

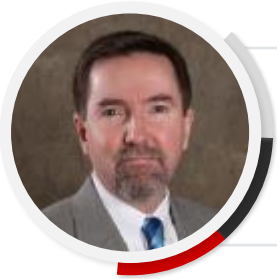
Integration in a Day: **Using Microsoft Azure**

Best practices integration for Manufacturing



Our **Hitachi Solutions** Team

Presenters joining us today:



Chuck Tichenor
VP Solution Principal



Kalyan Koppineedi
Senior Solution Architect



Kyri Miltiadous
Principal Software
Engineer



Russell Derouin
Azure Principal



Daniel Vigil
Director, Business
Development

Agenda

- 1** Content Overview and Intros (10 Minutes)
- 2** Why Azure?
- 3** Azure and Integration
- 4** Integration Patterns with Azure
- 5** Hands On: Integration use cases

Webinar Questions and Follow-up: We look forward to working with **you!**



Contact Us

Mark Nielson

Vice President of Sales, US Manufacturing



+1 973-630-9417



mneilson@hitachisolutions.com



[Mark Nielson | LinkedIn](#)

1

Introductions

Hitachi Solutions a Microsoft Partner

What's the purpose of the presentation?

1

Demonstrate Azure
Integration Services
features and benefits

2

Educate on the
Azure services that
can be used with
best practice
integration patterns

3

Demonstrate how
common integration
scenarios can be
implemented in
Azure

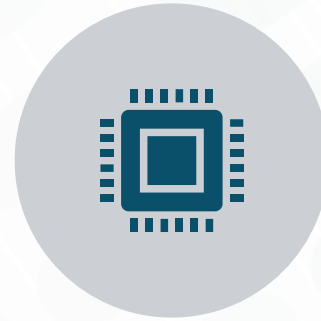
4

Educate how Azure
supports integration
platform capabilities

Who is the Intended Audience for the presentation?



IT decision makers who are evaluating integration platforms



Software Architects (i.e. solution, integration) evaluating solution designs and technology approaches



Enterprise Architects seeking to understand integration platform capabilities and their implementation



Integration Developers seeking best practice guidance on Azure Integration Services.

Introducing **Hitachi, Ltd.** and **Hitachi Solutions**

HITACHI
Inspire the Next

 **Hitachi Solutions**

Since 1910, **Hitachi, Ltd.** has been a leader in manufacturing innovative products and solutions that support industry and social infrastructure around the globe.



368,300+ Employees Globally



853 Companies (696 outside Japan)



100+ Countries

We are **Hitachi Solutions**.

Hitachi Solutions is a **global systems integrator** with leading capabilities in *Microsoft applications and technologies*. Through **advisory services, industry and technology expertise**, and **implementation excellence** our *skilled* professionals support and accelerate **our customers'** data and business system modernization initiatives, **end-to-end**.

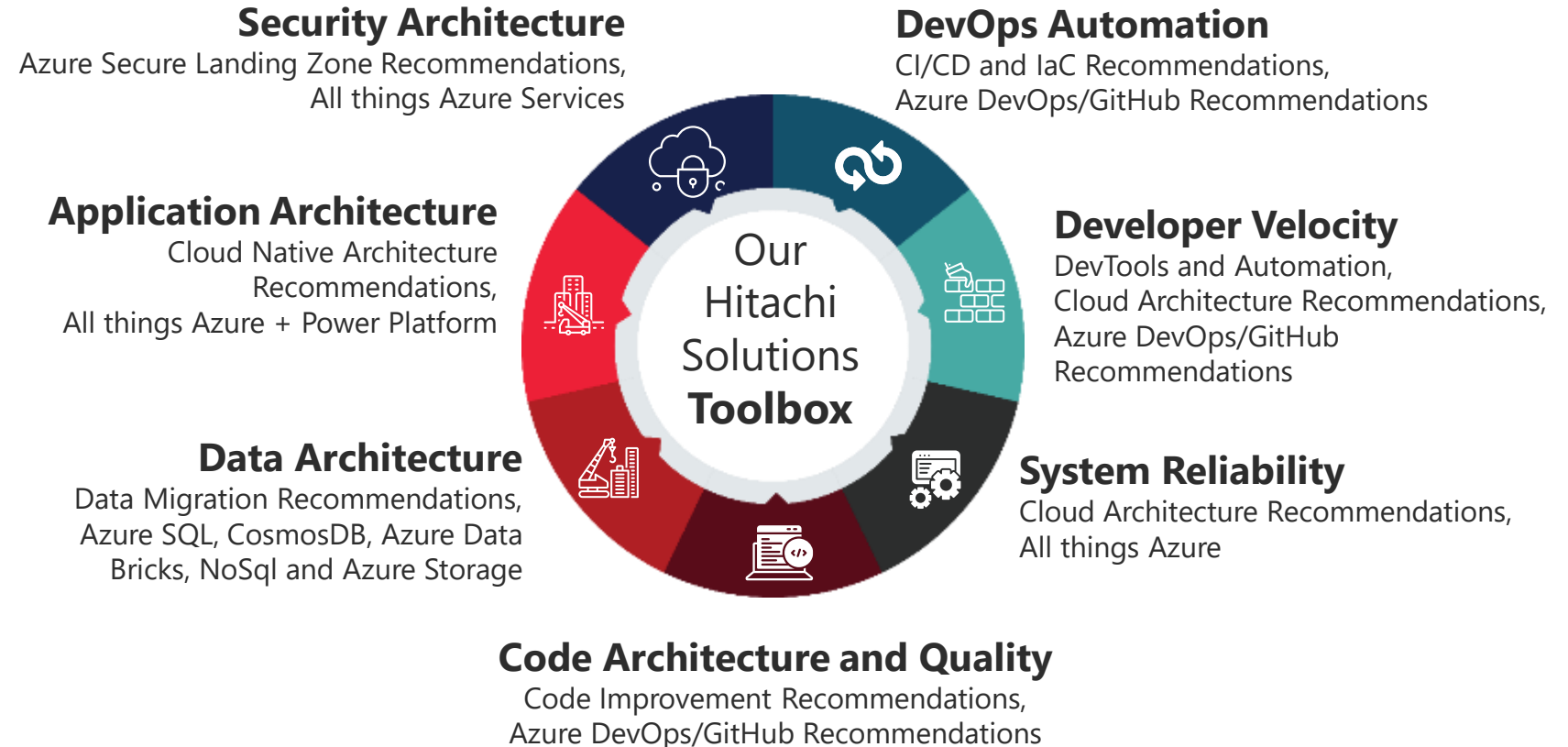
With our **global reach**, we are well-positioned to support customers at **scale** and *forge strategic relationships **for life***.

Our Hitachi Solutions ***Toolbox...***

Our *App Innovation* and
Development
breadth & depth
is *how* we
are helping customers
modernize their solutions



Our Expertise in Azure **Apps and Integration**



Our Microsoft Achievements:

Hitachi Solutions capabilities and expertise helps customers – end-to-end across all of Microsoft's Solution Areas.

Our **Microsoft Partner Solution Designations** include:



Microsoft Cloud

Partner with Hitachi Solutions

For depth and breadth of expertise across ALL Microsoft Cloud solution areas



Digital & App Innovation
Azure



Business Applications



Infrastructure
Azure



Security



Data & AI
Azure



Modern Work

Our **Advanced Specializations** include:



- Infra and Database Migration to Microsoft Azure
- Microsoft Azure Virtual Desktop
- Analytics on Microsoft Azure
- Modernization of Web Applications to Microsoft Azure



- Cloud Security
- Threat Protection
- Identity and Access Management
- Information Protection and Governance



- Finance
- Sales
- Service
- Supply Chain
- Microsoft Low Code Application Development

2

Why Azure?

Aligning Cloud Deployment with
Azure Services

Compete

AIS offers a consistent Azure-native service, with fully managed, unified, and secure experience across clouds and on-premises, with transparent pricing. Integrated with popular tools used by professional developers, such as Visual Studio and Visual Code, AIS offers an accessible experience that can be used easily by technical as well as non-technical/ citizen developers. Where **Mulesoft provides a custom-made development platform that requires significant ramp-up time for non-integration specialists and lacks the scalability that Azure can offer.**

iPaaS

Mulesoft lacks several iPaaS components and is limited to only cloud services. They don't have any service like Azure Functions, Event Grid or Event Hub. Limiting future investments.

Mulesoft relies on third party services from AWS to manage event-routing services (Service's SNS) and for serverless compute and data integration services (AWS Lambda).

Pricing

Transparent and predictable pricing structure. Azure Integration Services offers a wide range of pricing tiers, from **pay-as-you-go** to dedicated pricing plans as per usage. Buy only the integration capabilities you need.

MuleSoft doesn't offer any consumption-based pricing plans, that results into wastage of resources if not used fully.

Partner

MuleSoft adapters mainly work with Salesforce since it's their parent company, but they lack integration with rest of the partner ecosystem. Azure Integration Services has got strong and global partner ecosystem with lots of Microsoft partners writing / updating adapters for Microsoft and Logic Apps.

Integration **Platform as a Service**



Embrace the
API Economy



Establish a
Flexible Platform



Connect
SaaS, On-Prem, &
Cloud



Enable
Digital
Transformation

Azure **Integration Services**



Seamlessly integrate applications & data within your business to accelerate time to market and enhance productivity



Efficiently connect people & businesses (B2B) to strengthen relationships and facilitate collaboration



Easily connect LOB applications, SaaS, and cloud capabilities to create innovative solutions and new experiences

Act with confidence when integrating apps, workflows and devices

Arm your people with timely insights, anywhere, anytime

Azure Integration Services: **Benefits**

Policy System

Modernize applications and infrastructure to achieve both scale and speed to enable modern experiences

 **Manulife**



Rapidly build composable apps to gain visibility & unlock insights integrating apps, data, and processes for your enterprise

 **Swiss Re**

Automate your business process with ease – add resiliency, decoupling and event driven capabilities



Leverage Azure's comprehensive, secure and flexible platform to save cost

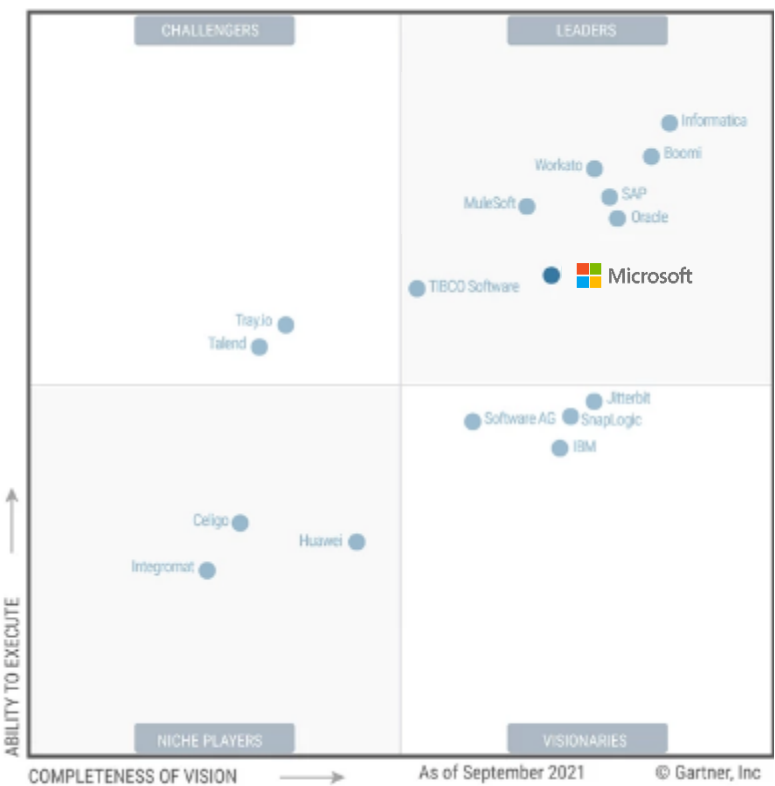



**Yusen
Logistics**

Azure Integration Services: **Leader in the Industry**

<https://azure.microsoft.com/en-us/blog/microsoft-named-as-a-leader-in-2021-gartner-magic-quadrant-for-enterprise-integration-platform-as-a-service/>

Figure 1: Magic Quadrant for Enterprise Integration Platform as a Service

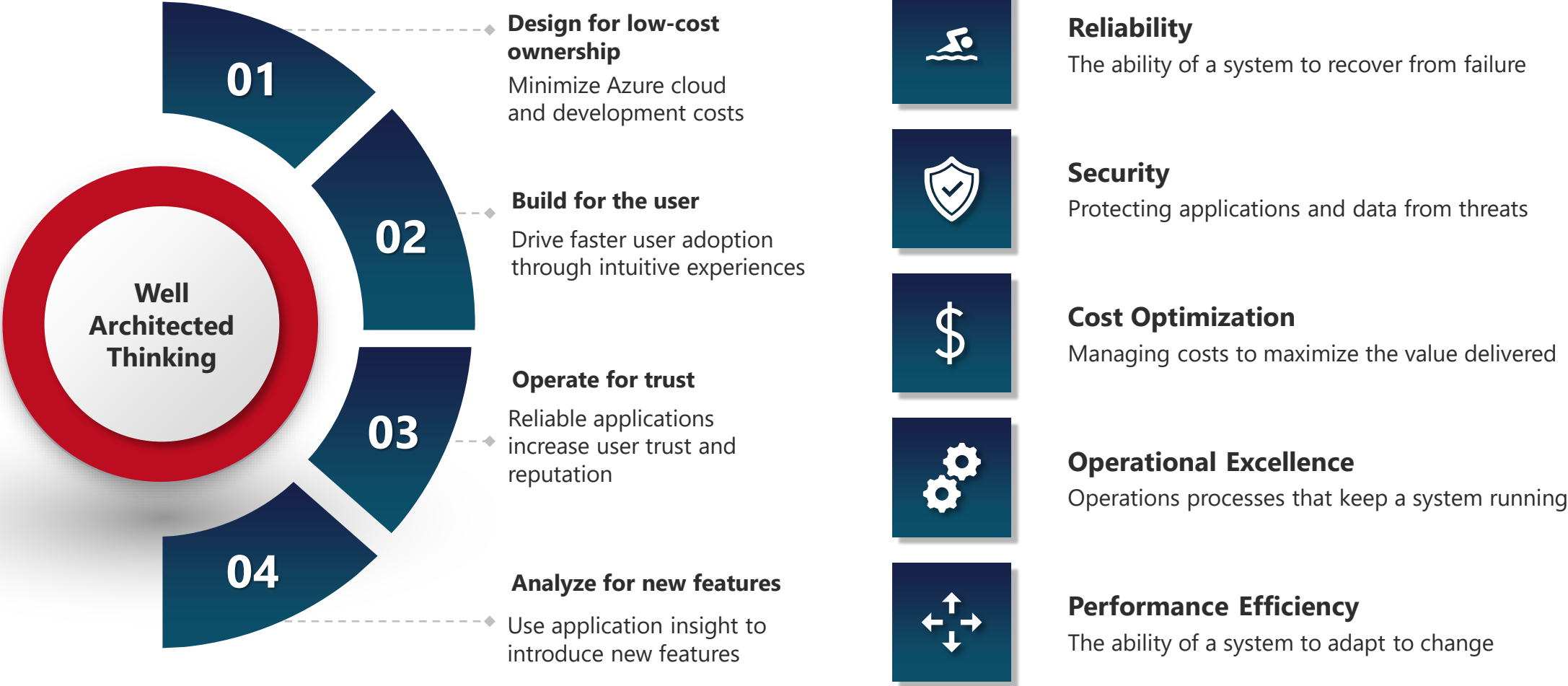


Source: Gartner (September 2021)



Microsoft named as a Leader in 2021 Gartner® Magic Quadrant™ for Enterprise Integration Platform as a Service

