Discover Microsoft AI for leaders in sustainability

Leverage AI tools and resources for your business

Introduction

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- 1 minute

"Leverage AI tools and resources for your business" is a starting point for business decision-makers who would like to get a high-level overview of AI. To start building AI in your organization, you will need to get acquainted with what this technology offers, how it works, and how it can help you and your business. All AI practices and products discussed in the module follow responsible AI principles.

Learning objectives

In this module, you will:

- Get familiar with available AI tools and approaches.
- Understand basic AI terminology and practices.
- How to use prebuilt AI to build intelligent applications.
- Identify AI use cases.

Prerequisites

- Basic understanding of IT concepts.
- Basic understanding of business concepts.

Next, let’s examine what AI means and how it's different from other related concepts.

Identify basic AI technology concepts

Completed100 XP

- 7 minutes

The term AI tends to be thrown around a lot. You've probably heard about machine learning, deep learning, data science, generative AI, and responsible AI. However, it may not be clear what all these terms mean and how they're different to each other. In this unit, we'll clarify these concepts so you can understand how they apply to your business problem.

What is AI?

Artificial Intelligence (AI) is the ability of a computer program or machine to **mimic human-like behavior**. For example, to mimic visual senses, speech recognition, decision-making, natural language understanding, and so on.

It's not a technology of itself, but rather a goal set by technologists to imitate human intelligence.

What is generative AI?

Generative AI is a **subset of AI**. AI can be used to predict outcomes, detect entities, or classify documents, among others. However, generative AI, also known as GenAI, **creates content, such as images, videos, or text.**

The goal is that this AI-generated content should be as useful as any created by humans. This approach is possible thanks to **large language models (LLMs),** which are complex AI models that can be used for a broad range of use cases.

For example,

you may use generative AI to develop follow-up questions to a meeting, create an image from text, or explain the punch line of a joke, even if the joke is in a video.

What is data science?

Data science is an **interdisciplinary field** whose aim is to achieve AI. It uses many different techniques, mostly **machine learning and statistics**. In most cases, data scientists are the experts in charge of **solving AI problems**.

What is machine learning?

Machine learning is a **technique** where a machine sifts through numerous amounts of data to find patterns. This technique is **frequently used for AI purposes**.

Machine learning uses algorithms that train a machine to learn patterns based on differentiating features about the data. The more training data, the more accurate the predictions. Here are some examples:

- **Email spam detection** - Machine learning could look for patterns where email has words like "free" or "guarantee", the email address domain is on a blocked list, or a link displayed in text doesn't match the URL behind it.
- **Credit card fraud detection** - Machine learning could look for patterns like the spending in a zip code the owner doesn't usually visit, buying an expensive item, or a sudden shopping spree.

What is deep learning?

Deep learning is a **subset of machine learning**. Deep learning is imitating how a human brain processes information, as a connected artificial neural network.

Unlike machine learning, **deep learning can discover complex patterns and differentiating features about the data on its own**.

It normally works with **unstructured data like images, text, and audio**. That's why it requires **enormous amounts of data for better analysis and massive computing power for speed**.

For instance,
a) deep learning can be used to detect cancerous cells in medical images.

b) Deep learning scans every pixel in the image as input to the neural nodes. The nodes analyze each pixel to filter out features that look cancerous.

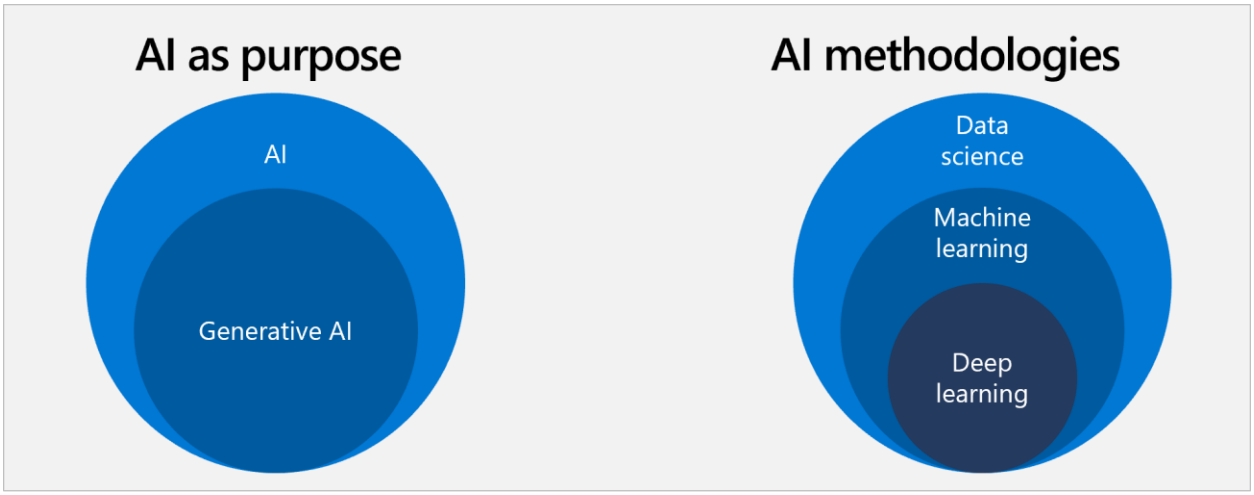
c) Each layer of nodes pushes findings of potential cancerous cells to the next layer of nodes to repeat the process and eventually aggregate all of the findings to classify the image.

For example, the image might be classified as a healthy image or an image with cancerous features.

What is responsible AI?

AI has a **great disruptive potential**. That is why it should follow the highest ethical standards. Responsible AI refers to the **principles and best practices** that ensure AI work is accountable, inclusive, reliable, safe, fair, transparent, secure, and respects privacy.

For instance,
AI could create a video that shows a real person at an event they didn't attend in real life. **Responsible AI** involves not using this technology for deceitful purposes, since it would compromise their **privacy and have unfair consequences**.



Expanding on the primary concepts of AI, where machines show capabilities that are usually associated with human capabilities, you can see how learning patterns, interpreting data, and reasoning with data works.

To achieve this, we need to feed the machine a lot of data before it can learn. Additionally, machine

learning creates algorithms varying from simple linear functions to extremely complex ones, like an artificial neural network.

Next, let's explore which tools and frameworks you have available if you want to add AI to your business.

Learn the Microsoft AI approach

Completed100 XP

- 7 minutes

AI is disrupting every industry and every business. For the last decade, AI has enabled companies of all sizes to achieve better business results. There's already a **mainstream business use of AI** thanks to these three trends:

- Access to **massive amounts of data.**
- Access to **massive computing power through cloud**.
- Access **to AI algorithms.**

However, AI is now experiencing major breakthroughs. A new generation of LLMs enables new use cases that weren't possible a few years ago, such as those based on high-quality generative AI.

Based on these technologies, organizations will experience a **second wave of AI-powered transformation**. However, businesses need an easy way to access the latest AI if they want to take full advantage of it.

Microsoft is working to **democratize AI use**.

For this, it has designed a wide range of solutions and services to bring AI to everyone, irrespective of their level of AI expertise. There are four approaches, ranging from the level of AI and coding expertise required.

- **AI as copilot for business users**: Microsoft has embedded AI in everyday applications, so business users can benefit from it, even if they don't know anything about coding or data science.
  In this approach, AI is delivered as a **Software as a Service (SaaS)** and becomes transparent, that is, it's fully integrated within the provided service without users having to worry about it.
  For example, **Microsoft 365 Copilot** incorporates the latest generative AI in the shape of a **virtual assistant that performs tasks for you in Microsoft 365 apps**.
- **Microsoft Power Platform:** It covers several low-code products that help you build different pieces of applications. These products have a layer of AI, but it's transparent as well and you can benefit from it without handling it directly.

- **Azure AI Services**: These are the solutions for users who want to deliver an AI project but have **little data science expertise**. They offer premade AI models for you to reuse or customize.
- **Azure Machine Learning**: All machine learning tasks can be handled from this platform. It helps data **science teams in setting, automating, and enabling machine** learning best practices.

Keep in mind that Microsoft has designed all these products and services following strict responsible AI principles. Any AI implementation should be equally respectful.

The rest of this module covers each of these options. Next, we'll discuss the one with the lowest entry barrier, AI as copilot, embedded in everyday applications.

Use AI embedded in everyday applications

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- 8 minutes

To truly realize the potential of AI, it's essential to bring AI to every employee in ways that are relevant and meaningful to their work.

Microsoft makes this possible by embedding AI in the applications people use in their everyday routine. No code or data science expertise is required because AI is delivered as just another feature of a **SaaS product**. The result is a wide range of intelligent applications for business users.

In this unit, we'll discuss how these intelligent business applications weave relevant AI capabilities into their existing workflows.

Dynamics 365 helps workers from specific business lines and functions automate and improve certain tasks.

