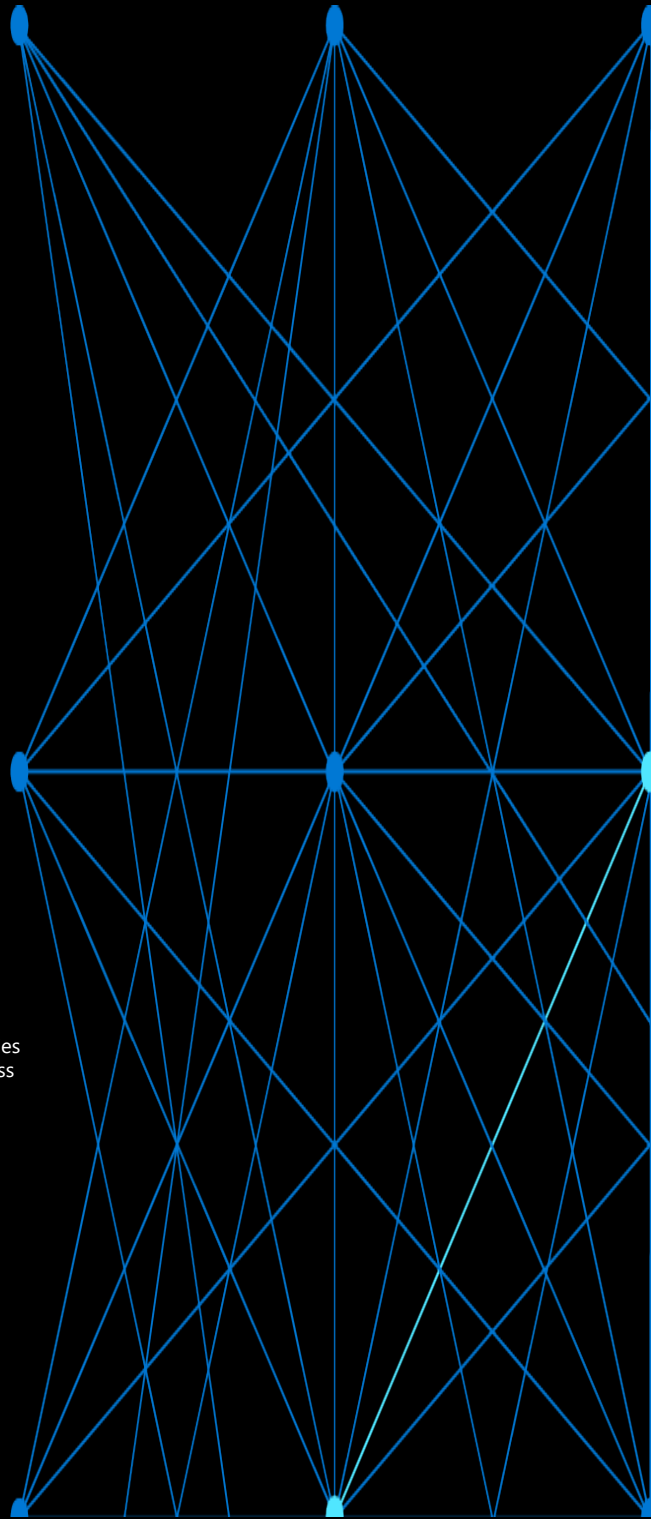




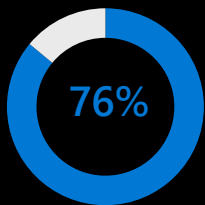
# Enable AI solutions using Cloud Adoption Framework for Azure

The Microsoft Cloud Adoption Framework (CAF) for Azure is a collection of documentation, technical guidance, best practices, and tools that aligns strategies for business, organizational readiness, and technology to enable desired business outcomes faster and adopt the cloud with confidence.

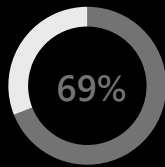


# 76% of CEOs consider Digital Transformation their #1 priority

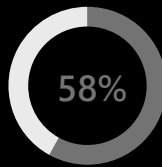
Trends that will transform business over the next five years



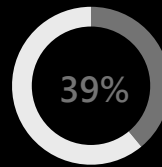
Technological  
advances



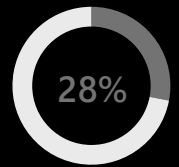
Demographic  
shifts



Shift in global  
economic power



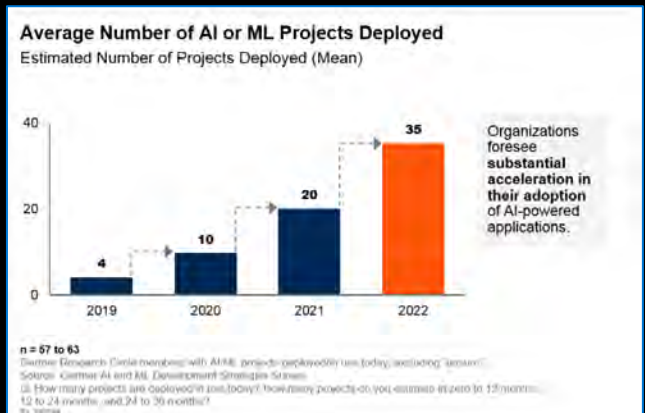
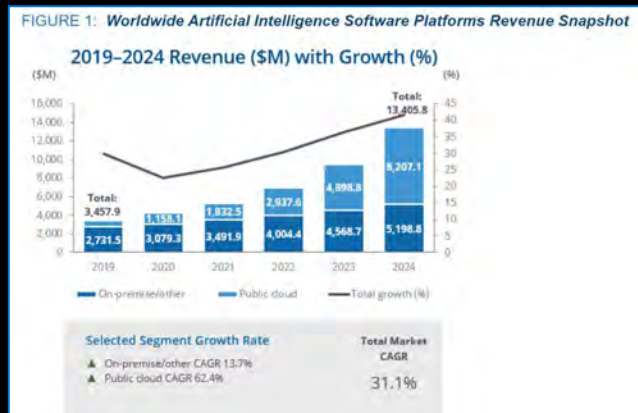
Resource scarcity  
& climate change



Urbanization

Source: PWC CEO Survey

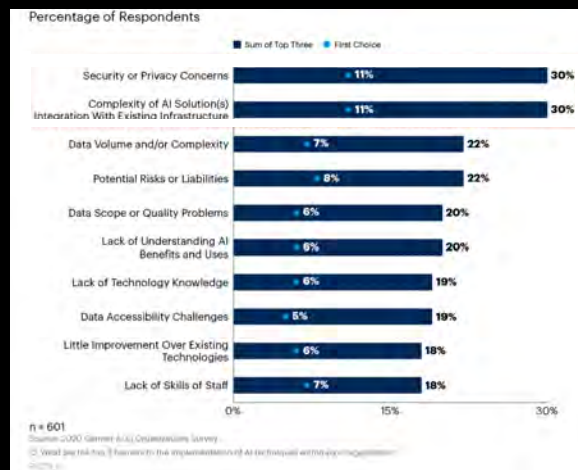
# Organizations foresee accelerated AI adoption



