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DATA SKILLS UNDERSTANDING THE WORLD

Bi Factory DATA KNOWLEDGE ADVISOR

iSolutions SOFTWARE ENGINEERING

ETLOG SOFTWARE SOLUTIONS LOGISTICS

CREDEM CREDEMTEL

packt

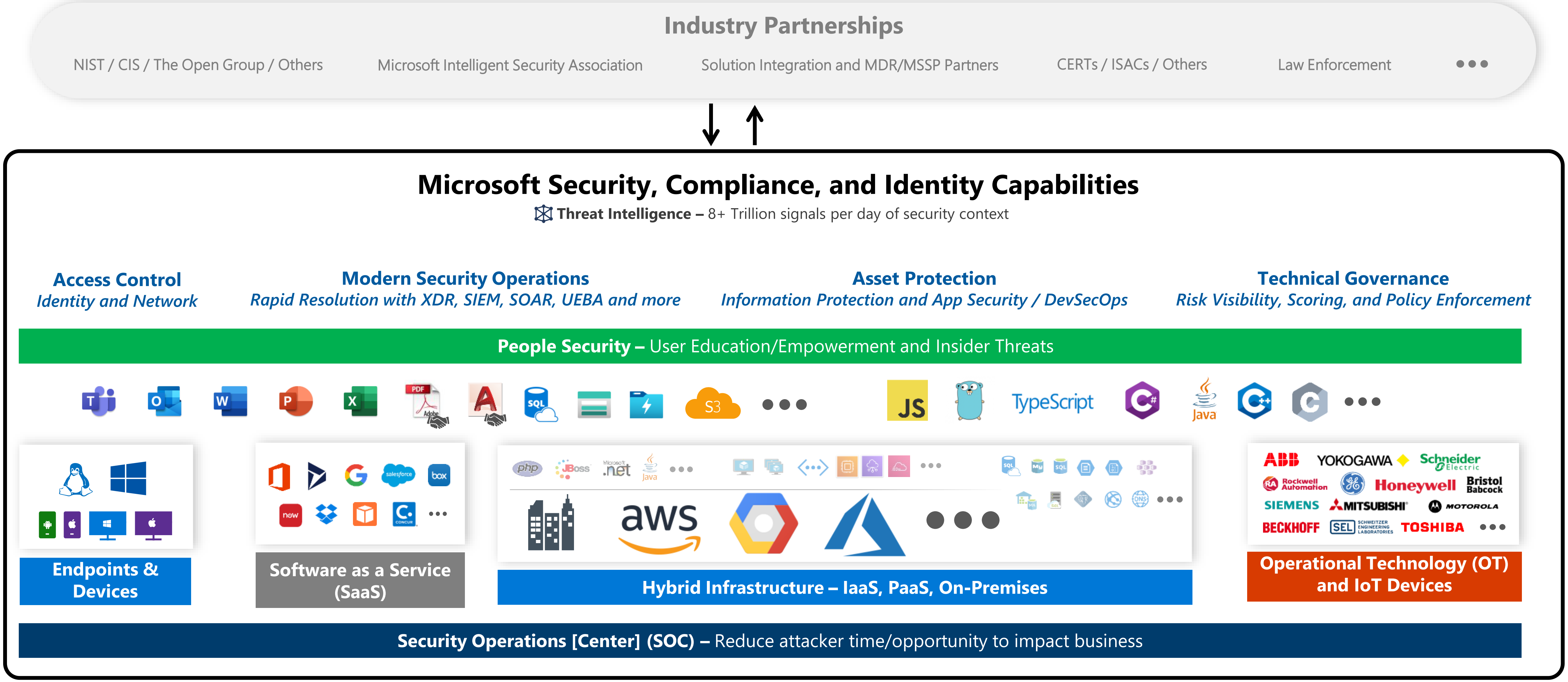
LOBRA A CULTURE OF INNOVATION EXCELLENCE

QUANTUMDATIS

Design and architect your Secure IoT system and infrastructure

Comprehensive Security, Compliance, and Identity

Cross-cloud and cross-platform capabilities that integrates with your existing solutions



Industry Partnerships

NIST / CIS / The Open Group / Others

Microsoft Intelligent Security Association

Solution Integration and MDR/MSSP Partners

CERTs / ISACs / Others

Law Enforcement

•••

Microsoft Security, Compliance, and Identity Capabilities

Threat Intelligence – 8+ Trillion signals per day of security context

Access Control
Identity and Network

Modern Security Operations
Rapid Resolution with XDR, SIEM, SOAR, UEBA and more

Asset Protection
Information Protection and App Security / DevSecOps

Technical Governance
Risk Visibility, Scoring, and Policy Enforcement

People Security – User Education/Empowerment and Insider Threats

Endpoints & Devices

Software as a Service (SaaS)

Hybrid Infrastructure – IaaS, PaaS, On-Premises

Operational Technology (OT) and IoT Devices

Security Operations [Center] (SOC) – Reduce attacker time/opportunity to impact business

November 2020 – https://aka.ms/MCRA

IoT attacks put businesses at risk

Devices bricked or held for ransom

Devices are used for malicious purposes

Data & IP theft

Data polluted & compromised

Devices used to attack networks

IoT attacks put businesses at risk

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The cost of IoT Attacks

Stolen IP & other highly valuable data

Compromised regulatory status or certifications

Brand impact (loss of trust)

Recovery costs

Financial and legal responsibility

Downtime

Security forensics

Microsoft Zero Trust Principles

Guidance for technical architecture

Verify explicitly

Always validate all available data points including

- User identity and location
- Device health
- Service or workload context
- Data classification
- Anomalies

Use least privilege access

To help secure both data and productivity, limit user access using

- Just-in-**time** (JIT)
- Just-**enough**-access (JEA)
- Risk-based **adaptive** polices
- Data protection against **out of band** vectors

Assume breach

Minimize blast radius for breaches and prevent lateral movement by

- **Segmenting access** by network, user, devices, and app awareness.
- **Encrypting** all sessions end to end.
- **Use analytics** for threat detection, posture visibility and improving defenses

Zero Trust

Strategy to increase security assurances

- **for business assets** data and applications
- **everywhere** including public & untrusted networks

Leads to

User Access

Policy Driven Access Architecture for **Productivity Environment**

1. Explicitly validate trust of access requests
2. Dynamically address insufficient trust

Modern SecOps

Pervasive detection and response

1. Deep asset visibility inside & outside the firewall
2. Rapid remediation with automation and integrated workflows

OT and Datacenter

Monitor and segment assets by business risk

- Workload, App, API, and Device Security
- Operational Technology (OT) + Industrial Internet of Things (IIoT)

Increases security

Increases productivity

Key Zero Trust Initiatives

Prioritize greatest positive impact (often enabling and securing remote work)

User Access (Productivity Environment)

Increase and explicitly validate trust for

- User Accounts - Require Passwordless or MFA to access applications + apply threat intelligence and UEBA
- Devices - Require Device Integrity for Access (critically important step)