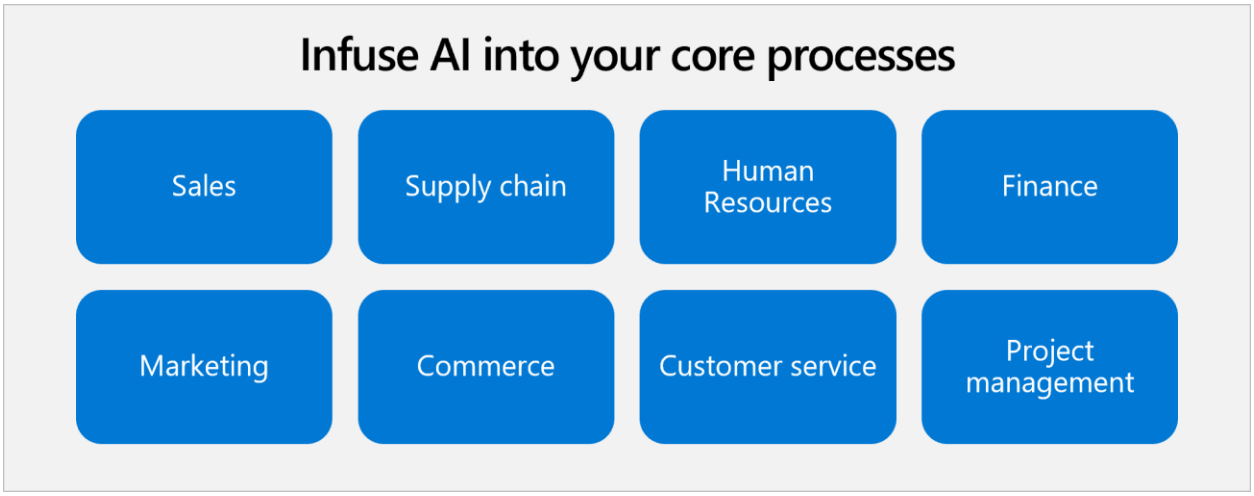
Microsoft 365 does the same by addressing a more general audience. Let's take a look at some examples of these applications that can help anyone use AI to get more done.

Business functions

Some AI solutions are specialized in helping solve problems and gain insight into some specific horizontal functions and sectors.

These solutions are often delivered as SaaS AI solutions, which deliver fast and cost-effective results. With powerful intelligence in their existing workflows, business users can be more proactive and effective in their core competencies.

Microsoft Dynamics 365 is designed with this goal: improve the performance at certain key business functions and sectors.



Here are some examples of powerful scenarios where AI is already having proven, beneficial effects:

- **Sales**: Sellers can sell smarter with embedded AI-powered insights fueled by customer data.
- **Supply chain**: Business users can use AI for predictive maintenance in factories. AI is also helpful to optimize inventory.
- **Human Resources**: Workforce data can be transformed into actionable insights and next-best-action guidance. AI can also be used to automate HR tasks for employees, making procedures more agile.
- **Finance**: Analysts are provided a range of AI-powered tools for real-time reporting, embedded analytics, and insights. For example, AI can predict when or whether their customers will pay their invoices.
- **Marketing**: AI-powered customer insights give marketing users a single view of their customers to optimize engagements and discover insights that drive personalized and meaningful experiences.
- **Commerce**: Commerce users can use AI insights to help them more effectively manage cashflows using payment recommendations, intelligent budget proposals, and cashflow forecasting. They can even use AI to better protect their e-commerce business—and their customers—against fraud.
- **Customer service**: Customer service users can gain insights to address increasing volumes and manage efficient agent distribution. They can also create virtual agents that identify and resolve customer issues quickly—all without having to write code.
- **Project management**: Embedded analytics can provide insights based on project sales and financial data. The solution proposes an AI-powered scheduling to anticipate needs. Operations users gain insights into how their customers use their products and services.

With business applications that use AI as a core ingredient, users can bring together relationships, processes, and data across applications to gain increased visibility and control.

Everyday AI

There are also numerous AI capabilities that are already included in the applications everyone uses in their everyday routine, since they're integrated into almost every job and function. Anyone can use them to address the realities of the modern workplace like virtual communication and the overwhelming amount of information.

For years, Microsoft has been putting AI to work in the **Microsoft 365** apps that people use every day—like **Microsoft Teams, Outlook, and Office**. With these intelligent productivity experiences, employees can collaborate and conduct meetings more effectively, focus their time on value-added work, and uncover timely insights to improve their work.

Microsoft 365 Copilot adds another layer of AI. Business users can ask this virtual assistant to perform certain tasks just by using natural language. The assistant uses the latest generative AI technology, OpenAI's GPT models, to understand the request and do what is asked.

These solutions can improve your routine by boosting your remote work, your focus, your productivity, and your search power.

Everyday AI for remote work

Virtual meetings are becoming increasingly critical in most of our lives. While there’s no true replacement for in-person collaboration, there are new AI tools that can decrease pain points, increase human connection, and make virtual work more engaging.

For example,
intelligent experiences in **Microsoft Teams like background blur and custom backgrounds** can help meeting participants minimize the chances of disturbances appearing on their screen.

Live captions help improve accessibility for meeting participants who are hard of hearing or have hearing loss, non-native English speakers, or people with a sleeping baby nearby.

Business users can even leverage real-time noise suppression to reduce distractions such as loud typing or a barking dog.

When you're not speaking in person, some nuances are missing, and misunderstandings can occur. Copilot can help business users find the right tone for their emails in Outlook to help address such issues.

Everyday AI for focus

Nowadays, workers' routines are too often interrupted by distractions, calls, and multitasking. AI can also help cope with this problem and enable employees **to focus their time and attention** on what matters most.

Note

68 percent of workers complain of their **lack of uninterrupted focus** time during their working routines.[1]

For instance, Microsoft 365 Copilot includes features for **focus to make sure users don't forget any important issue**s.
In OneNote, for example, it identifies unanswered questions all across existing notes and grouping them in one centralized location.
In Teams, Copilot can extract action points from the conversation in real time.

Everyday AI for productivity

Breakthroughs in AI technologies have also enabled the transformation of personal productivity in apps people use every day, apps like **PowerPoint, Word, and Excel**.

To help prepare more engaging presentations, users can take advantage of intelligent suggestions for slide designs. Copilot also incorporates **generative AI to create custom images for their slides**. Users can **rehearse the presentation and receive real-time feedback** to improve **pacing and limit filler words** or **culturally insensitive phrases**.

Writers can take advantage of intelligent suggestions to not only correct spelling and grammar but also rephrase entire sentences for more effect or clarity. Copilot goes further and can write summaries, brainstorm ideas, organize ideas into key themes, or fully rewrite content.

Everyday AI for search

Harnessing information has become the key to almost everything—from improving productivity to understanding customers and much more. However, data is often siloed and hard to find.

AI-powered search experiences **like Microsoft Search** can help business users wade through this data to uncover more effective insights and make better data-driven decisions. Microsoft Search enables users to search for people, files, sites, and more across their organizational data and public web data—all from within the **Microsoft 365 products** they're already working in. Results are even personalized to each user to ensure relevance. This feature is improved with Copilot.

Note

62 percent of employees consider they spend too much time struggling to find the information they need.[1]

Now is the time to empower your employees with the right AI tools to amplify their capabilities and achieve more.

In the next unit, we'll discuss Power Platform, which also offers AI features for people without data science expertise but does require a basic level of coding.

Discover how Microsoft Power Platform brings AI to your business

Completed100 XP

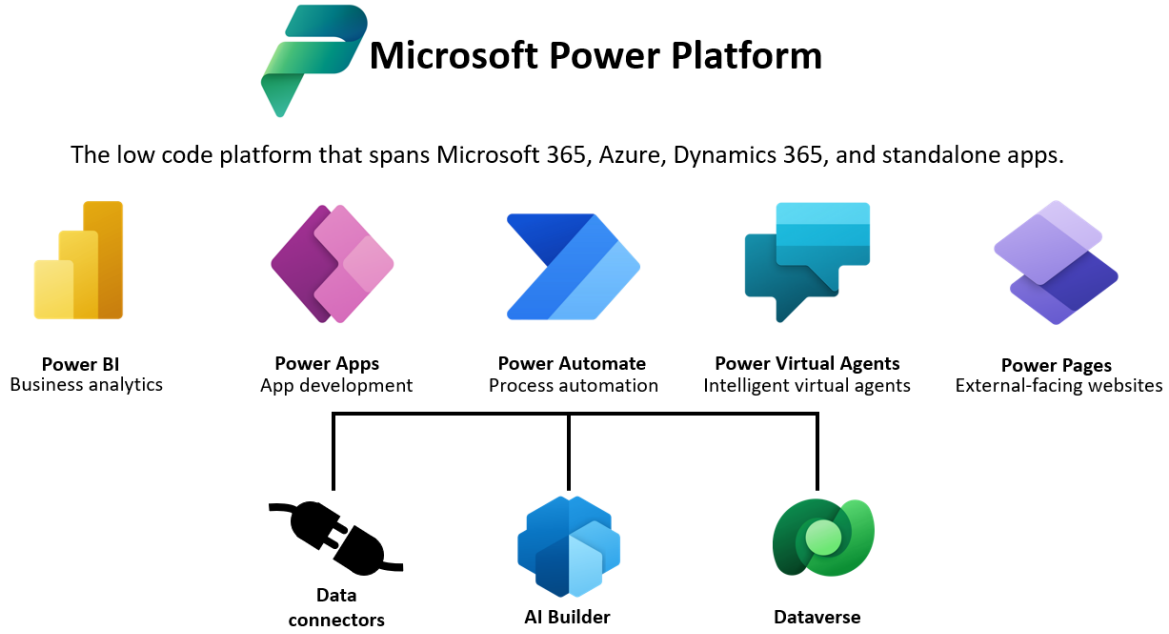
- 7 minutes

AI embedded in everyday applications may not be enough to power the business applications an organization needs. In these cases, Power Platform is the next step towards more customizable AI solutions. It provides a simple, low-code way to introduce AI in your business applications without having to create or manage the AI yourself.

What is Microsoft Power Platform?

Microsoft Power Platform is a low-code or no-code set of services designed to simplify the process of building solutions. It provides building blocks that help teams work faster. Even if Power Platform isn't centered on AI, its services are often powered by AI and help you create smart solutions.

The Power Platform portfolio includes five different products: Power BI, Power Apps, Power Automate, Power Virtual Agents, and Power Pages. It also offers three additional tools: AI Builder, Microsoft Dataverse, and Connectors. Let's see what each of them can do for you.



What can you do with Microsoft Power Platform?