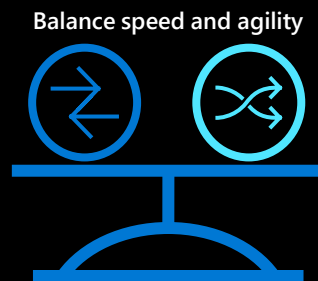
Microsoft Cloud Adoption Framework for Azure

# But there are challenges to AI adoption

## Top 10 barriers to AI implementation

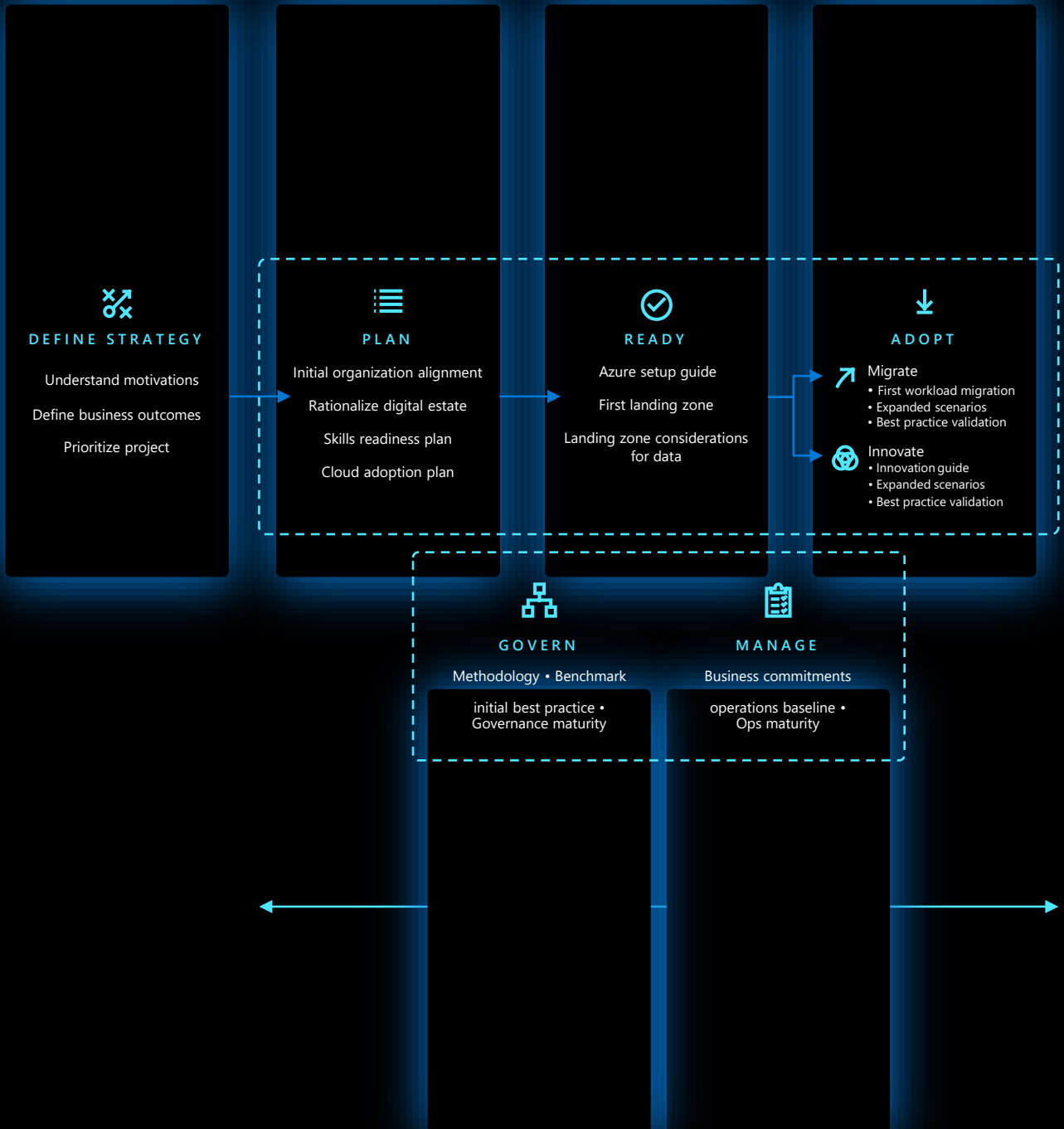


# Cloud Adoption Framework for successful AI adoption



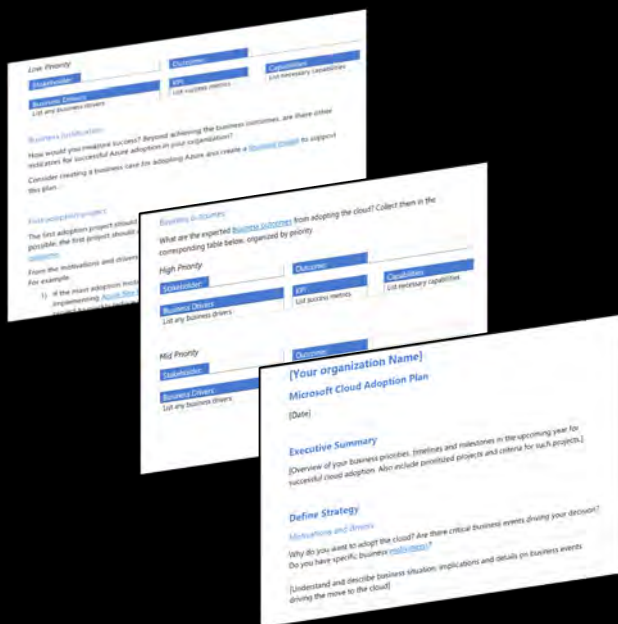
Align **process, people, and technology strategy** with **actionable, efficient, and comprehensive** guidance

# Enable AI Solutions



# Microsoft Cloud Adoption Framework for Azure (1 of 4)





## Define your strategy

To take full advantage of what cloud has to offer you need to [define a strategy](#)

To effectively define a strategy you need to document a strategy

Use the [cloud adoption plan template](#) to build out your cloud adoption strategy, and to track the output of each of the steps outlined above.



# Understand your motivations for cloud adoption

Business transformations that are supported by cloud adoption **can** be driven by various motivations. They are classified broadly into two main categories: **Migration** and **Innovation**.



## MIGRATION

- Cost savings
- Reduction in vendor or technical complexity
- Optimization of internal operations
- Increase business agility
- Prepare for new technical capabilities
- Scale to meet market or geographic demands

Infrastructure | Applications | Data | AI



## INNOVATE WITH AI

- Improve customer experiences or engagements
- Transform products or services
- Disrupt the market with new products or services
- Gain insights to drive business decisions
- Optimize operations through automation

# Define business outcomes

Engage different stakeholders and document desired outcomes across these categories

Outcomes-based scenarios		
	<b>Fiscal outcomes</b> Increased revenue, savings in total cost of ownership	Real-time product recommendations Call center inquiry deflection with chatbots
	<b>Agility outcomes</b> Faster time to decision and actionable results	Document process automation Contact center experience improvement Defect detection and product quality
	<b>Reach outcomes</b> Data democratization and empowered employees	Field service optimization, enabling knowledge workers
	<b>Security &amp; Compliance</b> Regulations addressed and implemented	Reduce risk by automating audit and compliance

## AI use cases by industry (1 of 3)



### Manufacturing

#### PREDICTIVE MAINTENANCE

Prevent unexpected downtime by empowering manufacturers to determine when equipment will require maintenance

#### INTELLIGENT SUPPLY CHAIN

Combine sensors, networks, and ambient intelligence to deliver the right product and service at the right time and margin—simplifying the delivery of complex product portfolios and services

#### FACTORY OF THE FUTURE

Augment industrial automation with Internet of Things (IoT), cloud-based computing, artificial intelligence (AI), and mixed reality to drive new levels of productivity and innovation with the assets and people you already have.