Increase security for accessing

- Apps - Modern apps + Legacy on-premises/IaaS apps by *modernizing VPN security* or going *beyond VPN* with App Proxy
- Data - Increased discovery and protection for sensitive data (CASB, CA Access Control, Azure Info Protection)

Governance to continuously monitor and reduce risk (including legacy protocols and applications)

Roll out to IT Admins first

- Targeted by Attackers
- High potential impact
- Provide technical feedback

Modernize Security Operations

- Streamline response to common attacks (Endpoint/Email/Identity)
- Reduce manual effort - using automated investigation/remediation, enforcing alert quality, and proactive threat hunting

OT and IoT Environments

- **Visibility** – Discover and classify assets with business critical, life safety, and operational/physical impact
- **Protection** – isolate assets from unneeded internet/production access with static and dynamic controls
- **Monitoring** – unify threat detection and response processes for OT, IT, and IoT assets

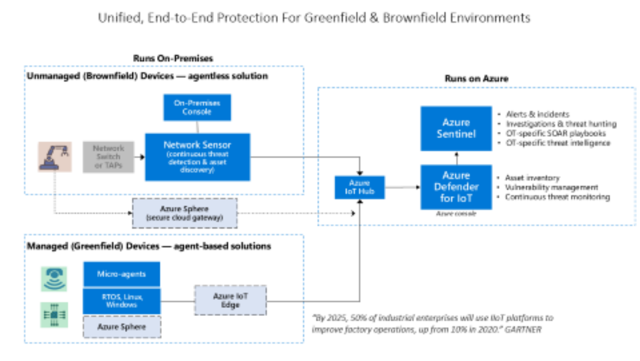
ZT is similar to Classic Security
Align to cloud migration schedule
or start after other ZT projects

Datacenter Security

- **Retire Legacy** - Retire or isolate legacy computing platforms (Unsupported OS/Applications)
- **Network Microsegmentation** - Additional network restrictions (dynamic trust-based and/or static rules)

Zero Trust Architectures

IoT + OT Architecture



Unified, End-to-End Protection For Greenfield & Brownfield Environments

Runs On-Premises
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Alerts & incidents
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OT-specific SOAR playbooks
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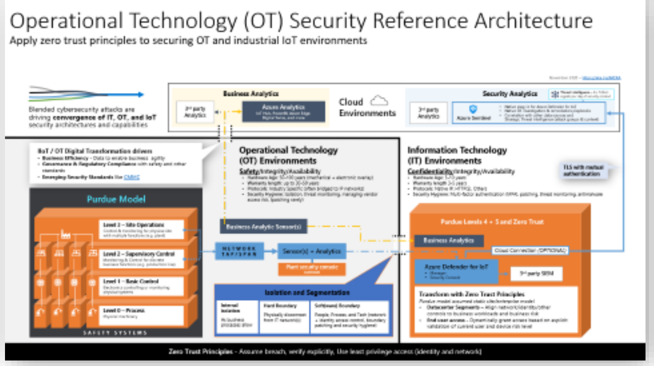
Azure console
Asset inventory
Vulnerability management
Continuous threat monitoring

"By 2025, 50% of industrial enterprises will use IIoT platforms to improve factory operations, up from 10% in 2020." GARTNER

OT Security



Operational Technology (OT) Security Reference Architecture

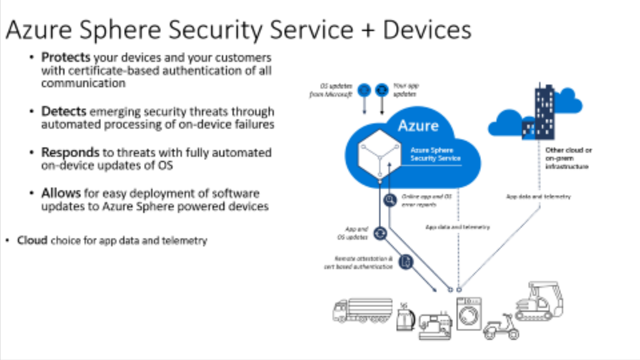
Apply zero trust principles to securing OT and industrial IoT environments

Blended cybersecurity attacks are driving convergence of IT, OT, and IoT security architectures and capabilities
Business Analytics
3rd party Analytics
Azure Analytics
Cloud Environments
Security Analytics
3rd party Analytics
Azure Sentinel
IIoT / OT Digital Transformation drivers
Business Efficiency
Governance & Regulatory Compliance
Emerging Security Standards like CMMC
Purdue Model
Level 3 – Site Operations
Level 2 – Supervisory Control
Level 1 – Basic Control
Level 0 – Process
SAFETY SYSTEMS
Operational Technology (OT) Environments
Safety/Integrity/Availability
Business Analytic Sensor(s)
NETWORK TAP/SPAN
Sensor(s) + Analytics
Plant security console
Isolation and Segmentation
Internal Isolation
Hard Boundary
Soft(ware) Boundary
Information Technology (IT) Environments
Confidentiality/Integrity/Availability
TLS with mutual authentication
Purdue Levels 4 + 5 and Zero Trust
Business Analytics
Cloud Connection (OPTIONAL)
Azure Defender for IoT
3rd party SIEM
Transform with Zero Trust Principles
Datacenter Segments
End user access

Zero Trust Principles - Assume breach, verify explicitly, Use least privilege access (identity and network)

Devices

Azure Sphere



Azure Sphere Security Service + Devices

- **Protects** your devices and your customers with certificate-based authentication of all communication
- **Detects** emerging security threats through automated processing of on-device failures
- **Responds** to threats with fully automated on-device updates of OS
- **Allows** for easy deployment of software updates to Azure Sphere powered devices

- **Cloud** choice for app data and telemetry

OS updates from Microsoft
Your app updates
Azure
Azure Sphere Security Service
Other cloud or on-prem infrastructure
Online app and OS error reports
App data and telemetry
App and OS updates
App data and telemetry
Remote attestation & cert based authentication

