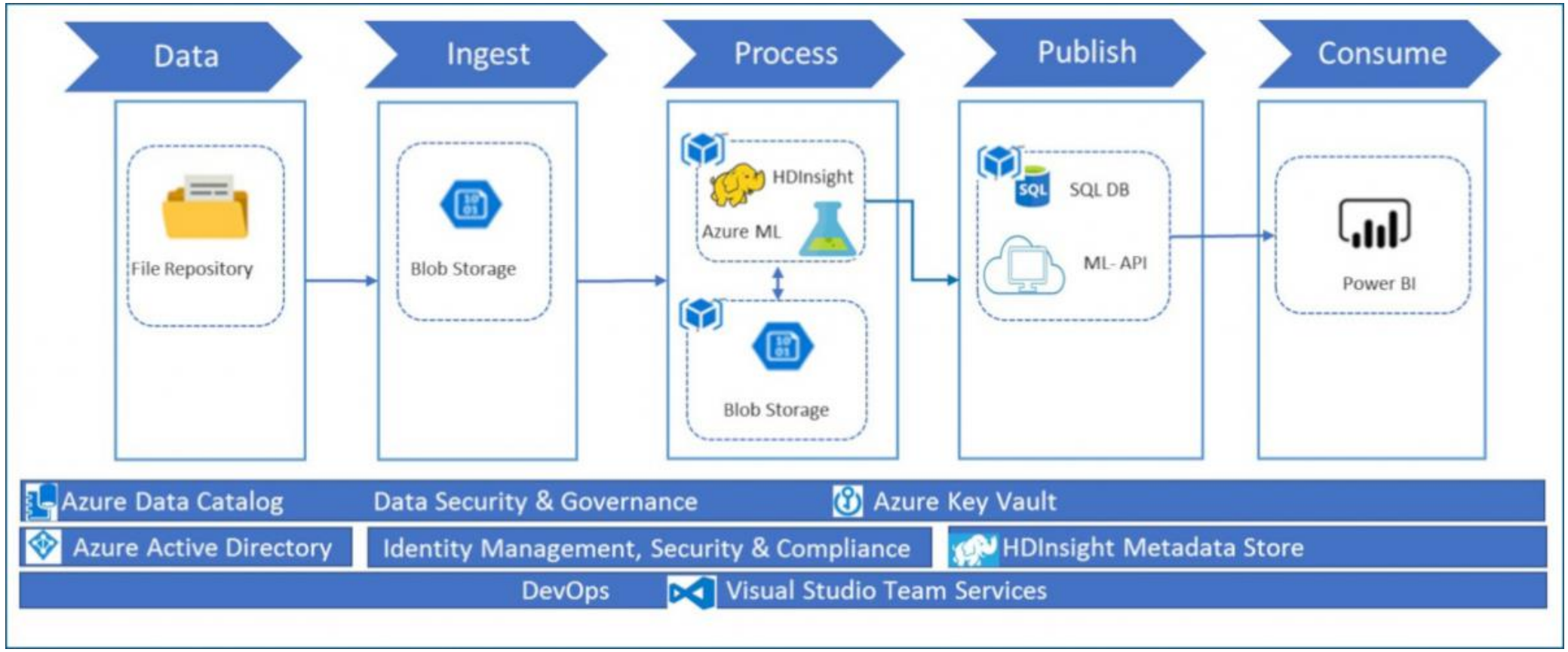
Solutions

- **Analyze 500+GB** of data
- **Developed & validated** failure prediction models
- **Physical failure testing** is closer to model outcome
- **Platform implemented** for a plant with 600+ robots