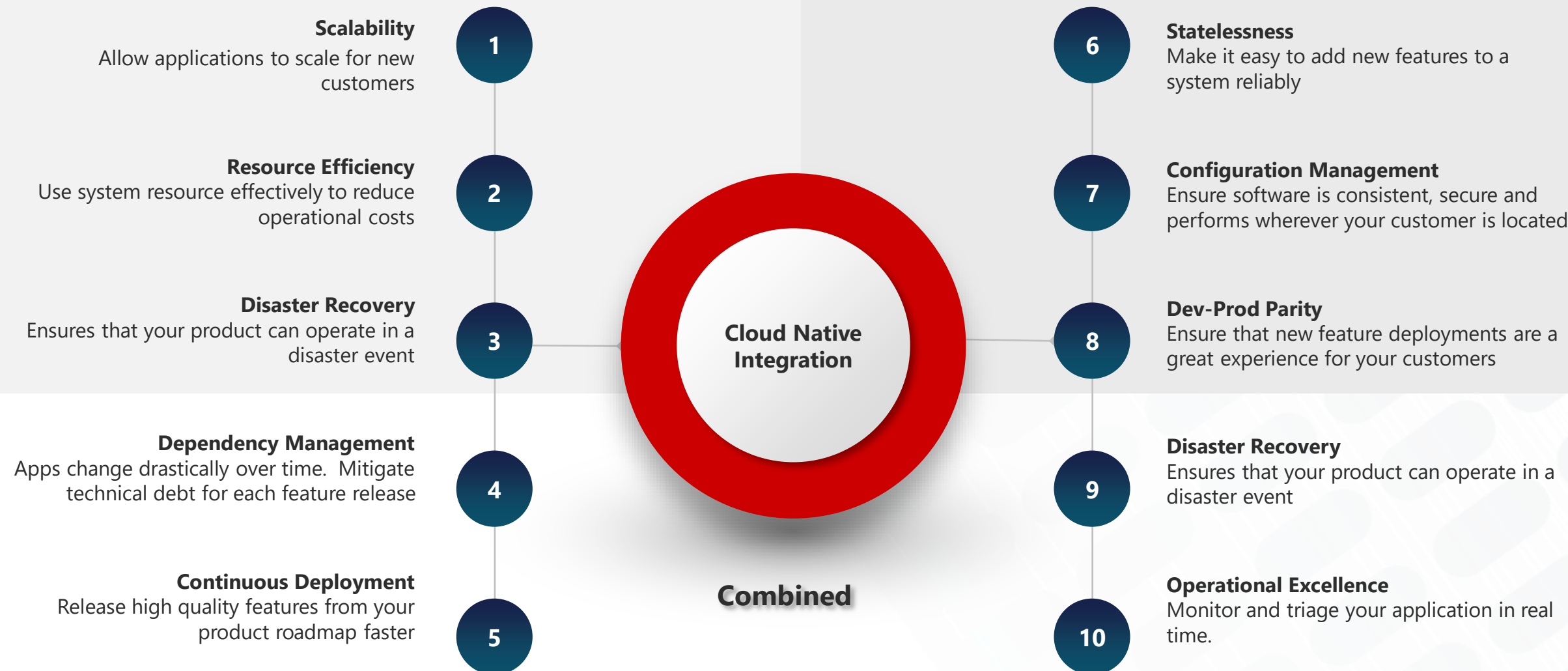
We Consider **User Experience, Cost and Market Growth**



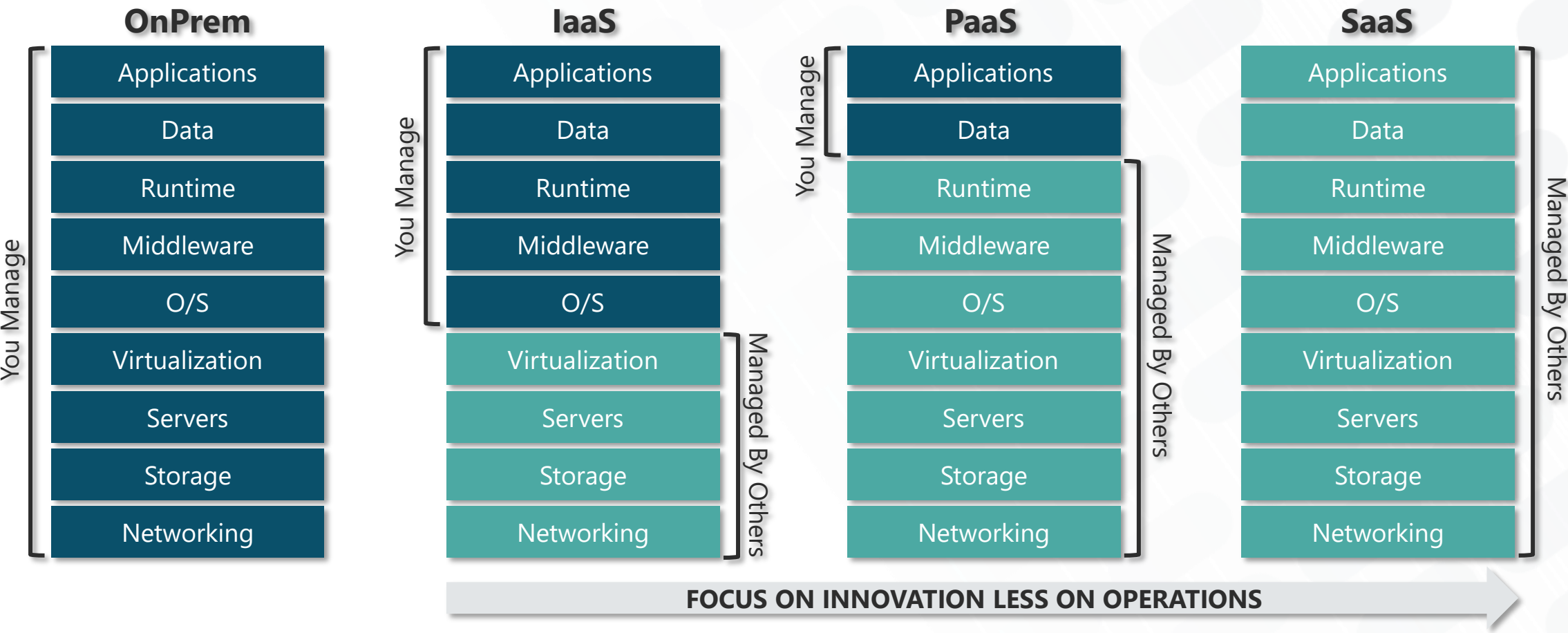
Design by Principle for Scale and Flexibility

Cloud Native

12-Factor



Focus on Innovation Instead of Infrastructure



The Most Trusted and Compliant Cloud

Global	 ISO 27001	 ISO 27018	 ISO 27017	 ISO 22301	 SOC 1 Type 2	 SOC 2 Type 2	 SOC 3	 CSA STAR Self-Assessment	 CSA STAR Certification	 CSA STAR Attestation				
US gov	 Moderate JAB P-ATO	 High JAB P-ATO	 DoD DISA SRG Level 2	 DoD DISA SRG Level 4	 SP 800-171	 FIPS 140-2	 Section 508 VPAT	 ITAR	 CJIS	 IRS 1075				
Industry	 PCI DSS Level 1	 CDSA	 MPAA	 FACT UK	 Shared Assessments	 FISC Japan	 HIPAA /HITECH Act	 HITRUST	 GxP 21 CFR Part 11	 MARS-E	 IG Toolkit UK	 FERPA	 GLBA	 FFIEC
Regional	 Argentina PDPA	 EU Model Clauses	 UK G-Cloud	 China DJCP	 China GB 18030	 China TRUCS	 Singapore MTCS	 Australia IRAP/CCSL	 New Zealand GCIO	 Japan My Number Act	 ENISA IAF	 Japan CS Mark Gold	 Spain ENS	 Spain DPA
	 India MeitY	 Canada Privacy Laws	 Privacy Shield	 Germany IT Grundschutz workbook										

Where Does **Azure** Shine?

Microsoft is the leader in enterprise software and embraces open source.