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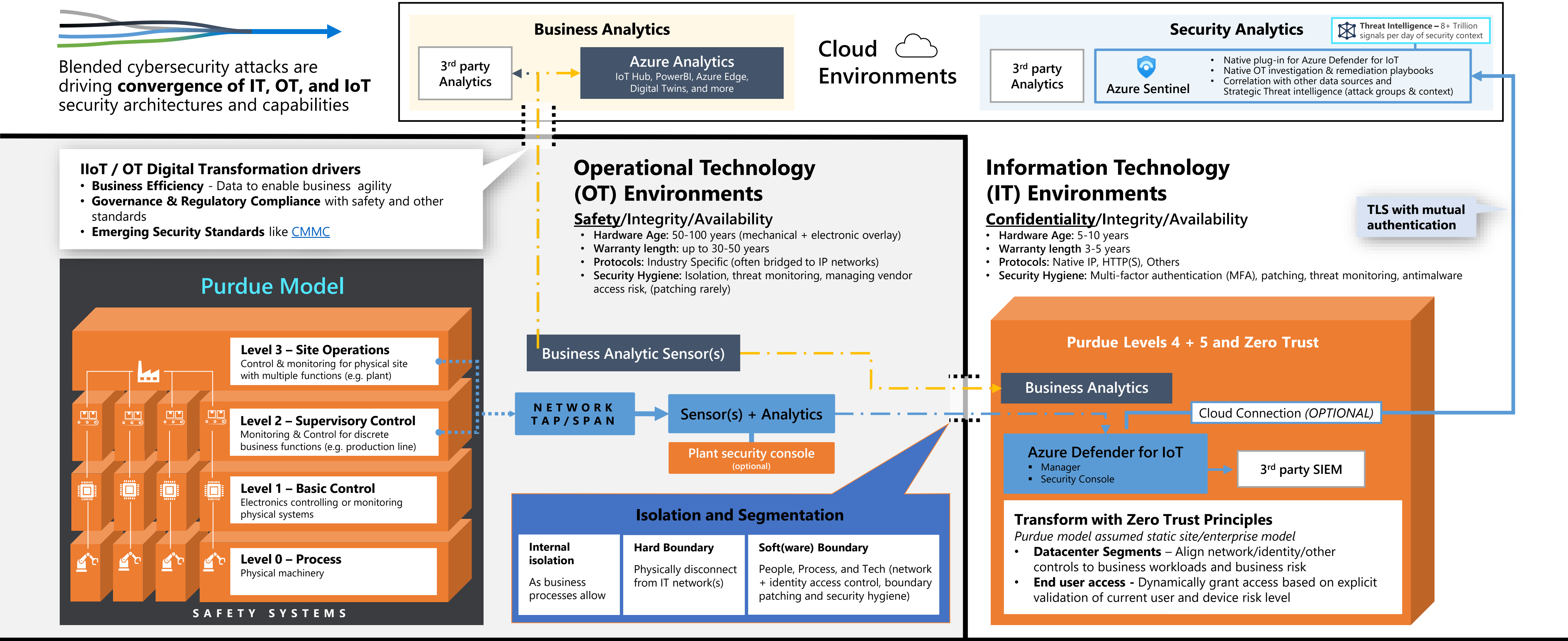


Blended cybersecurity attacks are driving **convergence of IT, OT, and IoT** security architectures and capabilities

IIoT / OT Digital Transformation drivers
- **Business Efficiency** - Data to enable business agility
- **Governance & Regulatory Compliance** with safety and other standards
- **Emerging Security Standards** like CMMC

Operational Technology (OT) Environments

Safety/Integrity/Availability
- **Hardware Age:** 50-100 years (mechanical + electronic overlay)
- **Warranty length:** up to 30-50 years
- **Protocols:** Industry Specific (often bridged to IP networks)
- **Security Hygiene:** Isolation, threat monitoring, managing vendor access risk, (patching rarely)

Information Technology (IT) Environments

Confidentiality/Integrity/Availability
- **Hardware Age:** 5-10 years
- **Warranty length** 3-5 years
- **Protocols:** Native IP, HTTP(S), Others
- **Security Hygiene:** Multi-factor authentication (MFA), patching, threat monitoring, antimalware

Transform with Zero Trust Principles

Purdue model assumed static site/enterprise model
- **Datacenter Segments** – Align network/identity/other controls to business workloads and business risk
- **End user access** - Dynamically grant access based on explicit validation of current user and device risk level

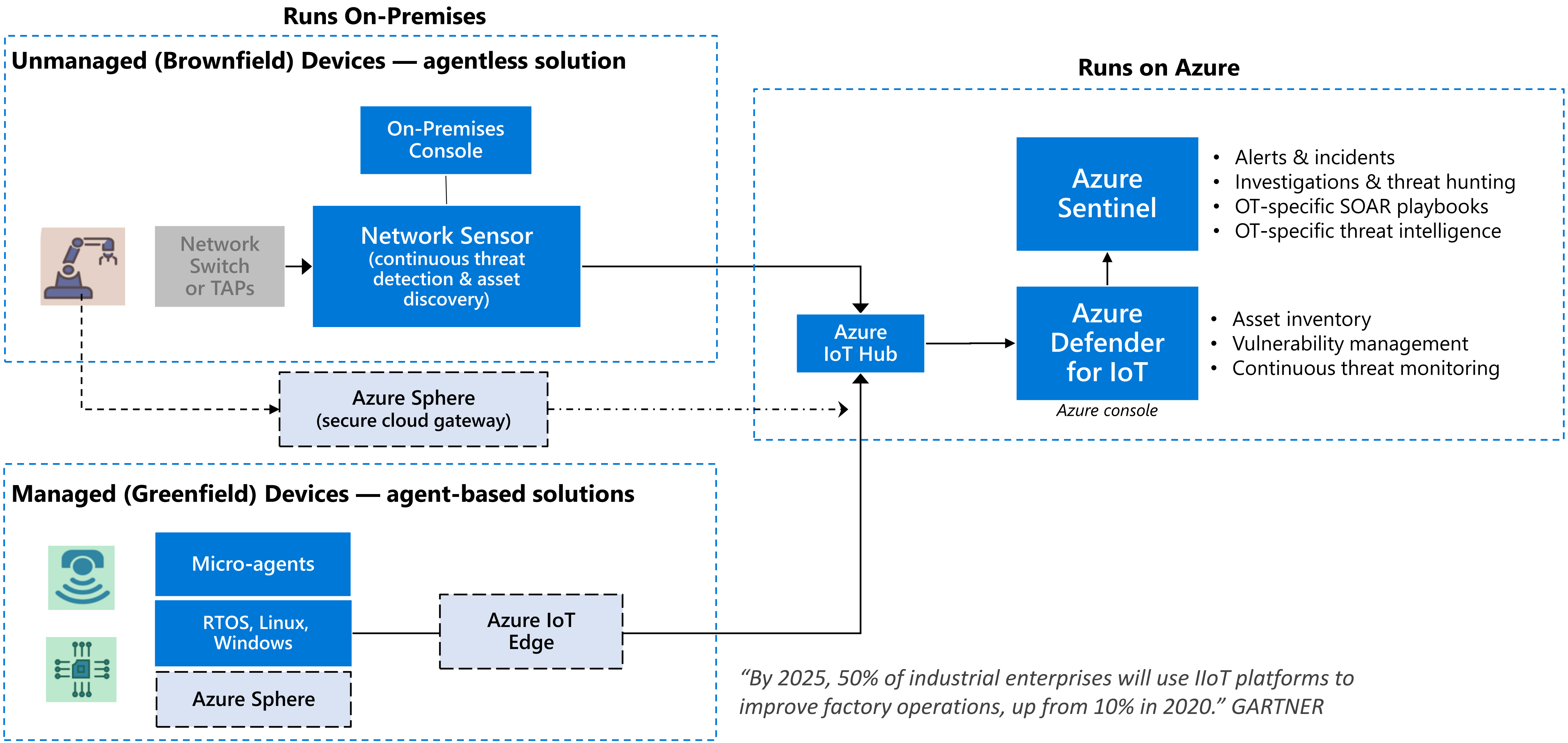
Isolation and Segmentation

Internal isolation	Hard Boundary	Soft(ware) Boundary
As business processes allow	Physically disconnect from IT network(s)	People, Process, and Tech (network + identity access control, boundary patching and security hygiene)

