

Advanced Analytics and Machine Learning

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Data Platform & Advanced Analytics

Manufacturing Industry

June 6, 2017



Digital Transformation

“ *Digital transformation is revolutionizing not just the IT sector but the economy in its entirety. It’s progressing faster than ever with development of increasingly powerful **mobile devices**, safer cloud , hyperscale computing, high-speed telecommunications and, more fundamentally, behavioral changes in our society.* ”

Fonte: ICT PWC

NATURAL INTERFACE



DEVICES



SOCIAL



Industry 4.0 in Manufacturing – Components

Plug-and-Play Factory

Real-time Product & Parts Tracking

Predictive Maintenance

On-demand Assistance (based on AR/VR)

Automated Parts Ordering & Delivery

Embedded Digital Product Memory

„Factory as a Service“

Parts-controlled Production Process

Self-optimizing Production

Human-Robot Collaboration

Seamless Integration of Planning & Production

Seamless Supply & Value Chain Integration

Cyber-Physical Systems (CPS)

Autonomous Robots

Intelligent Products

Additive Manufacturing

Big Data & Analytics / ML

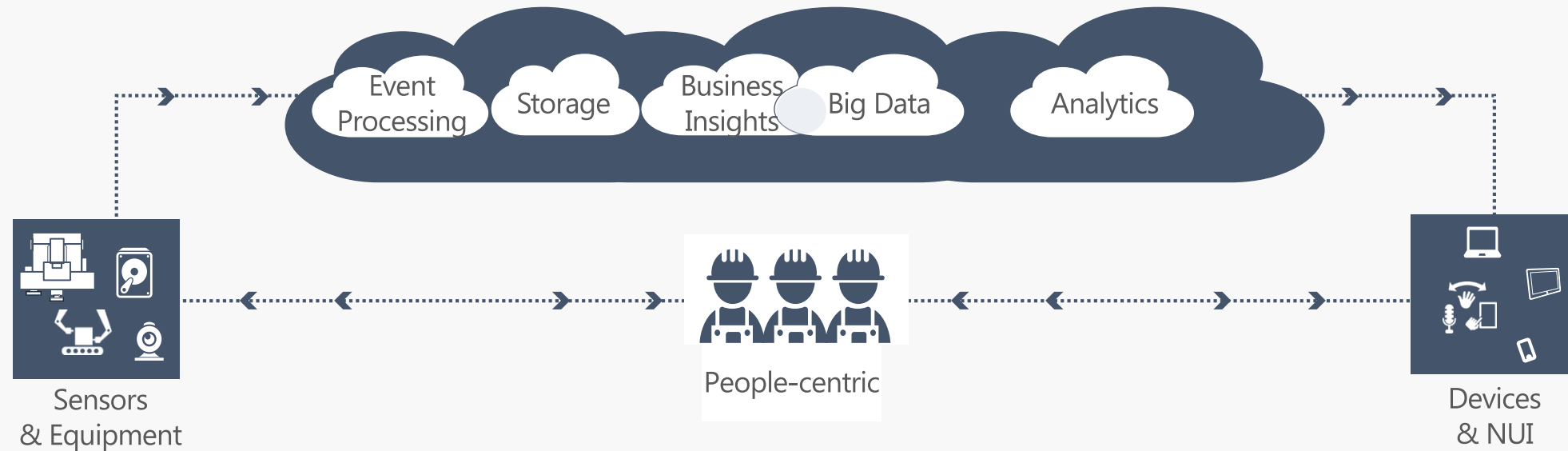
Augmented Reality

Mobile Devices/Apps

Internet of Things (IoT) & Services (& People)

Connectivity & Cloud

Internet of Things, People and Services



Device Connectivity & Management

Gain visibility, access and control to machinery and processes

Data management & Insights

Manage KPIs to improve operational performance and decision making

Advanced Analytics

Anticipate problems and deliver new value added services

Business Productivity & Process Optimization

Integrate People and Business Processes





Economia de Escala



Microsoft Azure - The Intelligent Cloud Platform

38

Azure regions



Trusted Cloud Principles

Commitment to principles worthy of your organization's trust

Security



We will implement strong security measures to safeguard your data.

Privacy & Control



We will provide you with control over your data to help keep it private.

Transparency



We will explain what we do with your data in clear, plain language.

Compliance

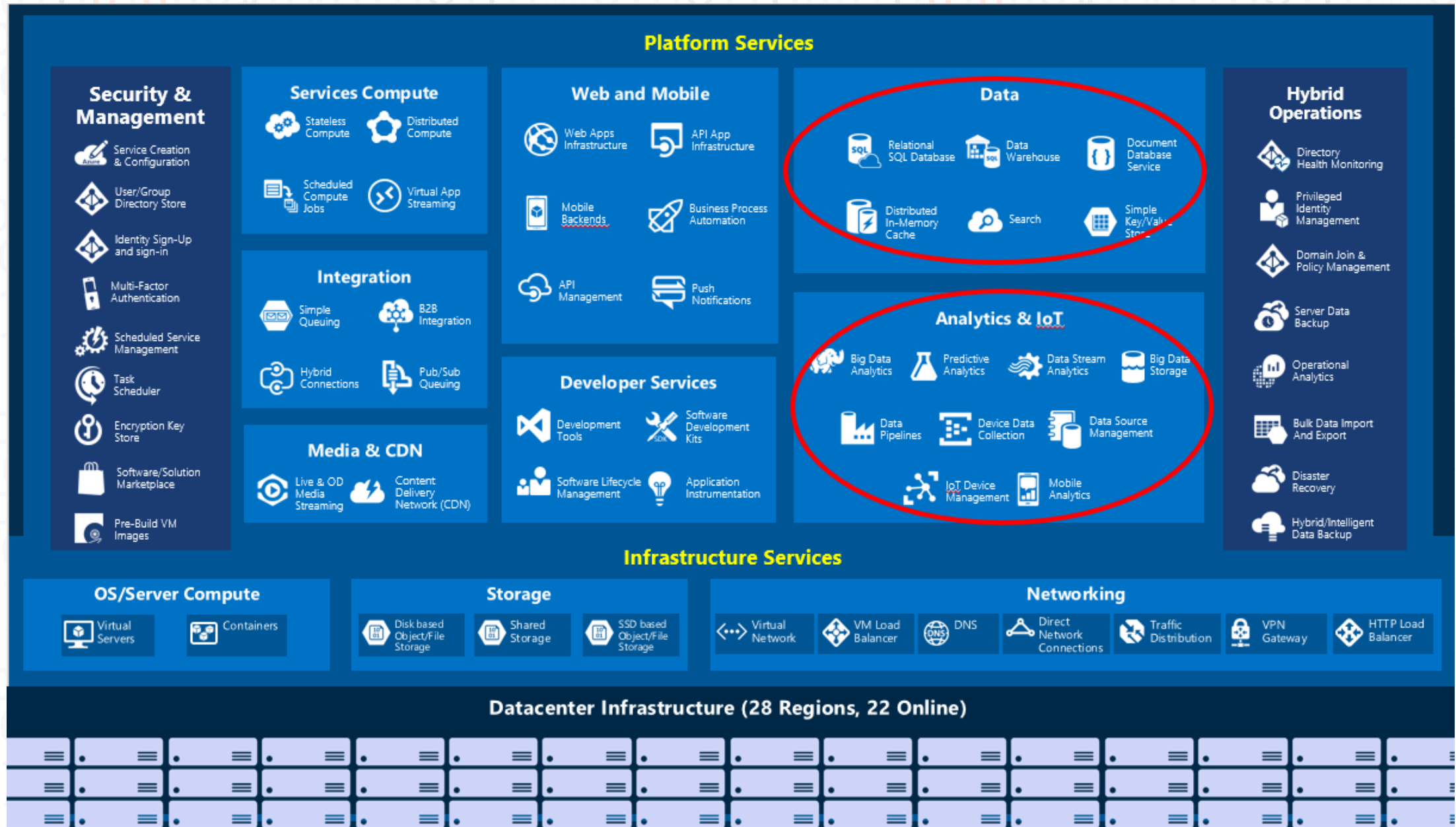


We will help you meet your specific compliance needs.