All of the products contained in Power Platform are used to speed up business app development. Beside the specific AI functionalities included in them, they can be connected to Copilot. Thanks to this feature, users can leverage the Copilot generative AI to automatically create the report, workflow, app, website, or chatbot just by describing what they need.

Power BI

Power BI is a business analytics service. It provides insights on a customizable dashboard. It helps organizations be more data-driven and take better decisions based on data. This data-driven approach aligns with one of the core principles of AI, which emphasizes using data to gain valuable insights and make better choices.

Power Apps

Power Apps is a low-code development environment that enables businesses to easily create custom apps without extensive coding knowledge. With the inclusion of AI Builder, developers can seamlessly integrate prebuilt or custom AI models, optimizing business processes and enhancing the intelligence of their applications.

Power Automate

Power Automate is a powerful tool that allows businesses to automate repetitive tasks and streamline workflows without the need for extensive programming. With the integration of AI Builder, users can effortlessly incorporate prebuilt or custom AI models, enabling intelligent decision-making and driving efficiency in business processes.

Power Virtual Agents

Power Virtual Agents is a tool for building chatbots. It's built over many AI models, mostly those enabling natural language understanding (NLU), so the bot can understand what is being said. However, its AI can also detect pieces of the bot that can be improved, and even automatically implement the improvements.

Power Pages

Power Pages is a low-code software-as-a-service (SaaS) platform for creating, hosting, and managing websites. Power Pages simplifies the website development process, making it accessible even to users with limited technical expertise.

Data connectors

Data connectors establish seamless connections between various components (apps, data, devices) and the cloud. These connectors ensure smooth integration and communication, creating a cohesive experience across the platform.

AI Builder

AI Builder empowers developers to incorporate AI capabilities into their applications and workflows without requiring data science expertise. With prebuilt and customizable AI models, AI Builder enhances Power Apps and Power Automate by enabling functionalities like sentiment analysis, category classification, entity detection, key phrase identification, and language analysis.

Dataverse

Dataverse acts as the storage solution in the Power Platform, enabling seamless integration with all its products. It serves as a central repository for data, allowing for efficient organization and accessibility.

Power Platform is a suite of powerful tools designed to help businesses create apps, analyze data, automate tasks, build chatbots, and manage websites. With Power BI, you can get valuable insights from your data and make better decisions. Power Apps lets you easily build custom apps without coding, and AI Builder adds intelligent features like language analysis and sentiment analysis. Power Automate helps you automate repetitive tasks and save time, and Power Virtual Agents allows you to create chatbots that understand and respond to users. Plus, Data connectors ensure smooth integration between different components, and Dataverse provides a central place to store

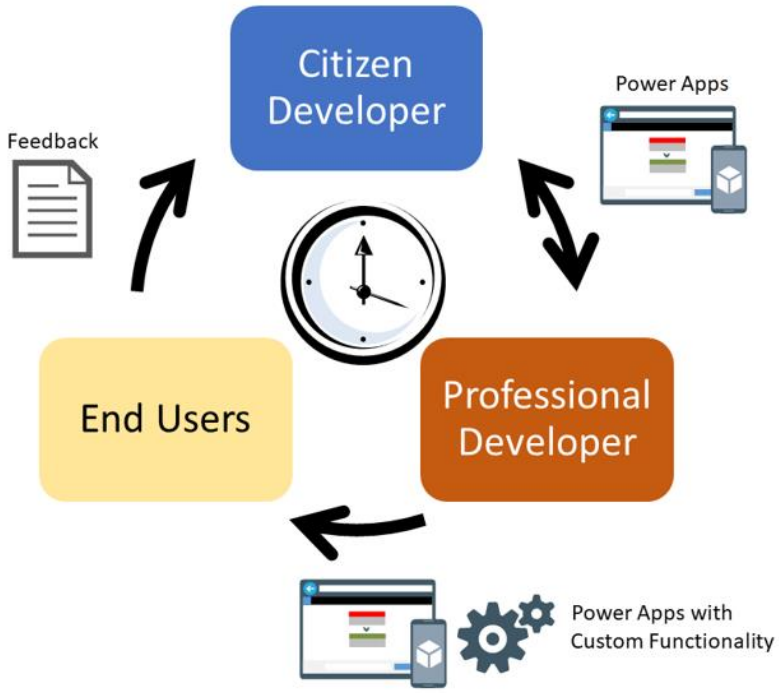
and access your data. By using these tools together, you can enhance productivity and make your business more efficient.

What is the business value of Microsoft Power Platform?

There are two main ways in which Power Platform creates business value for organizations:

- **Reducing development costs**: It provides the building blocks for teams to create custom solutions in much less time than required when starting by scratch. Teams can build custom apps in just a matter of days or weeks.
- **Enabling more agile, scalable development**: The low-code philosophy is central to Power Platform. It allows for faster, more agile solution development. It empowers citizen developers, that is, employees with less coding expertise, to provide working solutions to end users. Professional developers can iterate on this version for further improvement. This collaborative development approach implies solutions are available to end users at an earlier stage and are less costly. This structure is easy to escalate by adding custom functionality.

The diagram shows how this fusion development approach works.



Use Microsoft Power Platform to build a smart inventory app

Let's imagine a retail organization needs an app to manage their inventory. Traditionally, professional developers would build this, but that option would take more time. Thanks to Power Platform, the employees in charge of the inventory can become citizen developers and create an app tailored to what they know they need, based on their expertise.

Citizen developers can use Power Apps to build this prototype of the inventory app. They can even explain in natural language their needs and Copilot can translate them to an actual app. Once this

prototype is built, professional developers can fill in any potential gaps for further functionalities. Then, professional developers can develop an API to check the inventory in real time and update the data on the app. This data would be stored and managed in Microsoft Dataverse. With the information provided by the API, workflows can be created to automatically detect what's missing and replenish inventory with Power Automate. All these data and operations would be reflected in a Power BI report, so it's easier to understand what's happening with the inventory and take the best data-informed decisions.

Each of the products and services we've covered are prebuilt AI models, so the user doesn't require any data science expertise. If your business requires more ambitious solutions, the next available AI tools require some degree of AI knowledge. To fully benefit from them, let's first learn more about how data science teams work and what's the typical machine learning lifecycle.

Understand the machine learning lifecycle

Completed100 XP

- 4 minutes

In this unit, we discuss the typical machine learning lifecycle and its common challenges. It provides an overview of the process if you're building **a custom model**, either from the ground up or using a pretrained model as a starting point. This knowledge should empower you to approach data science projects.

Machine learning challenges and need of machine learning operations

The recent boom of AI premade models, such as those offered by OpenAI, can help organizations reduce significantly the intimidating amount of resources a data science project can require. However, as more organizations experiment with AI, they find that the **machine learning lifecycle** is more complex than just creating an AI model or reusing a prebuilt one.

Even if your organization is using premade AI models like those provided by Azure AI Services, you probably still need to **document and manage data, code, model environments, and the machine learning models themselves**. You need to establish processes for developing, packaging, and deploying models, as well as monitoring their performance and occasionally retraining them. And most organizations are managing multiple models in production at the same time, adding to the complexity.

To cope effectively with this complexity, some **best practices are required**. They focus on cross-team collaboration, automating and standardizing processes, and ensuring models can be easily audited, explained, and reused.

To get this done, data science teams rely on the **machine learning operations** approach. This methodology is **inspired by DevOps (development and operations),** the industry standard for managing operations for an application development cycle, since the struggles of developers and data scientists are similar.

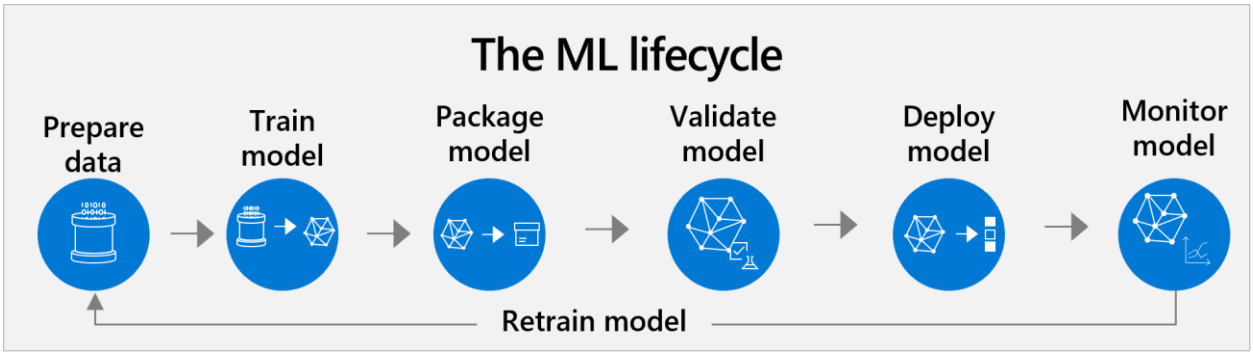
Let's see what the **typical machine learning lifecycle** looks like,

first if you're building your own AI model, and then if you're using premade models. Data scientists can manage and execute machine learning workflows from **Azure Machine Learning**, a platform by Microsoft to make machine learning operations practices easier. Such tools help teams collaborate in a shared, auditable, and safe environment where many processes can be optimized via automation.

Machine learning lifecycle to build your own AI model

This is the classic approach and covers all the usual steps of a data science project. In many scenarios, the resulting AI model performs better than a more generic prebuilt model.

