



ULTIMATE

# Microsoft Certified Azure AI Engineer Associate (AI-102) Certification Guide

Crack AI-102 Certification by Building  
Generative AI, Intelligent Agents and  
Enterprise Azure AI Solutions

Pablo Piovano

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# CHAPTER 1

## Introduction to the AI-102 Certification and Azure AI

### Introduction

In this chapter, readers will be introduced to the core building blocks that define the Azure AI ecosystem and its evolution within Microsoft's cloud platform. The chapter explains the distinction between task-specific Azure AI Services and platform-level capabilities provided by Microsoft Foundry, clarifying how modular APIs, foundation models, Retrieval-Augmented Generation (RAG), and intelligent agents fit together in real-world enterprise architectures. These concepts form the technical and architectural foundation required to design scalable, secure, and production-ready AI solutions on Azure.

The chapter also establishes a clear understanding of the Azure AI Engineer role, outlining the professional responsibilities, required competencies, and success criteria associated with designing and operating AI solutions in cloud environments. Key themes such as responsible AI, governance, lifecycle management, and business impact are introduced early to frame the mindset expected of certified professionals. Finally, the chapter contextualizes the AI-102 certification as both a validation of technical expertise and a guide for navigating the tools, services, and architectural patterns that will be explored throughout the rest of the book.

### Structure

In this chapter, we will cover the following topics:

- The Rise of AI and the Role of Microsoft Azure
- Professional roles and responsibilities of an Azure AI Engineer
- The Importance of Azure AI and Technological Democratization

- From Cognitive Services to Microsoft Foundry: The Evolution of AI in Microsoft Azure
  - The Birth of Cognitive Services
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## **The Rise of AI and the Role of Microsoft Azure**

Artificial Intelligence has become one of the defining forces of modern digital transformation. In less than a decade, AI has evolved from a research concept into an indispensable component of business operations across industries such as banking, healthcare, retail, education, logistics, and the public sector. Organizations now rely on AI to automate tasks, improve decision-making, understand customers, enhance accessibility, and accelerate innovation at an unprecedented speed.

Microsoft Azure has played a central role in this global transition by democratizing access to artificial intelligence. Instead of requiring specialized infrastructure or deep machine learning expertise, Azure ensures

advanced AI capabilities are available through scalable cloud services, foundation models, and Generative AI tools, and are fit for consumption as per the demands of the organization. This democratization has empowered millions of developers and businesses to rapidly unlock value and build intelligent solutions.

Today, Azure AI is able to automate document processing, detect fraud in real time, power regular conversational agents, integrate real-time translation and sentiment analysis, and create inclusive solutions using voice, vision, and natural language technologies. The strength of Azure AI lies in its modular, open, and ever-evolving ecosystem, which integrates seamlessly into existing applications and workflows.

One of the most transformative advancements in this ecosystem is **Retrieval-Augmented Generation (RAG)**. RAG combines **Large Language Models (LLMs)** with advanced search engines—such as Azure AI Search—to generate responses grounded in accurate, up-to-date organizational data. Instead of relying solely on model pre-training, the system retrieves relevant information at query time, offering higher accuracy, transparency, and explainability. RAG enables a variety of tasks, from context-aware enterprise bots and technical support systems to document automation and regulatory compliance, thereby increasing faith and functionality in mission-critical environments.

## [The Importance of Azure AI and Technological Democratization](#)

The impact of artificial intelligence depends not only on model performance, but also on accessibility, governance, and responsible adoption. Microsoft Azure has been instrumental in turning AI into a global, inclusive technology used by organizations of all sizes.

Azure democratizes AI through several foundational principles. These are:

- **Simple and Flexible Access:** Any organization can leverage AI through APIs, pre-built services, and ready-to-use foundation models. Teams can begin with modular Azure AI Services and advance to powerful generative models and agents in Microsoft Foundry.
- **Global Scalability:** The worldwide infrastructure of Azure offers compliant, and high-availability environments that supports various

projects from prototypes to large-scale enterprise deployments.