Business Analytics
3rd party Analytics
Azure Analytics
IoT Hub, PowerBI, Azure Edge, Digital Twins, and more
Cloud Environments
Security Analytics
Threat Intelligence – 8+ Trillion signals per day of security context
3rd party Analytics
Azure Sentinel
Native plug-in for Azure Defender for IoT
Native OT investigation & remediation playbooks
Correlation with other data sources and Strategic Threat intelligence (attack groups & context)
TLS with mutual authentication
Purdue Model
Level 3 – Site Operations
Control & monitoring for physical site with multiple functions (e.g. plant)
Level 2 – Supervisory Control
Monitoring & Control for discrete business functions (e.g. production line)
Level 1 – Basic Control
Electronics controlling or monitoring physical systems
Level 0 – Process
Physical machinery
SAFETY SYSTEMS
Business Analytic Sensor(s)
NETWORK TAP/SPAN
Sensor(s) + Analytics
Plant security console
(optional)
Purdue Levels 4 + 5 and Zero Trust
Business Analytics
Cloud Connection (OPTIONAL)
Azure Defender for IoT
Manager
Security Console
3rd party SIEM

Zero Trust Principles - Assume breach, verify explicitly, Use least privilege access (identity and network)

Unified, End-to-End Protection For Greenfield & Brownfield Environments



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Managed (Greenfield) Devices — agent-based solutions

Micro-agents

RTOS, Linux, Windows

Azure Sphere

Azure IoT Edge

Runs on Azure

Azure IoT Hub

Azure Sentinel

- Alerts & incidents
- Investigations & threat hunting
- OT-specific SOAR playbooks
- OT-specific threat intelligence

Azure Defender for IoT

- Asset inventory
- Vulnerability management
- Continuous threat monitoring

Azure console

“By 2025, 50% of industrial enterprises will use IIoT platforms to improve factory operations, up from 10% in 2020.” GARTNER

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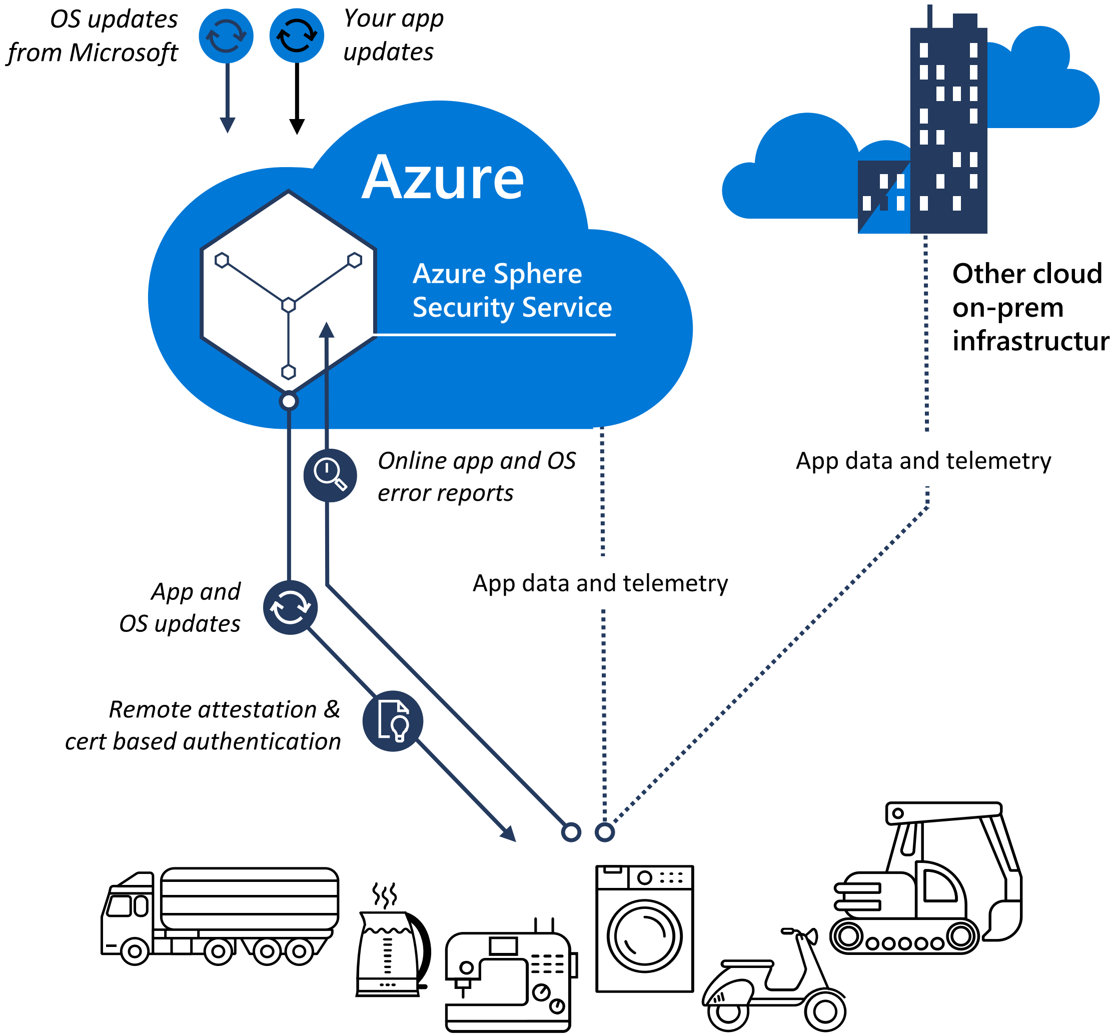

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Understanding when to use what