1. **Prepare dataset**. AI starts at data. First, data scientists need to prepare data with which to train the model. This is often the biggest time commitment in the lifecycle. This task involves finding or building your own dataset, cleaning it so it's easily readable by machines, ensuring it's a representative sample, discovering which variables are pertinent for your goal, and so on.
2. **Train and test**. Next, data scientists apply algorithms to the data to train a machine learning model. Then they test it with new data to see how accurate its predictions are.
3. **Package**. A model can't be directly put into an app. It needs to be containerized, so it can run with all the tools and frameworks that have been used in its building.
4. **Validate**. At this point, the team evaluates how model performance compares to their business goals. Testing may have returned good enough metrics, but still the model may not work as expected when used in a real business scenario.
    - **Repeat steps 1-4**. It can take hundreds of training hours to find a satisfactory model. The development team may train many versions of the model by adjusting training data, tuning algorithm hyperparameters, or trying totally different algorithms. Ideally the model improves with each round of adjustment. Ultimately, it's the development team's role to determine which version of the model best fits the business use case.
5. **Deploy**. Finally, they deploy the model in the cloud (often through an API), on an on-premises server, or at the edge on devices like cameras, IoT gateways, or machinery.
6. **Monitor and retrain**. Even if a model works well at first, it needs to be continually monitored and retrained to stay relevant and accurate.



Machine learning lifecycle using a prebuilt model

Creating your own model from scratch used to be the default option. However, the boom of premade models has changed the paradigm. It's increasingly common to base your data science projects on integrating premade models and adapting them to your business needs. This approach can change the workflow significantly.

1. **Validate**: Using a prebuilt model means organizations start just by checking if it works for them. It's key to understand as soon as possible which premade model to use and how viable it is.
    - **Repeat steps 1-4**: Data scientists repeat steps 1-4 until results are good enough. It may often take some effort for the premade model to deliver what is required.
2. **Engineer prompts**: It's the first option to improve results obtained with a prebuilt model. The team needs to explain what they need so the model understands every nuance. This task involves rephrasing the request (prompt) until the model gets it. It may take time. However, citizen developers and even end users can do prompt engineering if guided by data scientists. This approach gives more power to business users.
3. **Customize dataset**: If prompt engineering doesn't improve results enough, it may be because the prebuilt model is too generic for the intended use case. Then, data scientists need to complement the model with custom training data.
4. **Train and test**: Data scientists can add a custom training layer on top of the premade models with the additional data of step 3. This way, they get a new version of the prebuilt model, tailored to the AI problem they're trying to solve. Another option is to develop a full custom model that covers for the gaps left by the premade one. Many models can coexist within an AI solution.
5. **Package and deploy**: There are different ways to use a prebuilt model. In many cases, it may be enough to use it via API. This approach implies the organization doesn't own it and can't customize it, but it saves the time of packaging and deploying it. If there's been some level of custom training, the AI team needs to package and deploy this new version of the model.
6. **Monitor**: As all models, prebuilt ones also need to be checked regularly to keep its edge. Data scientists should bring themselves be up to date on new prebuilt models. New custom trainings may also be necessary at some point.

Which of the two approaches is better? It depends on the scenario.

Working with **premade models** has the advantage of requiring **less resources and delivering results** faster.
However, prebuilt models are trained to solve a wide range of use cases, so they may struggle to meet very specific needs.

In these cases, a full **custom model may be a better idea**. A flexible mix of both approaches is often preferable and helps scale. AI teams can save resources using premade models for the easiest use cases, while investing these resources in building custom AI models for the hardest scenarios. Further iterations can improve the prebuilt models by retraining them.

Next, let's dive deeper into the benefits and business value that machine learning operations can provide.

Discover the business value of applying DevOps practices to machine learning

Completed100 XP

- 6 minutes

In this unit, we discuss the importance of machine learning operations **(MLOps).** MLOps applies the methodology of DevOps (development and operations) to manage the machine learning lifecycle more efficiently. It enables a more agile, productive collaboration in AI teams among all stakeholders. These collaborations involve data scientists, AI engineers, app developers, and other IT teams.

There are many available products to help teams implement MLOps.
Microsoft offers **Azure Machine Learning, Azure DevOps, and GitHub.**

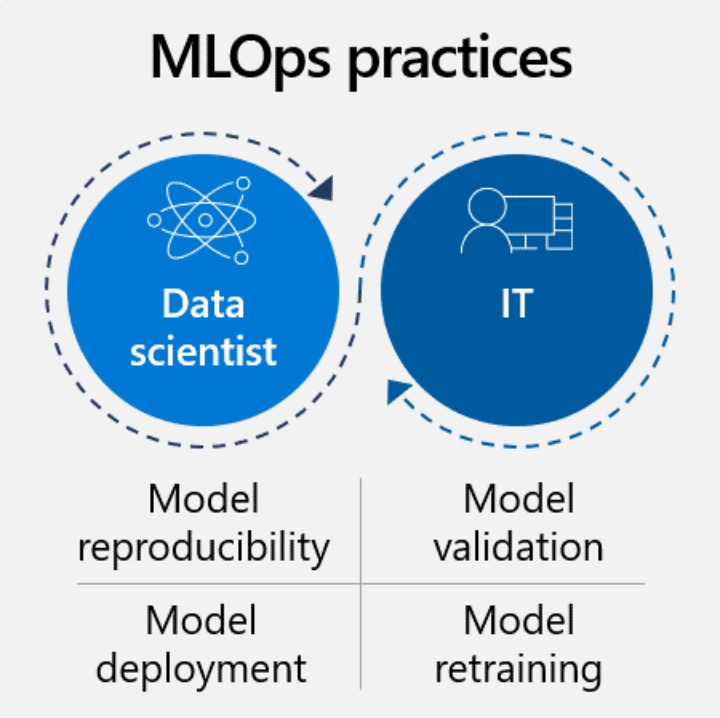
MLOps processes and tools help those teams collaborate and provide visibility through shared, auditable documentation. MLOps technologies provide the ability to save and track changes to all resources, like data, code, models, and other tools. These technologies can also create efficiencies and accelerate the lifecycle with automation, repeatable workflows, and reusable assets. All these practices make AI projects more agile and efficient.

Model reproducibility

During initial iterative training and later model retraining, there are a few things that can make the complex process more manageable. One of them is to keep models reproducible, which means they can easily be run on the same dataset by any team member with same or similar results. Reproducibility is **achieved by documenting processes and sharing resources**.

First, it's helpful to centrally **manage assets** like environments, code, datasets, and models so teams can share and reuse them.

- **Model registry**: As teams experiment with different versions of a model, a model registry provides a central place to save each version. With a registry, teams can easily revert to a previous version if something isn't working, even after the solution has gone into production. The model registry also serves as an audit trail for each model's history.
- **Code management**: Technical decision-makers need to determine which technologies and processes their teams will use for code management. This generally includes code repositories like GitHub where code can be saved, versioned, shared, and reused. It also includes tools for using and versioning code.
- **Dataset management**: We also recommend saving training datasets centrally. This way, teams can reuse them, share them with colleagues, or monitor how they change over time to manage drift.



- **Shared environments**: Create model environments that can be shared among individuals. This simplifies the handoff between steps in the model creation process and makes it possible for teams to collaborate on certain steps.

Second, we recommend automating tasks with **machine learning pipelines**. A pipeline is a workflow of complete computing tasks that can be run independently. In machine learning, a pipeline can automate data preparation, training configuration, training processes, or model validation. Pipelines save costs and time for data scientists each time they need to iterate some part of the machine learning lifecycle.

Model validation

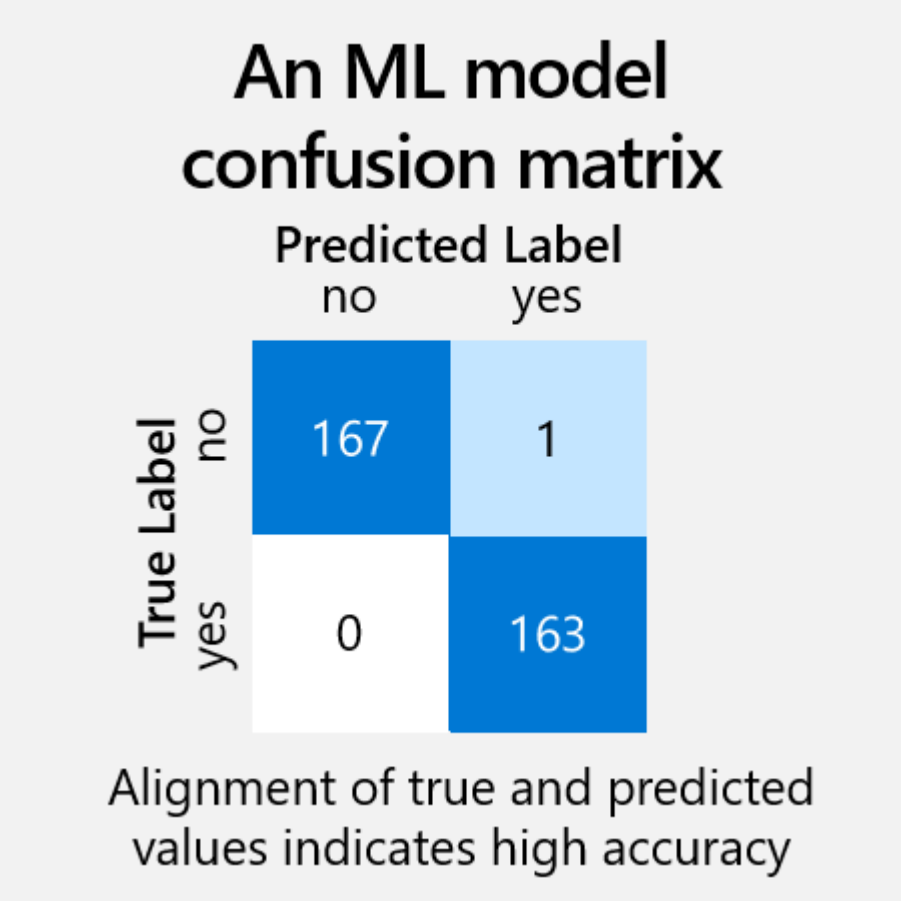
Before a model is deployed, it's critical to validate its performance metrics. You may have several metrics that are used to indicate the "best" model. It's important to work with data scientists to

understand what metrics are important and evaluate them before deployment. There are **tools to evaluate model metrics**, such as a loss function or a confusion matrix.