Compliance audits and certifications

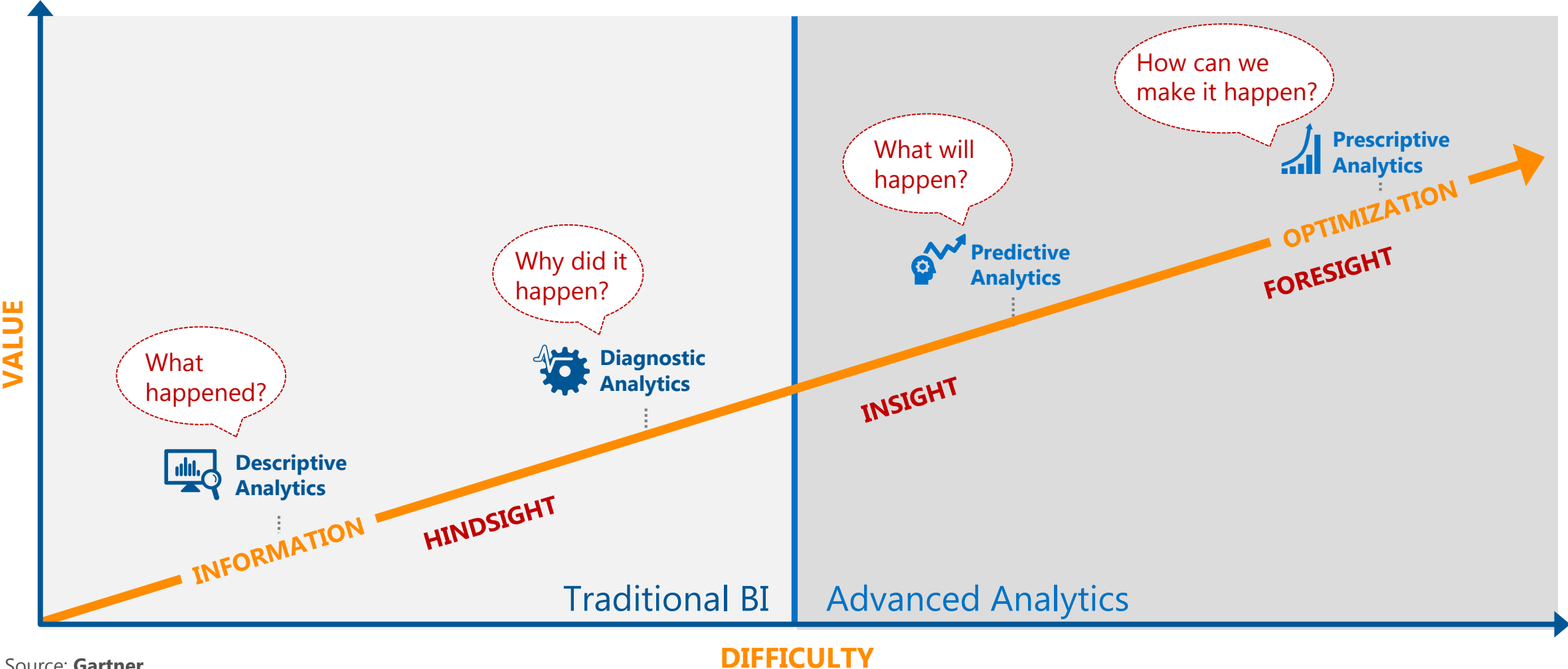
<p>GLOBAL</p>	 BSI	 SOC 1 Type 2	 SOC 2 Type 2	 PCI DSS Level 1	 Cloud Controls Matrix							
<p>UNITED STATES</p>	 FedRAMP JAB P-ATO	 HIPAA / HITECH	 FIPS 140-2	 21 CFR Part 11	 FERPA	 DISA Level 2	 CJIS	 IRS 1075	 ITAR-ready	 Section 508 VPAT		
<p>REGIONAL</p>	 European Union Model Clauses	 EU Safe Harbor	 United Kingdom G-Cloud	 China Multi Layer Protection Scheme	 China GB 18030	 China CCCPPF	 Singapore MTCS Level 3	 Australian Signals Directorate	 New Zealand GCIO	 Japan Financial Services	 ENISA IAF	 Germany IT-Grundschutz Workbook
<p>INDUSTRY STANDARDS</p>	 ISO 27001	 ISO 27018	 Content Delivery and Security Association	 Shared Assessments	 PPDM	 OPC Foundation	 ISO/IEC 22301:2012					