More suitable

Less suitable

Azure RTOS

Smart phones

Fitness trackers

Sensors

Consumer Electronics

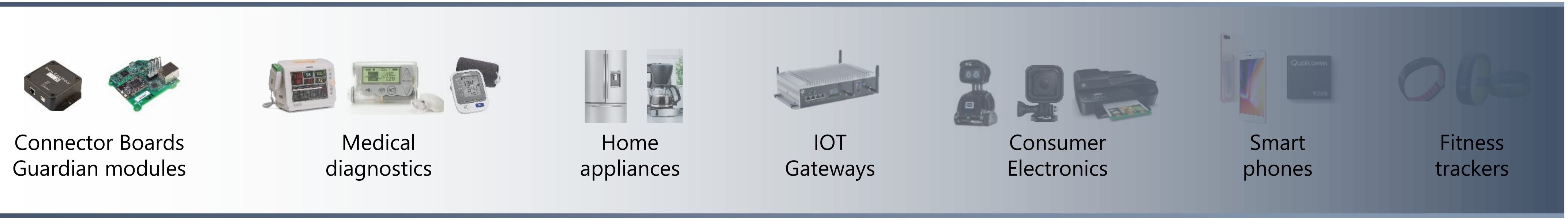
Thermostats, Smoke Alarms

Medical diagnostics

POS, Kiosks ATMs, Gas Pumps, Vending, Digital signage

PLC/Indus. Automation Embedded Servers

Azure Sphere


Connector Boards Guardian modules

Medical diagnostics

Home appliances

IOT Gateways

Consumer Electronics

Smart phones

Fitness trackers

Windows IoT

POS, Kiosks ATMs, Gas Pumps, Vending, Digital signage

HMIs, PLC/Indus. Automation Embedded Servers

MRI, Xray devices

Industrial Robots & gateways

Consumer Electronics

Smart phones

Fitness trackers

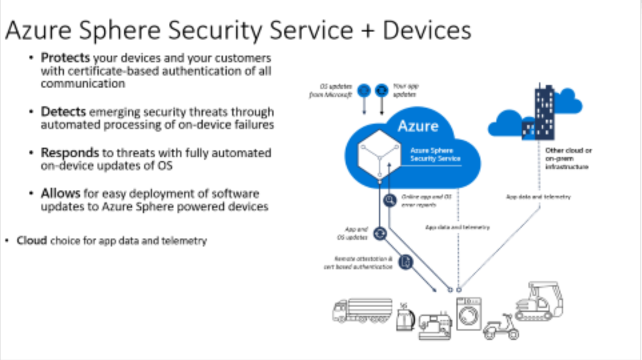
Sensors

How do I choose what operating system to use?

	Azure RTOS	Azure Sphere	Windows 10 IOT
What is it?	An embedded development suite that includes small, fast, reliable and easy-to-use RTOS capabilities for building embedded sensors, and devices – whether they are connected to the Internet or not.	A turnkey device security solution that is purpose-built to allow any developer to create a connected device that is highly secured by default in the everchanging cybersecurity threat landscape.	A member of the Windows 10 family that gives embedded devices a full OS and graphical user interface
When do I use it?	Billions of tiny, resource-constrained devices that require hard real-time processing	Secure IoT apps and devices with seven levels of security and the ability to support a secured root of trust in a smaller footprint.	Specific-use or dedicated devices that need a full Windows OS, complete with graphical user interface.

Zero Trust Architectures

Azure Sphere



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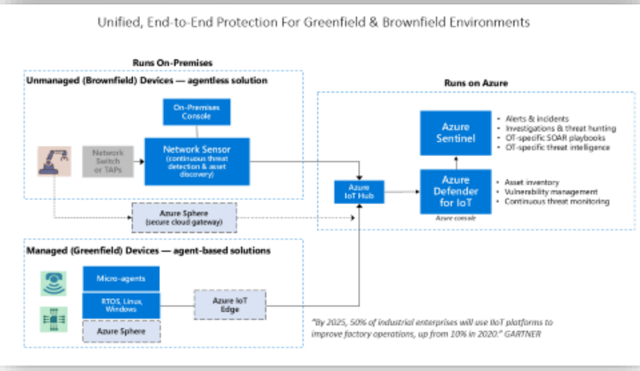
IIoT + OT Architecture



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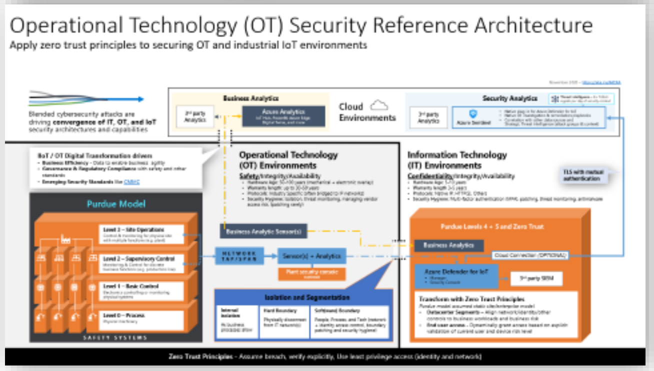
OT Security



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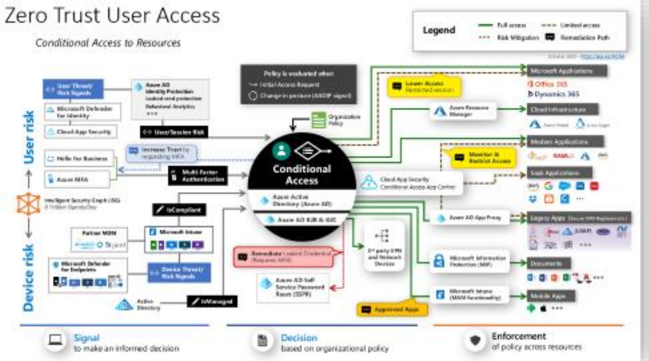
Zero Trust Principles - Assume breach, verify explicitly, Use least privilege access (identity and network)

Other Zero Trust Architectures

User Access and Productivity



Zero Trust User Access

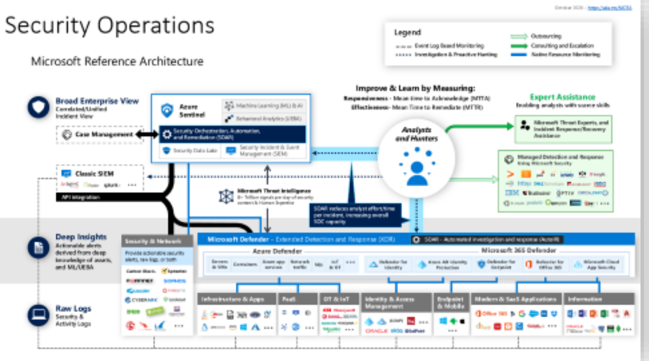
Conditional Access to Resources

Signal
to make an informed decision

Decision
based on organizational policy

Enforcement
of policy across resources

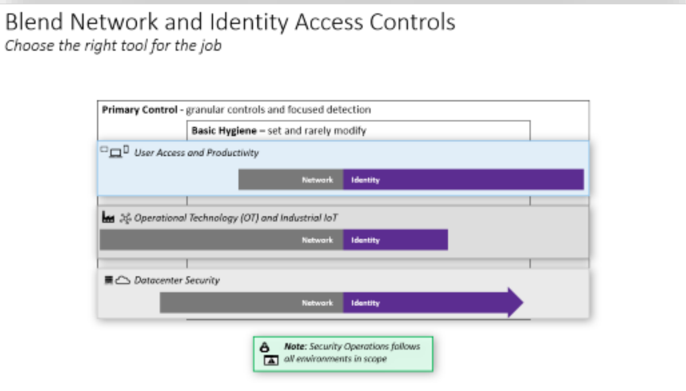
Modernize Security Operations



Security Operations

Microsoft Reference Architecture

Blend Access Controls



Blend Network and Identity Access Controls

Choose the right tool for the job

Primary Control - granular controls and focused detection
Basic Hygiene – set and rarely modify
User Access and Productivity
Network
Identity
Operational Technology (OT) and Industrial IoT
Network
Identity
Datacenter Security
Network
Identity