- **Multidisciplinary Collaboration:** Integrations with GitHub, Visual Studio, VS Code, Azure DevOps, and Microsoft 365 enables cross-functional collaboration between developers, data teams, and business stakeholders.
- **Responsible and Ethical AI:** Azure includes tools for transparency, fairness, privacy, and security—such as content safety, auditing, and evaluation—aligned with Microsoft’s Responsible AI principles.
- **Continuous Innovation:** Azure consistently updates its ecosystem with frontier models, multimodal capabilities, RAG architectures, intelligent agents, and multi-provider model catalogs. Microsoft Foundry, in particular, provides rapid access to new model families (such as GPT-5.1, Claude, Grok, Phi-4, and others) as they become available.

With the help of these capabilities, AI is no longer solely reserved for advanced research teams or large enterprises. Any organization can analyze data in real time, automate processes, personalize customer experiences, and create more inclusive digital products, easily through the flexibility and power of Azure AI.

By combining **Azure AI Services** (task-specific, production-ready APIs) with **Microsoft Foundry** (a unified platform for models and agents), Azure provides a complete and scalable ecosystem that supports organizations at every stage of their AI adoption journey.

## [From Cognitive Services to Microsoft Foundry: The Evolution of AI in Microsoft Azure](#)

This section traces the evolution of artificial intelligence within Microsoft Azure, from the early introduction of Cognitive Services to the emergence of Microsoft Foundry as a unified, enterprise-scale AI platform.

### [The Birth of Cognitive Services](#)

The journey of Microsoft AI in Azure began with Project Oxford in 2015, a set of APIs designed to simplify vision, speech, language, and knowledge tasks. These quickly matured into Azure Cognitive Services, enabling

developers to add intelligent features such as face detection, OCR, speech recognition, and text analytics without building or training models themselves.

As the needs of customers increased, Microsoft introduced more specialized services like:

- **Form Recognizer (2019):** Later expanded as Azure AI Document Intelligence, focused on extracting structured information from documents.
- **Azure Video Analyzer (2020):** Real-time video understanding for events, objects, and scenarios as part of Azure Media Services.

These services supported concrete, domain-specific cases across sectors including finance, healthcare, logistics, and retail.

## **Unification: Azure AI Services (2020–2023)**

As the catalog expanded, Microsoft consolidated its AI APIs and domain-specific solutions under the Azure AI Services brand. This provided a unified structure for services covering vision, language, speech, search, translation, content understanding, safety, and decision-making. Azure AI Services gradually became the foundation for thousands of enterprise applications, particularly, those requiring predictable performance, low latency, and production-ready AI capabilities.

## **The Generative AI Era: Azure AI Studio (2023)**

With the rise of Large Language Models and Generative AI, Microsoft launched Azure AI Studio in 2023. This platform offered:

- Integrated access to GPT-4 and other advanced models
- Tools for prompt engineering and orchestration
- Evaluation and safety testing capabilities
- End-to-end workflows for experimentation and deployment

Azure AI Studio marked the beginning of the unified Generative AI development at a large scale within Azure.

## [Azure AI Foundry \(Ignite 2024\): Unifying Models and Agents](#)

During Microsoft Ignite 2024, Azure AI Studio was rebranded as Azure AI Foundry, emphasizing a more comprehensive and integrated approach to building AI applications and agents. Azure AI Foundry introduced:

- A unified SDK
- Prebuilt templates and deployment workflows
- Native support for agents and RAG architectures
- Enterprise knowledge systems (Bing, Fabric, SharePoint)
- A platform-wide experience for governance, evaluation, and observance

The name Azure AI Foundry highlighted the platform's tight integration with the Azure cloud, and was used from November 2024 through November 2025.

## [Microsoft Foundry \(Ignite 2025\): A Broader, Enterprise AI Ecosystem](#)

At **Microsoft Ignite 2025**, the platform was officially renamed **Microsoft Foundry**. This change signaled a shift from an Azure-centric brand to a **Microsoft-wide AI ecosystem**, expanding its role across:

- Multi-provider and open model catalogs
- Intelligent agent orchestration
- Interoperability across clouds and systems
- Enhanced security, governance, and modularity for enterprise AI

Importance of the name change:

- **Azure AI Foundry (2024):** It emphasized the role of the workspace of Azure for generative AI and agents.
- **Microsoft Foundry (2025):** It reflects a broader strategic vision—an enterprise AI “*factory floor*” that spans models, agents, data, tools, and integrations across the entire Microsoft Cloud.