Microsoft Azure - The Intelligent Cloud Platform

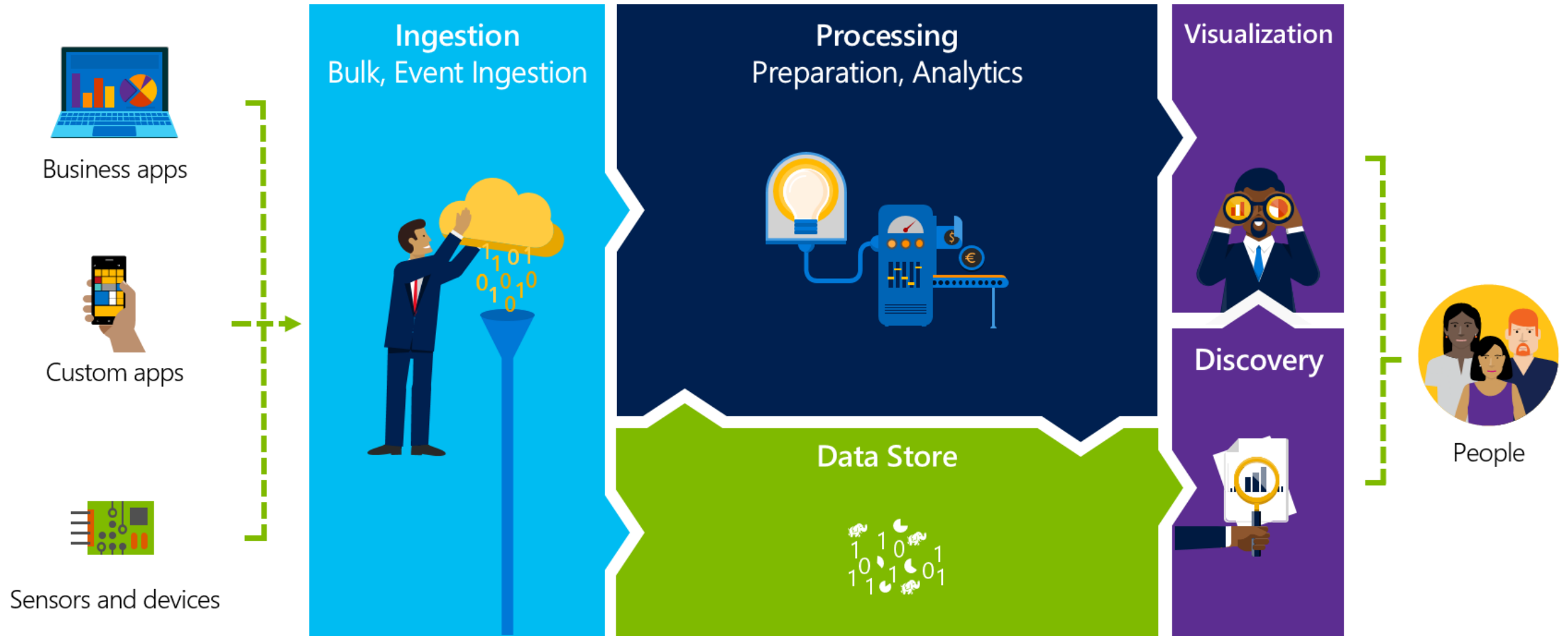


Advanced Analytics

Beyond business intelligence

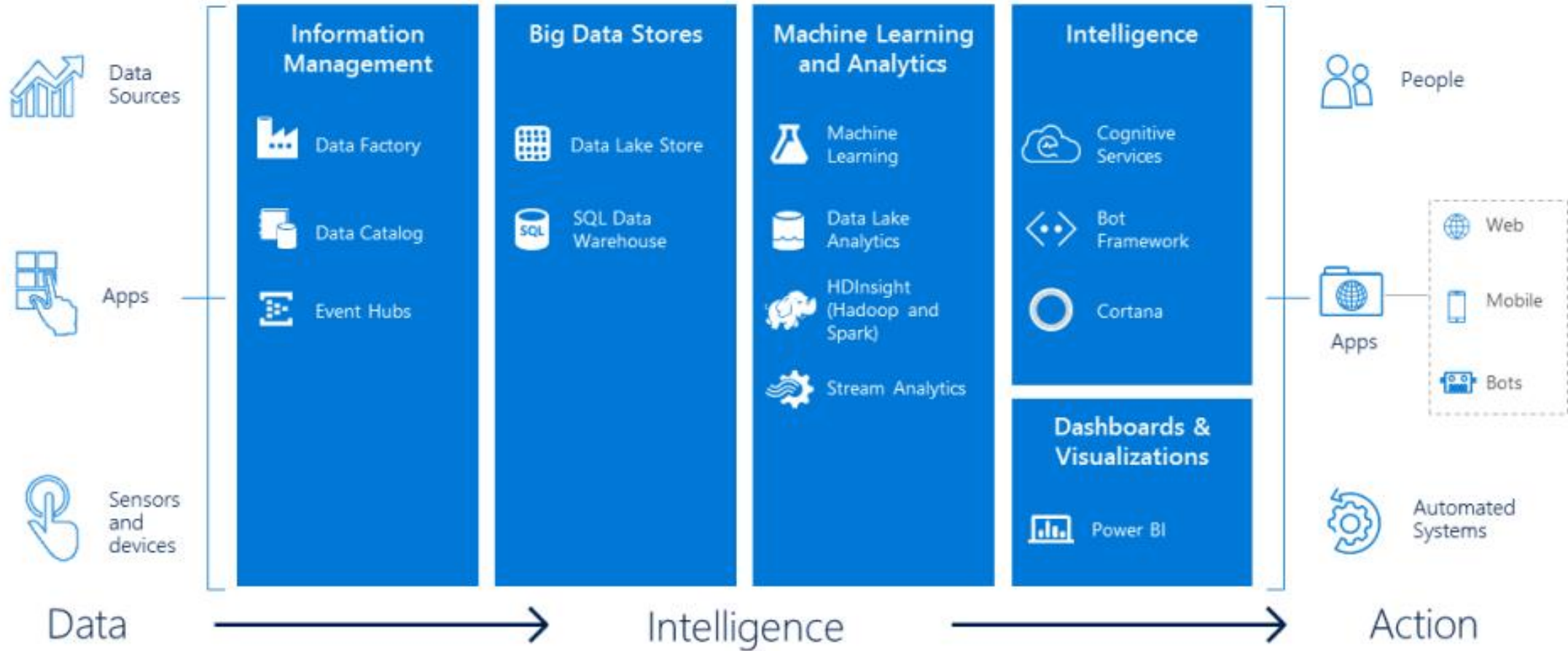


Big Data flow






















Cortana Intelligence Suite

Transform your data into actionable insight

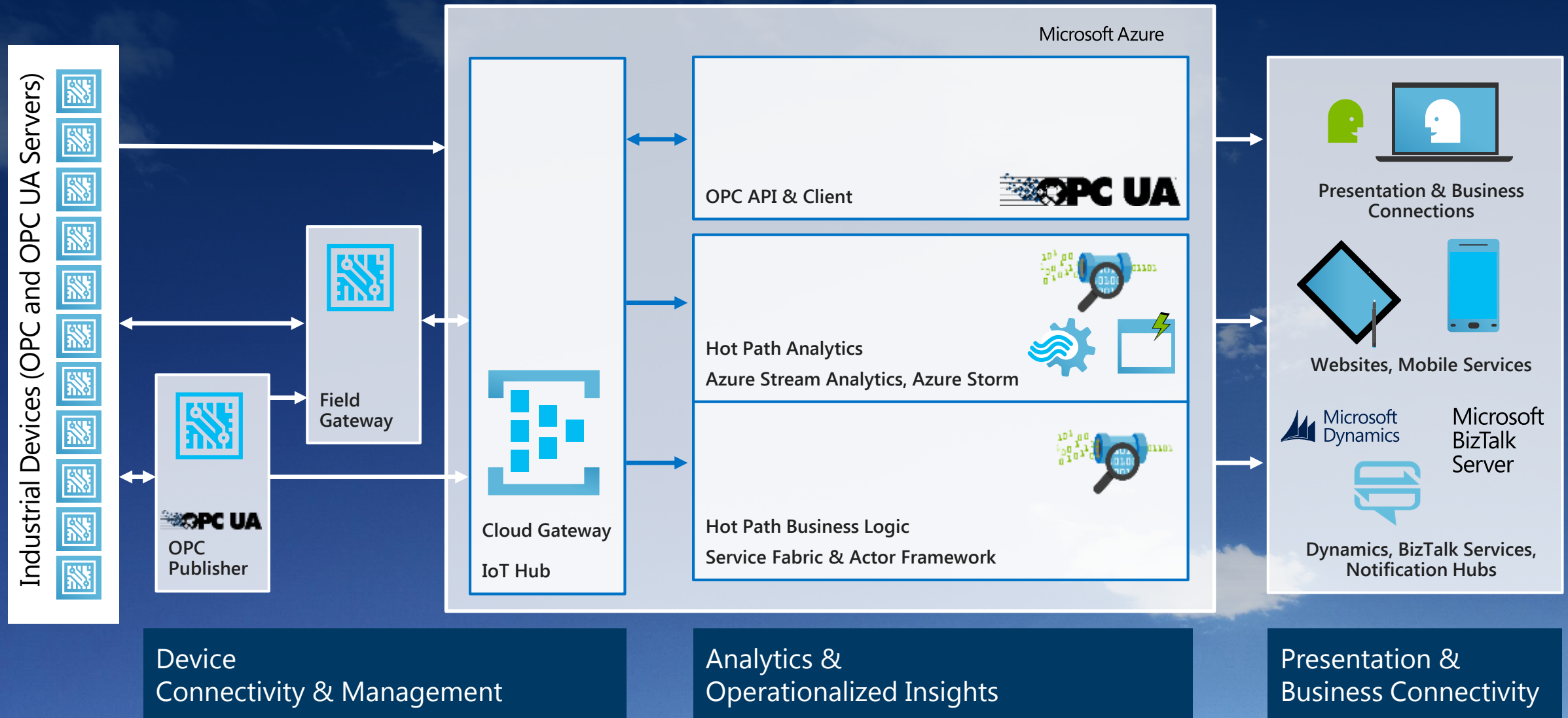


Azure IoT Suite

Microsoft is Bringing the Internet of Your Things to life

Producers / Consumer	Connect Devices	Storage	Analytics	Take Action
	 Event Hubs	 SQL Database	 Machine Learning	 Azure Websites
	 Service Bus	 Table/Blob Storage	 Stream Analytics	 Power BI
	 External Data Sources	 DocumentDB	 HDInsight	 Notification Hubs
		 External Data Sources	 Data Factory	 Mobile Services
				 BizTalk Services

OPC UA Integration into Azure IoT Suite



Digital Transformation Customer Outcomes

Microsoft is focused on empowering every individual and every organization to achieve more through Digital Transformation.