Microsoft



Linux



HashiCorp

Terraform

SQL Server



Linux



TypeScript



.NET Core



Linux

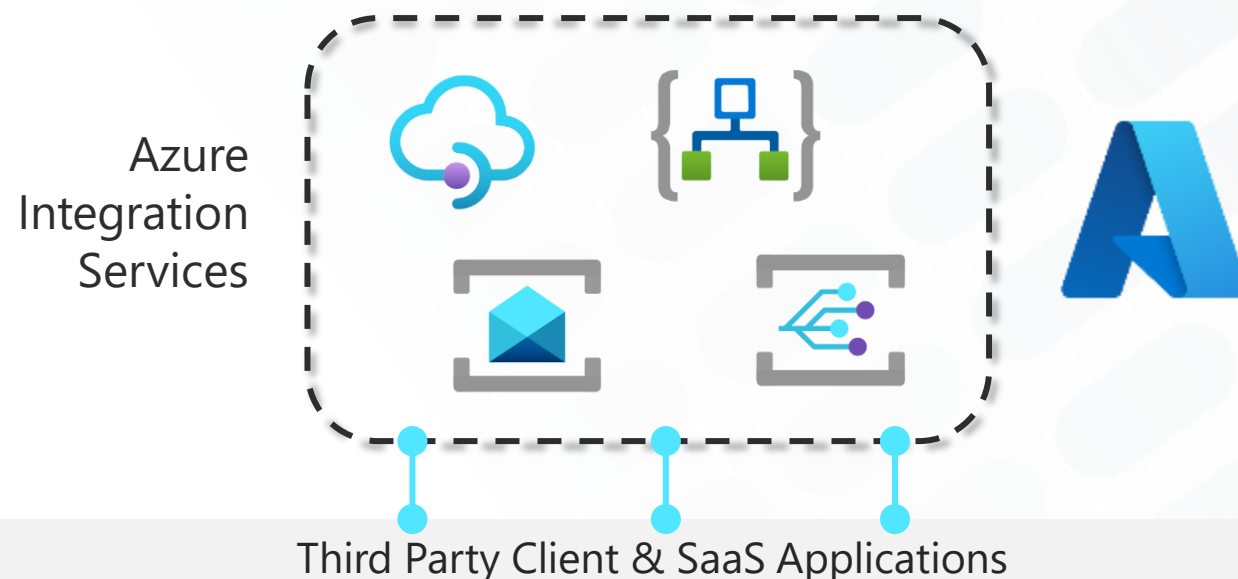


kubernetes

3

Azure and Integration Azure Integration Services

Integrating with **Best-of-Breed Manufacturing Business Systems**



Vision and Strategy



Product Development



Source and Procure



Manufacture and Produce



Distribute



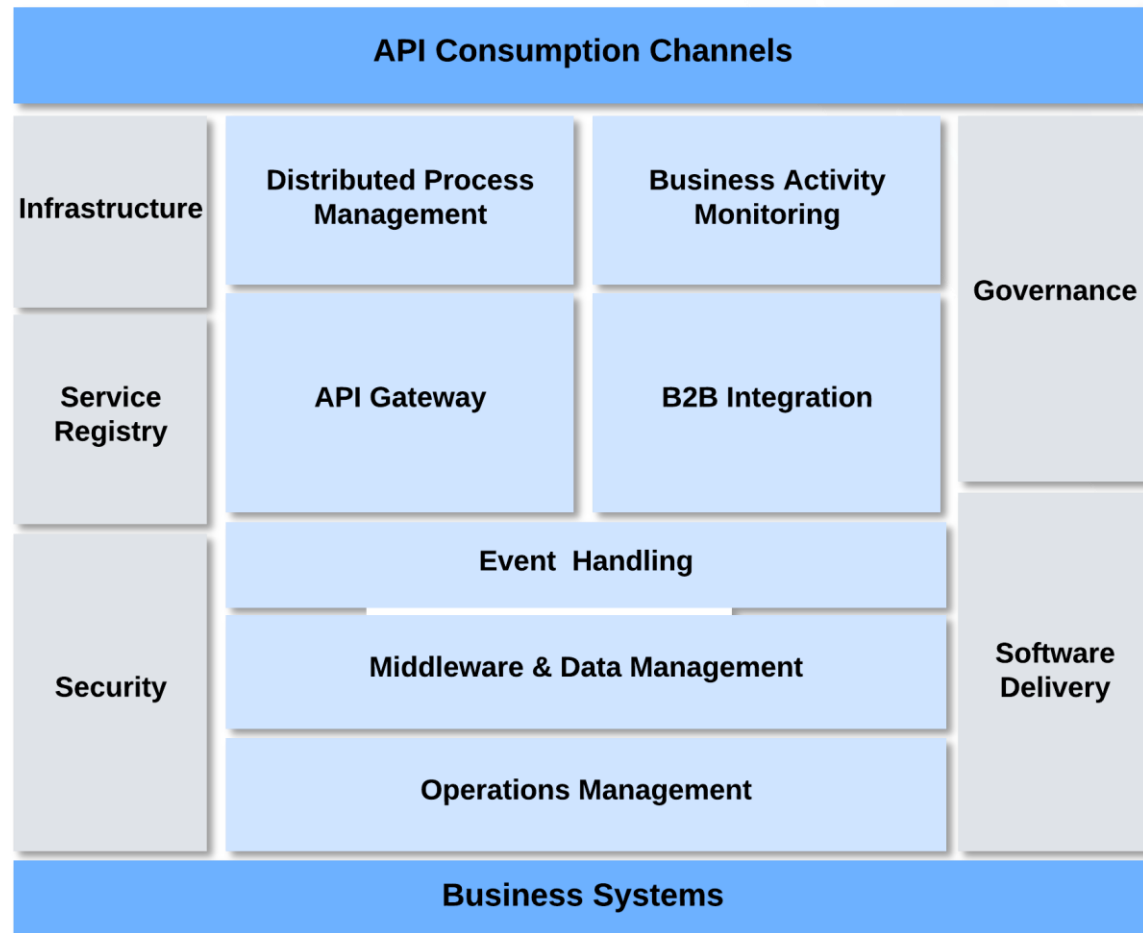
Market and Sale



Support Customers

Modern Integration Platforms: Features and Requirements

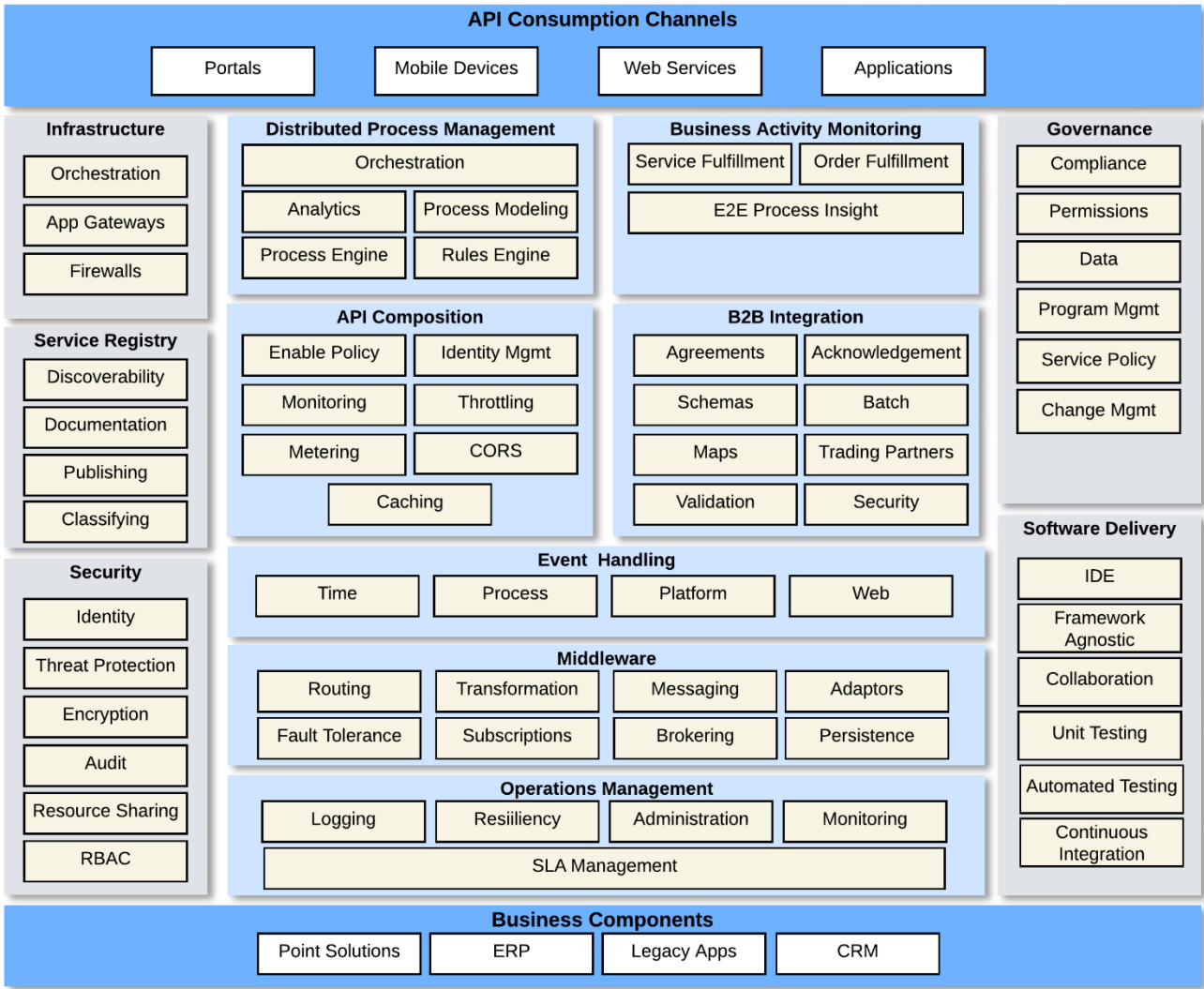
Integration Platform Features



Integration Requirements

- **Accelerate Integration Implementation**
 - Empower a broad set of users with tailored experiences that enable them to integrate applications and data.
- **Deploy & Access Anywhere**
 - Connect to your information assets no matter where they're hosted
 - The flexibility to deploy integration apps on-prem or across public clouds
- **Deliver Insights and Opportunities**
 - Use APIs to build a foundation that helps your business operate and adapt faster.
 - Surface critical business events in real time
- **Enable Business Agility and Change**
 - Incrementally add innovation to legacy processes (i.e. Strangler Pattern)
- **Reduce Cost and Improve Implementation Efficiency**
 - Streamline inter-system processes to reduce manual errors
 - Expose critical system data and drive downstream re-use of "source of truth" data to support operations.
 - Enable comprehensive views of customers across all sales channels
 - Drive consistent customer experience across sales channels
- **Protect Sensitive and Proprietary Business Data**
 - Lock down who and how data is being accessed
 - Use best-in-class security for all integration and API
 - Monitor and measure how data is being accessed

Modern Integration Platforms: A Deeper Dive



Legend

- Application Endpoints
- Functional Integration Components
- Non-Functional Integration Components
- Service Capabilities

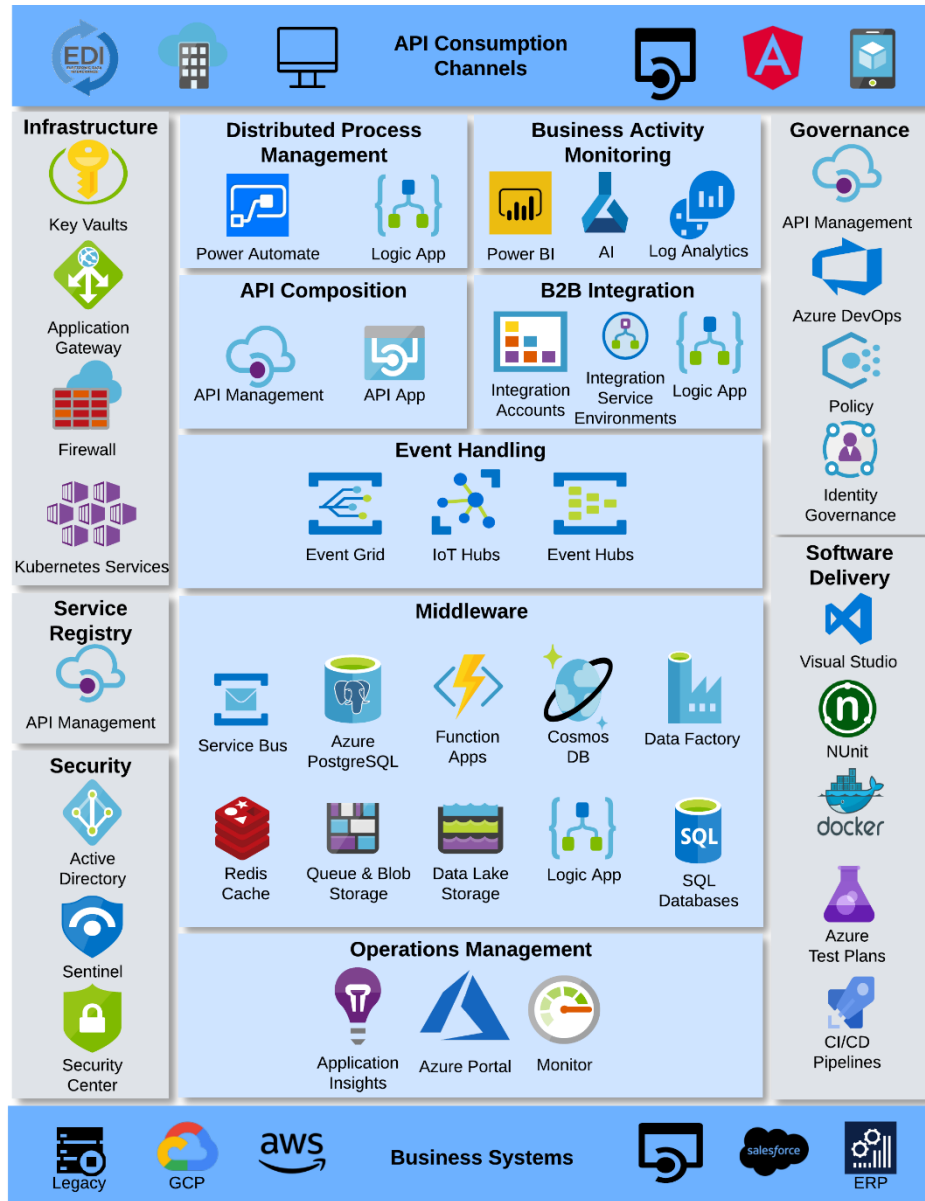
Functional Integration Capabilities

- **Distribute Processing** across large heterogenous environments
- **Monitor business activities** from end-to-end
- **B2B integration** support to manage all digital communication with partners
- **API Composition** to manage full lifecycle, security policy and performance of all API internal and external to the enterprise
- **Event Handling** for event-driven workloads including IoT, RFID and business events
- The **Middleware** can decouple applications through *temporal decoupling* and *load leveling* to support sending and receiving messages at different rates or times.
- **Operations Management** provides visibility into the integrations of business applications.

Non-Functional Integration Capabilities

- **Infrastructure** enables integration on-prem, B2B and to the cloud
- **Service Registries** promote API re-use and discoverability
- **Security** policy is enabled for each functional capability
- **Governance** defines how APIs and integration will be implemented to protect organizational interests
- **Software Delivery** is the bases for implementing resilient, fast-to-market and flexible software.

Delivering Integration in Azure: **Fit for Purpose Ecosystem**



Use **Hitachi Solutions** Azure expertise to leverage the best Azure services for the right use case

- Azure integration services work together to provide iPaaS. They can be used individually or combined to enable robust integration patterns.
- Azure integration services can connect applications inside an enterprise, in the cloud or both.
- Azure integration services will support a multitude of workloads including
 - Internet of Things
 - Big Data fast and slow path integration
 - B2B integration
 - On-prem to cloud, cloud to cloud integration
- Middleware persistence is important for integration performance. Azure supports a plethora of proprietary and 3rd party data services to enable application and integration performance.
- Azure has best-in-class operation management capabilities for all service components on-prem and in the cloud. Get insight into your integration and app landscape in real-time.
- Software delivery is an important component to solid integrations. Microsoft has a 20+ track record in delivery software delivery IDEs, source control and team collaboration

The **Application Integration Services** Value



Scalability & Availability:

Leverage the global reach of Azure Integration Services – globally available across all 52 AZURE regions. Azure Integration Services is considered an industry leader in EiPaaS that offers integration across on-premises and cloud through API Management, Logic Apps, Service Bus, Event Grid, Functions, Event Hubs, Data Factory.



Monitoring:

Application Insights Smart Detection. Azure Integration Services can be integrated with Application Insights, Smart Detection can perform proactive analysis of the service telemetry and detect eventual performance anomalies.



Secure:

Meet your security requirements seamlessly with **Managed Identities**, RBAC (role-based access controls) and network allow-lists. As well as **Azure Key Vault** and **Azure Active Directory**.



Governance & Compliance:

Set up policies like quotas or transformations on the APIs and get insights from build-in analytics with APIM. Leverage Azure DevOps to govern entirety of your application lifecycle, including risk and compliance assessments, backups, documentation, and approval workflows.



Cost:

Flexible payment Options - Azure Integration Services offers a wide range of pricing tiers, from pay-as-you-go to dedicated pricing plans as per usage.

Azure: **Choosing the Right Integration Service**



Azure has a plethora of integration and automation options



These Azure services are solutions for automating business process.



Azure integration services can be configured for input, actions, conditions and output and can be executed via events, http, queues or schedule.



Each service has unique advantages, but other key considerations are orchestration and serverless compute.



Hitachi Solutions will demonstrate the use of event driven architecture, serverless compute and messaging to drive business process (Azure Functions, Logic Apps, Service Bus and Event Hubs)

App Integration Services: **Summary**

Azure API Management

Integrate your backend legacy systems exposing an API façade to connect applications, systems or data located on premises or in the cloud & unlock insights



Azure Logic Apps

Handle B2B integrations with diverse third-party partners and providers without the need for custom integrations for B2B data flows



Azure Event Grid

Build scalable & reliable serverless applications, microservices, and distributed systems enabling event driven apps seamlessly



Azure Service Bus

Build elastic scale apps and integrate cloud resources such as Azure SQL Database, Azure Storage, and Web Apps to enhance durability



Azure Functions

Accelerate app development with lightweight serverless functions for Big Data processing, including scheduling reminders & notifications



Azure Data Factory

Create and schedule data-driven workflows (also called referred to as "pipelines") that can ingest data from disparate data stores.



Azure Services: **Common Attributes**



All Azure resources have a wide array of common capabilities to facilitate common security, management, and interoperability. Some of those common capabilities are described below:



Security and Compliance:

Helps organizations meet compliance requirements by providing granular, policy monitored, hierarchical role-based access control (RBAC), secure key management, and auditing capabilities.



Encryption and Secure Networking:

Azure Resources have common capabilities for encryption of data at rest and in transit as well as secure networking and firewall capabilities for completely secure communications.



Monitoring and Diagnostics:

Provides monitoring capabilities for resource status, resource processing, application logging, access logs, and other metrics. Integrates with Azure Monitor for more in-depth analysis.



Analytics:

For collecting and analyzing manufacturing application log data, enabling powerful query capabilities and insights into system diagnostics and behavior visualization.



Fine Grained Access Control:

Azure Active Directory combined with Identity and Access Management provides a consistent mechanism for controlling access to all Azure resources



Integration with Azure Services:

Services seamlessly integrate with other Azure services for simple and consistent facilities for security, communication, tracking, cost management, and analytics.

Azure Functions **Features:** Flexibility and Scale for Integration



What is it? A serverless compute engine for data processing best used for the creation and execution of small pieces of code. It's event-driven by nature and supports a multitude of triggers and bindings.



Event-Driven Execution:

Triggered by a variety of events, making them ideal for reacting to changes, queues, or requests



Automatic Scaling:

The platform automatically adjusts the number of compute resources based on incoming events..



Integration with Azure Services:

Functions offer built-in integration. This includes connectors and triggers for services like Cosmos DB, Event Hubs, Storage and Service Bus



Bindings:

Azure Functions provide input and output bindings that simplify the process of connecting to data sources and services.



Durable Functions:

Durable Functions support complex, stateful coordination patterns in a serverless environment.



Monitoring and Diagnostics:

The integration with Azure Monitor and Application Insights enables robust monitoring and diagnostics..



Security and Compliance:

Functions benefit from Azure's security and compliance features, including network security and identity management.

Azure Functions **Benefits:** Elevating Enterprise Integration



What is it? A serverless compute engine for data processing best used for the creation and execution of small pieces of code. It's event-driven by nature and supports a multitude of triggers and bindings.



Event-Driven and Scalable:

Seamlessly responds to events, scales automatically, ideal for dynamic enterprise environments.



Asynchronous Messaging:

Aligns with Enterprise Integration Patterns for robust, loosely-coupled architectures.



Microservices Architecture:

Supports decentralized, scalable microservices, enhancing agility and resilience.



Cost-Effective and Efficient:

Pay-per-use model, reduces overhead for intermittent processes.



Language Agnostic:

Supports diverse programming needs including C#, .NET, and more.



Seamless Integration:

Facilitates complex integrations with Azure services and external systems.



Cloud-Native Solution:

Leverages the power of cloud computing for modern, scalable enterprise applications.



Pattern-Based Approach:

Fit well with microservice architectures to build small modular services.

Azure Logic App **Features:** Simplifying Enterprise Integration



What is it? A serverless compute engine for data processing best used for the creation and execution of small pieces of code. It's event-driven by nature and supports a multitude of triggers and bindings.



Low-code Designer:

Making it simpler to build workflows by dragging and dropping connectors and control flow elements.



Connectors:

Library of connectors to various services, including Azure services, Salesforce, Office 365, and custom, on-premises systems



Triggers and Actions:

Workflows start with a trigger, such as receiving an email or a message in a queue, and then proceed with a series of actions.



Enterprise Integration:

Supports enterprise-level integration patterns and standards, including B2B/EDI, XML processing.



Condition-based Logic and Loops:

Allows for the implementation of conditional logic and loops for complex workflows.



Scalability and Availability:

Ensures high availability and reliability for critical business processes and integration workflows.



Monitoring and Management:

Leverages the power of cloud computing for modern, scalable enterprise applications.

Azure Logic App **Benefits:** Streamlining Enterprise Integration



What is it? A low-code serverless compute engine for creating and running automated workflows that connect apps, data, services and systems at scale.



Workflow Automation: Simplifies complex integrations with automated workflows.



Visual Designer & Connectors: Intuitive interface with extensive pre-built connectors for rapid integration.



Scalable & Reliable: Manages heavy workloads, ensuring high availability for enterprise demands.



Rapid Development: Facilitates quick deployment, enhancing business agility.



Event-Driven Architecture: Supports real-time business event processing, crucial for dynamic enterprises.



Enterprise Security & Compliance: Inherits Azure's robust security and compliance standards.



Cost-Effective: Pay-as-you-go model, ideal for varying enterprise needs.



Pattern-Based Integration: Aligns with Enterprise Integration Patterns for best-practice solutions.

Azure Service Bus **Features**



What is it? Reliable, durable, transactional, enterprise-class message bus that facilitates the decoupling of message producers and consumers.



Messaging Patterns:

Supports multiple messaging patterns, including Publish/Subscribe, Request/Response, and Queues.



Queues and Topics:

Queues are used for point-to-point communication, ensuring messages are delivered to a single consumer. Topics enable publish/subscribe scenarios, allowing multiple subscribers to receive messages.



Reliability and Scalability:

Provides high availability and reliability, ensuring that messages are delivered even in the case of failures. Scalable architecture allows you to handle variable workloads and increasing message volumes.



Dead Lettering:

Messages that cannot be delivered successfully are moved to a dead-letter queue, facilitating troubleshooting and analysis.