In summary, the name **Azure AI Foundry** was used from November 2024 until November 2025, when finally, it was consolidated as **Microsoft Foundry** to reflect a wider strategic focus on enterprise AI.

From Project Oxford to Microsoft Foundry, the evolution of the AI ecosystem of Azure demonstrates the commitment of Microsoft in simplifying access to AI, supporting generative and agent-based workloads, enabling multi-model and multi-provider environments, and providing a unified, governed platform for organizations to build and operate AI responsibly at scale.

## **Microsoft Foundry as the Core of AI Strategy**

At Microsoft Ignite 2025, Microsoft announced the evolution of Azure AI Foundry into **Microsoft Foundry**, positioning it as the unified platform for building, operating, and governing AI solutions across the Microsoft Cloud. Microsoft Foundry centralizes models, agents, tools, observability, and governance into a single environment, allowing organizations to design, test, deploy, and scale AI applications with consistent security, compliance, and operational reliability.

Microsoft Foundry now hosts one of the largest and most diverse AI model catalogs in the industry. As of late 2025, the ecosystem includes more than 11,000 models from Microsoft, Azure OpenAI, Anthropic, Cohere, Mistral, DeepSeek, Meta, xAI, NVIDIA, Black Forest Labs, and others. This extensive collection enables enterprises to choose the most suitable model for any scenario—from frontier reasoning to lightweight multimodal inference—without leaving the unified Foundry environment.

Recent additions highlight the commitment of Microsoft in providing multi-provider, enterprise-ready AI. The Claude models of Anthropic are available as fully managed, production-ready endpoints within Foundry, bringing top-tier reasoning and safety capabilities to Azure. Likewise, Azure OpenAI now includes the **GPT-5.1 family**, designed for advanced reasoning, deep analytics, and long-context business workloads, as well as tightly integrated into the evaluation and safety tooling of Foundry. Azure remains one of the few clouds offering both Azure OpenAI models and the Claude family of Anthropic as first-class, governed services under a single platform.

The ecosystem also includes cutting-edge models such as **Grok 3** and **Grok 3 Mini** from xAI, optimized for tool-use and problem-solving; **FLUX.1.1**

**[pro]** and related models from Black Forest Labs for high-fidelity text-to-image workflows; and the own **Phi-4** family of Microsoft—mini, multimodal, and flash-reasoning variants—engineered for efficient, low-latency inference and on-device or edge scenarios. This breadth allows Azure AI Engineers to combine strengths from different model families to achieve the right balance of latency, accuracy, cost, and modality for each business requirement.

Across all these models, Microsoft Foundry provides a unified layer for security, governance, telemetry, evaluations, routing, and deployment. Capabilities such as **Model Router**, advanced fine-tuning (LoRA/QLoRA, supervised fine-tuning, and Direct Preference Optimization), and the fully managed **Foundry Agent Service** allow enterprises to orchestrate multi-agent workflows, integrate agents with corporate knowledge using Bing, Fabric, SharePoint, and Azure AI Search, and deploy solutions confidently at scale.

In essence, Microsoft Foundry represents the new strategic core of the AI platform of Microsoft: a unified, flexible, and extensible environment that empowers organizations to innovate faster, maximize model value, and deliver secure, reliable AI solutions across every business domain.

## **[Azure AI Services and Microsoft Foundry](#)**

Digital transformation and the growing adoption of artificial intelligence have driven Microsoft to evolve its portfolio of cloud-based solutions. Today, two main pillars define the value proposition of Azure for AI: **Azure AI Services** and **Microsoft Foundry**.

### **[Azure AI Services: Modularity and Specialization](#)**

Azure AI Services is a family of modular services designed to address specific AI needs for businesses of all sizes and industries. According to the official website of Microsoft, the updated catalog includes:

- **Azure AI Content Safety:** It monitors text and images to detect offensive or inappropriate content, ensuring safe digital environments.
- **Azure AI Content Understanding:** It accelerates the development of multimodal solutions by combining text, image, and other data analysis.