Engage your customers

Building better, stronger engagements by harnessing data representing a complete view of your customer, then drawing actionable intelligence, predictive insights that can deliver personalization at scale.



Empower your employees

Empowering employees with tools that fuel collaboration and productivity, while mitigating the risks that come with providing freedom and space to employees.



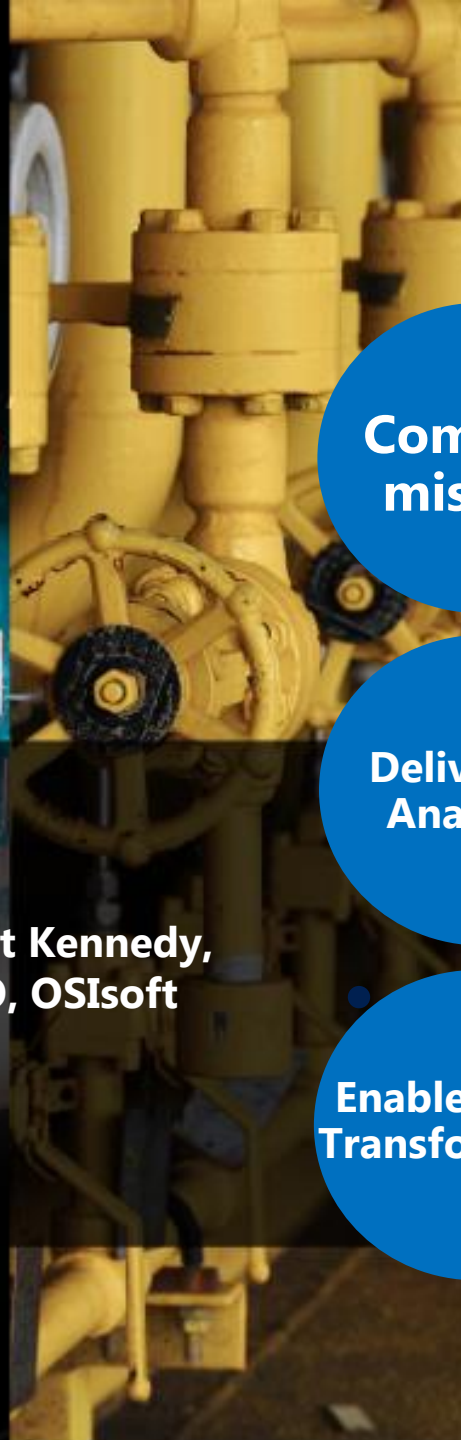
Optimize your operations

Optimizing operations to reshape customer relationships and service models by gathering data across a wide, dispersed set of endpoints, and drawing insights through advanced analytics that can be used to introduce improvements on a continuous, real time basis.



Transform your products

Reinventing products, services and business models using digital content to capitalize on emerging revenue opportunities.



Common mission

Deliver IoT Analytics

Enable Digital Transformation



**Dr. Pat Kennedy,
CEO, OSIsoft**

Data Infrastructure for Digital Transformation



"A digital transformation is remaking companies and their factories, **bringing the intersection of manufacturing and technology even closer**"*

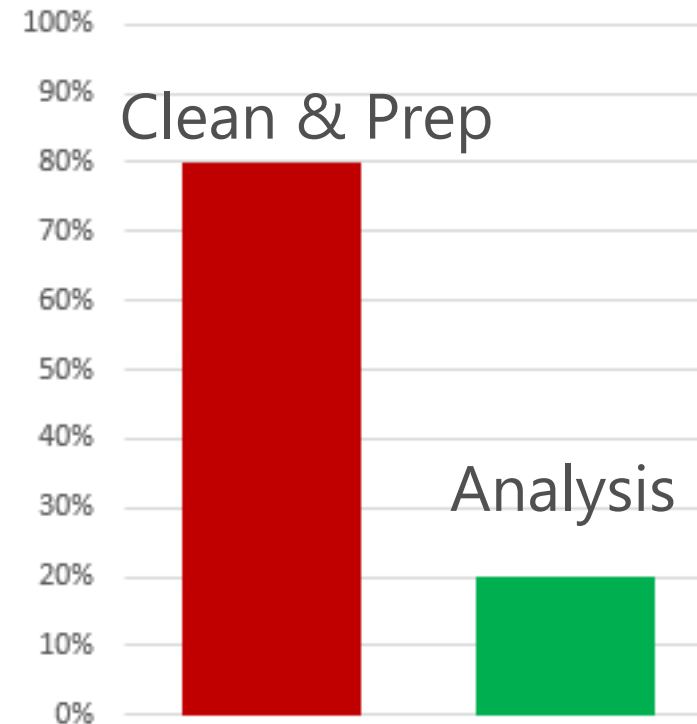
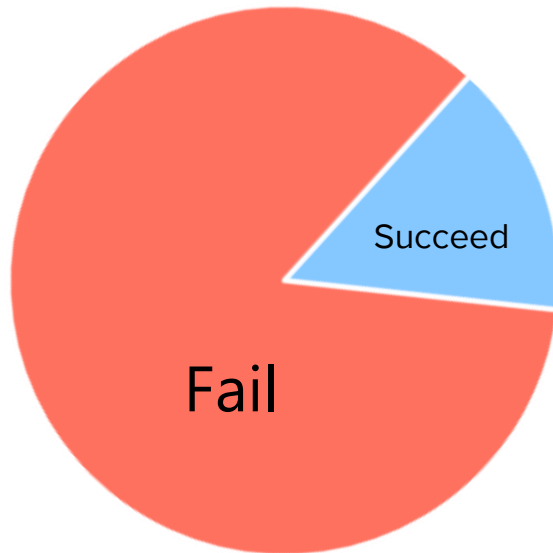


Satya Nadella CEO, Microsoft

IoT Analytics: Sound attractive... but there are challenges

64% of large enterprises plan to implement a big data project.