### Healthcare provider

#### PROCESS AUTOMATION

Automate error-prone, manual tasks like form entry and free up your staff to focus on higher value tasks

#### DIGITAL ENGAGEMENT

Engage customers and employees digitally through chatbots and conversational experiences to help triage and enable customers to self-serve

#### COMPLIANCE ANALYTICS

Proactively identify regulatory risks and workflow efficiencies, such as misuse of patient data or the theft of controlled substances

## AI use cases by industry (2 of 3)



### Consumer goods

#### DYNAMIC PRICING

CPG companies use price optimization to track customer behavior through multiple data points and variables, so they can price goods according to dynamic customer, business and market conditions.

#### PROCUREMENT ANALYTICS

Current technology allows IoT and event processing across multiple connected devices to enable the collection and analysis of vast amounts of data to evaluate, purchase and track shipments from point of origin to manufacturing locations.

#### NETWORK VISIBILITY

Data sharing across the supply chain and constant real-time monitoring enables CPG companies to identify cost reduction opportunities, perform demand analysis and rapidly troubleshoot line-down issues.



### Retail

#### DIGITAL CUSTOMER ENGAGEMENT

Interact with and support your customers digitally with conversational experiences

#### PERSONALIZATION

Deliver more personalized experiences for your customers to improve satisfaction, and provide better recommendations of offers and products to increase sales

#### DEMAND FORECASTING

Improve demand predictions to reduce costs of excess inventory or missed sales due to out-of-stock products

## AI use cases by industry (3 of 3)



### Insurance

#### CUSTOMER ANALYTICS

Obtain a 360-degree view of policyholders with data about customer behavior across multiple channels and personalize the customer experience

#### FRAUD DETECTION

Counter evolving fraud schemes with a modernized approach that detects anomalies across multiple channels and enables predictive modeling for rapid insight.

#### CLAIMS ANALYTICS

Create efficiencies with predictive analytics and self-service models that streamline underwriting and issue policies faster.

#### RISK ANALYTICS

Analyze large sets of disparate data to optimize your portfolio while enabling rapid responses and addressing regularity complexity.



### Banking

#### FRAUD DETECTION

An explosion of data is driving the need for more scalable analytics solutions that can detect fraud schemes and provide rapid insights across channels and enterprise.

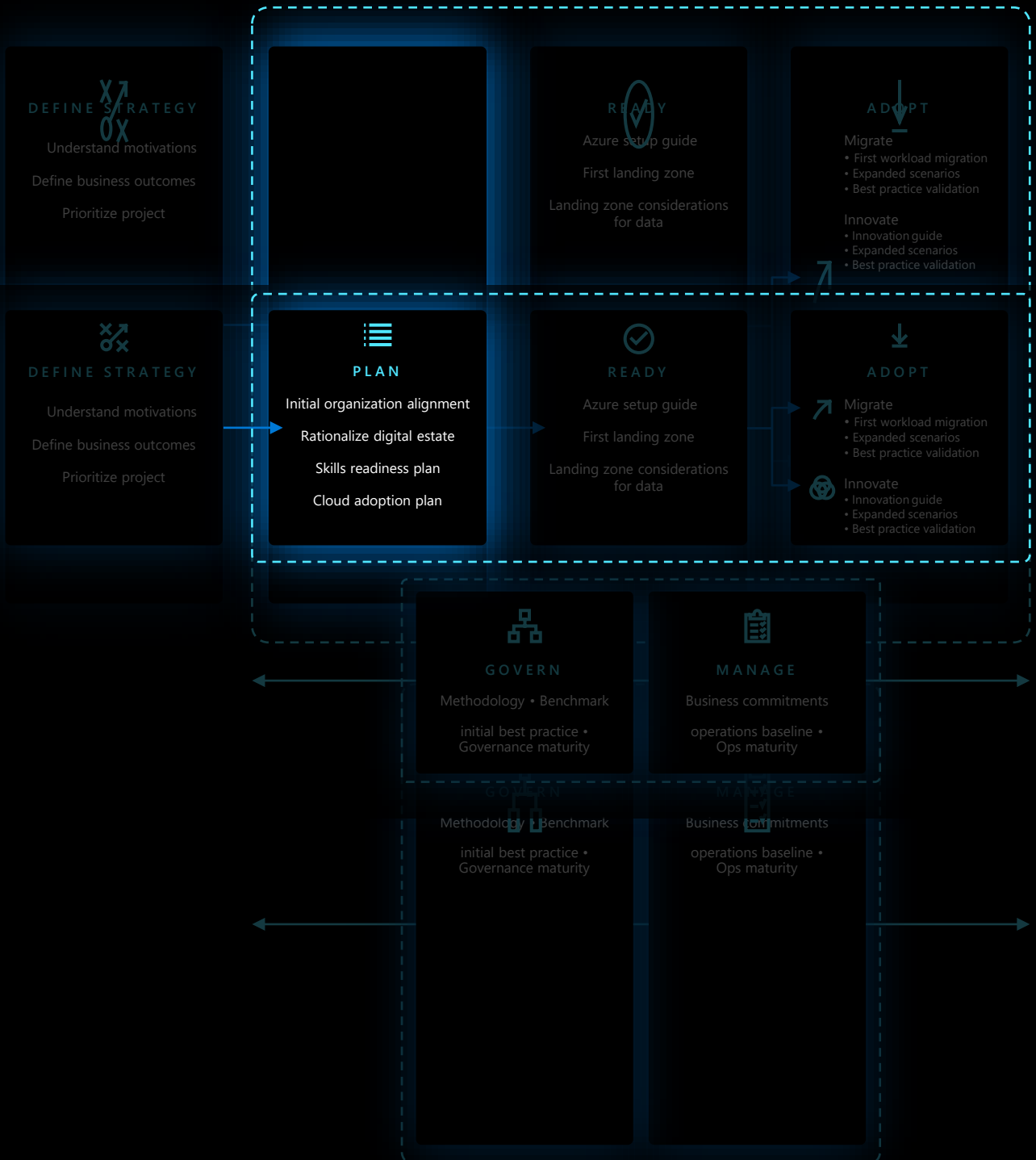
#### PERSONALIZATION

More users are interacting in more ways; understanding those customers from multiple data sources and using that knowledge to personalize shopping experiences is vital.