- **Azure AI Document Intelligence:** It extracts text, key-value pairs, tables, and document structures using advanced machine learning.
- **Azure AI Language:** It enables the development of conversational interfaces, document summarization, and text analysis using pre-trained AI functions.
- **Azure AI Search:** It provides relevant search capabilities using keyword, vector, and hybrid search methods to find the most accurate information.
- **Azure AI Speech:** It incorporates advanced features such as speech-to-text, text-to-speech, speech translation, and speaker recognition.
- **Azure AI Translator:** It translates documents and text in real-time into more than 100 languages, facilitating global communication.
- **Azure AI Video Indexer:** It analyzes and extracts relevant information from video content, such as automatic transcripts, object identification, face recognition, scene detection, and intelligent search in large audiovisual collections.
- **Azure AI Vision:** It analyzes images, detects faces, and reads text using OCR and machine learning.
- **Azure OpenAI:** It enables integration and deployment of advanced models for natural language generation and understanding, as well as models for analyzing and processing textual and visual information, supporting the development of custom intelligent solutions.

These services are designed for easy integration into new or existing applications, allowing organizations to leverage artificial intelligence without having to build models from scratch while ensuring flexibility, scalability, and rapid implementation.

### **Microsoft Foundry: Models, Agents, and Orchestration**

While Azure AI Services provides specialized, task-focused APIs, **Microsoft Foundry** offers a unified environment for developing, customizing, and managing generative AI applications and agents. The primary differentiator however, lies in providing a centralized platform where teams can:

- Access an extensive catalog of language, vision, and intelligent agent models from Microsoft and multiple partners.

- Orchestrate and customize AI agents that can interact with each other and with enterprise systems, automating processes and improving operational efficiency.
- Integrate familiar tools such as GitHub, Visual Studio, VS Code, and Copilot Studio, accelerating collaboration and the development cycle.
- Ensure governance, security, and ethics with regulatory compliance controls, responsible AI practices, and built-in observability and evaluation tools.
- Implement generative AI solutions, RAG architectures, and multimodal workflows easily and at scale.

Together, Azure AI Services and Microsoft Foundry give organizations the flexibility to:

- Start quickly with ready-to-use APIs.
- Evolve toward advanced generative and agent-based solutions.
- Centralize governance, safety, monitoring, and model lifecycle management.

This dual ecosystem ensures that enterprises can adopt AI at their own pace, leveraging both pre-built capabilities and next-generation AI technologies under a single, coherent strategy.