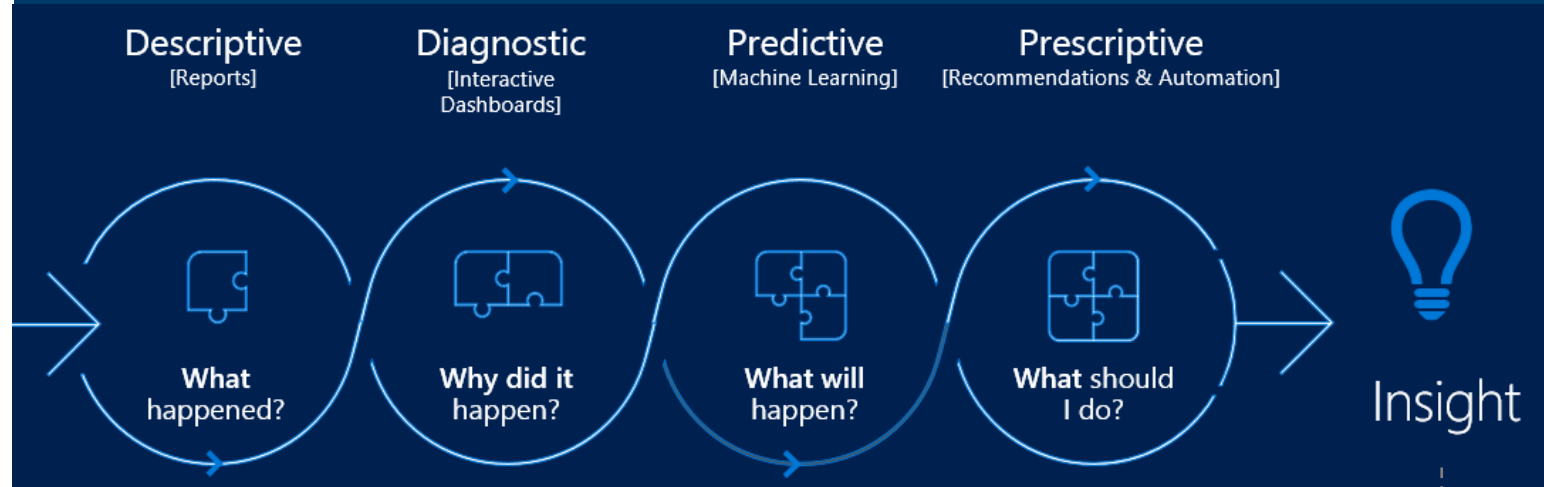
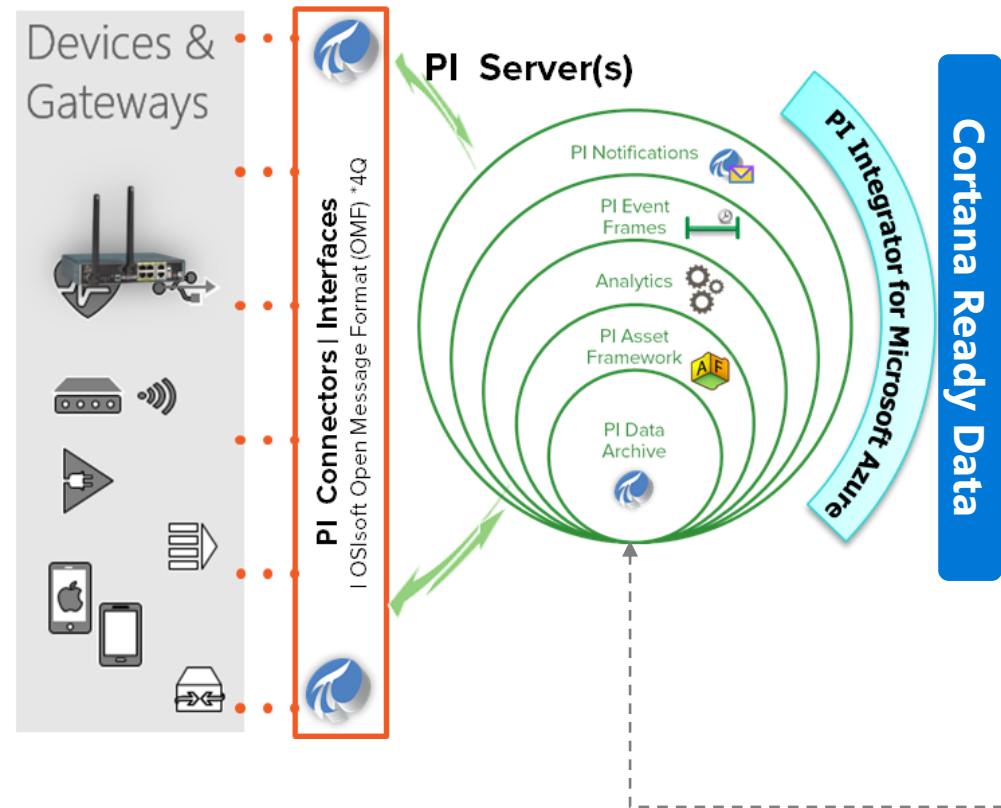
85% will be unsuccessful.



Data cleansing and preparation tasks can take **50-80%** of the development time and funds.

PI Integrator for Microsoft Azure

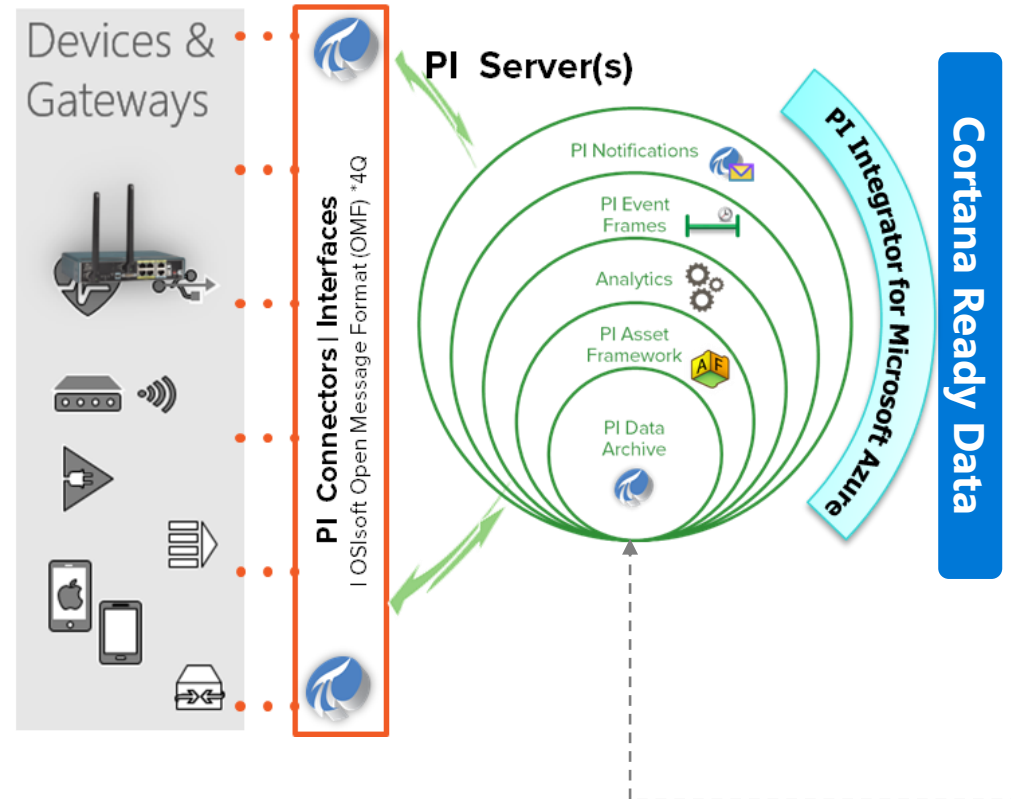
From data to decisions and actions



Insight / Predictions as Future Data (to PI 2015)