Note: *Security Operations follows all environments in scope*

Blend Network and Identity Access Controls

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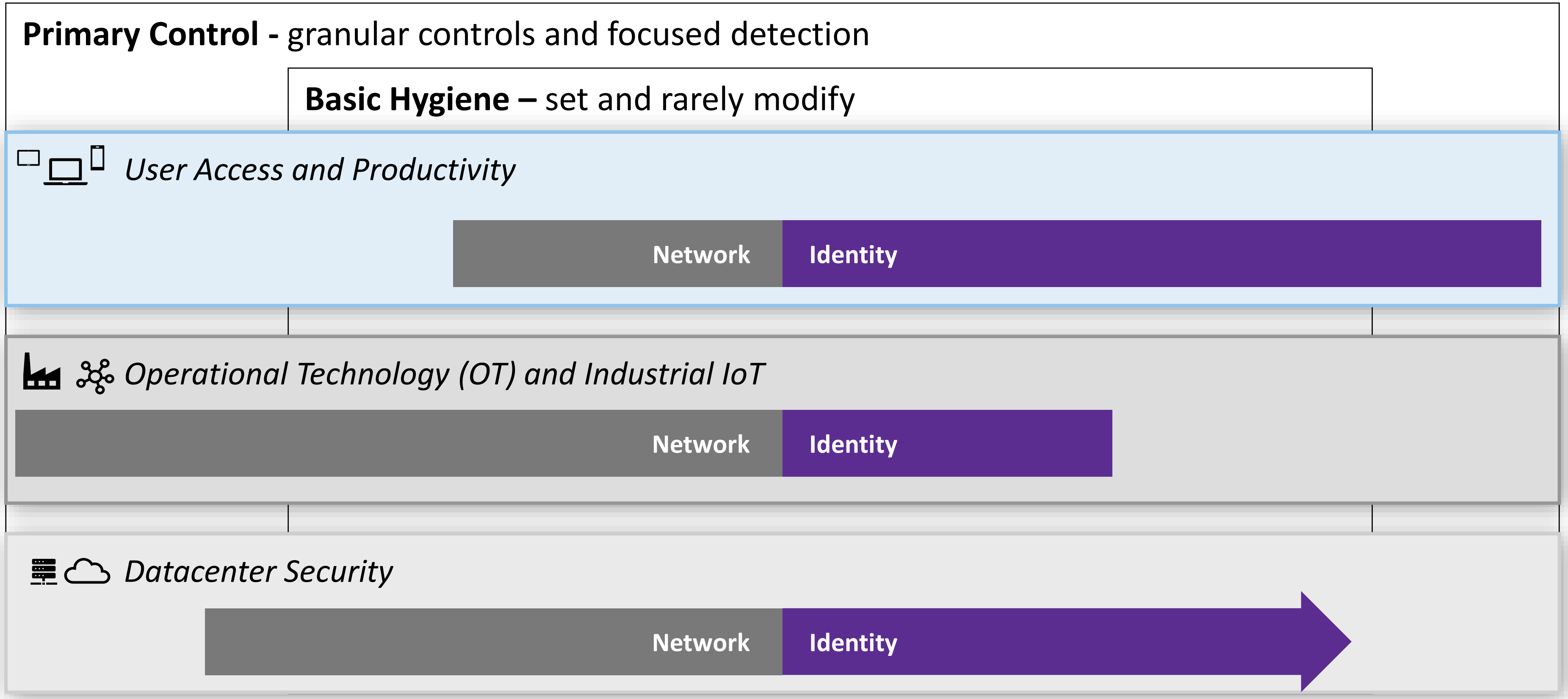