Metrics usually compare what the model has predicted with what it should have predicted (the true value or ground truth). Overall, the focus is to maximize true positives and true negatives, that is, the model succeeding in predicting true values. It's equally important to avoid false positives and false negatives, that is, wrong predictions and missed predictions.

It's critical to validate performance metrics against the business use case. For example, perhaps you designed a model to predict patient health. As a healthcare provider dealing with life and death situations, you likely prefer to have false positive diagnoses rather than an incredibly high rate of accuracy that misses diagnoses.

If the model is a newer version of an existing model, you need to see if it performs better than the previous one on key metrics.



Model deployment

There are several options for deploying the model into production. Data scientists and AI engineers must work together to find out the best option for each case.

- **Cloud**: One option is deploying models using the cloud, often leveraging an application programming interface (API). There are scalable tools to automate and simplify this process, like Kubernetes or Azure Container Instances.
- **On-premises**: Models can also be deployed directly onsite, in the organization's own servers.
- **Edge**: It's also possible to deploy models on edge devices, like cameras, drones, and machinery. This option may be helpful in IoT scenarios.

No matter where you deploy the model, the workflow is similar. First, you register the model in the model registry. Then, you prepare to deploy the model by specifying assets, usage, and the compute target. Finally, you deploy it to your desired location, test it, and continue to monitor model-specific metrics throughout the lifecycle.

Model retraining

Although this is the end of the development process, this is just the beginning of the maintenance cycle. Models need to be monitored and periodically retrained to correct performance issues and take advantage of newer training data. To set yourself up for success, you want to create a retraining loop—or a systematic and iterative process to continually refine and ensure the accuracy of the model.

This process may seem overly complicated. Keep in mind that it can be greatly simplified by using **prebuilt models.** MLOps tools like **Azure Machine Learning** don't necessarily need to be populated with custom models, they also accept prebuilt models. In this sense, Azure AI Services is a great alternative, as it offers faster results with less data science expertise required.

In the next unit, let's discuss the opportunities of Azure AI Services.

Explore the potential of Azure AI Services

Completed100 XP

- 8 minutes

This unit discusses the **prebuilt AI models** that are available in **Azure AI Services**. They are a solid alternative to developing internal custom AI models.

What are Azure AI Services?

- When considering adopting AI into your business, you should consider **prebuilt AI services first**.
- **Azure AI Services** is a Microsoft product that delivers AI as **SaaS**. It includes **pretrained models developed by Microsoft global researchers** and data scientists to solve common problems.

- To avoid reinventing the wheel, businesses can leverage **prebuilt services** to achieve quality and accelerate delivery of technology solutions.

- It's better to use the Azure AI Services that offer **prebuilt AI services in vision, speech, language, search, or decision-making** to solve common scenarios.

- This brings AI within reach of **every developer and organization without requiring machine learning expertise**.

- As a result, it **enables developers of all skill levels** to easily add intelligence to new or existing business applications.

There are some benefits to using Azure AI Services instead of custom AI models:

- **Empower citizen developers**: AI Services are designed for people with little data science expertise. For example, they usually handle most training decisions and provide basic testing results after training. Business users can use AI Services to adapt it to their business needs, with some guidance and troubleshooting from the data science team.
- **Save costs**: Since AI Services are serverless, they're usually less costly than developing and training the model internally.
- **Deployment flexibility**: You can export AI Services models and run them wherever you need, in the cloud, on-premises, or on the edge.

What can you do with Azure AI Services?

There are five large families of AI Services: speech, language, vision, decision, and Azure OpenAI Service. Each service includes several AI models that complement each other.

- **Speech**: These models deal with oral conversation. They can transform speech to **text and vice versa.** It's also possible to translate what the speaker says and identify each speaker. Models can even suggest pronunciation corrections to the speakers.
- **Language**: These AI Services focus on processing and analyzing text. They're trained to understand **natural language and extract insights**. For example, models recognize language, intent, entities, and sentiment in a text. Besides, they can find answers to the questions put to them.
- **Vision**: It includes models that analyze images and videos. Beside more generic models, there are specific ones for extracting text from images (optical character recognition or **OCR**), for recognizing human faces. Another option is **Azure Custom Vision**, which lets users build their **own AI models** to recognize objects or classify images. Keep in mind that **face recognition services** are highly restricted due to Microsoft responsible AI policies.
- **Decision**: These models provide recommendations on the best decisions to take. They can raise an alert when they **detect anomalies in your data**, or flag potentially unsafe content. There's also **Personalizer,** a recommendation model that suggests which content to show to each user based on their behavior.

- **Azure OpenAI Service**: Microsoft offers some of the latest **generative AI models developed by OpenAI**. The next unit will discuss them in more depth.

All Azure AI Services deliver AI models as SaaS. If you need to customize the product and built your own SaaS, **Azure Applied AI Services** enables you to do so without increasing data science complexity. Azure Applied AI Services is built on top of Azure AI Services and focus on key scenarios. For example, Azure Form Recognizer incorporates OCR and text analytics models to extract data from invoices, receipts, and other documents.

Use Azure AI Services in a real use case

Let's imagine how you could improve the **sales** and **after-sales functions** of your business just using **Azure AI Services**.

First, you could increase sales by **recommending relevant products to users on your website** with **Personalizer, based on their behavior data**. You might assist them during their shopping experience with a **virtual assistant powered by Azure OpenAI Services**. This assistant could solve questions in a **natural, fluid interaction**.

Once the sale is done, you may want to analyze the reviews clients are **publishing on your products.** Language AI Services can **analyze feedback and extract insights on what clients think about specific products and your brand**. This information is key to improve what you're offering.

However, customers may not always be satisfied with their purchase. You have a call center to solve these issues and deliver post-sale services. Speech AI Services can analyze, monitor, and evaluate these calls. You can find out what customers complain most about, or whether they are content with the solutions you're offering them. Using these insights to improve post-sales services can help you build customer loyalty.

Azure AI Services include the latest AI models. Not only are their models continuously updated, they also cover state-of-the-art OpenAI models. You can use the newest large language models (LLM), like the GPT assistant or the Bing Search Chat. Let's discover how in the next unit.

Discover the business value of Azure Open AI Service

Completed100 XP

- 3 minutes

Azure OpenAI Service is the latest addition to Azure AI Services. It's evidence of Microsoft commitment to offer state-of-the-art AI models in a way that's accessible to business users.

What is Azure OpenAI Service?

OpenAI is a successful AI company that has lately developed some of the most famous generative AI models. ChatGPT and DALL-E are some of their creations. These models are available via a public API. As all generative AI, OpenAI models receive prompts or instructions from the user and send back AI-generated content.

Azure OpenAI Service is a Microsoft product that enables users to leverage OpenAI models via **Azure AI Services**. In other words, it allows you to access OpenAI models directly from Azure, instead of the public API.

Keep in mind that **Azure OpenAI Service** isn't the only Microsoft product delivering this kind of models to users. In previous units, we've already discussed generative AI included in **Microsoft 365 Copilot and Copilot in Power Platform.** These copilot features are powered by GPT, the OpenAI model for text generation.

What can you do with Azure OpenAI Service?

The models included in Azure OpenAI Service focus on **generative AI**. That is, they allow users to automatically create content that credibly looks human-made. For example:

- **Language**: GPT models that understand and produce natural language. They can extract meaning from the users' prompts, including nuances, at human-like level. Thanks to this ability, they can engage in a believable and satisfactory conversation. They're also good summarizing, solving questions, and writing emails, copies, code, or other documents when given clear instructions.
- **Image**: DALL-E models that create visuals. They translate the user's prompt into an image. These models can be used to generate all kinds of art: realistic photographs, illustrations, logos, sketches, and so on. DALL-E successfully recreates styles when asked to.
- **Code**: Codex models are designed to translate user's prompts into working programing code. Developers can use them to create code snippets and speed up their performance. Codex provides results in several programming languages. It's technology behind GitHub Copilot.
- **More complex models**: Embeddings models provide the ground for data scientists to build more complex AI models. They analyze texts and create an abstract mapping of their meaning. These mappings help AI experts find similarities in texts. Embeddings models are key in scenarios involving searches, recommendations, or anomalies.

OpenAI models evolve continuously, and so does Azure OpenAI Service. You can check which specific versions of these models are available in the Azure OpenAI Service documentation.

Benefits of using Azure OpenAI Service instead of connecting directly to the OpenAI API

Many business leaders aren't sure about the difference between consuming OpenAI models directly from their API or via Azure OpenAI Service. There are clear reasons for organizations to prefer the Azure OpenAI Service:

- **Same models**: Given a specific model and version, Azure delivers exactly the same as the API. Azure users aren't missing any updates. The AI is just as good.
- **Privacy**: OpenAI's API is public. This fact implies that all data sent to the API may be used to improve the models. If your use case involves private, confidential information, using the API may not be the best option. In contrast, when using Azure OpenAI Service, Microsoft

hosts the models within their Azure infrastructure. No customer data is sent to OpenAI for improving the models, since it all remains in Azure.

- **Security**: Microsoft Azure is a dependable, robust, and trustworthy platform. Azure developers have extensive experience securing the infrastructure for public and private organizations from all around the world to work safely in Azure. Azure OpenAI Service is built upon this expertise. It delivers encryption, private networking, and a system of regional availability to ensure your business blooms safe and uninterrupted.
- **Responsible AI**: The Microsoft ethical commitment guides how OpenAI models are offered in Azure. Microsoft is doing extensive research and work to identify, measure, mitigate, and operate to deal with all potential harms coming from this generative AI. For example, developers prevent misuse with a system of additional instructions that overrule specific prompts. There's also a content filter system that ensures the models don't deliver any potentially harmful content.