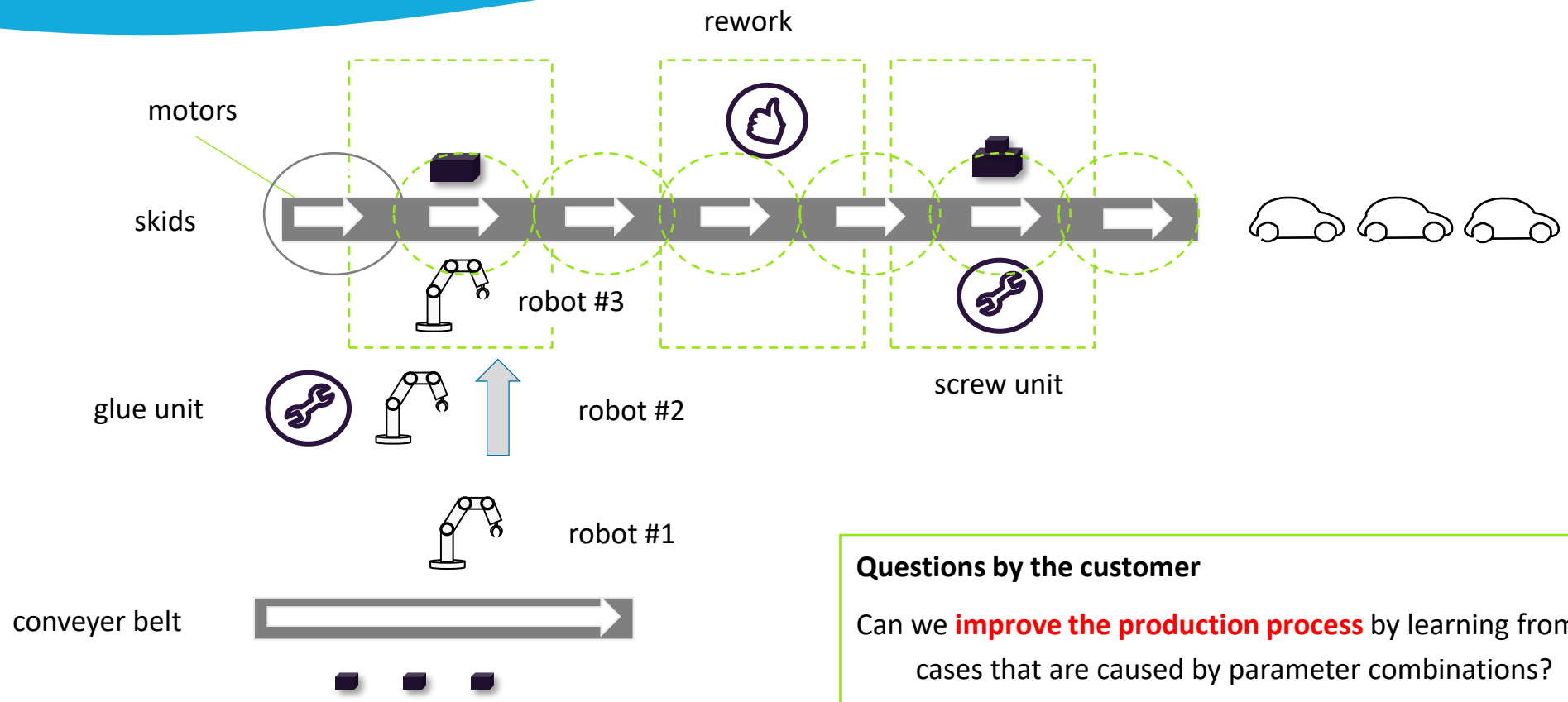
Benefits

- **Saved 500 minutes/weeks** of operational down time for about 600+ robots
- Move from preventive to predictive with advanced analysis
  - **Trends in machine** or equipment malfunctions
  - **Manufacturing process performance & quality**

Predictive Maintenance of Machines/Robots



A reliable transport through the production line is ensured by our Predictive Maintenance solution