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Network | Identity

Operational Technology (OT) and Industrial IoT

Network | Identity

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Network | Identity

***Note:** Security Operations follows all environments in scope*

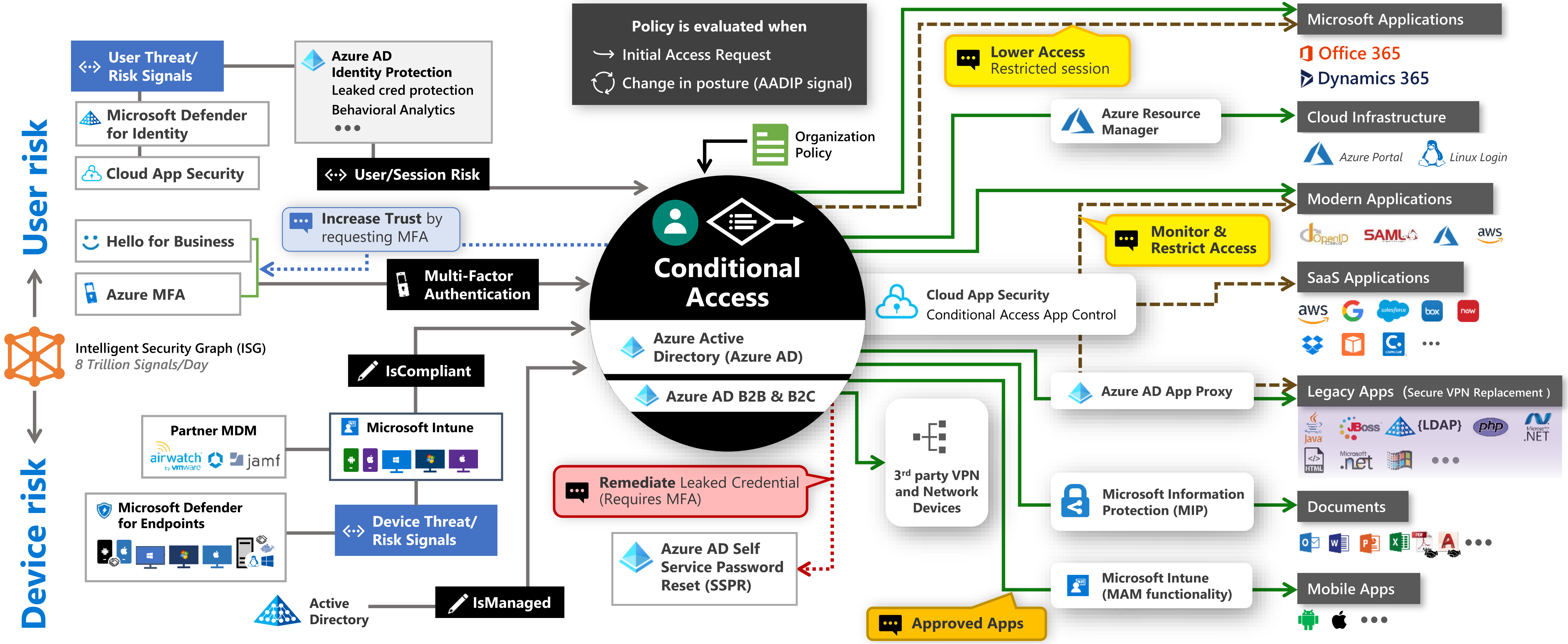
Zero Trust User Access

Conditional Access to Resources

Legend

- Full access
- Limited access
- Risk Mitigation
- Remediation Path

October 2020 – https://aka.ms/MCRA



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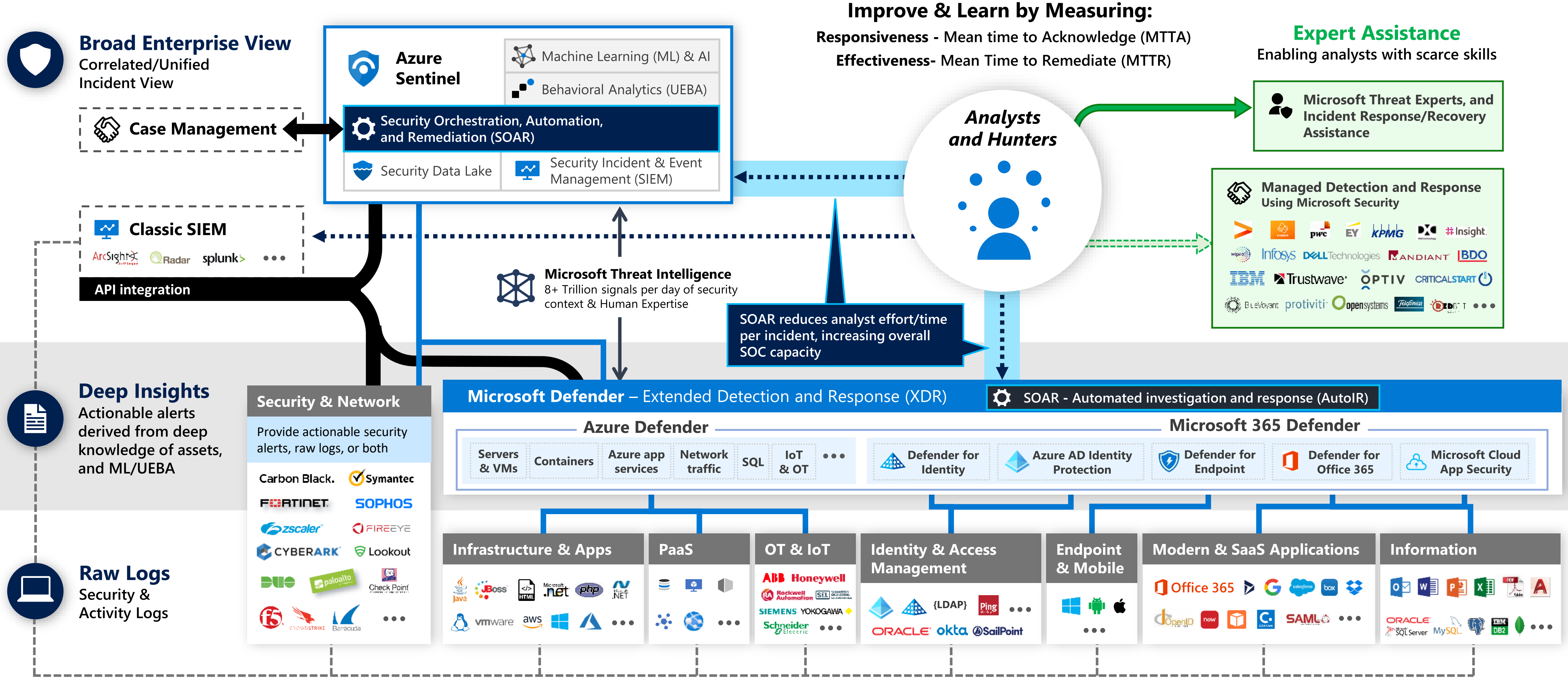
Security Operations

Microsoft Reference Architecture

Legend

- – – – Event Log Based Monitoring
- ▪▪▪▪ Investigation & Proactive Hunting
- ⇢ Outsourcing
- → Consulting and Escalation
- ▬ Native Resource Monitoring



Broad Enterprise View
Correlated/Unified Incident View

Case Management

Azure Sentinel
- Machine Learning (ML) & AI
- Behavioral Analytics (UEBA)
- Security Orchestration, Automation, and Remediation (SOAR)
- Security Data Lake
- Security Incident & Event Management (SIEM)

Classic SIEM

API integration

Microsoft Threat Intelligence
8+ Trillion signals per day of security context & Human Expertise

Improve & Learn by Measuring:
Responsiveness - Mean time to Acknowledge (MTTA)
Effectiveness- Mean Time to Remediate (MTTR)

Analysts and Hunters

SOAR reduces analyst effort/time per incident, increasing overall SOC capacity

Expert Assistance
Enabling analysts with scarce skills

Microsoft Threat Experts, and Incident Response/Recovery Assistance

Managed Detection and Response Using Microsoft Security

Deep Insights
Actionable alerts derived from deep knowledge of assets, and ML/UEBA

Security & Network
Provide actionable security alerts, raw logs, or both

Microsoft Defender – Extended Detection and Response (XDR)

SOAR - Automated investigation and response (AutoIR)

Azure Defender
- Servers & VMs
- Containers
- Azure app services
- Network traffic
- SQL
- IoT & OT
- •••

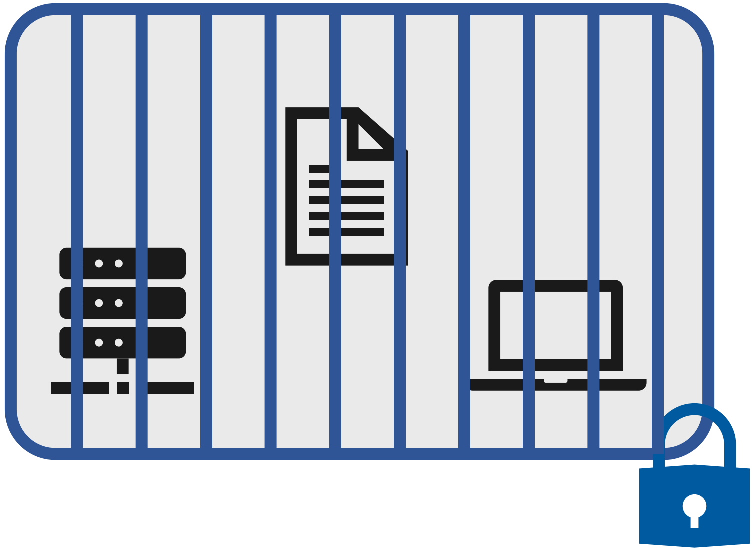
Microsoft 365 Defender
- Defender for Identity
- Azure AD Identity Protection
- Defender for Endpoint
- Defender for Office 365
- Microsoft Cloud App Security