PI Integrator for Microsoft Azure

Cortana Intelligence

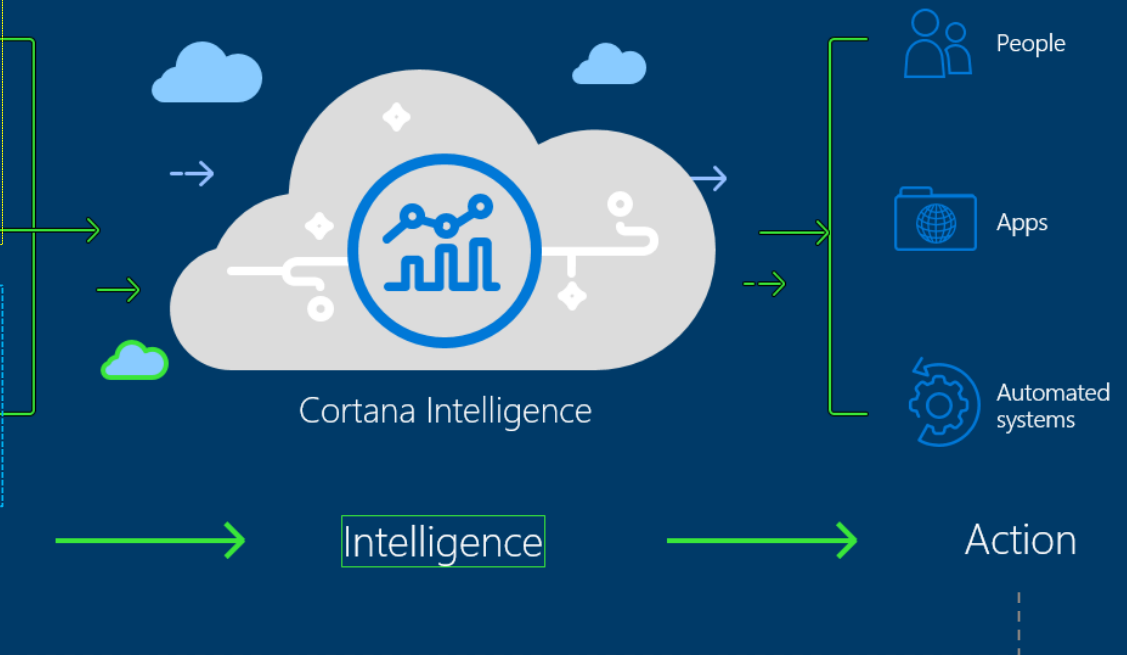


**Now: Production Ready
Release: Nov 2016**

- Azure SQL Data Warehouse
- Azure Data Lake store

**Now: Technology Preview
Release: 1H 2017**

- Event Hub
- Stream Analytics



Insight / Predictions as Future Data (to PI 2015)

video

1010101 1001010 1101001100101

Analytics & Business Intelligence Partner Airlift

Deschutes Brewery Case Study Video



0101 0100110011 1100

011011100 0101 0100110011

Leveraging the PI System and Cortana Intelligence to Increase Process Efficiency

COMPANY and GOAL

Deschutes Brewery is the 7th largest craft brewery in US, and wanted to maximize production with its existing infrastructure to fund construction of a 2nd brewery in Roanoke, VA



CHALLENGE

Batch's phase transition happens between manual density measurements occurring every 8-10 hours

- Impact: Losing up to 72 hours in production time

SOLUTION

Use data science to achieve accurate predictive analytics for determining a batch's density measurements

- PI System
- PI Integrator for Microsoft Azure
- SQL Data Warehouse
- Azure Machine Learning
- Azure Data Factory

RESULTS

Ability to eliminate production time losses and increase production capacity

- Accurate predictions of when a batch's phase transitions from fermentation to free rise

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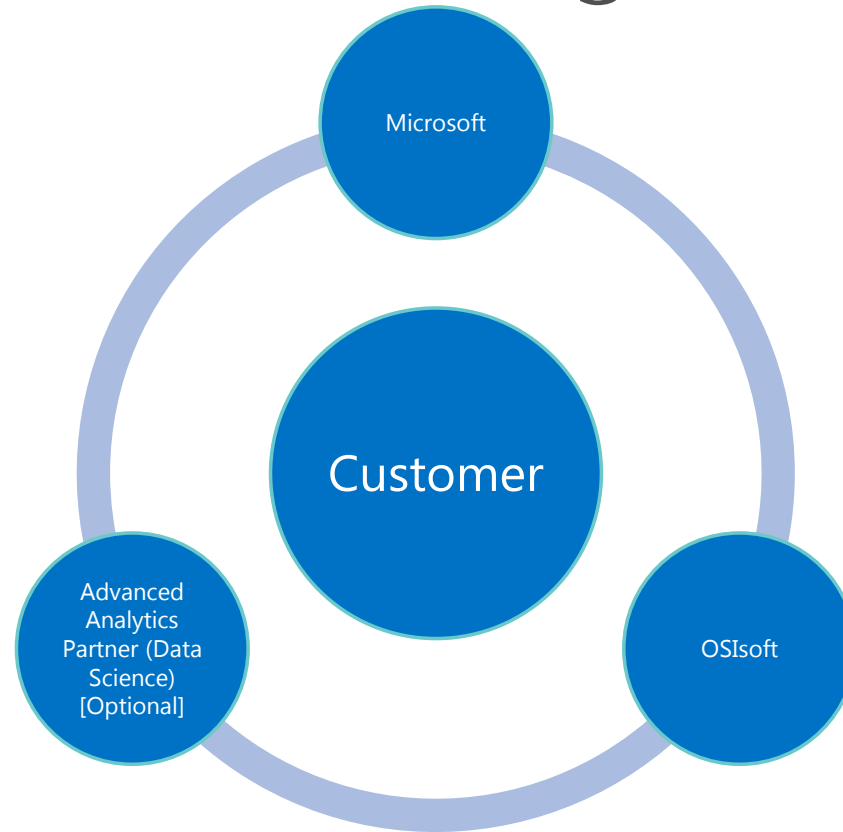
Analytics & Business Intelligence Partner Airlift

Red Carpet Incubation Program (RCIP)

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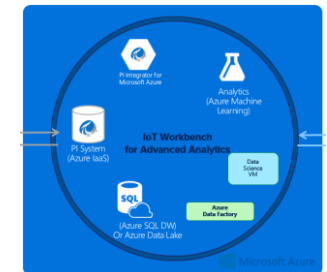
Red Carpet Incubation Program (RCIP)

The Red Carpet Incubation Program (RCIP) is a comprehensive collaboration between OSIsoft and Microsoft aimed at rapid operationalization of advanced analytics.



PI Integrator for Microsoft Azure (PII4MSA)

Red Carpet Incubation Program



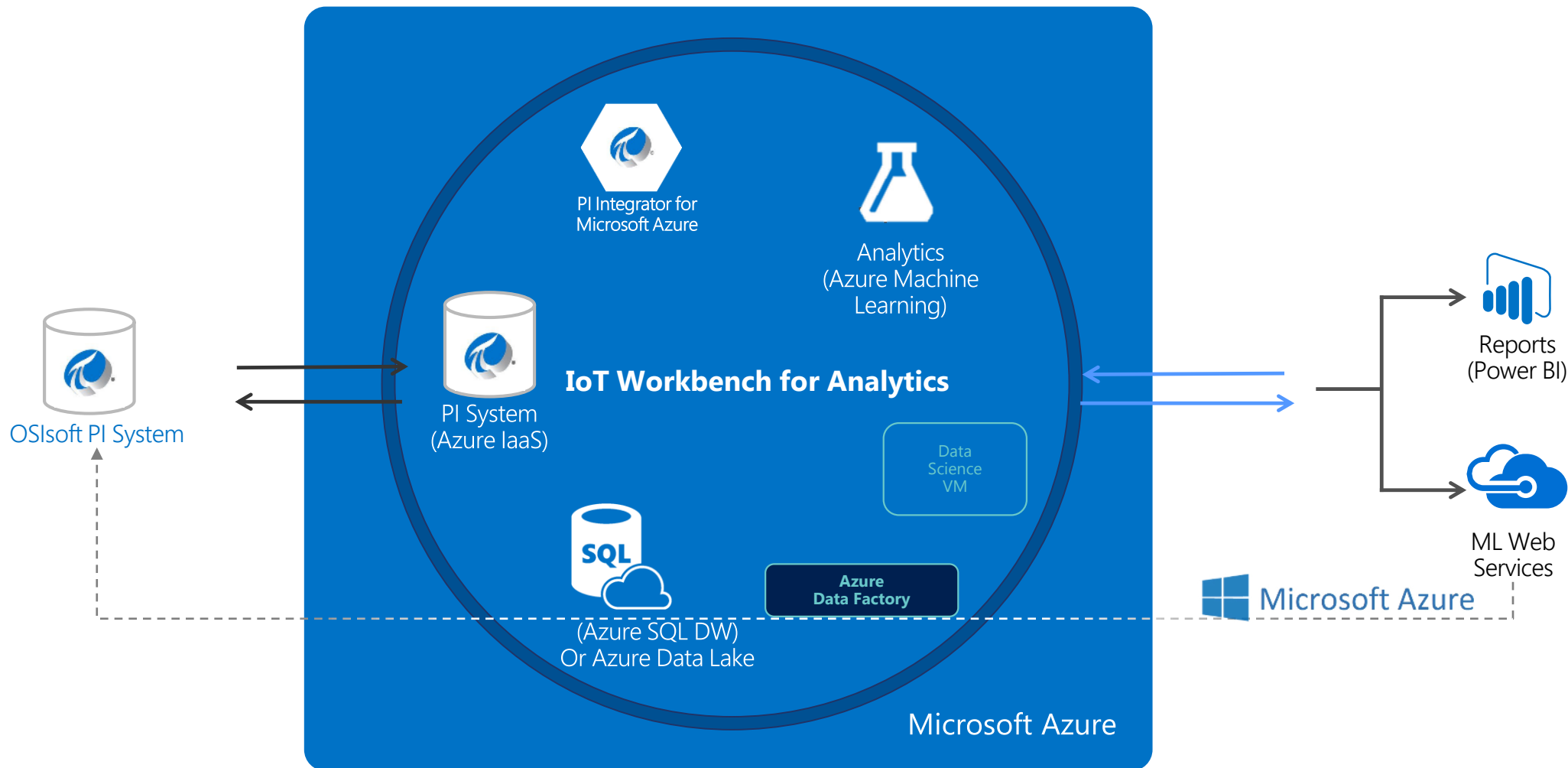
IoT Workbench for Advanced Analytics (Azure-based)