Message Sessions:

Supports message sessions, allowing related messages to be grouped and processed together.



Scheduled Messages:

Enables the scheduling of messages for future delivery, providing flexibility in message handling.



Secure:

Integrates with Azure Active Directory (Azure AD) for authentication and authorization. Supports Shared Access Signatures (SAS) for secure access to resources.

Azure Service Bus **Benefits**



What is it? Reliable, durable, transactional, enterprise-class message bus that facilitates the decoupling of message producers and consumers.



Reliable:

Ensures reliable and asynchronous communication between applications and services.



Scalable:

Scales seamlessly to handle varying workloads and increasing message volumes.



Fault Tolerant:

Offers fault tolerance and recovery mechanisms to ensure message delivery in the presence of failures.



Basic Transformation:

Allows for message transformation and enrichment through filters and rules, supporting diverse integration scenarios.



Monitoring and Analytics:

Provides monitoring capabilities and integration with Azure Monitor and Azure Log Analytics for analytics and insights.



Service Level Agreements (SLAs):

Azure Service Bus provides SLAs for availability and message delivery, offering a level of assurance for critical business applications.

Azure Event Grid **Features**



What is it? simplifies the development of event-driven applications by allowing you to easily subscribe and react to events from various Azure services and custom sources.



Event Publishers:

Supports a wide range of event publishers, including Azure services like Blob Storage, Azure IoT Hub, Azure Event Hubs, and more. Additionally, it allows custom events to be published.



Event Topics:

Events are organized into topics, providing a logical separation and abstraction for event sources. Topics can be created for specific scenarios or applications. Enables event subscribers to react to events from event sources. Subscribers can be Azure Functions, Logic Apps, Event Hubs, or custom endpoints.



Push and Pull Models:

Supports both push and pull models for event delivery. Subscribers can receive events through HTTP/HTTPS (push) or periodically poll for events (pull).



Filtering:

Allows subscribers to set up event filters based on event type or subject, enabling targeted event processing.



Dead Lettering:

Implements dead-lettering for events that cannot be successfully delivered to subscribers, allowing for troubleshooting and analysis.



Retry Policies:

Provides configurable retry policies for handling transient errors during event delivery.



Event Domains:

Allows creating event domains to logically group related event topics and simplify management.



Event Schema:

Supports the use of event schema to define the structure of events, providing a standardized way to describe event payloads.

Azure Event Grid **Benefits**



What is it? simplifies the development of event-driven applications by allowing you to easily subscribe and react to events from various Azure services and custom sources.



Simplified Event Handling - Streamlines the development of event-driven applications by providing a central event routing service for diverse Azure services and custom sources.



Flexibility and Extensibility - Offers flexibility by supporting a variety of event sources and subscribers, allowing you to build and extend event-driven architectures.



Near-Real-Time Event Processing - Facilitates near-real-time event processing, enabling applications to react to events as they happen.



Scalability - Scales horizontally to handle large volumes of events, ensuring high throughput and responsiveness. Dynamically scales to accommodate changes in the volume of events, ensuring optimal performance during peak times.



Cost-Efficient - Adopts a pay-as-you-go pricing model, making it cost-efficient for applications with varying event loads.



Event-driven Microservices - Facilitates the development of event-driven microservices architectures, promoting loosely coupled and scalable systems.

Azure IoT Hub **Features**



What is it? Serves as a central hub that enables bidirectional communication between applications and the manufacturing devices it manages.



Device Identity and Authentication - Provides a secure and scalable way to manage and authenticate IoT devices, ensuring that only authorized devices can connect.



Bidirectional Communication - Enables communication between IoT applications and devices, supporting both cloud-to-device and device-to-cloud messaging.



Device Twin - Maintains a digital twin for each IoT device, allowing applications to synchronize and query the current state of devices.



Device Management - Facilitates device management operations, such as device provisioning, configuration, and firmware updates.



Message Routing - Supports automatic message routing based on predefined rules, allowing messages to be sent to specific endpoints or processed in a particular way.



Device Provisioning Service - Allows for automatic provisioning of devices, simplifying the onboarding process and ensuring secure device connections.



Custom Endpoints - Supports the configuration of custom endpoints, enabling flexibility in connecting devices to custom backend services.

Azure IoT Hub **Benefits**



What is it? Serves as a central hub that enables bidirectional communication between applications and the manufacturing devices it manages.



End-to-End IoT Solution - Provides a comprehensive platform for building end-to-end IoT solutions, from device connectivity to cloud-based applications.



Scalability and Performance - Scales horizontally to handle a large number of devices, ensuring optimal performance in IoT deployments of various sizes.



Real-Time - Facilitates real-time communication between devices and cloud applications, supporting timely data processing and decision-making.



Flexibility and Integration - Offers flexibility through integration with other Azure services, allowing developers to build customized and feature-rich IoT solutions.



Reliability and Resilience - Ensures reliable and resilient communication between devices and the cloud, even in challenging network conditions.

Azure API Management **Features**



What is it? is an enterprise-class, multi-cloud API management platform for securing, publishing, developing, and analyzing manufacturing application APIs.



API Gateway - Serves as a central entry point for APIs, handling tasks such as request routing, composition, and response aggregation.



Development - Provides a customizable developer portal for API documentation, testing, discovery, and onboarding. Facilitates collaboration between API developers and API consumers, making it easier to manage the API lifecycle.



API Versioning - Supports versioning of APIs, allowing for backward compatibility and smooth transitions when updating APIs.



Security and Authentication - Offers robust security features, including authentication and authorization mechanisms, API key management, and OAuth 2.0 support.



Rate Limiting and Quotas - Enables control over API consumption by implementing rate limiting and quotas, preventing abuse and ensuring fair usage.



Transformations and Policies - Allows the configuration of policies to modify parameters, including transformation, validation, and traffic control policies.



Caching - Supports response caching to improve performance by reducing the need to process repetitive requests.



Local Deployment - Allows deployment of APIs in multiple localities, ensuring low-latency access for users in different geographic locations.

Azure API Management **Benefits**



What is it? is an enterprise-class, multi-cloud API management platform for securing, publishing, developing, and analyzing manufacturing application APIs.



Centralized API Management - Provides a centralized platform for managing the entire API lifecycle, from design, development and versioning all the way to retirement.



Developer Engagement - Enhances developer experience through a user-friendly developer portal, clear documentation, and interactive testing capabilities.



Scalability - Scales horizontally to handle increased API traffic, ensuring high availability and performance.



Cost Efficiency - Optimizes API usage and resource allocation, helping organizations manage costs effectively.



Version Control - Simplifies API versioning and provides tools to manage multiple versions, supporting a smooth transition for consumers.



Flexibility and Customization - Offers flexibility through custom policies, allowing organizations to tailor API behavior based on specific requirements.



Analytics-Driven Insights - Leverages analytics to gain insights into API usage patterns, identify bottlenecks, and make data-driven decisions for optimization.



Faster Time-to-Market - Accelerates development by providing tools and features that streamline the API creation and deployment process.



Global Reach - Supports global deployment, ensuring that APIs can be accessed efficiently by users across different regions.

Azure Storage Accounts **Features**



What is it? Cloud-based object storage solution designed to store and manage massive amounts of unstructured data, such as text or binary data.



Scalability - Azure Blob Storage is highly scalable, allowing you to store and retrieve vast amounts of data, from small text files to large media files.



Durability and Redundancy - Data stored in Azure Blob Storage is highly durable and redundant. It is automatically replicated to ensure data availability even in the case of hardware failures. Read-only snapshots of blobs, allowing you to capture and preserve a point-in-time state of your data



Data Tiers - Offers multiple storage tiers, including Hot, Cool, and Archive. You can choose the appropriate tier based on your data access patterns and cost requirements.



Data Encryption - Encrypts data at rest and in transit, ensuring the confidentiality and integrity of your stored data.



Versioning - Supports versioning of blobs, allowing you to track changes to your data over time.



Lifecycle Management - Allows you to define policies for automatically transitioning data between storage tiers or deleting data based on specified criteria.



Triggers - Integrates with Azure Eventing system, allowing actions to be triggered on blob operations and changes, facilitating event-driven architectures.



Data Lake - Specialized blob storage system that supports HDFS for high-performance data operations on massive hierarchical file stores facilitating big-data processing with custom apps as well as Synapse, Fabric, and Databricks systems.

Azure Storage Accounts **Benefits**



What is it? Cloud-based object storage solution designed to store and manage massive amounts of unstructured data, such as text or binary data.



Cost-Effective Storage - Offers different storage tiers with varying costs, allowing you to optimize storage costs based on your data access patterns.



Global Reach - Provides a global distribution feature, enabling you to store data close to your users for low-latency access.



Easy Integration - Integrates seamlessly with other Azure services and tools, such as Azure Functions, Azure Logic Apps, and Azure Data Factory.



Developer-Friendly - Provides SDKs for various programming languages, making it easy for developers to integrate and interact with Azure Blob Storage.



Content Delivery - Integrates with Azure Content Delivery Network (CDN), enabling efficient and fast delivery of content to users around the world.



Data Analysis and Machine Learning - Facilitates data analysis and machine learning workflows by providing a scalable and reliable storage solution for large datasets.



Backup and Recovery - Serves as an excellent option for backup and recovery scenarios due to its durability and redundancy features.



Serverless Computing - Works seamlessly with serverless computing options, such as Azure Functions, enabling event-triggered processing of blob data.

Azure Data Factory **Features**



What is it? Allows you to create, schedule, and manage data processing workflows called pipelines that can orchestrate ETL processes between supported data stores.



Connectivity to Various Data Sources -

Supports connectivity to a wide range of on-premises and cloud-based data sources, including SQL databases, NoSQL databases, file-based storage, and more.



Data Movement and Transformation -

Facilitates efficient data movement and transformation using pre-built data connectors and transformations. Allows data wrangling using mapping data flows.



Data Pipeline Monitoring and Management -

Provides monitoring and management capabilities for data pipelines, including visual monitoring, debugging, and logging.



Data Flows and Activities - Supports the creation of data flows, which define data transformations, and activities, which represent units of work in a pipeline.



Dynamic Data Pipelines - Allows dynamic data pipelines with parameters, making it easy to create reusable and parameterized data workflows.



Azure DevOps Integration - Integrates with Azure DevOps for version control, continuous integration, and continuous delivery (CI/CD) of data pipelines.



Data Movement Scheduling - Supports scheduling and triggering of data movement and transformation activities, allowing for regular and automated data processing.



Hybrid Data Movement - Provides support for hybrid data movement, allowing the movement of data between on-premises data stores and the cloud.

Azure Data Factory **Benefits**



What is it? Allows you to create, schedule, and manage data processing workflows called pipelines that can orchestrate ETL processes between supported data stores.



Scalability and Performance - Scales horizontally to handle large volumes of data and provides high-performance data movement and transformation capabilities.



Serverless Data Integration - Offers a serverless data integration approach, eliminating the need for infrastructure management and enabling cost-effective solutions.



Code-Free Data Transformation - Enables code-free data transformations through a visual interface, making it accessible to users with varying technical backgrounds.



Data Lineage and Impact Analysis - Provides data lineage tracking and impact analysis, allowing users to understand the flow of data and the potential impact of changes to data pipelines.



Extensibility - Supports custom activities and custom connectors, allowing users to extend the functionality of Azure Data Factory to meet specific business requirements.



Global Reach - Offers global availability, allowing users to deploy data pipelines close to their data sources and destinations for optimal performance.



Comprehensive Monitoring and Logging - Provides comprehensive monitoring and logging capabilities, allowing users to track the status, performance, and errors in their data pipelines.



Ease of Integration with BI Tools - Facilitates easy integration with popular business intelligence (BI) tools, allowing users to visualize and analyze data processed by Azure Data Factory.

Azure Monitor **Features**



What is it? Comprehensive monitoring solution for gaining insights into the performance and health of applications and infrastructure in the Azure ecosystem.



Consolidated Data Collection - Azure Monitor collects data from various sources, including applications, operating systems, Azure resources, and network devices.



Metrics and Alerts - Captures and visualizes performance metrics, allowing users to set up alerts based on defined thresholds.



Application Insights - Provides Application Insights for detailed telemetry data on application performance, user interactions, and usage patterns.



Infrastructure Monitoring - Monitors the performance and health of virtual machines, Azure services, and on-premises infrastructure.



Diagnostic Settings - Allows configuring diagnostic settings to stream platform logs and metrics to Azure Monitor.



Service Map - Visualizes dependencies and connections between different components of an application, helping in understanding and troubleshooting complex architectures.

Azure Monitor **Benefits**



What is it? Comprehensive monitoring solution for gaining insights into the performance and health of applications and infrastructure in the Azure ecosystem.



End-to-End Visibility - Offers a unified view of application and infrastructure performance, providing end-to-end visibility into the entire IT environment.



Proactive Monitoring - Enables proactive monitoring through configurable alerts and notifications based on performance metrics and logs.



Troubleshooting and Diagnostics - Facilitates troubleshooting and diagnostics by providing detailed insights into issues affecting applications and services.



Optimization of Resources - Assists in optimizing resource utilization by identifying performance bottlenecks and areas for improvement.



Scalability - Scales to handle large and complex environments, ensuring effective monitoring for applications of varying sizes and complexities.



Integration with DevOps - Integrates with DevOps processes, providing feedback loops to developers for continuous improvement of applications.



Security Insights - Offers security insights by analyzing and monitoring security-related events, helping in the detection and response to security threats.



Customization and Extensibility - Allows customization and extensibility through APIs and integrations with third-party tools, enabling tailored monitoring solutions.



Cost Management - Aids in cost management by identifying underutilized resources and providing insights into resource consumption patterns.



Compliance and Auditing - Assists in compliance and auditing efforts by providing detailed logs and metrics for regulatory requirements.

Azure **Key Vault** and **Identity and Access Management (IAM)**: Features



What is it? IAM provides fine grained access control to Azure resources while Key Vault secures import secrets such as certs, passwords, and even secure config settings.



Secrets Management - Azure Key Vault allows you to securely store and manage sensitive information, such as connection strings, API keys, cryptographic keys, and passwords, as secrets.



Certificate Management - Facilitates the management and storage of digital certificates, simplifying the handling of SSL/TLS certificates for secure communication.



Role-Based Access Control (RBAC) - Leverages Azure IAM for fine-grained access control, enabling administrators to grant permissions to Key Vault resources based on roles.



Azure Managed Identity - Supports Azure Managed Identity, allowing Azure resources like virtual machines and Azure Functions to authenticate securely with Key Vault without the need for explicit credentials.



Azure Active Directory Integration - Utilizes Azure Active Directory (AAD) for authentication, enabling identity-based access control and ensuring secure interactions with Key Vault.



Auditing and Logging - Provides auditing and logging capabilities to track access and usage of Key Vault resources, aiding in compliance and security monitoring.



Soft Delete - Implements soft delete functionality to help recover accidentally deleted key vaults or keys within a specified retention period.

Azure **Key Vault** and **Identity and Access Management (IAM)**: Benefits



What is it? IAM provides fine grained access control to Azure resources while Key Vault secures import secrets such as certs, passwords, and even secure config settings.



Secure Key Management - Ensures the secure storage and management of cryptographic keys, preventing unauthorized access and potential security breaches.



Centralized Secrets Storage - Centralizes the storage of sensitive information, reducing the risk of accidental exposure and providing a single point of management.



Identity-Based Access Control - Leverages Azure IAM to implement role-based access control, ensuring that only authorized users and applications can access and manage Key Vault resources.



Simplified Credential Management - Simplifies credential management for applications by securely storing secrets, keys, and certificates in Key Vault, reducing the risk of hardcoded credentials.