In conclusion, Azure OpenAI Service combines the best of OpenAI and of Microsoft Azure. On one hand, it delivers the innovative OpenAI models. On the other hand, it has all the benefits of being hosted in the reliable, business-friendly environment that is Azure.

Use Azure OpenAI Service in a real use case

Let's imagine how an organization could develop a virtual assistant with Azure OpenAI Service. In the last unit's use case, we mentioned this possibility to deliver post-sales services.

Customers could interact with the assistant to ask for information about their orders, purchases, or warranties. They could talk to this assistant by chat or call. Previous generations of virtual assistants required designing the conversation flows, and this approach made conversations rigid to some extent. An assistant powered by a GPT model wouldn't suffer from this obstacle. It would require no workflow design and it could engage in more flexible, natural conversations. This perk implies that the assistant would be able to solve questions and tasks without specific training, as long as it's provided the information. This approach saves time and resources from the development team.

The AI team should feed the virtual assistant personal data and internal documentation to answer doubts about the refund policy, shipment status, and so on. Azure OpenAI Service allows you to do this operation safely, without risk of misusing data. Ensuring client data privacy is key, especially when the business deals with sensitive information such as credit card numbers.

Customers often dislike the user experience provided by chatbots because they perceive them as cold and distant. To create a friendlier, more human-like experience, the AI team could generate with DALL-E avatars for the virtual assistant or even the client's profile. This feature would reinforce the more natural conversation flow achieved by the GPT model. In general, customers would benefit from a warmer, more natural post-sales experience.

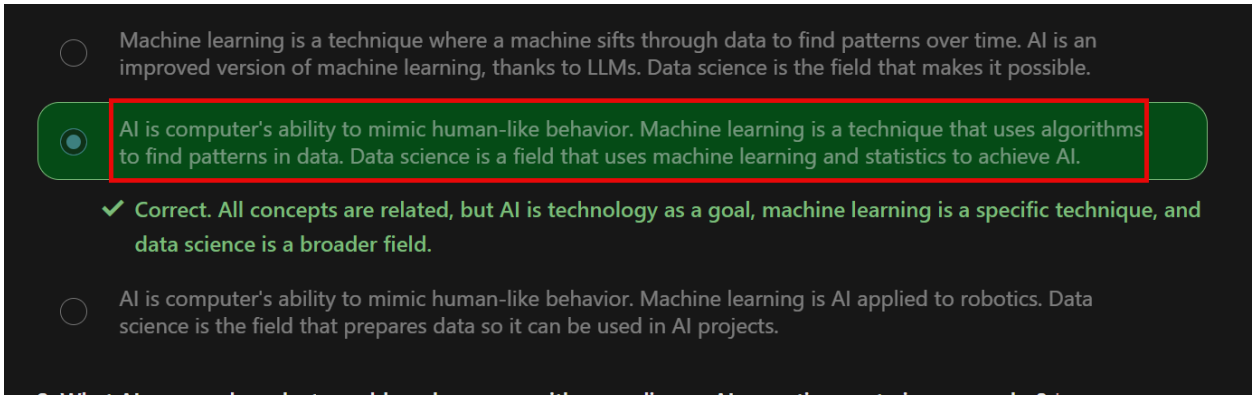
If the client is satisfied at the end of their interaction with the virtual assistant, data scientists could use the Embeddings model to recommend them further purchases. In this scenario, it's not only important to deliver the right recommendation. It's even more crucial to correctly read the mood of the customer: if they're unhappy about the shopping experience, it could be counter-productive to

suggest that they buy again. In that case, the assistant should be restrained from offering a recommendation. For this reason, it's key to count with GPT models, which are particularly good at noticing these nuances.

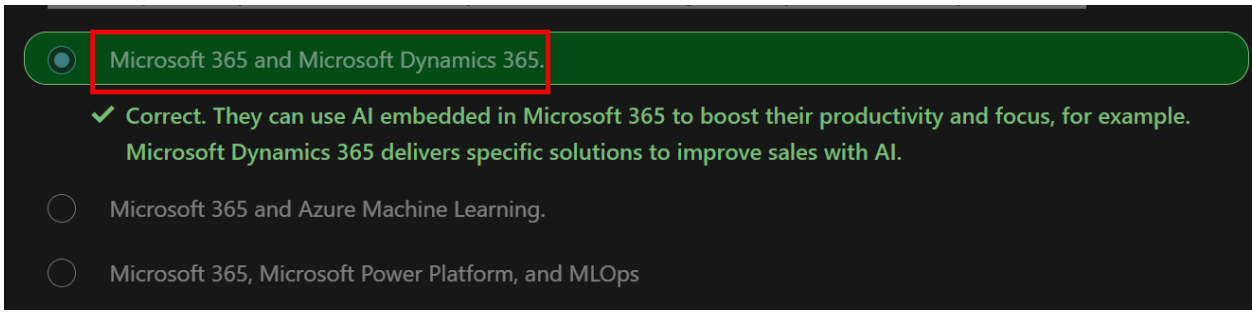
By now, we've covered what you can achieve with the available AI resources. Next, let’s wrap up everything you’ve learned with a knowledge check.

Knowledge Check

1. What's the difference between AI, data science, and machine learning?

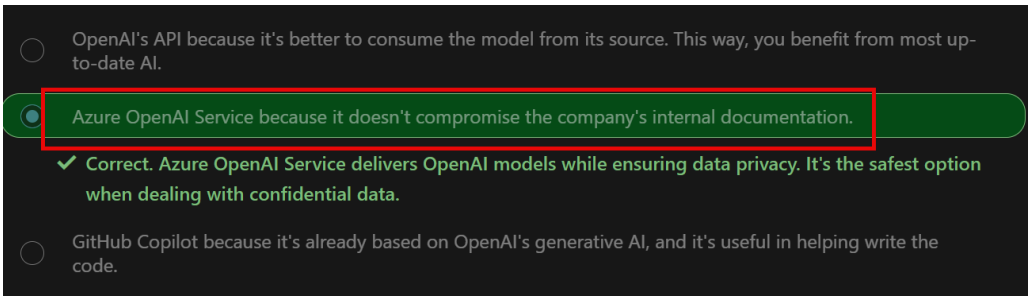


2. What AI-powered products could a salesperson with no coding or AI expertise use to improve sales?



3. A manufacturing company that produces machinery wants to develop a solution to extract information from their internal technical documentation. The Chief Digital Officer wants to solve the problem with OpenAI's generative AI. Which option should

be recommended for this use case?



Create business value from AI

This module is designed to help you **plan your AI strategy** and **adopt an AI-ready culture**. It proposes a **framework to drive that change in your organization**.

Learning objectives

In this module, you will:

- Articulate the **components of an AI strategy.**
- Describe the **key elements of an AI-ready organizational culture**.
- Understand the **stages to AI success**.

This module is part of these learning paths

- Discover Microsoft AI for leaders in finance
- Discover Microsoft AI for leaders in healthcare
- Discover Microsoft AI for leaders in manufacturing
- Discover Microsoft AI for leaders in retail
- Discover Microsoft AI for leaders in sustainability
- Transform your business with Microsoft AI

Introduction

Completed100 XP

- 1 minute

- AI helps organizations transform digitally by creating new experiences infused with capabilities to make them smart, fast, and helpful.

- To harness this potential, organizations must be ready to create, own, and operate AI-based systems.

- A **successful AI strategy** must consider **cultural issues** as well as **business ones**.

- Becoming an **AI-ready organization** requires a **fundamental transformation** in how you do things,
    - how **employees relate** to each other,
    - what **skills they have**, and
    - what **processes** and **principles** guide your behaviors.

Learning objectives

In this module, you will:

- Articulate the **components of an AI strategy**.
- Describe the **key elements of an AI-ready organizational culture**.
- Understand **the stages to AI success**.

Prerequisites

- Basic understanding of AI concepts.
- Basic understanding of business concepts.

Let's start by defining an AI strategy to enable your organization to adopt AI in a meaningful, successful way.

Define an AI strategy to create business value.

- There's excitement stirring around AI. It's now clear that AI technologies drive substantial value to organizations and should be embraced to keep a competitive edge.

- However, the complexity underpinning AI may feel intimidating. Any organization needs a **solid plan for AI adoption** and scaling to fully benefit from AI's potential.

- You should **consider AI as a tool to reach your business goals and incorporate** it into the **corporate strategy**.

- In Microsoft, we recommend using a **holistic framework for AI strategy**. This framework applies to all organizations and provides a **sensible approach to AI implementation**.

- This **AI strategy framework covers three elements**:
    - the **external environment** that gives you **context**,
    - the **value proposition** that you **offer to customers**, and

    - the **executive capabilities** of your organization.

External environment

- Your starting point should be to understand the external industry environment. Right now, it involves measuring **how AI is impacting your sector**.

- This technology is shifting overall buying behavior. AI is leading and empowering new competitors. It's disrupting **current business processes** and **opening opportunities** for new business models.

- **Governments are taking action** to deliver **new regulations on AI**.

- During the last decade, we've seen the disruptive potential of AI across industries. Now, a new generation of AI models is taking this power to the next level.

- **Generative AI** is capable of delivering content and insights with unparalleled results, and this technology changes how we work.

- Business leaders are already **strategizing to implement generative** AI to boost productivity. However, keep in mind that AI works best as a copilot, that is, as a guide to help you achieve better results. AI amplifies your expertise and skills.

Value proposition

- What do you want **to offer your customers**? You must consider the **benefits** and **functionalities** that your **AI-powered products and services** will deliver to your clients.