Red Carpet Incubation Program for Select Customers

 ArcelorMittal Integrated Steel & Mining	 Deschutes Brewery Craft Brewery	 Ciner Mining & Resources	 Henkel Multinational Consumer	 Toyota Automotive OEM	
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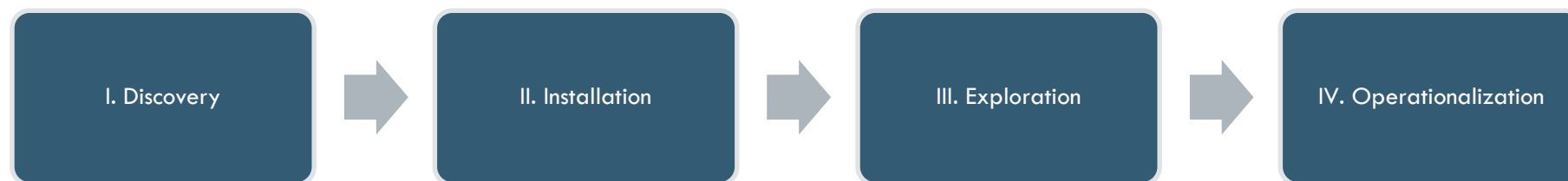
IoT Workbench for Analytics

Red Carpet Incubation Program (RCIP)
for PI Integrator for Microsoft Azure and Cortana Intelligence



Red Carpet Incubation Program (RCIP)

RCIP uses an agile advanced analytics incubation process to move customers through a four step process.



Looking for 2-3 Advanced Analytics Partners for Incubation with RCIP

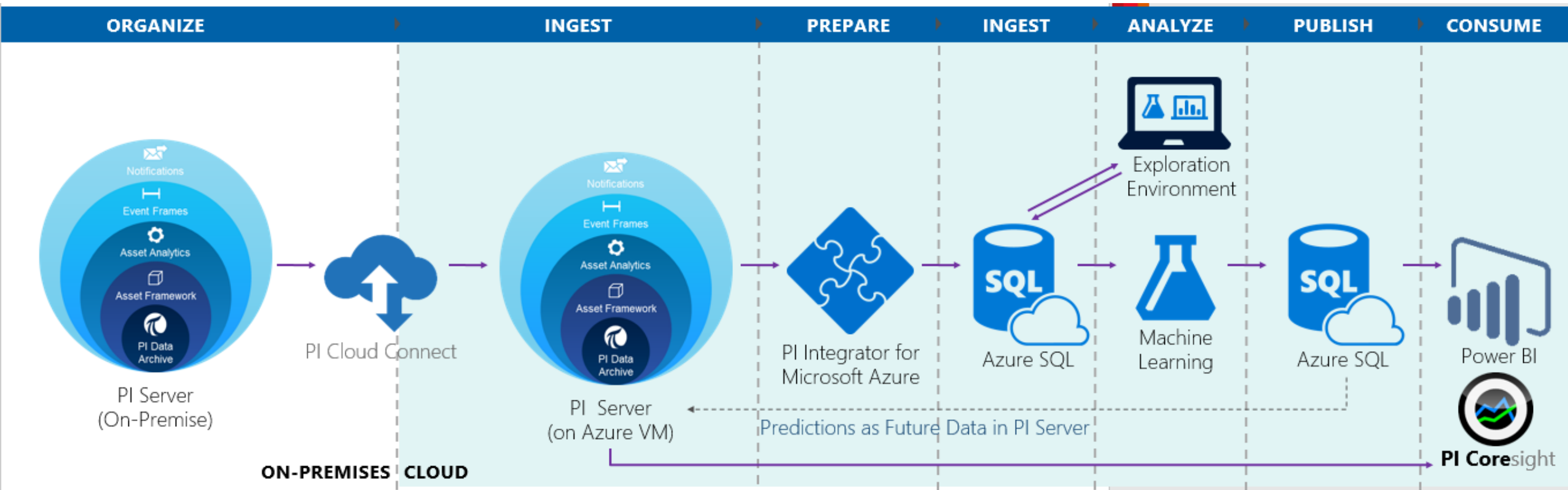
- *3-way MOU required. Cortana Intelligence Expertise. Cortana/ML Data Science Resources*
- *Manufacturing & Resources Practice. Willingness to work in a team, shorter RCIP timeframe. Agile and Ready to Incubate*

Open (3)

Open (3)

Open (3)

Hybrid Reference Architecture



Obrigado !



The challenge: real time identification, tracking and event detection

People

Vehicles

1.

*Specific
Actor/Object*



Facial recognition
(e.g., picture match,
against database)



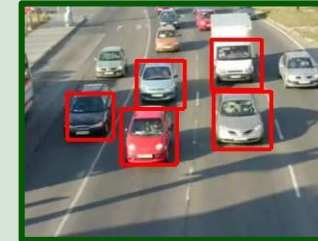
License plate
recognition
(e.g., against database)

2.

*General
Characteristics*



Attire recognition
(e.g., shirt, shoes, pants)



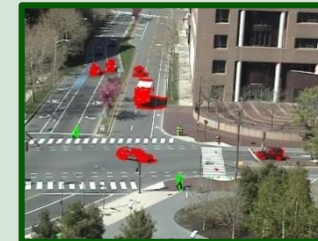
Type recognition
(e.g., model, color)

3.