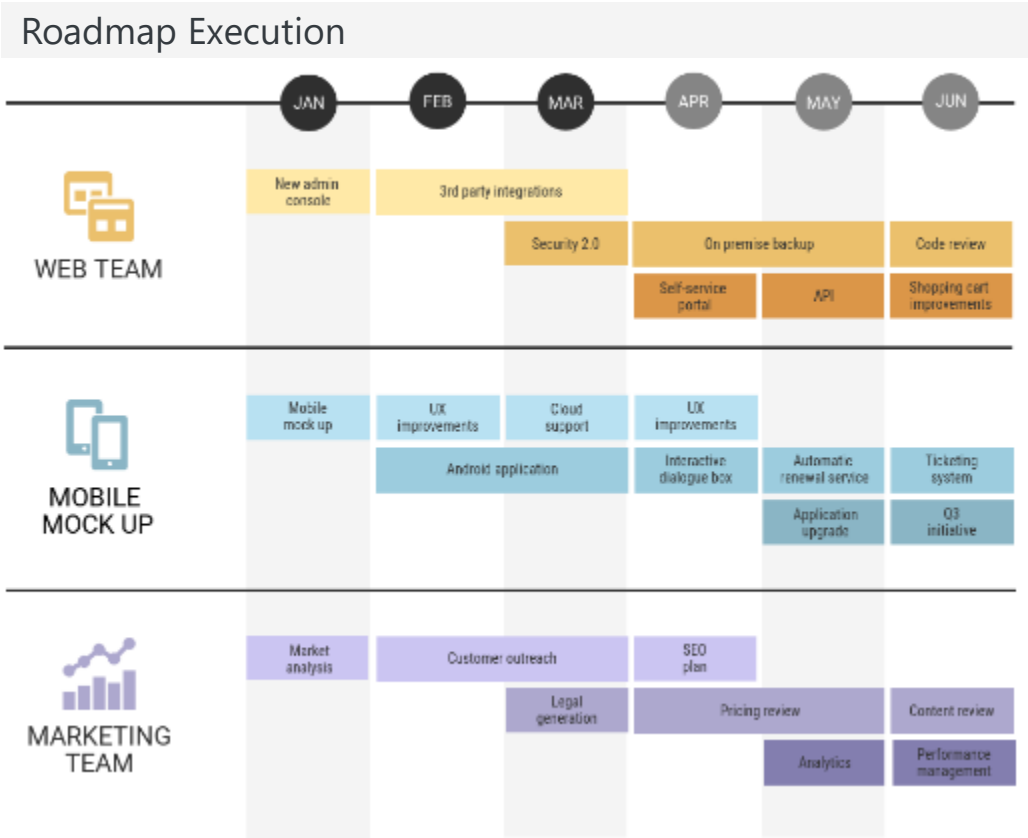
Azure Managed Identity for Automation - Supports Azure Managed Identity for automation scenarios, allowing applications and services to authenticate securely without the need for manual credential management.



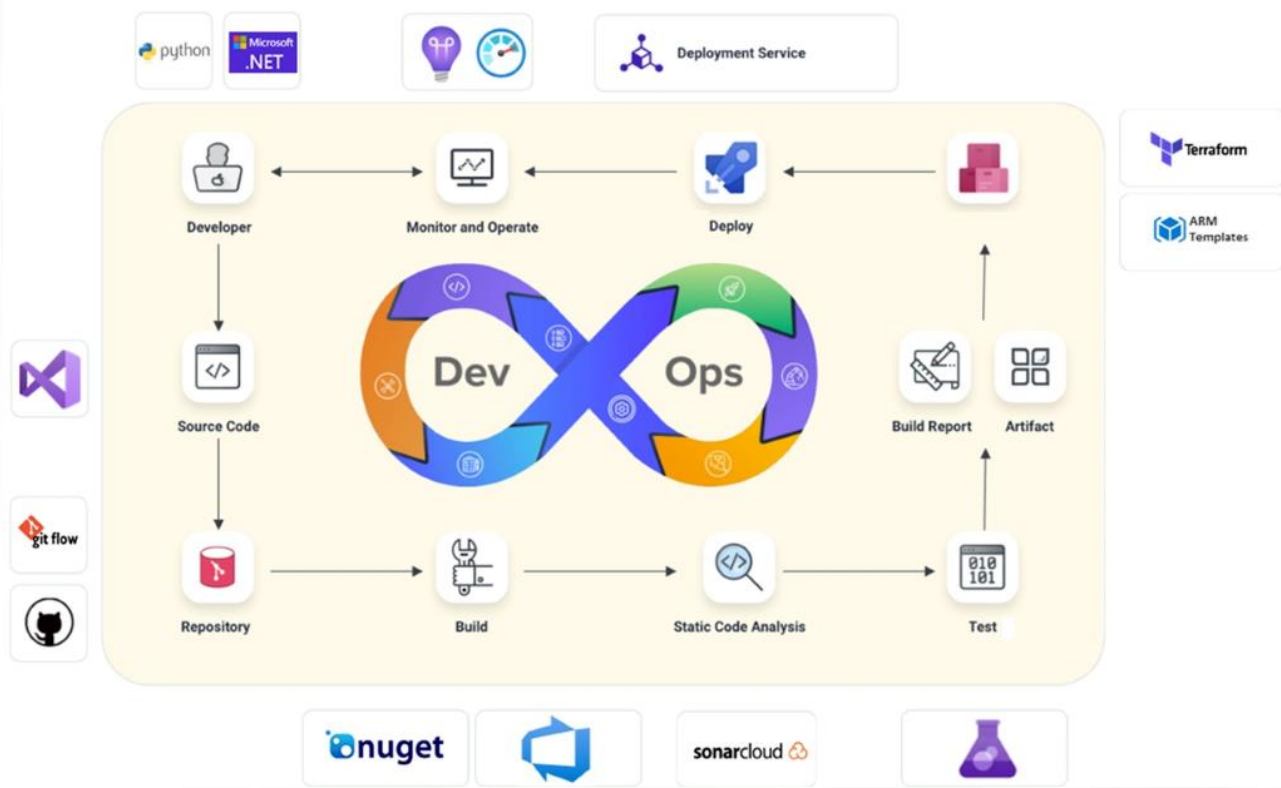
Policy-Based Management - Enables policy-based management for defining rules and restrictions on how keys, secrets, and certificates are used and accessed.

DevOps: Bringing it All Together

Product Roadmap



Roadmap Continuous Delivery



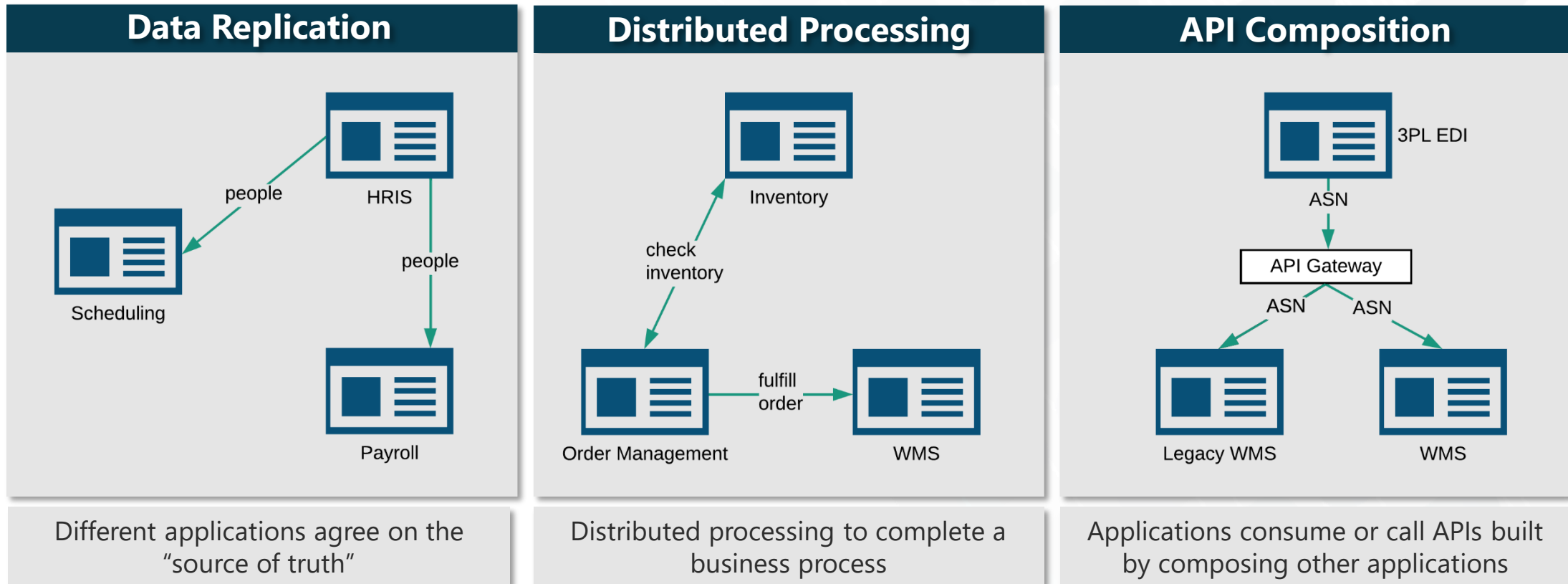
4

Integration Patterns with Azure Using Azure services for enterprise integration scenarios

The Three Most Common Integration Scenarios: **Data & Logic**

Integration is about making different applications and data structures work together, whether they are on-prem, cloud or external to an enterprise. More so, integrations move data so domain logic can be reused elsewhere.

Effectively, integration is about addressing three common workloads:

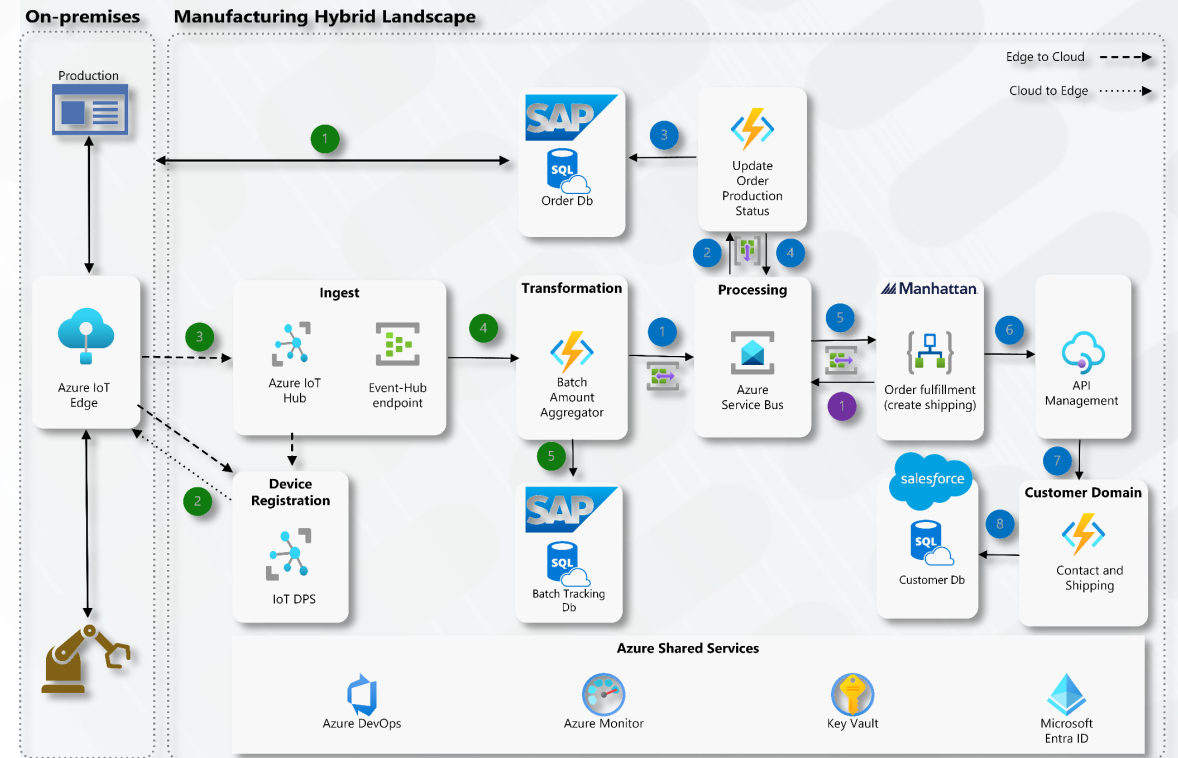


Demonstrating AIS Features in a Real-World Integration Scenario

Integration Platform Features

- **Event Handling**
 - Respond to messages immediately after delivery
- **Distributed Processing**
 - Distributed computational tasks across systems.
- **Business Activity Monitoring**
 - Real-time monitoring of key business activities
- **Operations Management**
 - Ensure that IT services meet the needs of the business
- **Governance**
 - Improve data reliability and re-use
- **Security**
 - Enforce security policy between all services

Azure Integration for Manufacturing



Commonly Used Integration Patterns (Woolf & Hohpe)



Messaging Endpoints

Event-Driven Consumer
Polling Consumer



Asynchronous Composed Messaging



Messaging channels include

Publish-Subscribe
Point-to-Point Channel
Guaranteed Delivery
Dead Letter Channel
Message Bus



Message Routing

Aggregator



Message Transformation

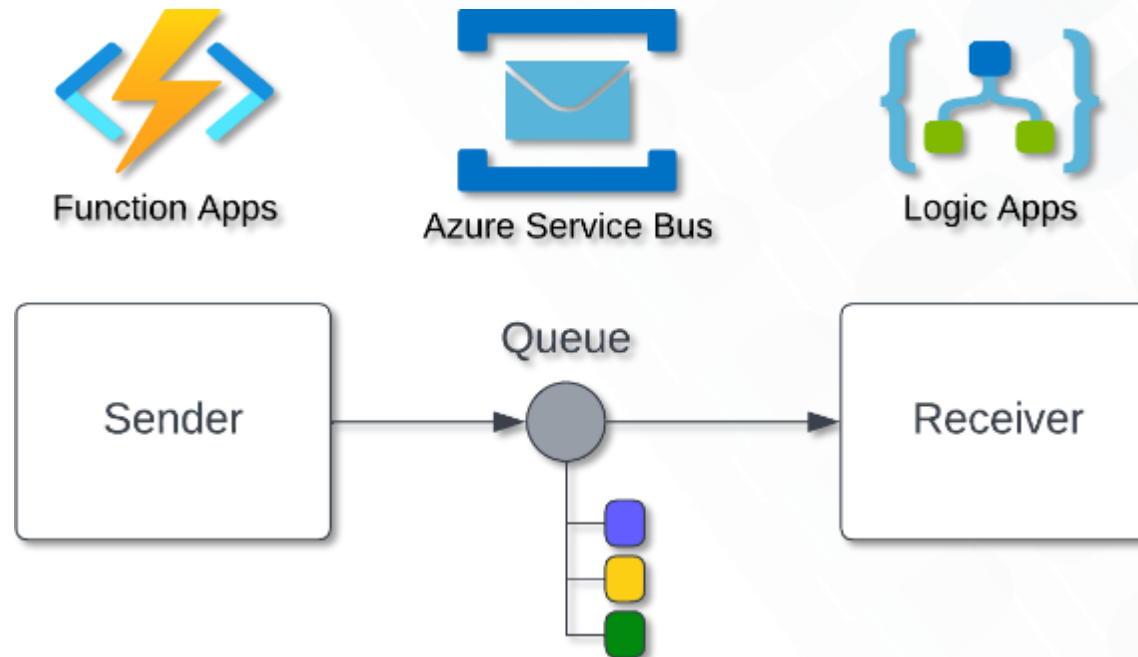
Canonical Data Model
Normalizer

Walkthrough what these communication and messaging patterns

- Benefit to modern integration scenarios.
- Reduce risk in complex integration scenarios
- They're ubiquitous to language or platform
- They're scalable and flexible through loose coupling and elasticity