- There **may be opportunities** to improve their customer experience by improving a service or by adding new features.

- AI may help you be more efficient and, allowing you to deliver your solution at a more competitive price.

- Perhaps it's time to embrace new business lines opened up by AI. When writing your value proposition, be realistic and take into account costs of production and delivery, since they have a direct impact on the customer experience.

- The overall goal is to decide how to meet external challenges and leverage key opportunities.

Organization and execution

- The most powerful, disruptive **value proposition will amount to nothing** if you're not ready to deliver it to term.
- You must be sure that **your organization has the capabilities and resources** to embrace your AI strategy plan.

- Your goals will likely **require deep organizational changes** so everyone in **the company can fulfill their new role.** So, there needs to be alignment **between people and processes** to empower employees with the **adequate AI-related competencies**.

- This task involves growing an AI-ready culture.

Next, let's focus on this third element, organization and execution. Let's explore how to prepare your organization to embrace AI and become an AI-ready company.

Discover the characteristics that foster an AI-ready culture

- A successful AI strategy must consider **cultural issues** as well as **business issues**.

- Becoming **an AI-ready organization** requires a **fundamental transformation** in
    - how **you do things**,
    - how **employees relate to each other**,
    - what skills they have, and
    - what **processes and principles** guide your behaviors.

- This transformation goes **to the core of an organization's culture**, and it's vital for **organizations to tackle** such transformation with a holistic approach.

- Leaders should back **this cultural change for everyone** at the **organization to embrace** and **adopt AI**.

Fostering an **AI-ready culture requires**:

- Being a **data-driven organization**.
- **Empowering people** to **participate in the AI transformation**, and creating an **inclusive environment** that allows **cross-functional**, **multidisciplinary collaboration**.
- Creating a responsible approach to AI that addresses the challenging questions AI presents.

Of course, this is only possible with **strong leadership that drives change by both adopting the changes this transformation** will require and actively supporting people throughout.

Below we share our perspective on the changes you need to make to achieve an AI-ready culture.

Data-driven

Any good AI system relies on having the **best and most complete data** and being able to reason over **your entire data estate**. In other words, it depends on a **matter of integrity and access**.

Access

- Due to data ownership or storage issues, most organizations generate, organize, and use data in a siloed manner.

- While each department may have a good view of the data coming from their **own processes**, they may lack other information that could be relevant to their operations.

For instance,

- a sales department might not have a complete view of a customer, because **they're missing pieces of data**, like e-commerce activity and payment status, which are controlled by other departments.

  In this case, a seller may make the **mistake of trying to sell a customer an insurance policy** that they already purchased through an online channel.

- By sharing data across the organization, the sum becomes greater than the parts.
- It's no longer each piece of data that matters, but what that data adds up to: a unified view of the customer.
- With that unified view, you can make better decisions, act more effectively, and provide a better customer experience.
- Your data estate must be accessible to be useful, whether it's on-premises, in the cloud, or on the edge.

Integrity

- The quality of the data is also key. In this example, if the customer data was riddled with errors, like inaccurate contact information, irrelevant data, or duplication, it wouldn't matter that the data had been unified; the seller could still make significant mistakes in interacting with the customer.

- Just as quality of data is key to creating next-level experiences for customers, it's also key to successful AI. An **AI model is only as good and complete as the data it can operate on** and learn from.

- So, it's of **paramount importance to work in a way that ensures your data is as complete and rigorous as possible**.

In summary, becoming **data-driven means** acquiring a **mindset of data sharing and rigorousness** that drives how you work and relate, and ultimately how you collaborate. This enables you to **realize the value of AI and better confront the challenges** that AI brings.

Empowering and inclusive

Fostering an AI-ready culture means **empowering people to be part of the AI transformation**. Organizations should provide the following opportunities to achieve this goal:

- **Enablement:** Space, resources, guidance, security, and support is needed to improve what people do with AI.
- **Time for learning:** Organizations should help people get the knowledge and the skills.
- **Room for experimentation:** During this process, you should encourage new ideas and continuous improvement. This experimentation must allow room for errors, as well as celebration and acknowledgment of success.

It also means to create an **inclusive environment**, one that is predicated on the willingness and ability of employees to work in **cross-functional teams** that cut across organizational boundaries.

- Furthermore, it means making those who **best understand the business a central piece of your transformation process.**

- **Data scientists working in isolation often create models** that lack **the business knowledge, purpose,** or value that would make them an effective AI resource.

- Similarly, **business people working in isolation** lack the **technical knowledge to understand what can be done from a data science** perspective. A multidisciplinary approach is important.

- By enabling cross-functional teams that include both **data scientists and the business employees** closest to the **business need**, you can **create powerful** and **effective AI solutions**.

- An **example** of this is our hugely successful **compliance predictive analytics tools, which were inspired and developed by employees working on our finance teams**.

- They were **successful** only because they were created with the **insights of those closest to the business need.** This example illustrates how powerful it's to create an inclusive, cross-organizational collaborative approach.

Responsible

- The third key element of an AI-ready culture is fostering a responsible approach to AI. As AI continues to evolve, it has the potential to drive considerable changes to our lives, raising complex and challenging questions about what future we want to see.

- Like a **Corporate Vice President of Strategic Missions and Technologies** at Microsoft says: the **question very often is not what AI can do, it's what AI should do**.

- Organizations need to ask themselves: **How do we design, build, and use AI systems** to create a **positive impact on individuals and society**? How **can we ensure that AI systems treat everyone fairly**? How can **we best prepare the workforce for the new AI era**?

- These questions demand for organizations to think about **their AI principles** and how to ensure them throughout the company.

- To **ensure responsible AI practices**, **specific planning** is required that should include an **AI governance model**.

- In this way, you can **deliver transparent, explainable, and ethical AI**. The module Embrace responsible AI principles and practices provides a more detailed discussion of the implications of responsible AI for business.

- Now that you understand the principles that **enable organizations to embrace AI**, let's assess **whether your organization is ready** and **how it should evolve**.

Discover the path to AI success

Now that you've learned about the basics of an AI-centric organization, it's important to understand that AI adoption is a journey. In their collaboration and discussion with business leaders, Microsoft is discovering insights on how organizations can achieve **AI success**.

Note

For this purpose, Microsoft has developed a **leader's guide to build a foundation for AI success**.

This model is based on five pillars that drive organizations to AI success:

- Business strategy.
- Technology strategy.
- AI strategy and experience.
- Organization and culture.
- AI governance.

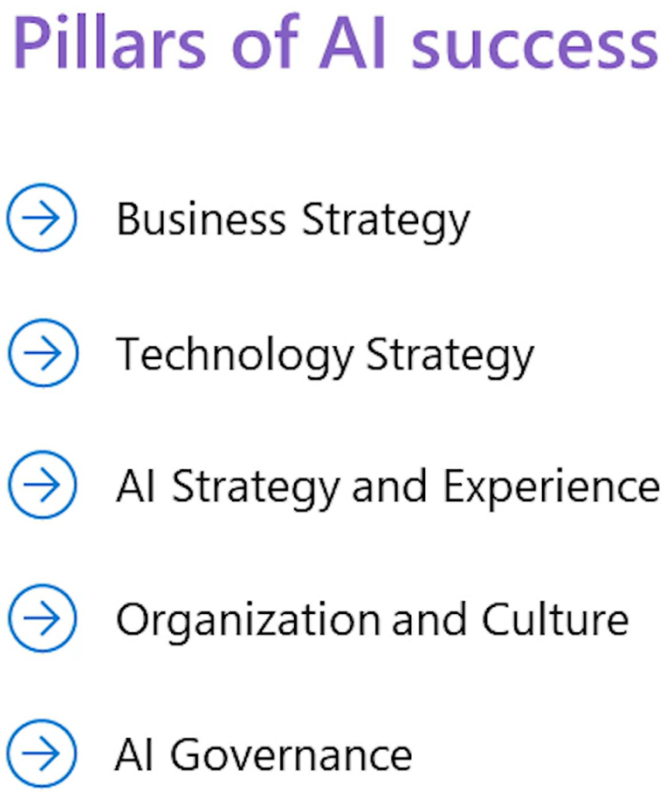
In the following video, Jessica Hawk, Corporate Vice President of Azure Data, AI and Digital Applications and Innovation Product Marketing, explains in detail this model and its five pillars.

VIDEO

75% of CEOs most advanced Gen AI will have competitive edge

- Copilot – M365 & Power Platform
- With Trust
- Responsible AI

Pillars of AI Success



a) *Business Strategy*

b) Technology Strategy

Pillars of AI success

Technology Strategy

An AI-ready application and data platform architecture, aligned parameters for build vs. buy decisions, and plans for where to host data and applications to optimize outcomes

c) AI Strategy and experience

Pillars of AI success

AI Strategy and Experience

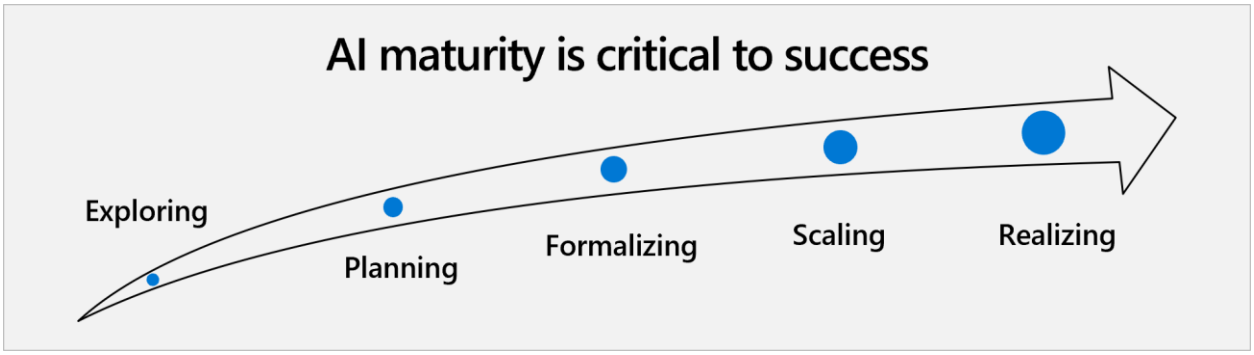
A systematic, customer-centric approach to AI that includes applying the right model to the right use case and experience in building, testing, and realizing AI value across multiple business units, use cases, and dimensions

d) Organizational and Culture

e) AI Governance

This whitepaper includes a model of the **stages of AI success**. This five-tiered chart is a tool to help organizations take AI to the next level and evaluates their AI maturity.