*General
Behavior*



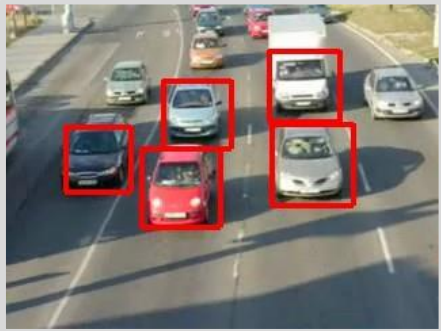
Behavior recognition
(e.g., running, fighting,
pointing gun, staggering)



Behavior recognition
(e.g., swerving, crash,
speeding, stopping)

What we have developed over the last 16 months

Vehicles



- Vehicle Tracking
- Type Classification (car/motorcycle/truck)
- Color Classification
- Speed Estimation
- Area-based Event Rules
- Traffic Congestion detection
- Anomalous Speed/Trajectory Detection

People

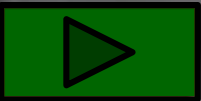


- Person Detection
- Face Recognition/ID (preliminary)
- Disguise Detection (preliminary)
- Age Classification
- Gender Classification
- Clothing Classification (preliminary)
- Abandoned Object Detection (preliminary)

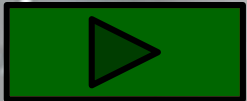
Three types of alerts already deployed to production



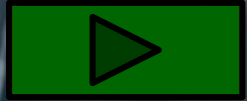
Vehicle on Shoulder



Stopped Motorcycle



Pedestrian on the Road



Additional alert type being deployed: helmet detection

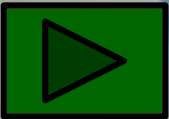


Works indoors as well



Corp Security Application: trespassing detection

- ✓ *Solution deployed by Beijing Corp Security*
- ✓ *Partnership with MSRA¹*
- ✓ *Detects the presence of people (but not cars) in forbidden or unexpected locations*



¹ We both leveraged MSRA technology (HumanSDK), as well as partnered with MSRA to deploy the real-time solution in Beijing

Our VA system is running in real time on Azure

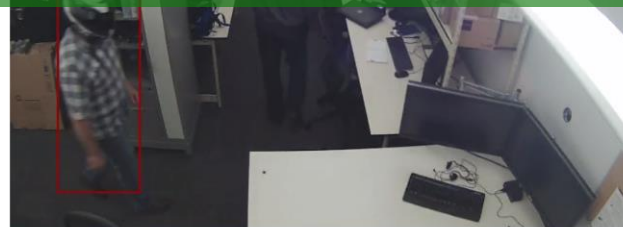
- ✓ *Developed and tested in partnership with MSRA and Microsoft Corporate Security*
- ✓ *Running in realtime completely in Azure*

✓ *Multiple additional live video streams and security alerts can be added*

```
Boot Time: 7/5/2016 8:10 PM
CPU: 100%
Default Gateway: 10.107.55.10
DHCP Server: 168.63.129.16
DNS Server: 168.63.129.16
Free Space: 216.34 GB NTFS
Host Name: TESTVNET
IE Version: 11.0.9600.18350
IP Address: 10.107.55.52
Logon Domain: TESTVNET
Logon Server: TESTVNET
MAC Address: 00-0D-3A-91-87-D7
Machine Domain: WORKGROUP
Memory: 3584 MB
Network Card: Microsoft Hyper-V Network Adapter
Network Speed: 4 Gb/s
Network Type: Ethernet
OS Version: Windows 2012 R2
Service Pack: No service pack
Snapshot Time: 7/14/2016 2:32 PM
Subnet Mask: 255.255.255.240
System Type: Server, Stand-alone, Terminal Server, DataCenter
User Name: atuser
Volumes: C:\ 127.00 GB NTFS
D:\ 7.00 GB NTFS
```

*< US\$40/month
to monitor a
camera 24/7¹*

Alert: PERSON WITH HELMET
Helmet Detecion
on Azure



Alert: ABANDONED OBJECT
Abandoned
Object on Azure

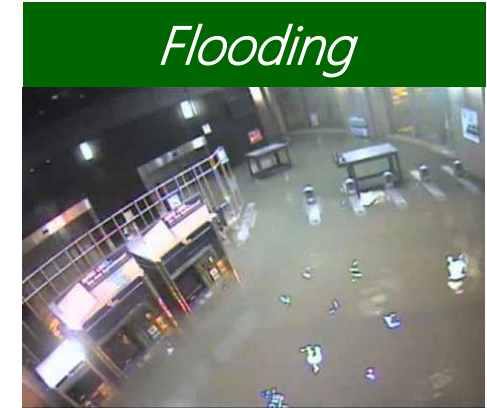


¹ Two or more cameras can run per F1 Azure node at current US\$83/month commercial pricing. We expect to be able to optimize code further

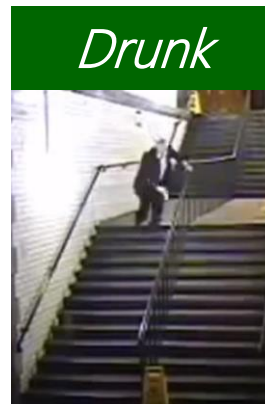
Some complex situations that we want to recognize automatically

ILLUSTRATIVE – NOT EXHAUSTIVE

State/Object Recognition – could be recognized from a single frame

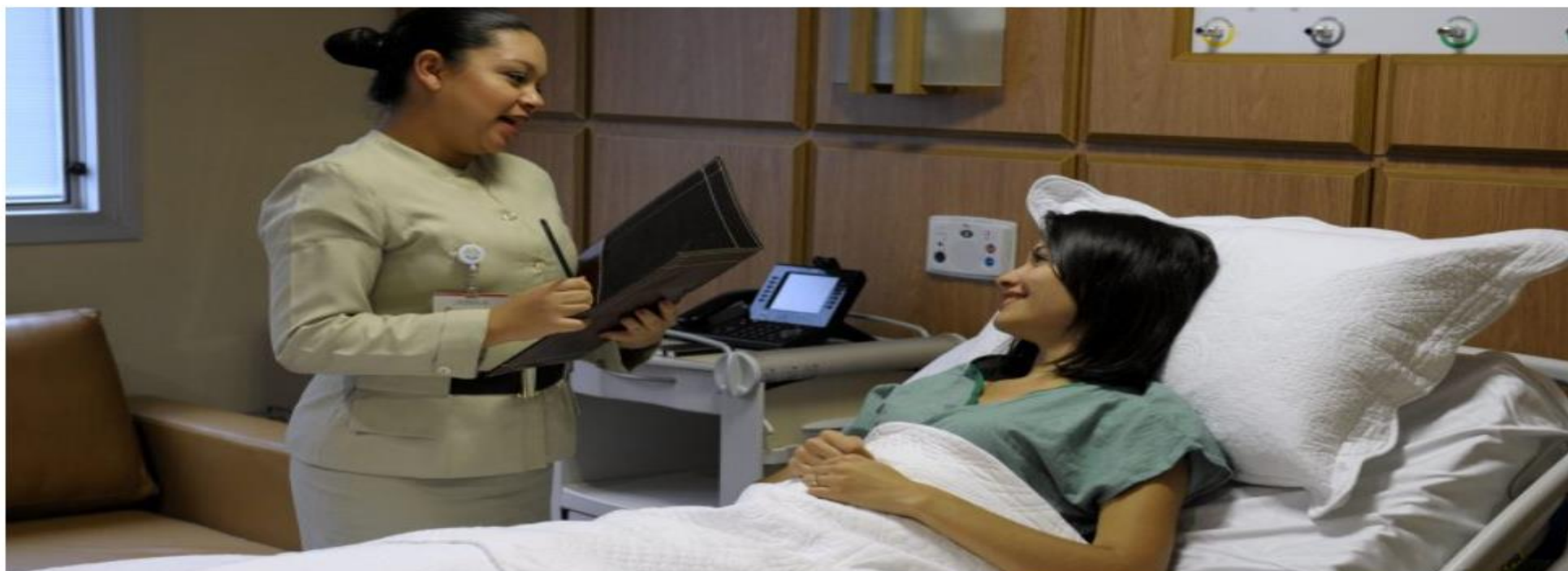


Action Recognition – recognized using temporal (multi-frame) information



Video Analytics

Microsoft faz parceria com Hospital 9 de Julho para implementar tecnologia na saúde



Posted 25 October , 2016 By Microsoft News Center Brasil



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São Paulo, 25 de outubro de 2016 – Toni Townes-Whitley, Vice-Presidente de Setor Público Global da Microsoft, participou hoje com Paula Bellizia, Presidente da Microsoft Brasil, e Paulo Cury, Presidente da Rede Ímpar, da assinatura de um Memorando de Entendimento para o desenvolvimento de tecnologia em parceria com o Hospital 9 de Julho.