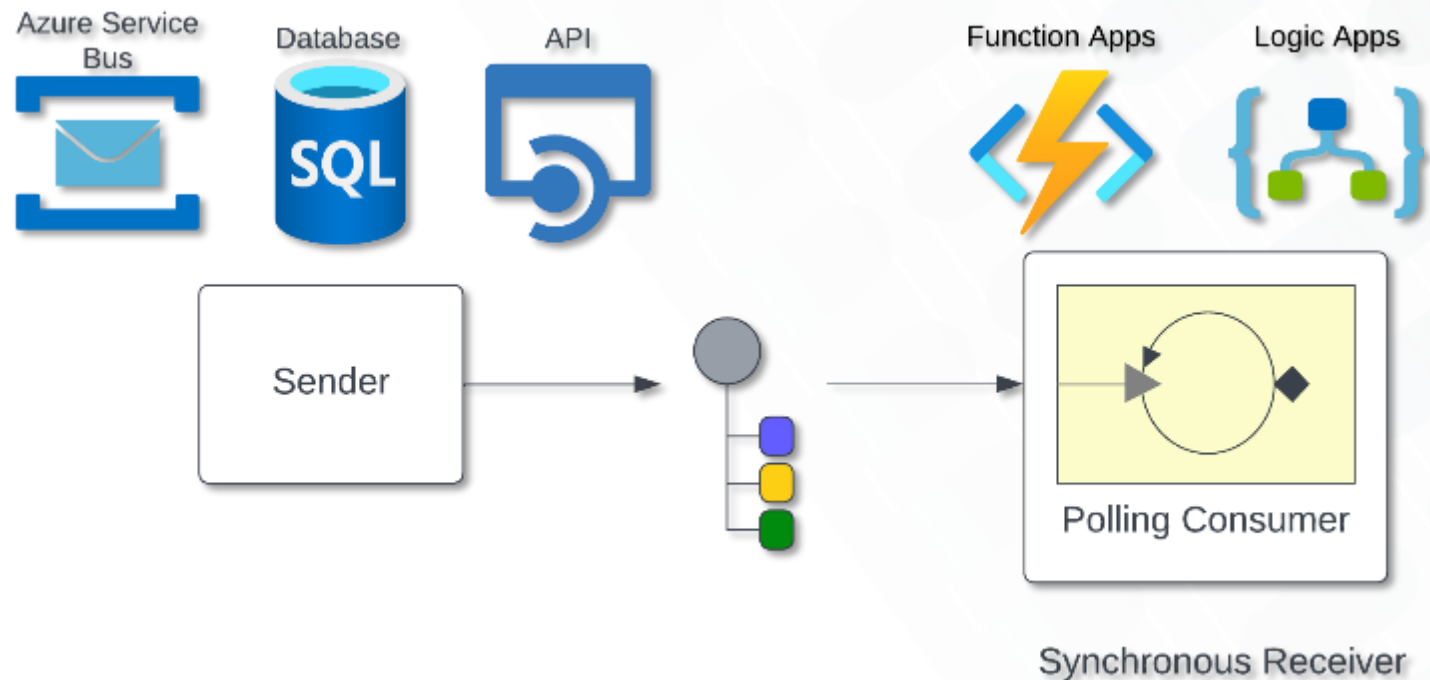
Asynchronous Messaging for Distributed Processing

- Loosely coupled communication where the sender and receiver of a message do not interact
- Messages are sent to a queue or topic by the sender and proceeds with operations
- The receiver retrieves and processes messages at its own pace.



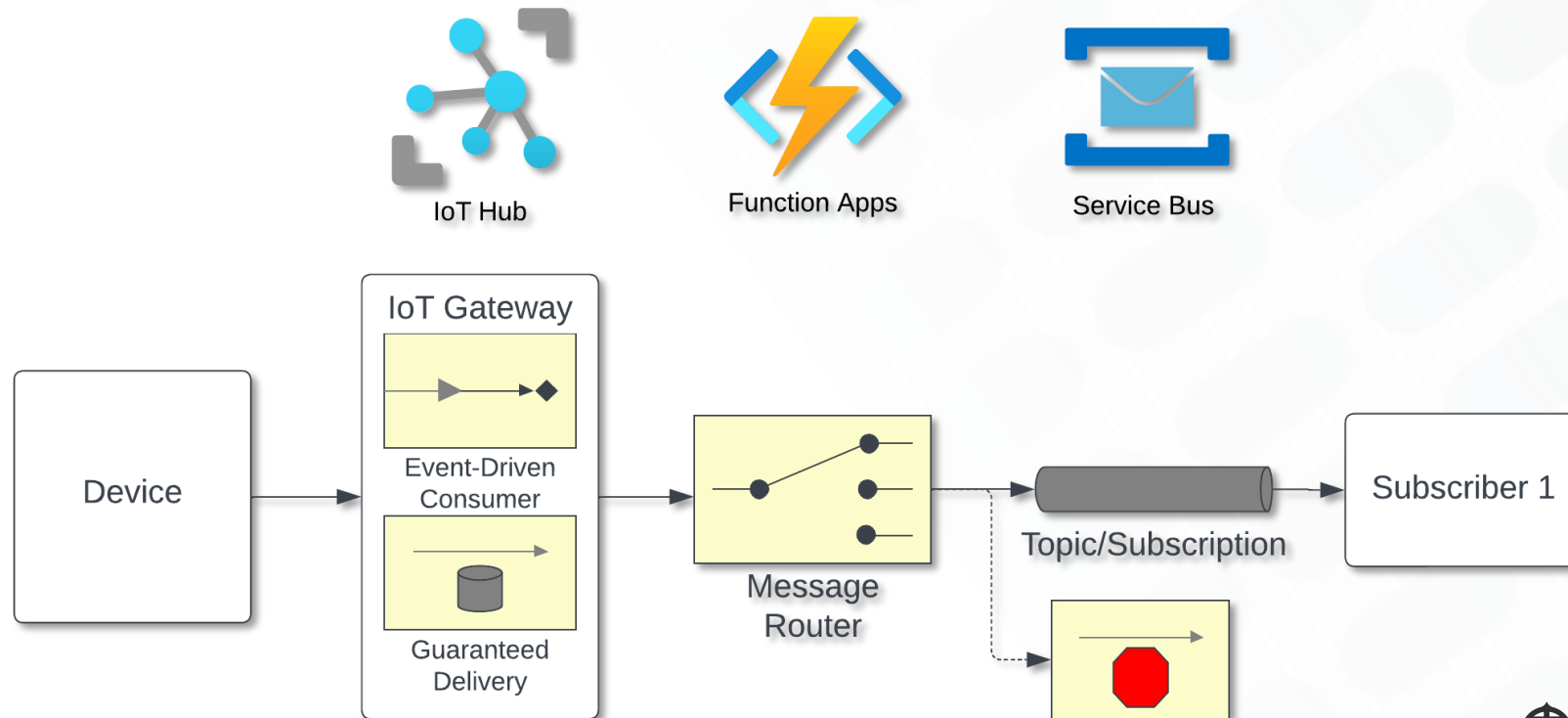
Messaging Endpoints: Event-Driven and Polling

- Loosely coupled communication where the sender and receiver of a message do not interact
- Messages are sent to a queue or topic by the sender and proceeds with operations
- The receiver retrieves and processes messages at its own pace.



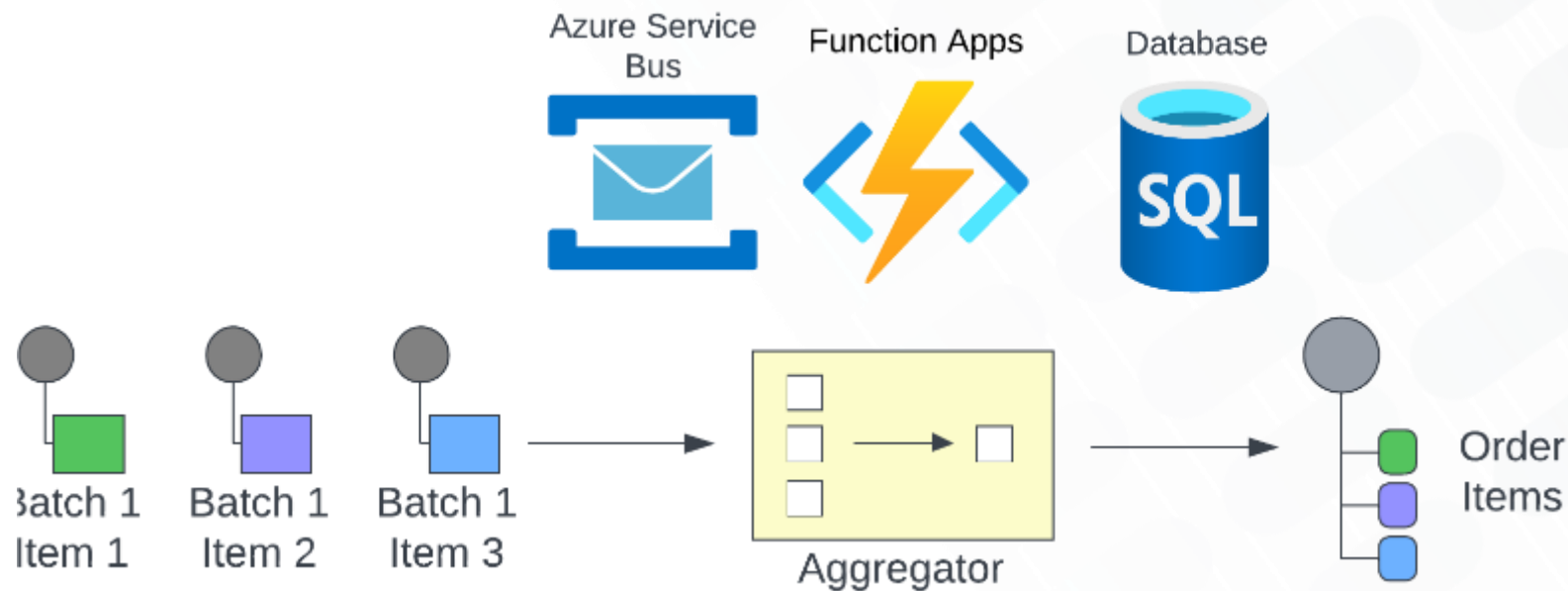
Messaging Channels: Pub-Sub, Point-to-Point, Dead Letter, Guarantee

- Conduit through which messages are transmitted between systems or components
- Decouple sender from one or more receivers of information
- Reliable and scale with support temporal load and recovery
- One- and two-way message acknowledgement for Quality of Service



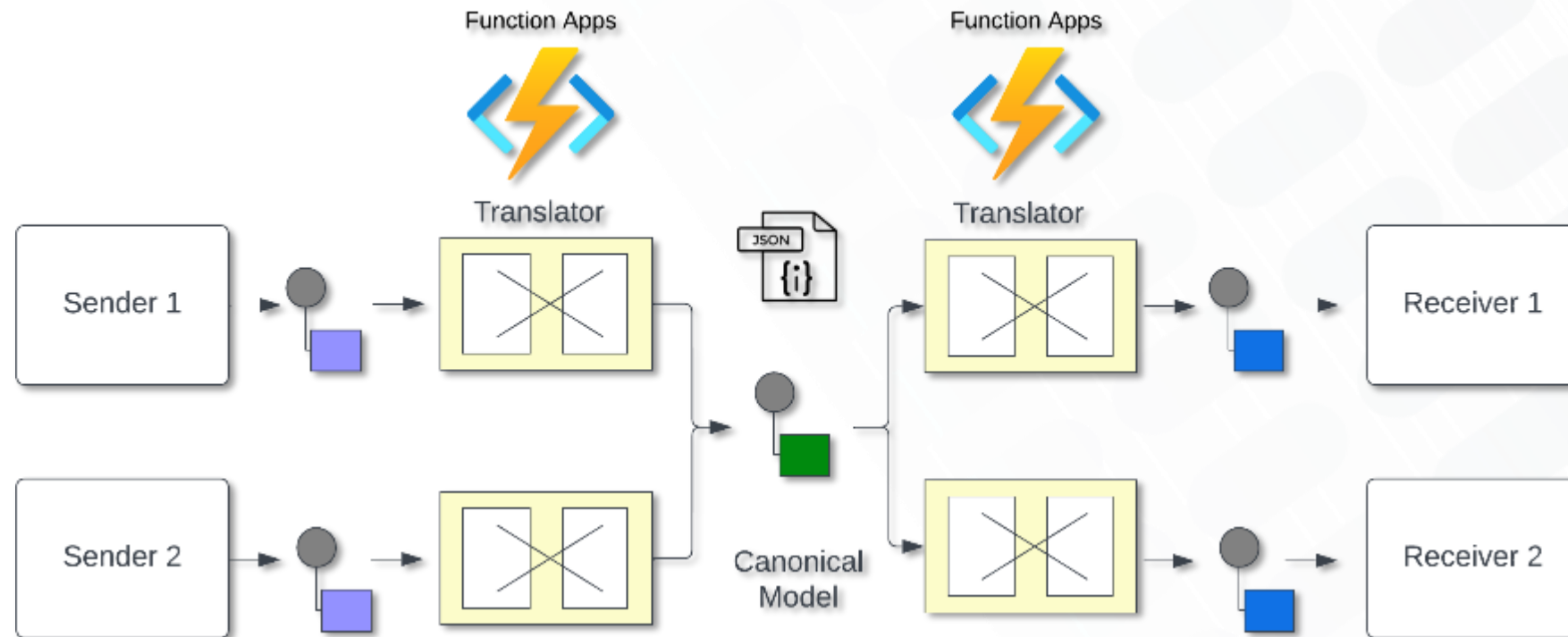
Message Routing: Stream and Correlate Messages for Aggregation

- Consolidate messages to meaning and efficient processing
- Improve messaging efficiency by reducing overhead associated with handling many messages
- Manage the temporal relationship among messages for certain time frames (i.e. production batches)
- Simplify integrations where multiple systems produce data that needs to be combined (i.e. customer order)



Message Transformation: Data Consistency through Domain Driven Design

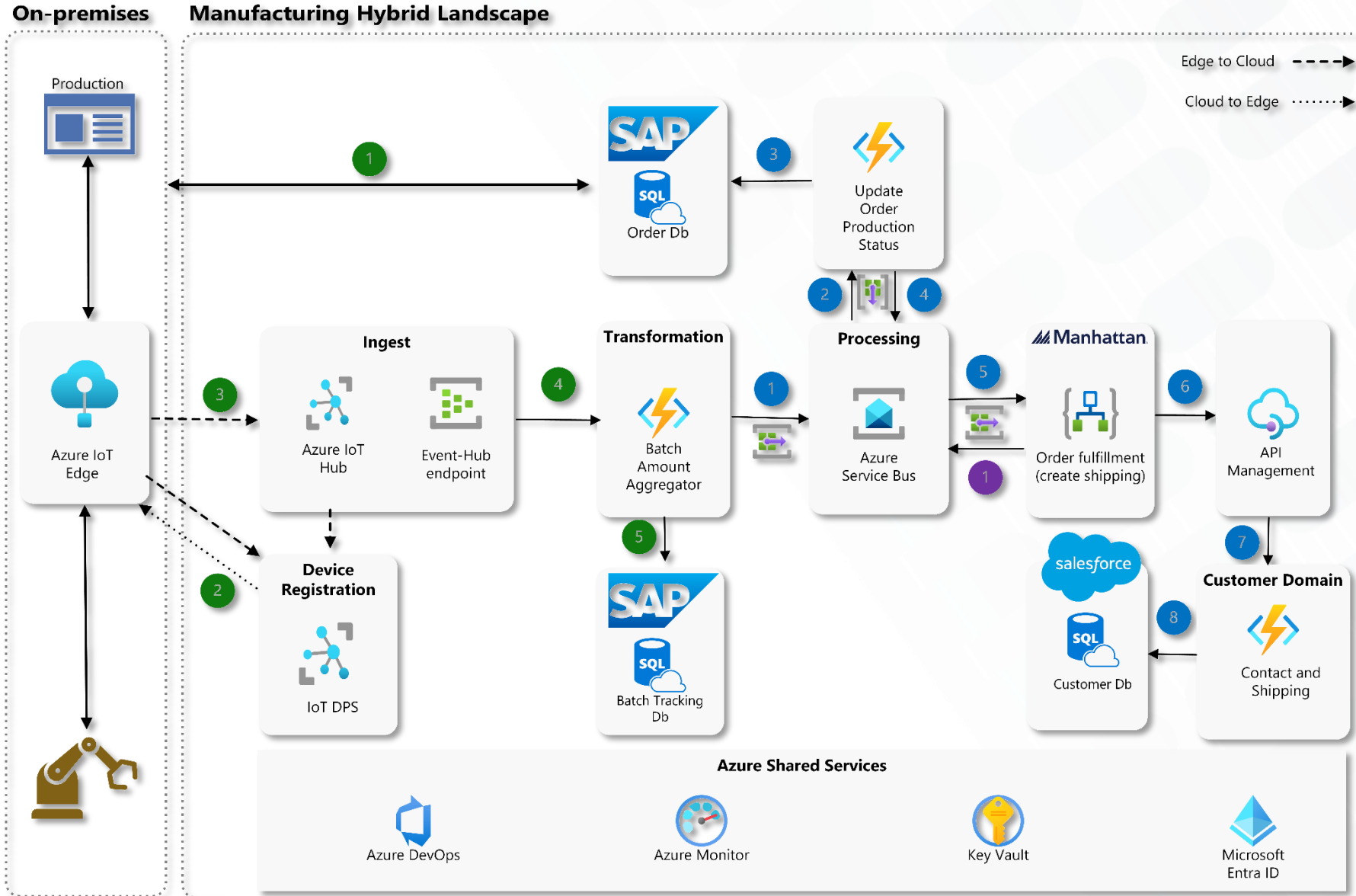
- Minimize dependencies when integrated apps use different formats
- Canonical data models are independent from any specific app.
- Loose coupling between app specific data and the integrated applications
- Model is implemented for the domain