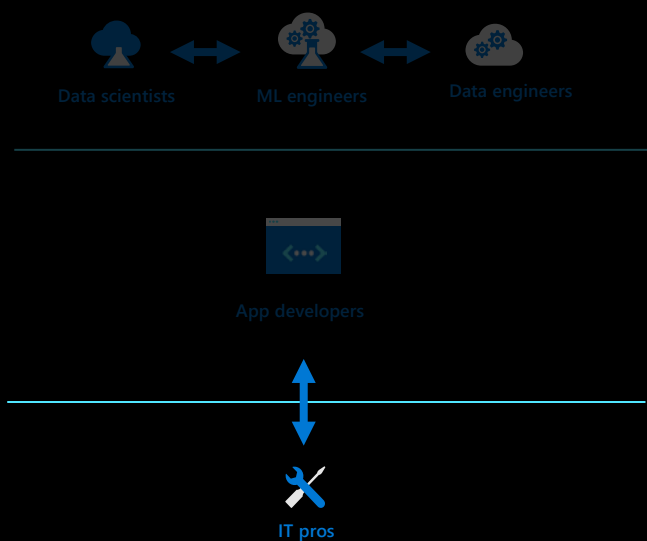
#### RISK MANAGEMENT

The complexity of access control and encryption is growing; data and AI can collect and analyze disparate simultaneous risks while using built in governance capabilities to ensure compliance with regulatory frameworks.

# Microsoft Cloud Adoption Framework for Azure (2 of 4)



# Key personas for cloud AI adoption



## Data scientist (Machine learning)

Proofs of concept are built rapidly in one of multiple languages (Python, R, Spark, etc.) and resources are provisioned as necessary

## ML Engineer (ML Ops)

Increase the pace of model development, deployment via monitoring, validation, and governance of ML models

## Data Engineer (Data integration and discovery)

Multiple sources and types of data are defined and connected. Key activities include data ingestion and data discovery

## App Developer (Development)

Access to data on cloud and hybrid configurations is secure and privacy requirements are enforced

## IT Pro (Management & security)

Access to data on cloud and hybrid configurations is secure and privacy requirements are enforced

# Skills readiness plan



Cloud computing is a technology shift and a new set of skills are required to support cloud solutions.

1.

## Identify the gaps...

List Cloud Responsibilities

Identify best aligning teams

Responsibilities that span teams are opportunities for better alignment

Identify skills necessary for each responsibility..

2

## Look across teams...

Skills often not confined to a single role or department.

Skills may have dependencies that span roles

Dependencies represent new processes and workflows

Identify the roles that will execute these skills

3

## Establish new teams...

A Cloud Operations team

Evolve beyond the Cloud Adoption and Governance teams as needed

Central IT may take on the role of scaling cloud adoption and reassessing tools and processes

A Cloud Center of Excellence

**Microsoft Learn**

[Azure Fundamentals](#)

[Azure AI Fundamentals](#)

[Azure Data Scientist](#)

[Azure Devops](#)

Use the [RACI Charts](#) to align responsibility and accountability across each team.



# Additional Considerations



[Balancing competing priorities](#)

[Balancing the portfolio](#)

[Define the monitoring strategy](#)

[Define security strategy](#)

[Define your Responsible AI Framework](#)

[Skills Strategy](#)

# Microsoft Cloud Adoption Framework for Azure (3 of 4)



# Azure setup guide



<https://aka.ms/adopt/setupguide>

Step-by-step guidance to help admins plan, set up, and secure Azure for your organization

## ORGANIZE RESOURCES

Set up a management hierarchy to consistently apply access control, policy, and compliance to groups of resources and use tagging to track related resources.

## MANAGE ACCESS

Use role-based access control to make sure that users have only the permissions they really need.

## MANAGE COSTS AND BILLING

Identify your subscription type, understand how billing works, and see how you can control costs.

Plan for governance, security, and compliance  
Enforce and automate policies and security settings that help you follow applicable legal requirements.

Use monitoring and reporting Get visibility across resources to help find and fix problems, optimize performance, or get insight to customer behavior.

## STAY CURRENT WITH AZURE

Track product updates so you can take a proactive approach to change management.



Management groups



Subscriptions



Resource groups



Azure  
Cognitive Services



Azure  
Bot Service



Azure  
Cognitive Search



Azure  
Machine Learning

Resources



## Prepare first landing zone

Landing zone is the environment that is provisioned to host workloads being migrated from an on-premises environment into Azure.

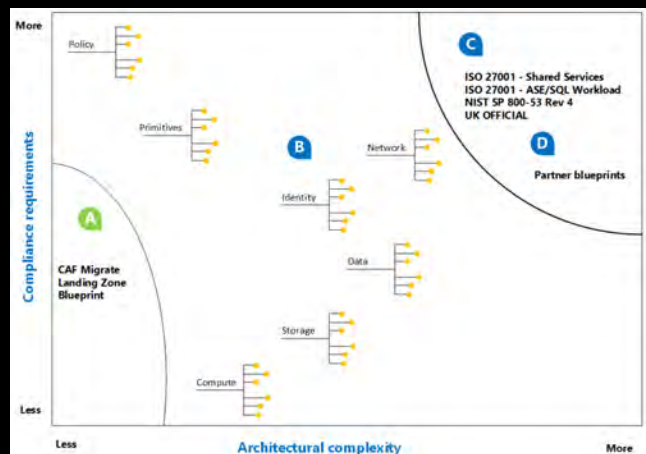
These blueprints create a base landing zone which can be customized to meet your specific needs.

[CAF Migration landing zone blueprint](#)

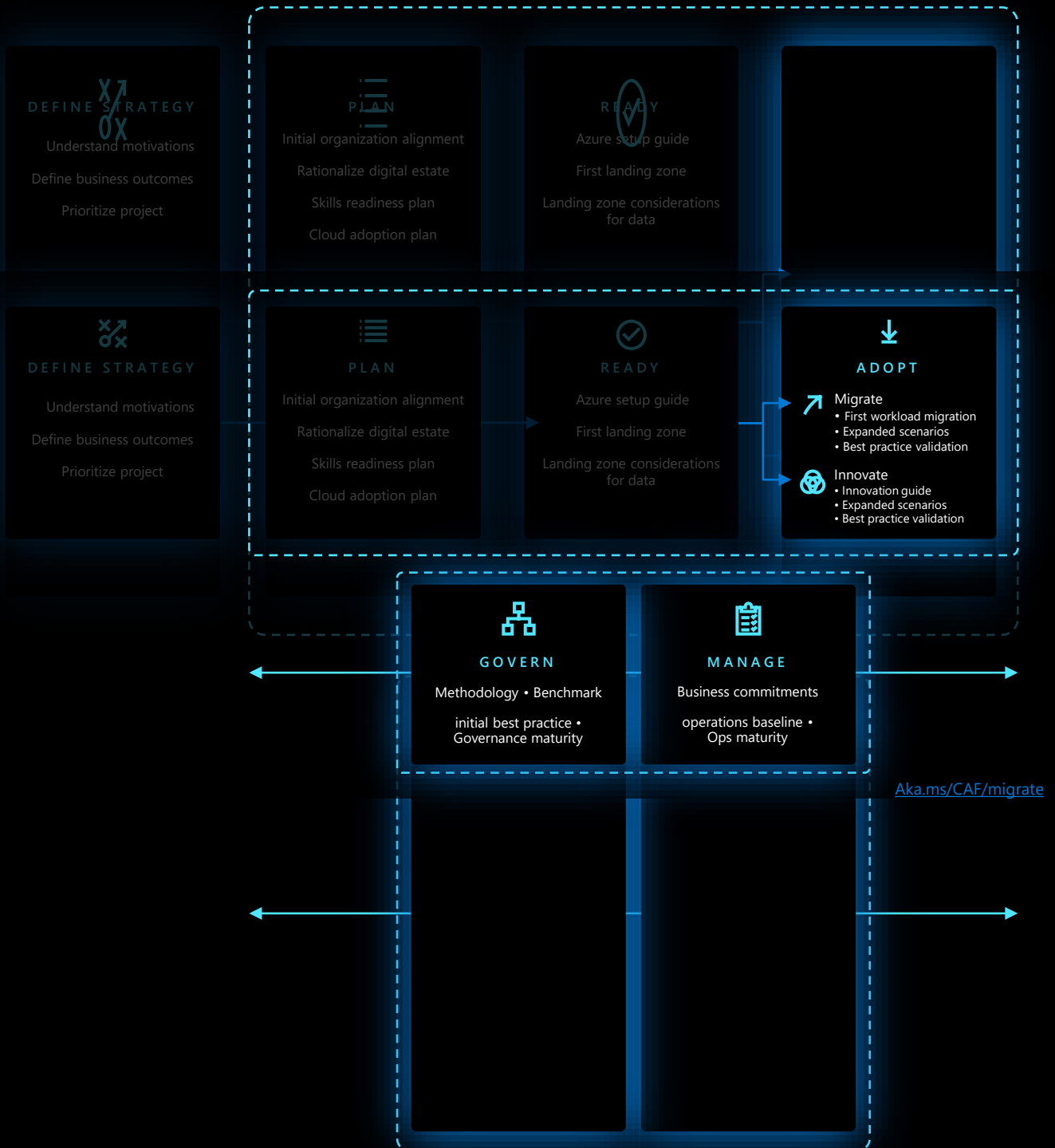
[CAF Foundation blueprint](#)