Raw Logs
Security & Activity Logs

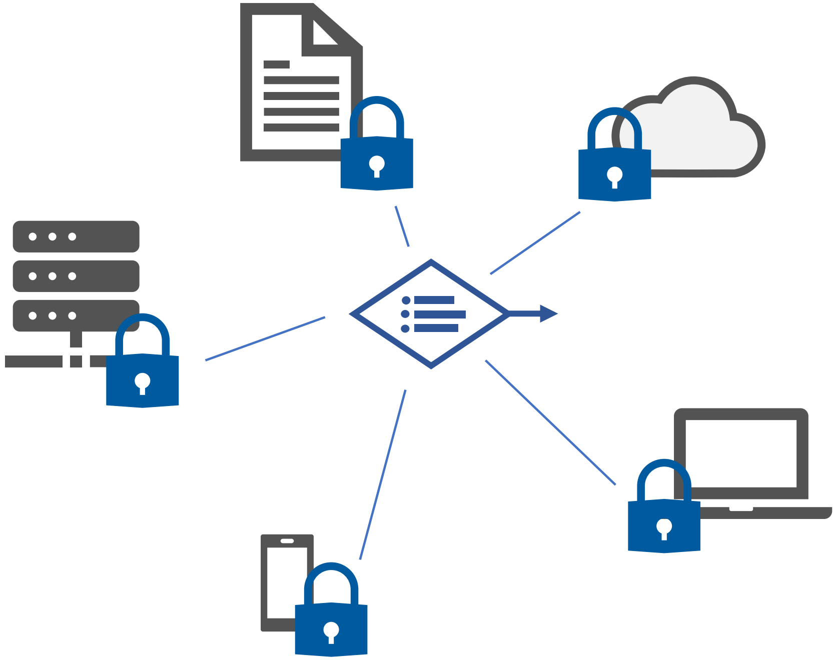
- Infrastructure & Apps
- PaaS
- OT & IoT
- Identity & Access Management
- Endpoint & Mobile
- Modern & SaaS Applications
- Information

Zero Trusts secures assets where they are

enabling secure freedom instead of locking them up in a "secure" network

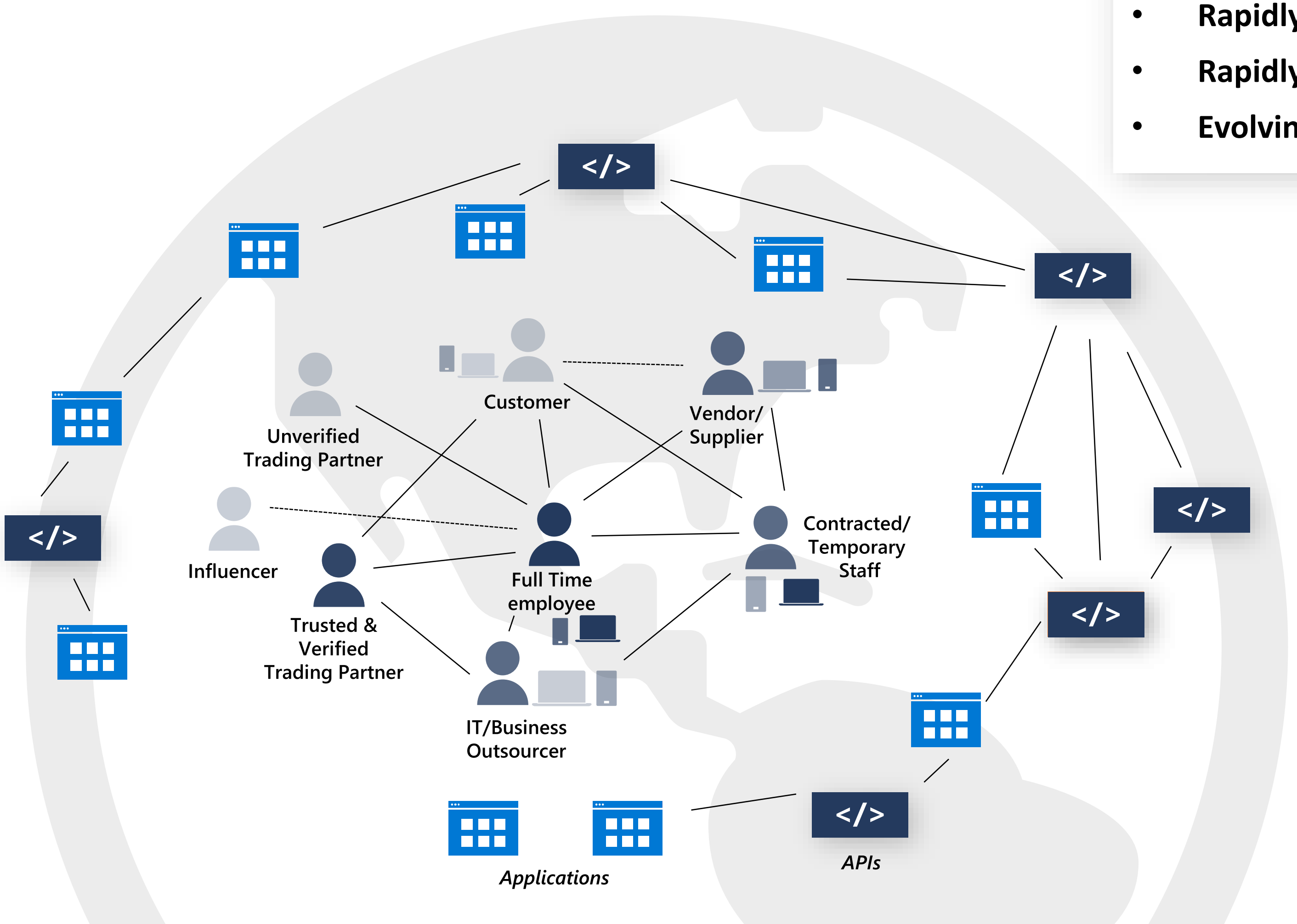


Classic Approach – Restrict everything to a 'secure' network



Zero Trust – Protect assets anywhere with central policy

The digitized world is interconnected and dynamic



Modern Work Use Cases

- **Normalization of remote work**
- **Rapidly evolving partnerships and competitors**
- **Rapidly changing communication patterns**
- **Evolving national interests and regulations**

Security Modernization Imperatives

- **Automated Policy Enforcement** - to address changing processes and models in an agile manner at minimum cost
- **Adaptive identity management** - to respond to rapidly changing roles, responsibilities and relationships
- **Data-centric and asset-centric approaches –** to
  - ***Better focus security resources*** by limiting the scope of what to protect (via trusted zones, tokenization, or similar approaches)
  - ***Better monitor assets and respond to threats*** regardless of network location.

Questions?

DATA SATURDAYS

Marco Dal Pino

Technical Consulting
Microsoft

- 30+ years in IT (Developer, Architect, Consultant, PM, Trainer)
- Speaker, Community addicted
- IoT Influencer

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	https://about.me/marcodalpino
	https://twitter.com/marcodalpino
✉	info@contoso.blog
	https://www.twitch.tv/dpcons

DATA SATURDAYS

Grazie!!!

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