5

Hands On Manufacturing integration use cases

Manufacturing Integration Architecture Use Cases



Use Case 1 - Event Consumption

- 1 Data from manufacturing systems & devices
- 2 Device registration
- 3 Events from IoT devices
- 4 Batch aggregation of events
- 5 Save inventory tracking data

Use Case 2 - Enrich Orders with Shipping Info

- 1 Publish aggregated batch totals notification
- 2 Subscribe to aggregated batch totals notification
- 3 Update batch manufactured amounts
- 4 Publish order completed notification
- 5 Subscribe to order completed notification
- 6 API customer request(s) to CRM via APIM
- 7 Secure requests proxied to external system
- 8 CRM endpoint fetches customer data

Use Case 3 - External Api Integration

- 1 Workflow publishes shipping notification

Webinar Questions and Follow-up: We look forward to working with **you!**



Contact Us

Mark Nielson

Vice President of Sales, US Manufacturing



+1 973-630-9417



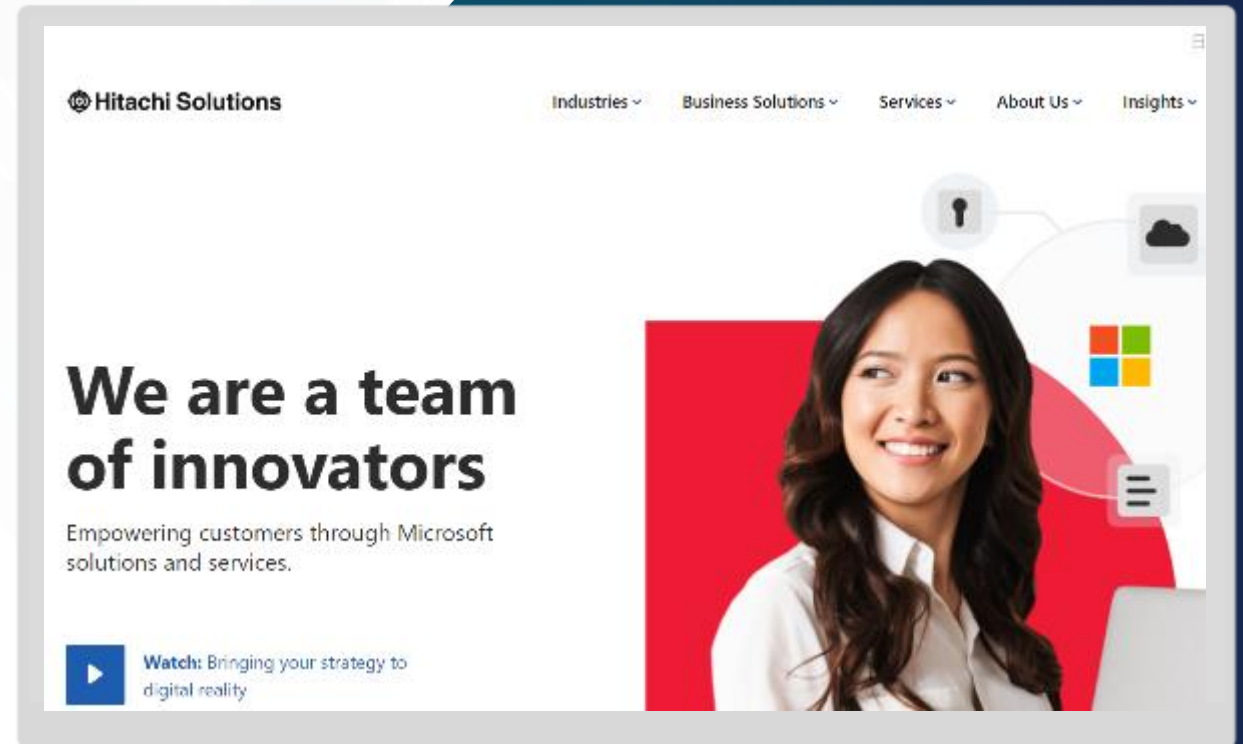
mneilson@hitachisolutions.com



[Mark Nielson | LinkedIn](#)

Thank you!

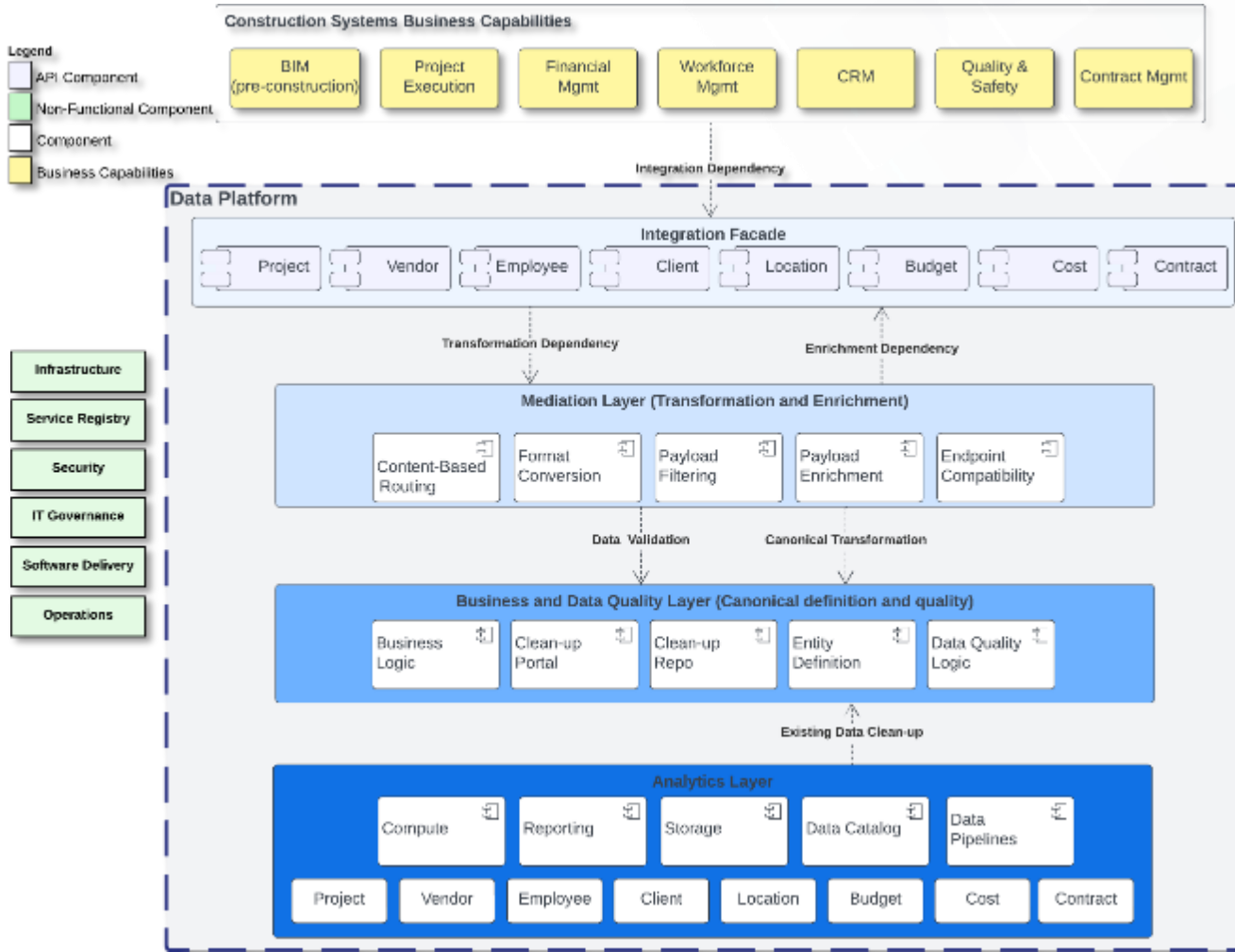
Learn more about Hitachi Solutions at:
global.hitachi-solutions.com



AEC Integration and Data Landscape Opportunity using Azure

AEC Industry wants construction specific integration and data products accelerators OOTB

- API products should reflect AEC industry master data
- Data mastering begins at the API to ensure quality at the source.
- APIs support Open API specifications that evolve with data governance and technology.
- Mediation needs to support synchronous or asynchronous integration patterns in a distributed system landscape.
- Integration features must support business logic to canonicalize, enrich, route or transform data payloads.
- Integration features must scale to include a Master Data Technology
- Analytics leverages clean master data for up-to-date and accurate information

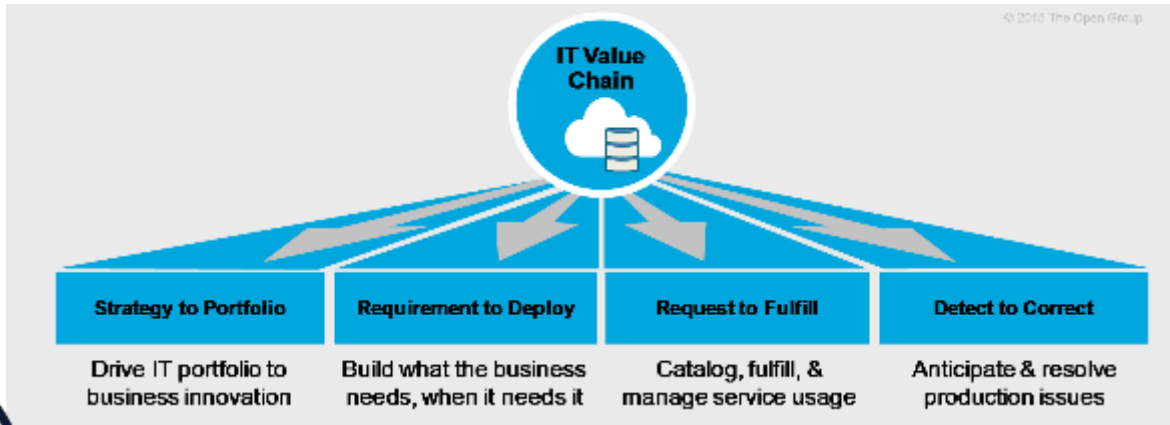


Modern Integration Platforms: Integration with Microservices

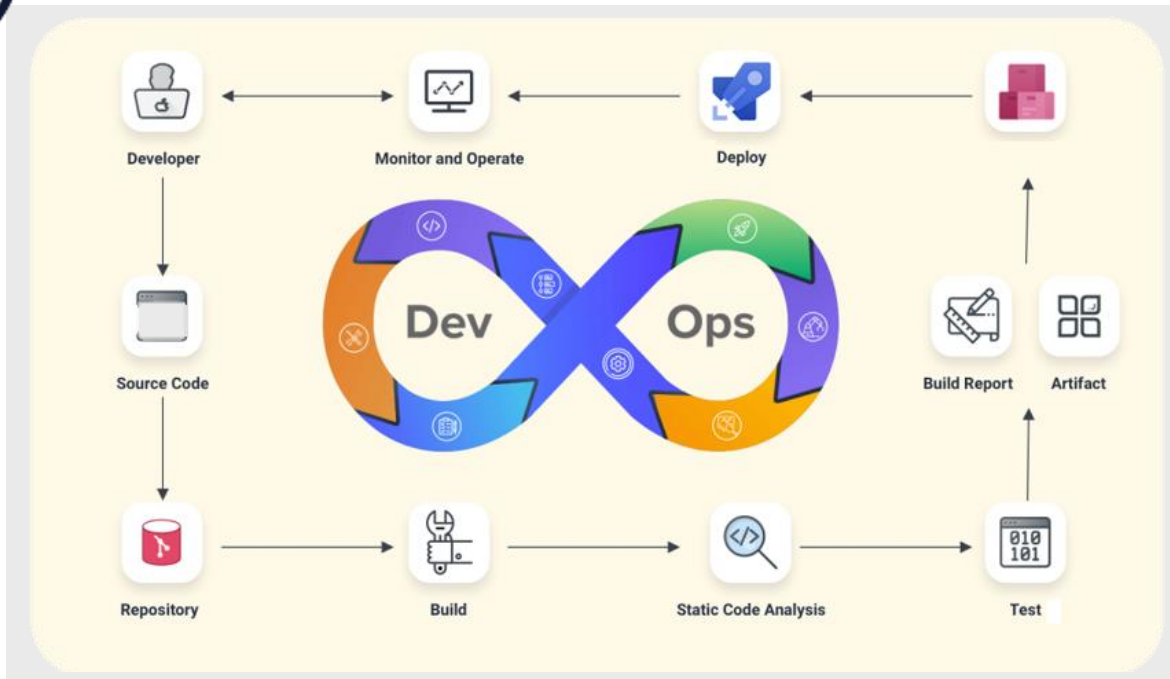
Azure Integration Services (AIS)

- Solve architectural challenges using AIS with service integration and API management
- Only use what is needed: reduce the dependency on centralized integration products
- Implement AIS to work with legacy applications with minimal disruption to business operations
- Improve service resiliency, development, discovery, governance and data management
- Organize services as core (i.e. data) versus transactional (i.e. process)
- Centralize and govern services through one central API gateway

Leverages DevOps for Development and Deployment



Tie IT Value Chain to DevOps



- Incorporate Dev Ops into IT value chain processes
- Enable continuous improvement through Dev Ops and developer velocity
- Manage change through workflow, approvals and role segregation
- Drive code resiliency through clean architecture, developer velocity and DevOps
- Automate unit, quality assurance and performance testing to minimize regression impacts.
- Develop and automate deployments for any environment (on-prem, cloud)
- Monitor the health of pipeline executions across environment
- Support for IaC including Terraform, Bicep and PowerShell

Azure Services – Common Attributes

All Azure resources have a wide array of common capabilities to facilitate common security, management, and interoperability. Some of those common capabilities are described below:



Security and Compliance - Helps organizations meet compliance requirements by providing granular, policy monitored, hierarchical role-based access control (RBAC), secure key management, and auditing capabilities.

Encryption and Secure Networking – Azure Resources have common capabilities for encryption of data at rest and in transit as well as secure networking and firewall capabilities for completely secure communications.

Monitoring and Diagnostics - Provides monitoring capabilities for resource status, resource processing, application logging, access logs, and other metrics. Integrates with Azure Monitor for more in-depth analysis.

Analytics - for collecting and analyzing manufacturing application log data, enabling powerful query capabilities and insights into system diagnostics and behavior visualization.