[CAF Terraform modules](#)

[CAF Enterprise-scale landing zone](#)



# Microsoft Cloud Adoption Framework for Azure (4 of 4)



## Innovate with AI (1 of 6)

scenarios



Build, manage, deploy  
your own custom ML  
models



Add domain-specific  
pre-built AI models to  
your apps & agents



Build AI-driven  
knowledge mining  
solutions

# Build, manage, deploy your own custom ML models

## Common scenarios



Predictive maintenance



Fraud detection



Intelligent recommendations



Inventory management

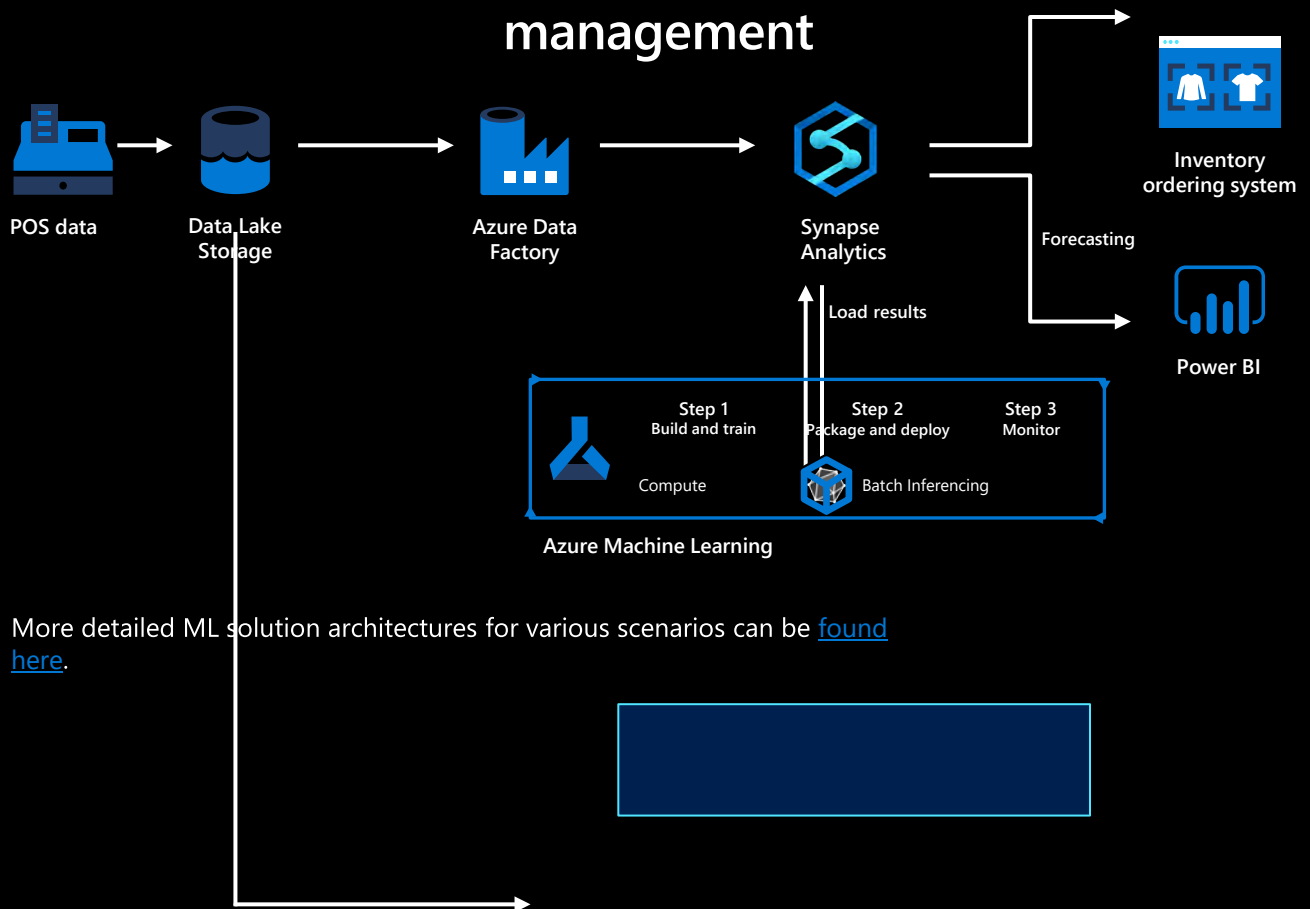


Demand forecasting



Sales forecasting

# Example solution architecture for inventory management







## Step by step guide (1 of 3)

1. **Identify the business problem to solve**

2. **Identify the data sources and explore the dataset**

3. **Select appropriate [Azure Machine Learning](#) capability**

Automated ML

Visual drag and drop

Code-first notebook

4. **Build the model and train using your data**

Create an AML workspace

Set up and use [compute targets](#)

Register your model in your AML workspace

Samples & tutorials (if needed)

[Predict taxi fees](#)

[Classify images](#)

[Build pipelines for batch scoring](#)

5. **Package and validate**

Package and debug models locally before deploying to the cloud

6. **Deploy**

Register your model

Create an inference configuration and deployment configuration

Consume the web service as REST API

7. **Monitor**

Enable and collect data for models in production

Detect data drift

Use [Application Insights](#) for monitoring

**ADDITIONAL RESOURCES:**

['Getting started' videos](#)

[Get Microsoft certified](#)