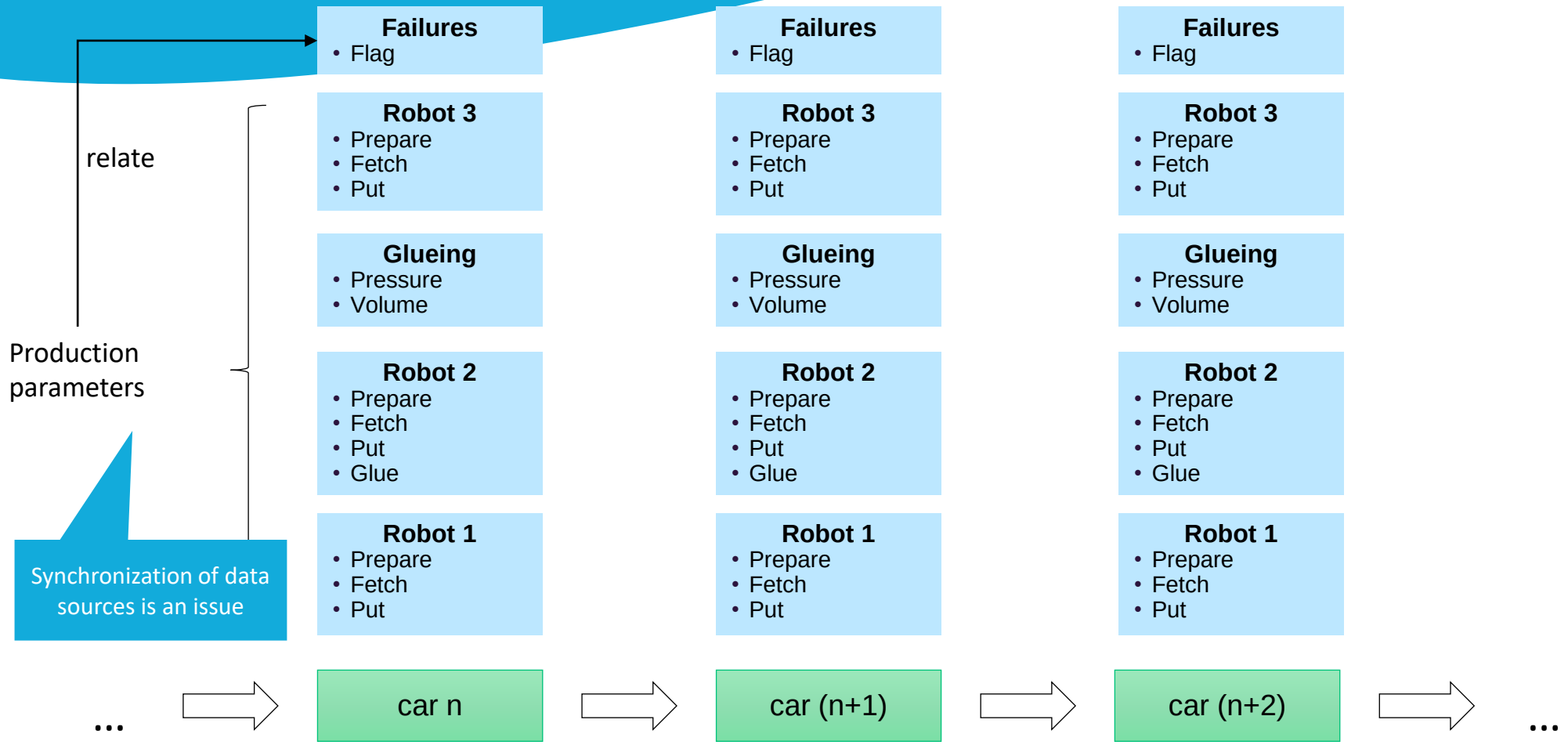


Questions by the customer

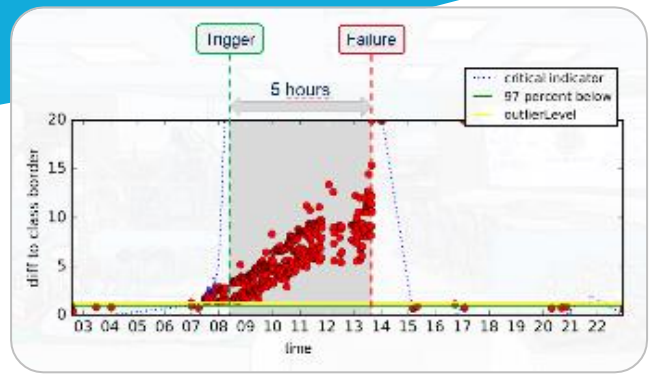
Can we **improve the production process** by learning from failure cases that are caused by parameter combinations?

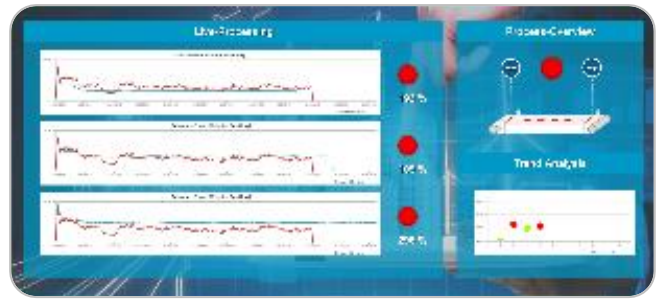
All parameters at all stations are within range. However, we see failures in the product.

A reliable transport through the production line is ensured by our Predictive Maintenance solution



A reliable transport through the production line is ensured by our Predictive Maintenance solution





Background

- Currently breakdowns of the production transportation system caused by the electric engines are responsible for damages reaching six-figure sums