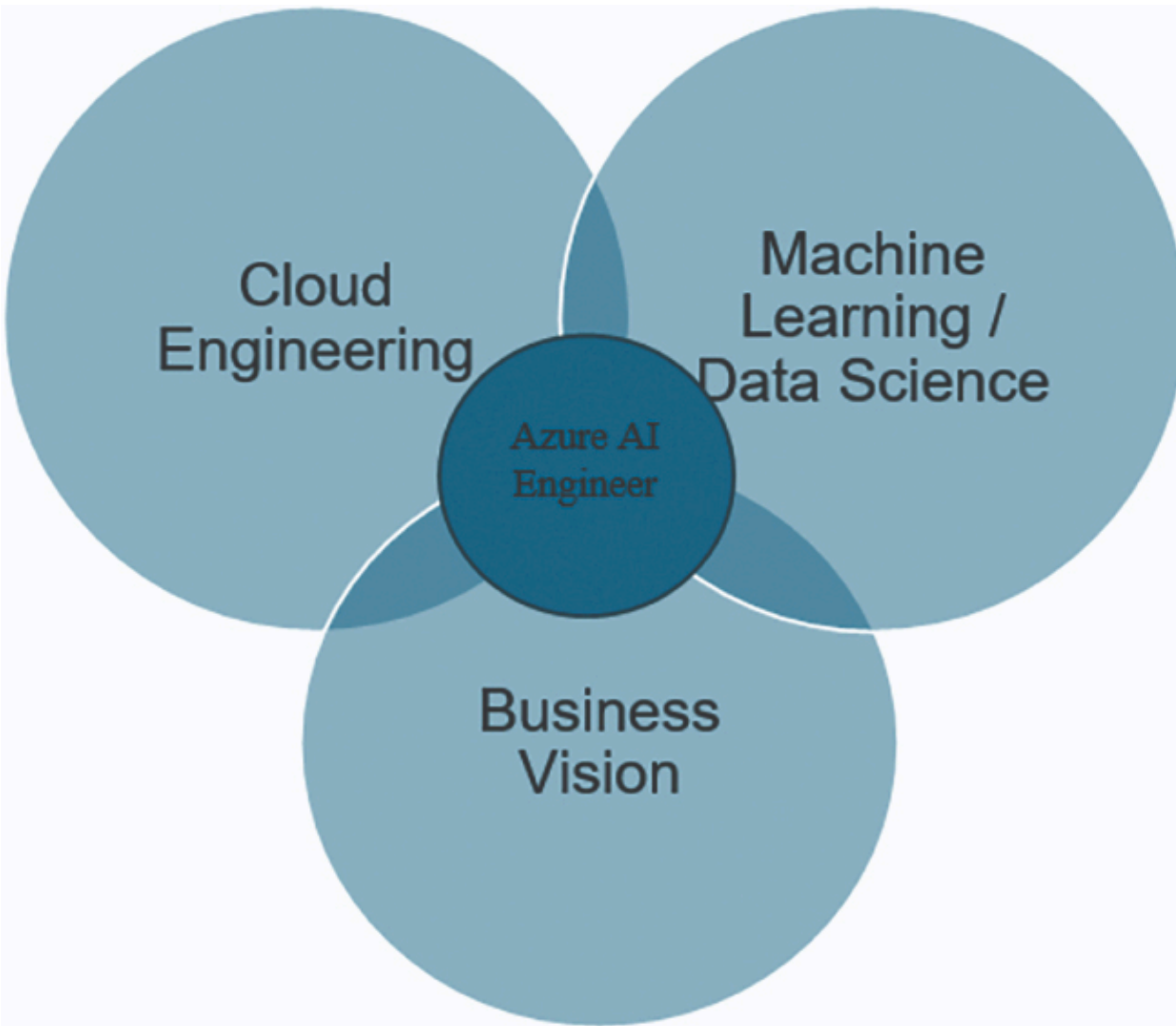
## [The Professional Role of the Azure AI Engineer](#)

As artificial intelligence becomes the driving force behind digital transformation in organizations of all sizes, there is an increasing need for professionals capable of designing, implementing, and operating AI solutions on robust, scalable platforms. In this context, the **Azure AI Engineer** has become a highly strategic and an in-demand role within the current technology ecosystem.

## [A Multidisciplinary and Strategic Profile](#)

The Azure AI Engineer stands out for their ability to bridge cloud technical expertise with advanced skills in artificial intelligence and machine learning (Refer to [Figure 1.1](#)). This professional is not simply a developer or a traditional data scientist; they represent the intersection between

engineering, advanced analytics, and a deep understanding of business needs.



*Figure 1.1: The Multidisciplinary Profile of the Azure AI Engineer: at the Intersection of Cloud Engineering, Machine Learning/Data Science, and Business Vision*

Key competencies of an Azure AI Engineer include:

- **Designing Intelligent Architectures:** The ability to select, integrate, and orchestrate the different Azure AI services—from vision and language to generative agents and advanced search systems—according to the requirements of each project.
- **Implementing and Customizing Models:** Proficiency in working with both pre-trained and custom models, adapting solutions to specific use cases, and maximizing the value delivered to the organization.

- **AI Lifecycle Management:** Mastery of MLOps practices, monitoring, versioning, and model deployment, ensuring optimal performance and compliance with data governance and security policies.
- **Governance and Ethics:** Application of responsible AI principles, aligning solutions with standards of transparency, fairness, privacy, and regulatory compliance.
- **Communication and Leadership:** The ability to collaborate with multidisciplinary teams, translate business needs into technical requirements, and lead the adoption of new technologies in dynamic environments.

## **Professional Expectations and Opportunities**

The Azure AI Engineer is the enabler of AI-driven digital transformation. Their work directly impacts operational efficiency, product and service innovation, personalized experiences, and the creation of sustainable competitive advantages. Additionally, the role requires constant learning, as the Azure AI ecosystem rapidly evolves with new tools, models, and methodologies.

Opportunities for this role are expanding: from leading automation projects and designing intelligent customer service agents to orchestrating multimodal solutions, and ensuring the ethical and responsible use of AI in global organizations.