## Innovate with AI (2 of 6)

scenarios



Build, manage, deploy  
your own custom ML  
models



Add domain-specific  
pre-built AI models to  
your apps & agents



Build AI-driven  
knowledge mining  
solutions

# Add domain-specific AI services to your applications

Common scenarios



Robotic process automation



Intelligent customer support



Personalization



Sentiment analysis



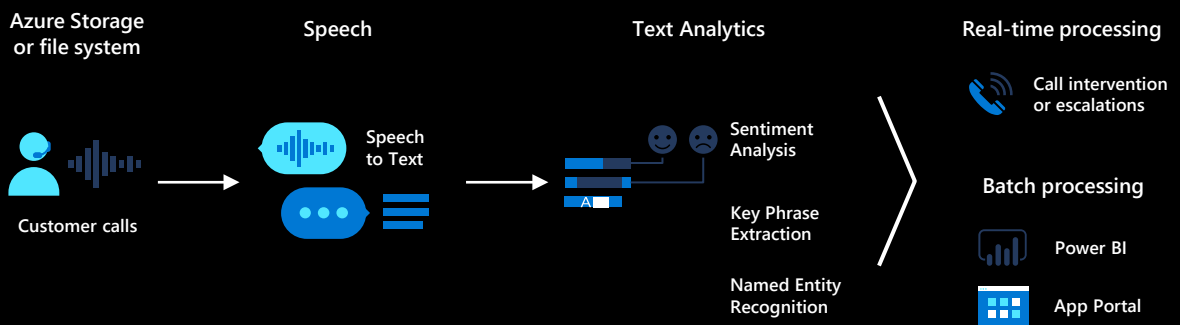
Object detection



Intelligent agents

More details on the solution architectures for these common scenarios can be [found here](#).

# Intelligent customer support



More detailed ML solution architectures for various scenarios can be [found here](#).



## Step by step guide (2 of 3)

1. Identify the business problem to solve
2. Choose the right Cognitive Service and/ or Bot Service

Get familiar with the [breadth of Cognitive Services](#)

Download the [Bot Framework SDK](#) and tools like [Composer](#)

3. Use existing model or customize to your need

Utilize APIs, SDKs and services

Apply your data to improve for your use case

4. Deploy in the cloud or using containers

Review list of [Cognitive Services with container support](#)

Select the corresponding service for [implementation guidance](#)

### ADDITIONAL RESOURCES

Explore [AI School learning paths](#)

You can quickly demo or try these services on the [Azure product pages](#) or [download intelligent kiosk](#) on GitHub

## Innovate with AI (3 of 6)

scenarios



Build, manage, deploy  
your own custom ML  
models



Add domain-specific  
pre-built AI models to  
your apps & agents



Build AI-driven  
knowledge mining  
solutions

# Build AI-driven knowledge mining solutions

## Common scenarios



Auditing and compliance



Digital asset management



Technical content review



Process management



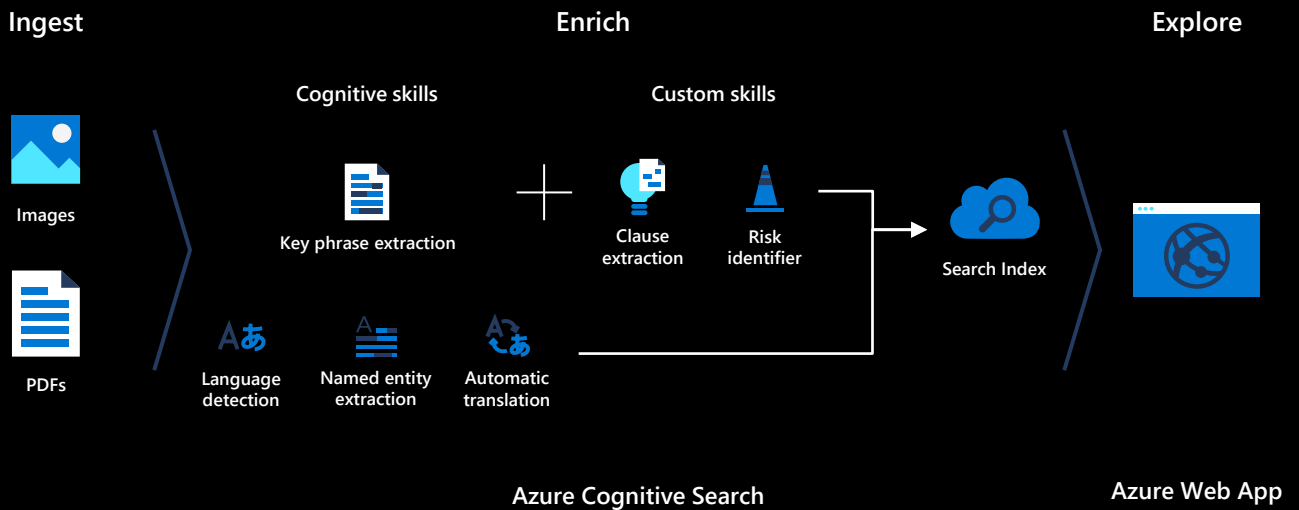
Customer feedback analytics



Catalog search

More details on the solution architectures for these common scenarios can be [found here](#).

# Auditing and compliance



More detailed ML solution architectures for various scenarios can be [found here](#).





## Step by step guide (3 of 3)

### 1. 1. Identify the business problem to solve

Learn [when to use Azure Cognitive Search](#)

### 2. 2. Set up your environment

[Get a key and URL](#)

Use the [Azure portal](#) or use [SDKs](#)

### 3. 3. Create index and skillset

[Create an index and load data](#)

[Add skillset \(cognitive skills\) within Azure portal](#)

### 4. Load documents

Import data to Azure Blob storage

[Use portal import data flow](#) to connect to Azure blob storage data source

### 5. 5. Define and search an index

[Define index](#)

[Search index](#)

#### ADDITIONAL RESOURCES

Complete the [knowledge mining bootcamp](#) and the [knowledge mining workshop](#)

Get started with [free KM solution accelerators](#).

Download and review the [Developer's guide to building knowledge mining solutions](#)

# Innovate with AI (4 of 6)

Guidance to get started



**Build, manage, deploy  
your own custom ML  
models**

- [Best Practices](#)
- [Building responsible models](#)



**Add domain-specific  
pre-built AI models to  
your apps & agents**

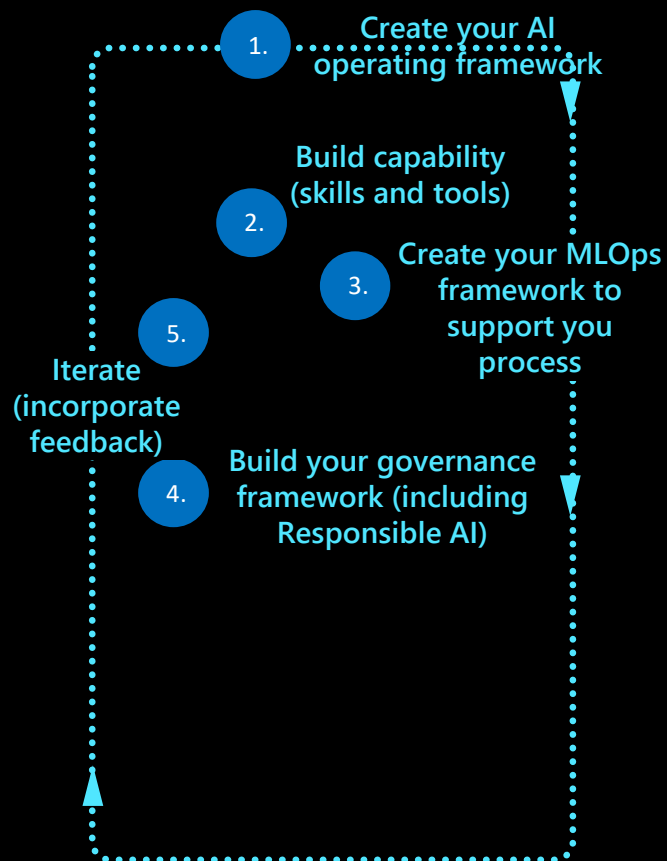
- [Visit the main Cognitive Services docs page for Best practices](#)
- [Principles for ethical bot design](#)