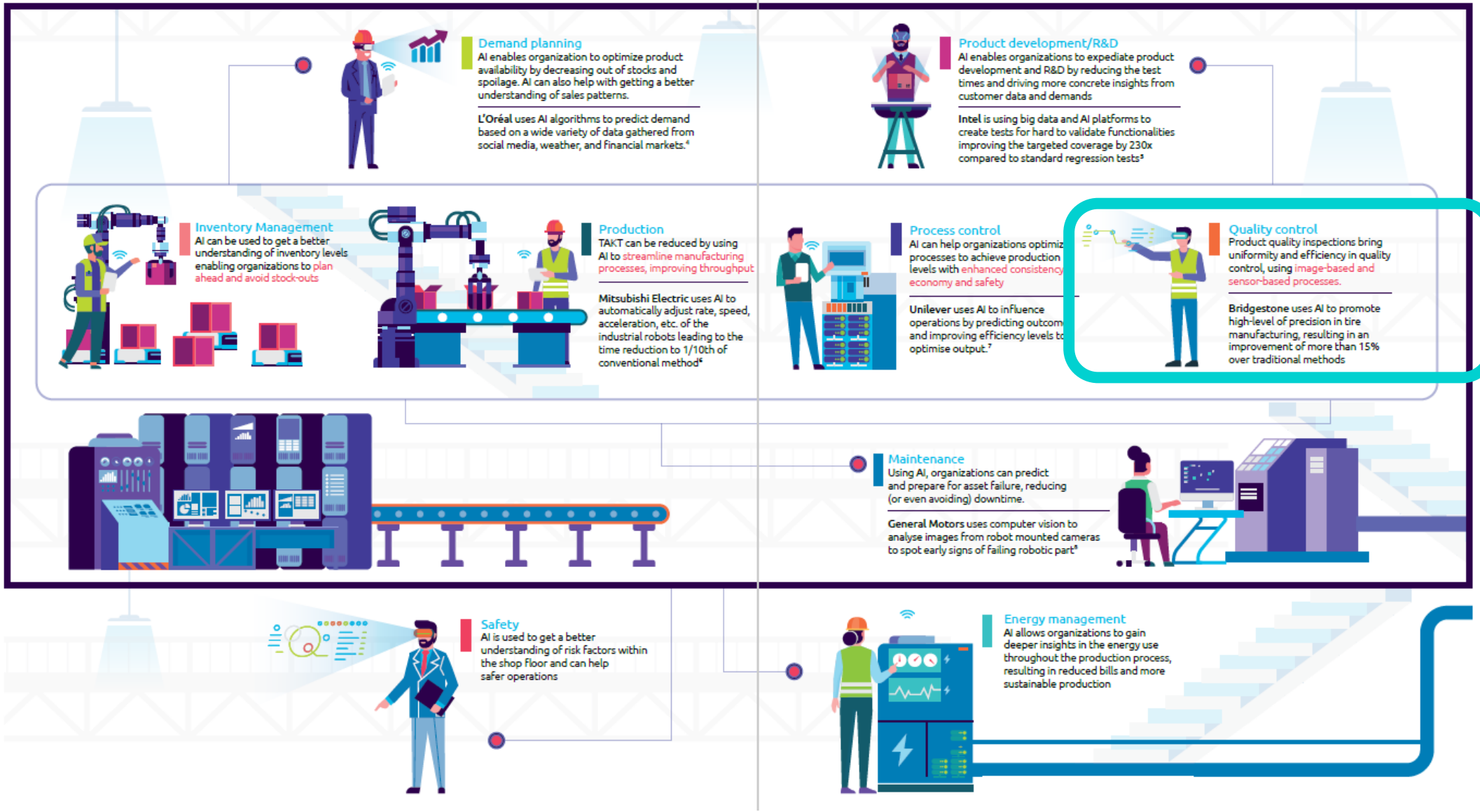
Solution

- Deployment of a predictive maintenance real-time monitoring of the transportation system

Benefits

- Improve performance of production line by rising uptime and reducing maintenance costs
- Creation of a scalable solution which is expandable in other factories and use case scenarios

AI potential accross the breadth and depth of manufacturing operations



Visual quality AI that is verifying vehicle engines are assembled correctly

Context

Client: Car manufacturer

Goal: Detect quality issues on the assembly line and not at the end

Why?

- Final assembly is mainly an areas of **manual task execution**: increase the likelihood of **assembly errors**
- Problems are usually detected at the final quality control loop and lead to **delays and rework effort**.

Solutions

- Creation of a **shop floor application** that detects errors using machine learning algorithms
- **Standard industrial cameras** are used to capture images.
- **Evaluation** of the images uses **open source component** on the shop floor without a server or cloud connection needed
- **Results** are transferred to the shop floor using a custom built OPC-UA adapter

Benefits

- The initial viability study was **completed after two weeks only**
- Using open source applications only our customer **is free of the usual vendor lock-in of shop floor** hardware solutions.
- Since the go live **no defects** have slipped through the visual quality check.
- The initial solutions **can be adapted** to other scenarios and plants.

Reach out to schedule a videoconference call for “Reopen and stay Open”or “AI Readiness” assessment!

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People matter, results count.

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