Ultimately, the Azure AI Engineer is more than a technology implementer—they act as an architect of innovation, guiding organizations toward a digital future that is secure, efficient, and aligned with human values.

## **Success Metrics, Challenges, and Opportunities**

The impact of an Azure AI Engineer goes far beyond the mere technical implementation of artificial intelligence solutions. Today, organizations are looking for professionals who can deliver measurable results, tackle technological and ethical challenges, and quickly adapt to a constantly evolving landscape.

### **Success Metrics: From the Lab to Real Value**

The success of an AI project on Azure is evaluated not just by its technical deployment but by the value it brings to the business. Some key metrics include:

- **Reduction in Operational Time:** Did the AI solution automate processes that previously required manual intervention? How much time is saved?
- **Model Accuracy and Reliability:** How accurately does the solution fulfill its purpose (for example, document recognition, sentiment analysis, fraud detection)?
- **Cost Savings:** To what extent has adopting Azure AI optimized resources or reduced expenses related to manual processes, errors, or fraud?
- **Scalability and Adoption:** How easy is it to replicate the solution in other business areas or regions? How many internal users or clients are effectively adopting it?
- **Compliance and Security:** Does the solution adhere to privacy, ethical, and security regulations, and how is compliance audited?

Measuring these variables not only demonstrates Return on Investment (ROI) but also helps identify opportunities for continuous improvement and scaling up results.

### [Current Challenges of the Role](#)

Despite the maturity of cloud-based AI platforms, Azure AI Engineers face significant challenges:

- **Constant Technological Updates:** Azure AI evolves rapidly, with frequent releases and improvements. This demands ongoing learning and adaptability to new tools and services.
- **Managing Complexity:** Integrating modular services, customizing models, and ensuring interoperability among systems can present challenges in architecture, data management, and performance.
- **Governance and Ethics:** The widespread adoption of AI raises questions on responsible data use, algorithm transparency, and bias mitigation. Professionals must ensure solutions are not only effective but also fair and aligned with organizational values.

- **Cybersecurity and Information Protection:** Implementing robust controls and ensuring regulatory compliance is crucial, especially when handling sensitive data or automating critical decisions.

## Opportunities in the Era of Generative AI and Intelligent Agents

The rise of generative AI, architectures such as *Retrieval-Augmented Generation (RAG)*, and more recently, **intelligent agents (AI Agents)**, opens up new possibilities for Azure AI Engineers:

- **Automation of Complex Processes:** From advanced virtual assistants to the generation of reports, summaries, and personalized documents.
- **Orchestration and Deployment of Intelligent Agents:** Agents are autonomous applications capable of interacting with users, systems, and other agents, solving complex tasks, integrating different data sources, and adapting to various business contexts.
- **Large-Scale Personalization:** Creating unique, adaptive experiences for each user, client, or employee, based on intelligent analysis of data and context.
- **Innovation in Products and Services:** Developing new digital offerings, business models, and disruptive solutions that place organizations at the forefront of their sectors.

With these agents, it is now possible to build systems that go beyond providing point solutions—managing dialogues, performing automated actions, and proactively collaborating in business tasks.

In this environment, the Azure AI Engineer has the opportunity to be a true change agent, driving digital transformation from experimentation to sustainable value creation, and leading the adoption of technologies that will define the future of enterprise artificial intelligence.

## The Value of the AI-102 Certification

In an environment where artificial intelligence is increasingly strategic for organizational competitiveness, the **AI-102: Designing and Implementing an Azure AI Solution** certification has become a mark of professional excellence and a gateway to new career opportunities.

## **International Recognition and Professional Differentiation**

The AI-102 certification validates that a professional not only masters Azure AI services and tools, but is also capable of designing, implementing, and maintaining intelligent solutions aligned with industry standards. This recognition, awarded by Microsoft, is valued globally by employers, clients, and strategic partners alike. In highly competitive markets, holding the AI-102 certification makes a clear difference and can be the deciding factor when applying for leadership roles in AI projects.

## **Continuous Learning and Alignment with Best Practices**

Preparing for the AI-102 certification requires staying up to date with the latest Azure AI technologies, including modular services, generative models, responsible AI practices, and new agent-based and Retrieval-Augmented Generation (RAG) architectures.