**Build AI-driven  
knowledge mining  
solutions**

- [Adding Custom skills to search](#)
- [Scaling for performance with Azure Cognitive Search](#)

# Guidance to get started with machine learning



# AI Framework from Idea to Production

## Navigator' to Envision & Roadmap Future State

- Ideation
- Business Case
- Prioritization

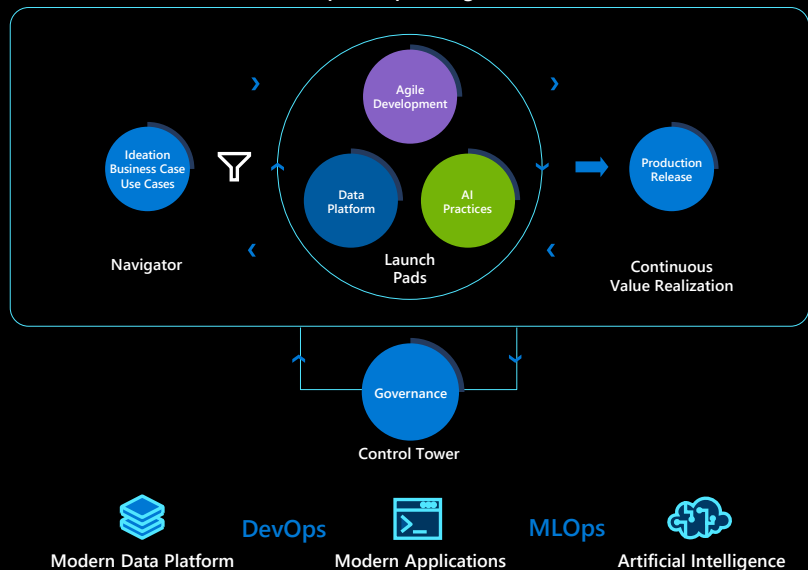
## 'Launch Pads' to Anchor Execution

- Backlog
- Agile Development
- AI Practices
- Data Modernization

## Operationalize for Business Value

- Release MVP to Market

## Enterprise Operating Model



# Build capability: AI Center of Excellence

## CoE program management

Oversees the program, manage interdependencies & drive strategy



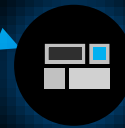
## Data Engineering & Integration team

Provides overall administration, tooling and guidance for the platform



## User support team

Provides support for end-users & tracks issues to resolution



## Data Scientist enablement team

Provides development and testing capability and expertise to the development teams across business units



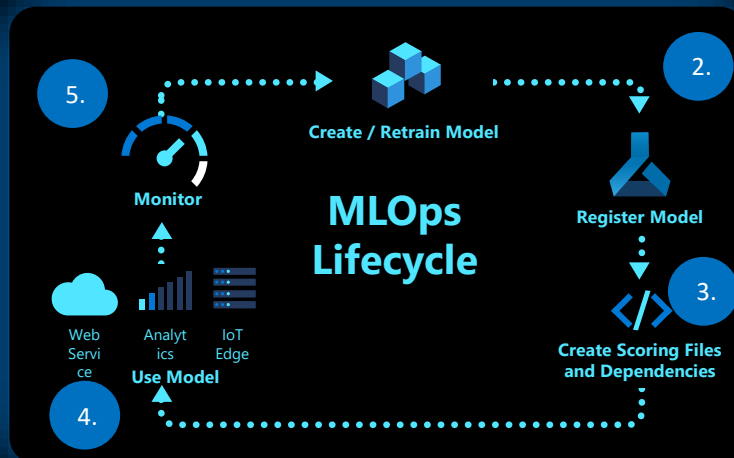
## Organizational empowerment & transformation team

# ML Ops Deployment Lifecycle

1. **Create models with reusable ML pipelines** using Azure ML extension for Azure DevOps. Make sure to Understand business problem and data, Acquire the necessary data.

**Observe data drift and close the feed back model information** with a continuous delivery process to improve future training and continuous delivery.

**Deploy and monitor performance** so you can release models with confidence and know when to retrain.



**Automate your MLOps rollout** using Azure ML for version models with rich metadata and event management. Register, package, deploy models from anywhere.

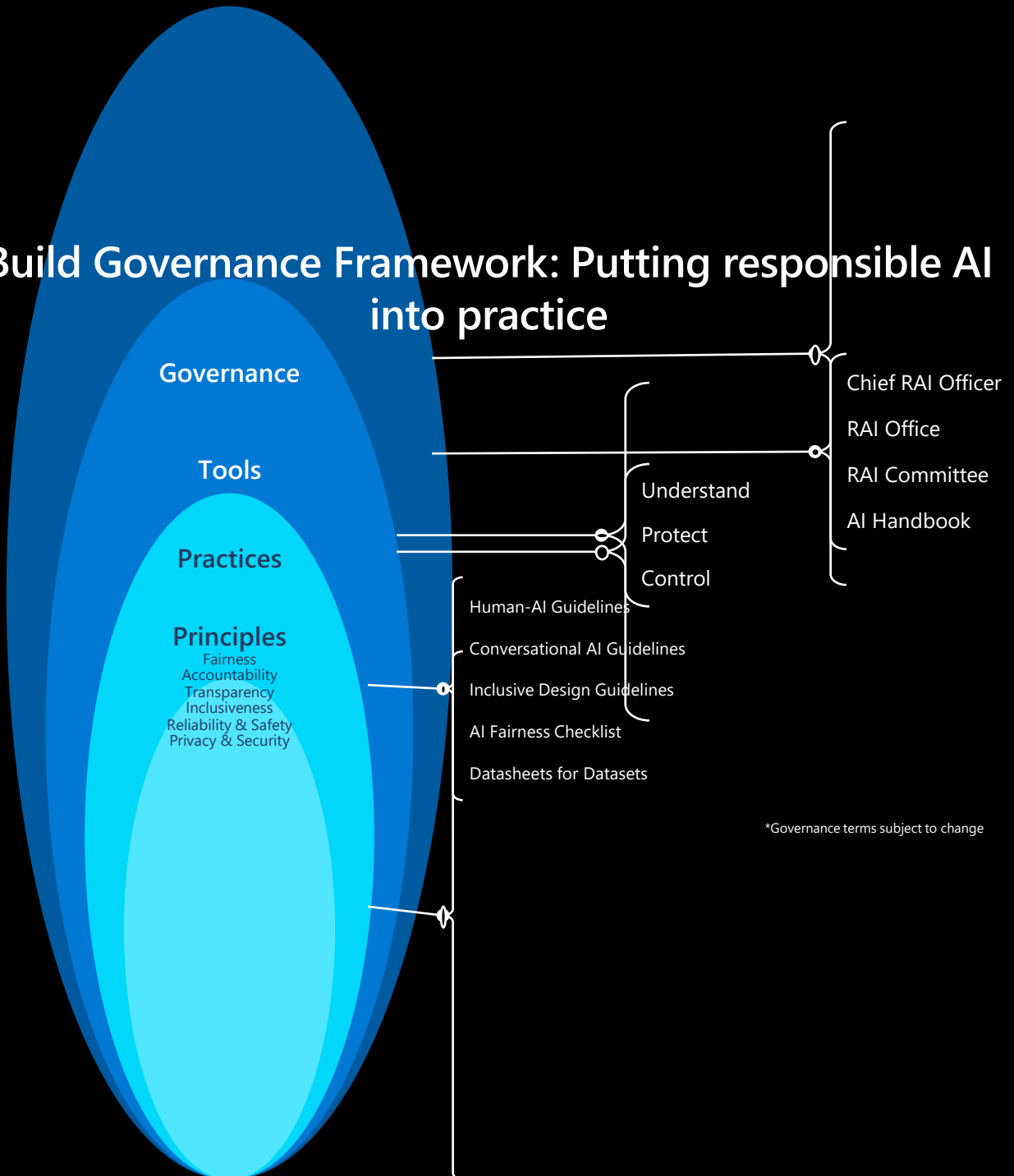
**Automatically create an audit trail** for all artifacts such as who is publishing models, why changes were made, when models were deployed, etc.