Fine Grained Access Control – Azure Active Directory combined with Identity and Access Management provides a consistent mechanism for controlling access to all Azure resources

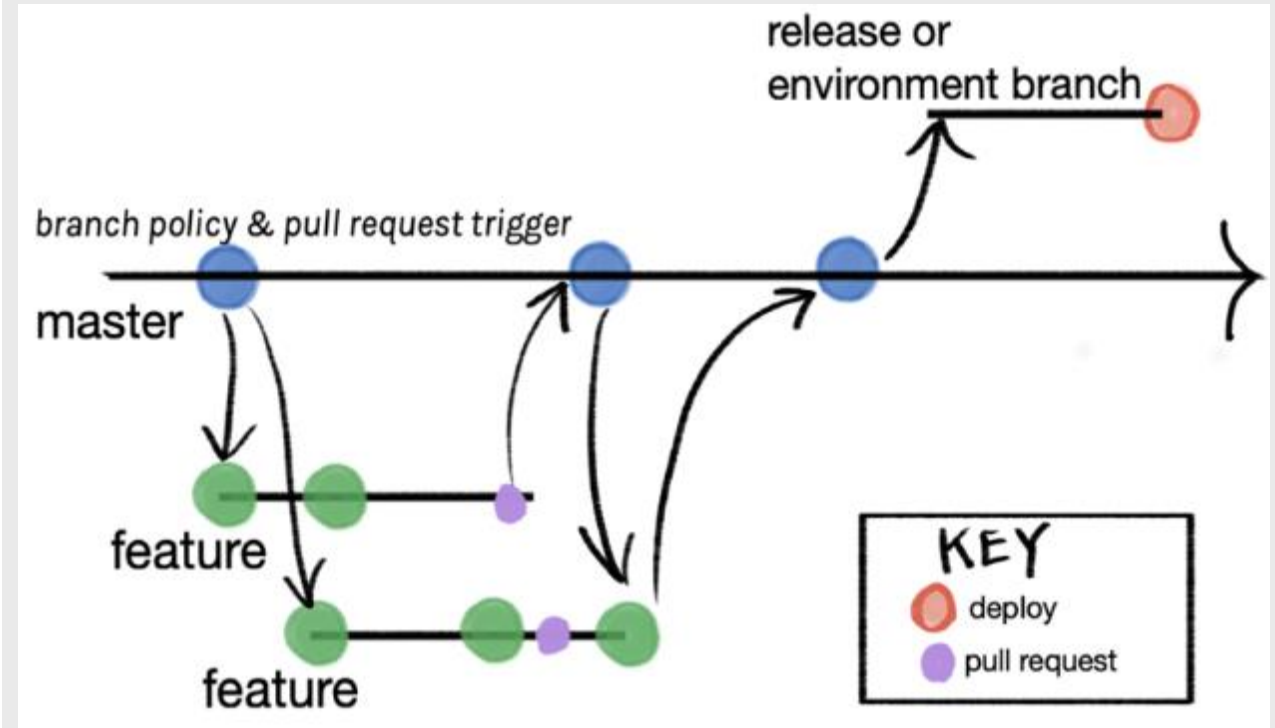
Integration with Azure Services – services seamlessly integrate with other Azure services for simple and consistent facilities for security, communication, tracking, cost management, and analytics.

Continuous Integration: Branching Strategy

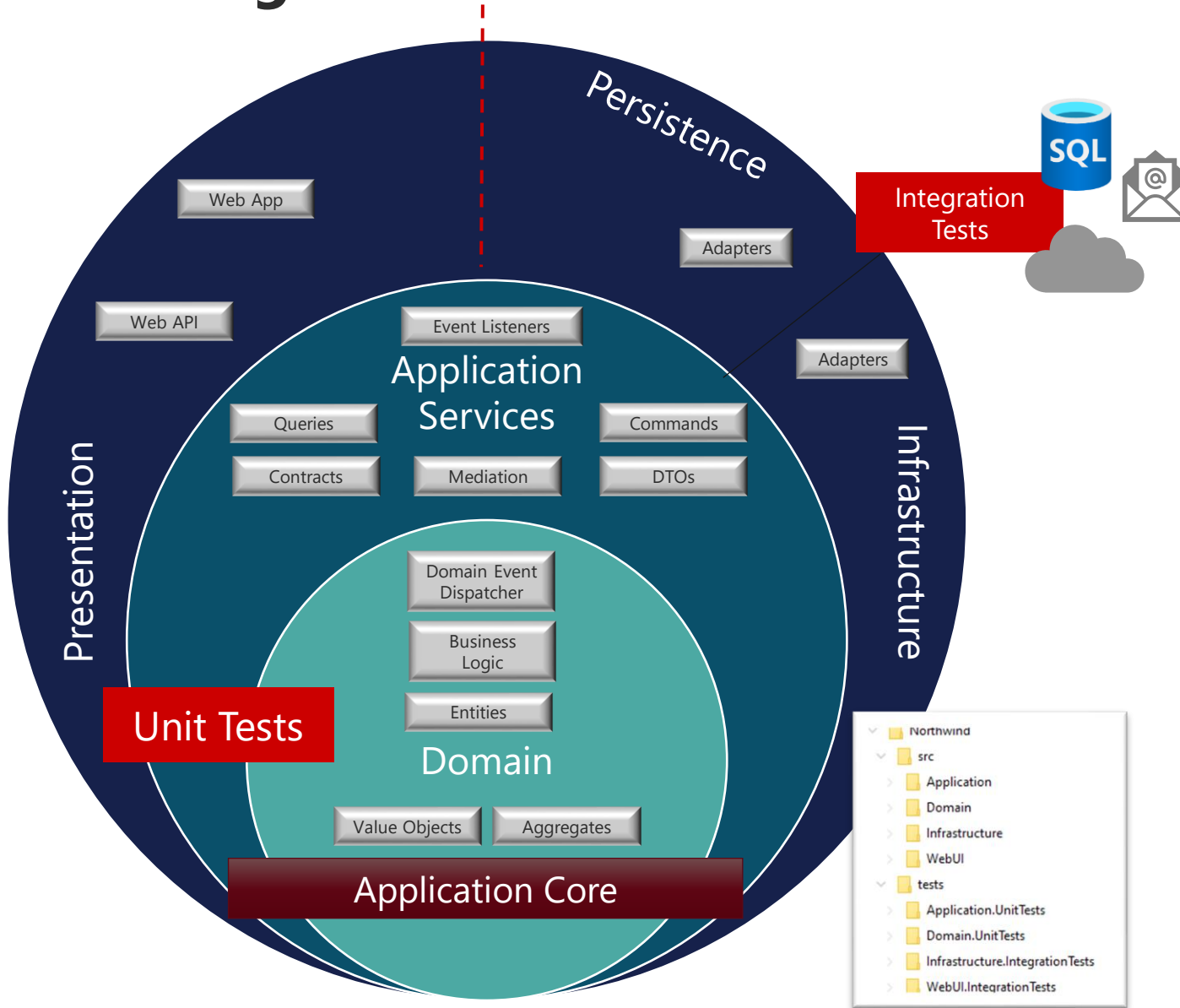
A **Branching Strategy** is something a data engineering team uses when interacting with version control system for writing and managing code. It focuses on how code branches are used in the analytics development process

DevOps is focused on creating a fast, streamlined and efficient workflow with focus on quality of the deliverable. A key **Benefit** to a properly implemented branching strategy is foundational to an efficient DevOps process.

- Many approaches to DevOps Branching strategies but recommend **Release flow**
- Branch strategy selection supports the number of simultaneous developers through feature branches
- Branch strategy protects the release code from other code in early stages of development
- Team consensus (pull request) to merge feature branches into master and release
- Branch strategy enables code fixes even while development is occurring



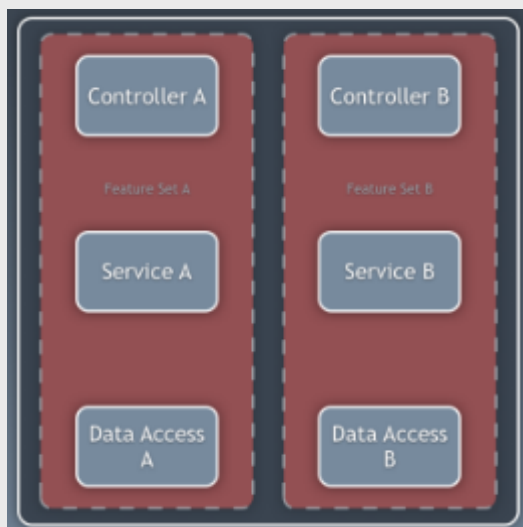
Enabling Microservices: Domain Driven Design and Clean Architecture



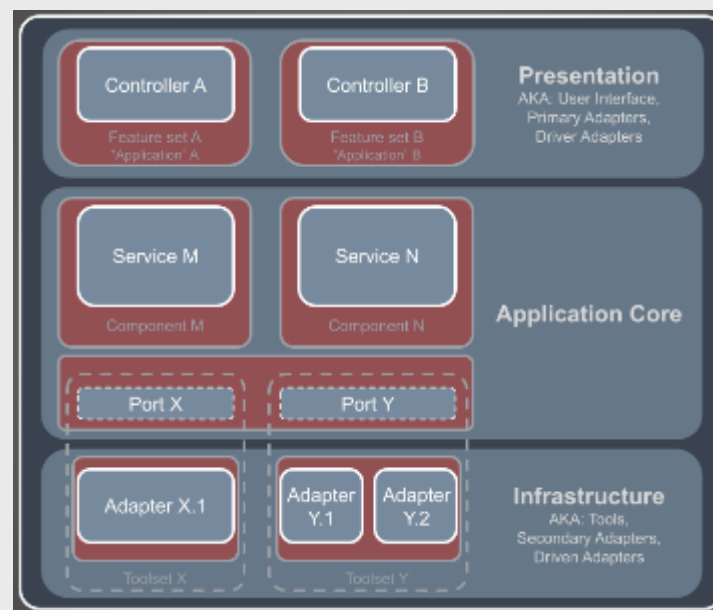
- SOLID software design principles to allow for code evolution (abstraction) and reduce regression impacts (loose coupling). *"Simply put, change one area of software without impacting others"*
- Use Clean Architecture to implement SOLID. I.e. Dependency Inversion principle by abstracting dependencies through interfaces, thus inverting compile time dependencies.
- Microservices should follow Domain Driven Design (DDD) specifically Bounded Context which is a central pattern to DDD.
- Each module that represents a context is separated from other contexts (bounded context), so they can evolve independently as business needs change.
- Unit testing and mocking are paramount to mitigating regression risk (bugs) as business requirements evolve.

Clean Architecture: Package by Component or Component

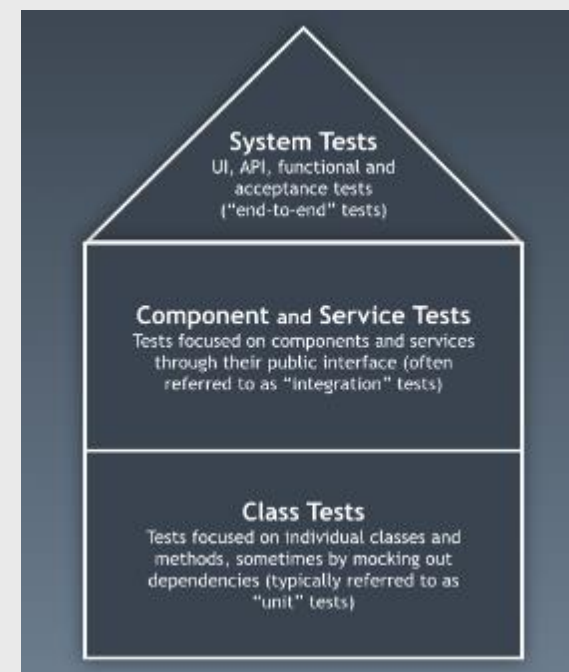
Feature Sets



Feature Sets and Code Segregation



Architectural Aligned Testing



Hitachi Integration Platform: Why Hitachi Solutions and How do we work?

Why Hitachi Solutions:

Hitachi Solutions is a global systems integrator specializing in Microsoft solutions. They offer advisory services, implementation excellence, and support for data and business system integration initiatives.

The Value:

Our Azure and Power Platform experts assist customers with application modernization, development, and integration. We prioritize a cloud-first approach, using best practice architectures, and feature accelerators. For specific business needs, we deploy fully-managed software and custom cloud solutions for PaaS and IaaS. We emphasize governed implementations to ensure business problems are solved securely. Leveraging low-code and cloud native solutions, Hitachi Solutions creates scalable, sustainable solutions that maximize user adoption.

The Outcomes:

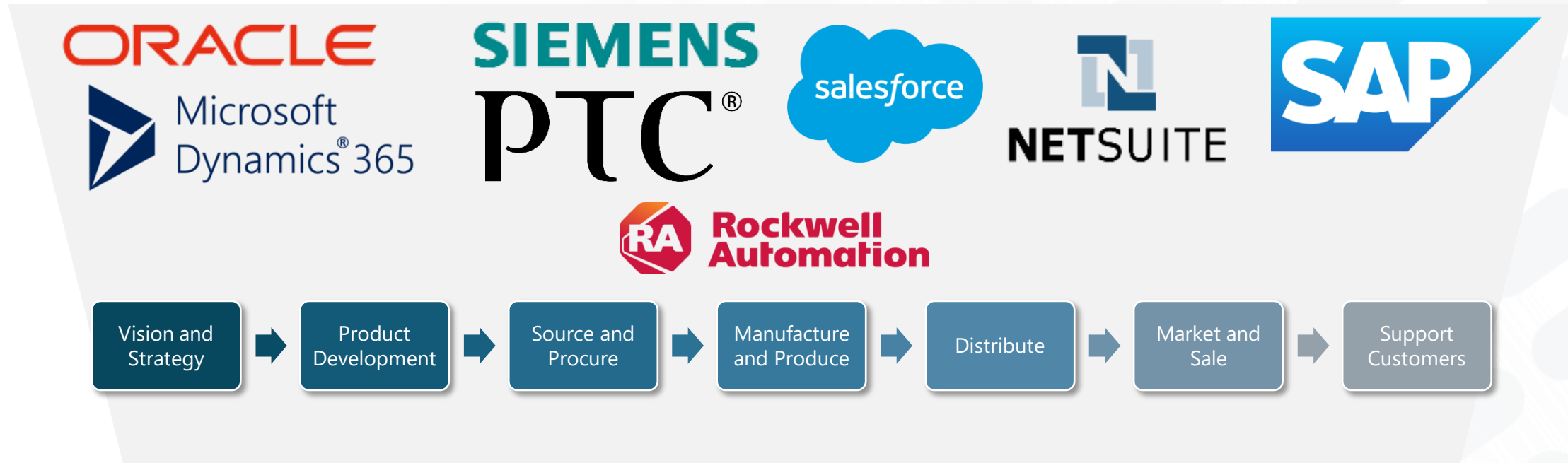
Our goal is to craft and then execute on a clear-cut plan to successfully integrate cloud and on-prem workloads in Azure. We follow a defined, tried and tested path for optimal integration paths in enterprise of all sizes and complexity levels.

Engagement Persona Focus:

Hitachi Solutions integration engagements focus on technical integrators including

- Data & Integration VP
- Director of Software Development
- Integration Developers
- Solutions Architects
- Quality Assurance Leads
- Network Administrators

Integrating with Best-of-Breed Manufacturing Business Systems



- Favors best-of-breed business applications that don't talk together
- Complex integration needs legacy systems, IoT, large supply chains, etc.
- Disparate processes along its value chain cause integration complexity
- Process complexity can increase decision time and inaccurate data
- Interoperability challenges between systems

We look forward to working with **you!**



Contact Us

Mark Nielson

Vice President of Sales, US Manufacturing



+1 973-630-9417



mneilson@hitachisolutions.com



[Mark Nielson | LinkedIn](#)