Since Microsoft certifications require annual renewal, maintaining the AI-102 credential also encourages ongoing learning and keeps professionals aligned with the continuous evolution of the platform.

This ensures that certified professionals are current with industry trends and best practices, positioning themselves as technical leaders within their organizations.

## **Comprehensive Development: Beyond the Exam**

Obtaining the certification is not just about passing a technical exam. The journey toward AI-102 strengthens transversal skills such as the ability to translate business needs into technical solutions, communicate complex concepts to diverse audiences, and lead multidisciplinary teams in dynamic environments. In essence, the certification is a validation of the ability of the self, to create a real impact with AI, from project conception through production deployment.

## **Career Impact and Access to New Opportunities**

Organizations value certified professionals to lead digital transformation projects, process automation, and the adoption of artificial intelligence across the enterprise. The AI-102 certification enables access to strategic roles such as Azure AI Engineer, solutions architect, AI consultant, or technology innovation leader.

Additionally, earning the certification increases professional visibility within the tech ecosystem and facilitates networking with AI experts through events, forums, and specialized communities where trends, best practices, and continuous learning opportunities are shared. This visibility also enhances the professional profile on platforms like LinkedIn, expanding connections and opening doors to new career opportunities in artificial intelligence and cloud services.

In summary, achieving the AI-102 certification accelerates professional growth, establishes a competitive edge, and provides access to high-impact projects in a constantly evolving technological environment.

## [Conclusion](#)

Azure AI is at the center of modern digital transformation, having evolved from basic cognitive services into an advanced, modular platform that democratizes access to artificial intelligence for organizations of all sizes and industries. With ready-to-use solutions for vision, language, speech, search, translation, documents, content, and video—as well as a unified platform in **Microsoft Foundry** for models, agents, and orchestration—Azure enables centralized development, customization, and management of intelligent applications.

The Azure AI Engineer plays a strategic role, bridging business vision with technology, designing secure, ethical, and scalable solutions, and leading high-impact teams and projects where true success is measured by the real value delivered to the business beyond technology alone. Architectures such as RAG and the deployment of intelligent agents are opening new opportunities for autonomous, personalized, and highly useful solutions, shaping the immediate future of enterprise AI.

Earning the AI-102 certification is a global professional differentiator, validating mastery of Azure AI and the ability to lead AI projects, accelerating career growth and unlocking new opportunities. This book serves as your guide—combining theory, hands-on practice, and real-world

cases—to mastering the technical, strategic, and ethical aspects of building and deploying artificial intelligence solutions with Azure.

Looking ahead, [Chapter 2](#) transitions from concepts and roles into practical execution. It focuses on how to plan, provision, and manage Azure AI solutions in real-world environments, guiding readers through service selection, resource creation, deployment strategies, monitoring, cost management, authentication, access control, and Responsible AI practices. This next chapter establishes the operational foundations required to design secure, scalable, and governed AI solutions aligned with business objectives and the requirements of the AI-102 certification.

## **Points to Remember**

- Azure AI drives digital transformation by democratizing access to advanced artificial intelligence for organizations of all sizes, enabling automation, innovation, and efficiency across industries.
- The Azure AI ecosystem has evolved from standalone Cognitive Services to an integrated platform, culminating in Microsoft Foundry, which provides modular, scalable, and responsible AI solutions.
- Azure AI Services and Microsoft Foundry offer ready-to-use modules and a unified environment for building, customizing, and managing intelligent applications and agents, ensuring security, governance, and ethical AI practices.
- Technologies like Retrieval-Augmented Generation (RAG) and intelligent agents are enabling the development of autonomous, personalized, and context-aware solutions that enhance business value and user experience.
- The Azure AI Engineer role is strategic and multidisciplinary, combining expertise in cloud engineering, machine learning, and business vision to design and implement impactful AI solutions.
- Measuring AI success goes beyond technology—key metrics include business impact, time and cost savings, scalability, adoption, compliance, and security.
- The AI-102 certification is globally recognized, validating professional skills in Azure AI, boosting career growth, and opening opportunities in the dynamic field of enterprise artificial intelligence.

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