# Selecting the appropriate AI service component

SCENARIO	AI SERVICE COMPONENT
I need to build a forecasting model that try algorithms and gives me the best model	<a href="#">AML AutomatedML</a>
I need to be able to label multiple objects and detect multiple objects on an image	<a href="#">AML SDK &amp; Labelling Service</a>
I need to be able to fully understand how my model is making a prediction	<a href="#">AML Explainability SDK</a>
I need to be able to process very large volume of data and do some data analysis and visualization using Spark	<a href="#">Azure Databricks</a>
I need to create a rapid experiment without having to write too much code	<a href="#">AML Designer</a>
I would like to see how my model is performing in the production	<a href="#">AML Data drift</a>
I would like to understand if there are any biasness in model prediction	<a href="#">AML Fairlearn</a>
I need to be able to orchestrate various execution steps in a repeatable way	<a href="#">AML Pipeline</a>
I need to be able to connect to multiple data sources and maintain versioning of all the data and model created	<a href="#">AML Dataset/Datastore &amp; Model Repo</a>

Landing zone consideration: [Review your data options](#)

# Build Governance Framework: Putting responsible AI into practice





# Build Governance Framework: Sensitive use cases



Denying  
Consequential  
Services



Risk of  
Harm



Infringe on  
Human Rights

# Responsible AI Tooling

## UNDERSTAND



Interpret ML



FairLearn



Data Drift

## CONTROL



Homomorphic  
Encryption



Differential  
Privacy



Presidio



Confidential ML

## PROTECT



MLOPs



RBAC

# Innovate with AI (5 of 6)

Guidance to get started



**Build, manage, deploy  
your own custom ML  
models**

- [Building models](#)
- [When to use Automated ML](#)
- [Operationalizing ML](#)
- [Building responsible models](#)



**Add domain-specific  
pre-built AI models to  
your apps & agents**

- [Visit the main Cognitive Services docs page for Best practices](#)
- [Principles for ethical bot design](#)



**Build AI-driven  
knowledge mining  
solutions**

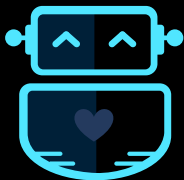
- [Adding Custom skills to search](#)
- [Scaling for performance with Azure Cognitive Search](#)

# 10 Guidelines for developers of conversational AI



1. Articulate the purpose of your bot
2. Be transparent that you use bots
3. Ensure a seamless hand-off to a human when needed
4. Design your bot to respect relevant cultural norms
5. Your bot must be reliable
6. Your bot must treat people fairly
7. Ensure your bot respects user privacy
8. Ensure your bot handles data securely
9. Ensure your bot is accessible
10. Accept responsibility for the bots you build and deploy

# Bot development process



## PLAN

Review the [bot design guidelines](#) for best practices on defining bot personas, conversational flow, and how you plan to measure success



## BUILD

Choose and download your preferred developer tools available free on Github (e.g. visual tools like [Bot Framework Composer](#), or [Bot Framework SDK](#) and CLI tools languages and use samples to get started. Add natural language and speech capabilities with



## TEST

Test your bot locally with the [Bot Framework Emulator](#) or in the [Azure webchat](#)



## PUBLISH

[Publish your bot](#) to Azure with Azure Bot Service to be available to your users



## CONNECT

Connect to [popular channels](#) like Teams, Facebook, Slack, Alexa and more.



## EVALUATE

Use the data collected in the Azure portal to [analyze and identify](#) opportunities to improve the service.

# Innovate with AI (6 of 6)

Guidance to get started



**Build, manage, deploy  
your own custom ML  
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- [Building models](#)
- [When to use Automated ML](#)
- [Operationalizing ML](#)
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**Build AI-driven  
knowledge mining  
solutions**

- [Adding Custom skills to search](#)
- [Scaling for performance with Azure Cognitive Search](#)

# Knowledge Mining Guidance (1 of 2)

## How to use Azure Cognitive Search

### Step 1: Provision service

When provisioning a paid-tier Azure Cognitive Search you can scale a paid-tier service in two dimensions:

- Add Replicas to grow your capacity to handle heavy query loads
- Add Partitions to grow storage for more documents

Note: By handling document storage and query throughput separately, you can calibrate resourcing based on production requirements.

### Step 2: Create index

- Define an Azure Cognitive Search index schema (in the portal or using [.NET SDK](#) or [REST API](#))
- The index schema must reflect the structure of the documents you wish to search

# Knowledge Mining Guidance (2 of 2)

## How to use Azure Cognitive Search

### Step 3: Load data

After you define an index, you're ready to upload content. You can use either a push or pull model.

- Pull model automates aspects of data ingestion and retrieves data from external data sources (Cosmos DB, SQL DB, Blob storage, SQL Server hosted in Azure VM).
- The push model is provided through the SDK or REST APIs, used for sending updated documents to an index. You can push data from virtually any dataset using the JSON format. See [Add, update, or delete Documents](#) or [How to use the .NET SDK](#) for guidance on loading data.

### Step 4: Search

- After populating an index, you can [issue search queries](#) to your service endpoint using simple HTTP requests with [REST API](#) or the [.NET SDK](#).
- Step through [Create your first search app](#) to build and then extend a web page that collects user input and handles results.



# Innovate with AI – recap



**Build, manage, deploy  
your own custom ML  
models**

[Learn more with best practices docs](#)

[Get started building your first ML experiment](#)



**Add domain-specific  
pre-built AI models to  
your apps & agents**

[Learn more with best practices docs](#)

[Get started by learning about and selecting a  
Cognitive Service](#)



**Build AI-driven  
knowledge mining  
solutions**

[Learn more with best practices docs](#)

[Get started with KM solution accelerators,  
bootcamps and workshops](#)