1. **Exploring stage:** Companies at this initial stage of AI adoption are just starting their AI journey yet. They're still learning about AI and experimenting with it in some parts of the organization.
2. **Planning stage:** Organizations at this stage are actively assessing, defining, and planning an AI strategy across the company.
3. **Formalizing stage:** At this point, companies are formalizing, socializing, and executing on AI strategy across the organization. These AI initiatives take place in multiple business units. AI is starting to generate value.
4. **Scaling stage:** Organizations are now in position to think bigger. AI initiatives deliver both incremental and new value across the company.
5. **Realizing stage:** At this final stage, AI achieves consistent AI value across the organization and in multiple business units.



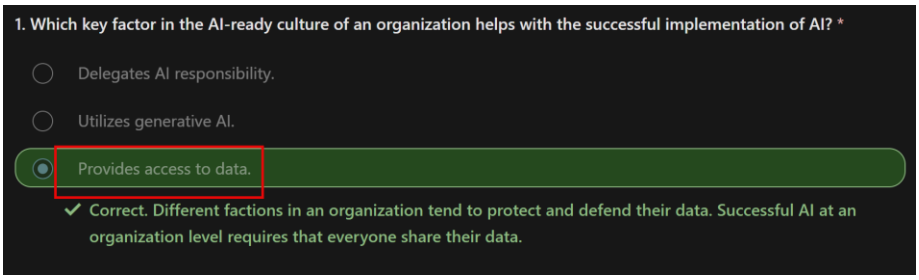
However, we've experienced an enormous AI acceleration during the last few years. Great breakthroughs in generative AI and premade models, such as the large language models (LLM) offered by OpenAI or Bing Chat AI, have greatly disrupted the field. This new context has two major implications:

- **Need to be up to date:** Now, even mature companies need to reinvent themselves and adopt new waves of AI to avoid losing their competitive edge. Their AI strategy must reflect and leverage the impact brought by recent technologies.
- **Mainstream AI:** Generative AI has changed the rules of AI adoption by empowering business users at an unprecedented level. It might be easier than ever to implement AI in business. Many companies are working hard to rank higher in the maturity assessment model.

Now that you've considered various aspects of what it means to have an AI-ready culture, how to assess your organization's AI success, and prepare for change, let's wrap up everything you've learned with a knowledge check.

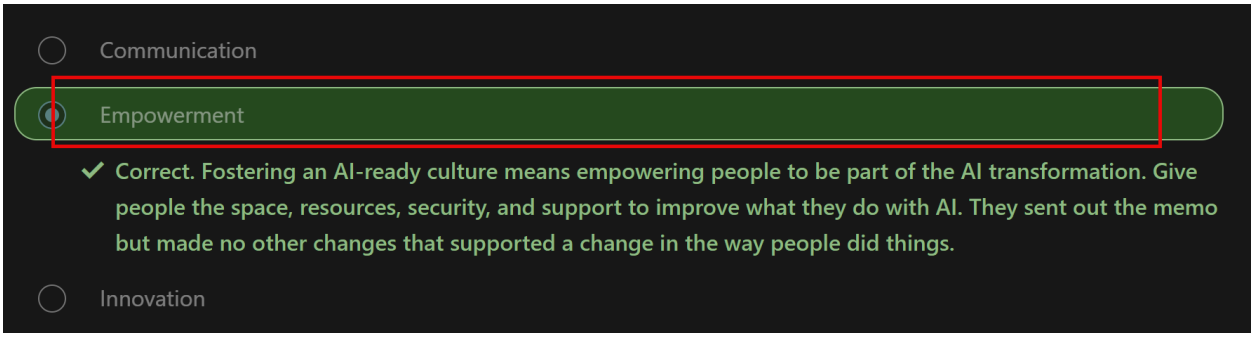
Knowledge Check

1. Which key factor in the AI-ready culture of an organization helps with the successful implementation of

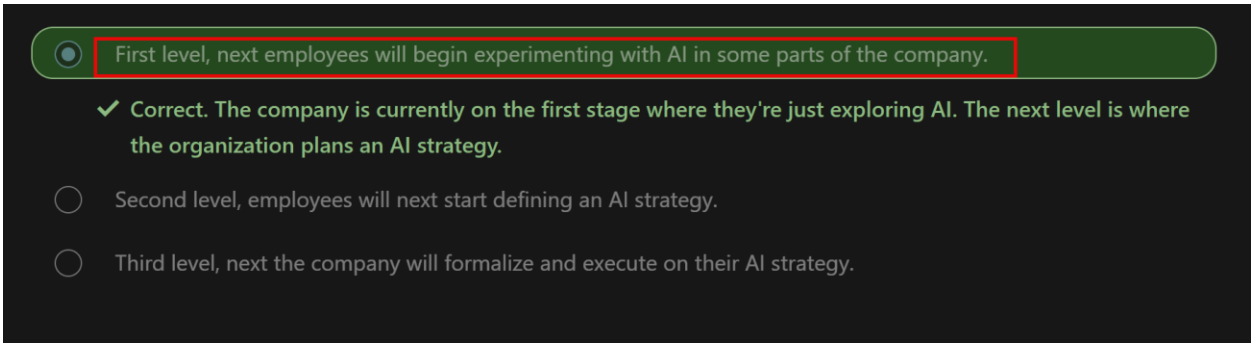


2. The leaders of a national/regional corporation saw how another business created an AI-ready culture and readily implemented Microsoft AI solutions. To encourage an AI-ready culture in their own corporation, the leaders published a recording of a speech on the

benefits of AI and how it would require a change to the culture of the organization. Then, they sent out memos with instructions to all of the company's vice presidents. One year later, only the finance division had implemented any AI technology in their operations. There was no visible change in company culture toward adopting AI. What critical factor in an AI-ready culture did leadership lack in their attempt to foster an AI-ready culture in their company?



3. The leaders of a regional law firm have been studying AI. The CEO is impressed that many companies have integrated it into their products, customer service, and their day-to-day work activities. One month ago, the CEO actually presented the basic concepts to top-level management. Since then, the CEO has received some good feedback from several vice presidents on its potential benefits. According to the maturity assessment seen in this module, which answer describes the stage of AI success that this company has reached, and what will they move onto next?



Summary

AI is changing business and how companies operate and drive value. AI adoption is key, but might not be enough. Organizations must adopt recent AI innovations across the organization and embrace AI as part of their corporate culture. This transformation is only possible with strong leadership that can see where the company currently stands, envision where they want the company to go, and that have the willingness to do the work to make the changes together to get there.

Now that you have reviewed this module, you should be able to:

- Articulate the components of an AI strategy.
- Describe the key elements of an AI-ready organizational culture.
- Understand the stages to AI success.

Use these resources to discover more

- Stay up to date with Microsoft AI, visit our AI website.
- To learn more about Microsoft commitment to responsible AI, visit our Responsible AI website.
- To learn more about how to drive your organization to AI success, read our "Building a Foundation for AI Success: A Leader's Guide" whitepaper.

Embrace responsible AI principles and practices

This module is designed to help you adopt responsible AI practices. It offers an overview of the principles, governance system, and procedures followed at Microsoft, but we encourage you to develop your own AI strategy.

Learning objectives

In this module, you will:

- Describe the importance of engaging with AI in a responsible manner.
- Identify six guiding principles to develop and use AI responsibly.
- Describe successful practices to responsible AI governance.

StartAdd

Prerequisites

- Basic understanding of AI concepts.
- Basic understanding of business concepts.

This module is part of these learning paths

- Discover Microsoft AI for leaders in finance
- Discover Microsoft AI for leaders in healthcare
- Discover Microsoft AI for leaders in manufacturing
- Discover Microsoft AI for leaders in retail
- Discover Microsoft AI for leaders in sustainability

- Transform your business with Microsoft AI

Introduction

- The societal implications of AI and the responsibility of organizations to anticipate and mitigate unintended consequences of AI technology are significant.

- Whether through third-party AI solutions or their own, organizations are finding the need to **create internal policies and practices to guide** their AI efforts.

- Microsoft believes that as **organizations and as a society**, our steps towards **responsible AI need to continually evolve to reflect new innovations** and lessons from **both our mistakes and accomplishments**.

- The **processes, tools, and resources mentioned** in these units can be a **starting point** from which organizations create their **own AI strategy**.

- As the use of AI increases across the **private and public sectors**, it's essential that we continue **to foster open dialogue**.

- Collaboration among businesses, governments, nongovernmental organizations (NGOs), academic researchers, and all other interested individuals and organizations allows us to build better solutions.

- Organizations that embrace AI early have a vital role to play in promoting the responsible use of AI and preparing society for its impacts. Their firsthand experience in dealing with the ethical challenges of AI are crucial knowledge for later adopters and those individuals who are trying to study or regulate AI technology.

Learning objectives

In this module, you will:

- Describe the importance of **engaging with AI in a responsible manner**.
- **Identify six guiding principles to develop and use AI responsibly**.
- Describe **successful practices to responsible AI governance**.

Prerequisites

- Basic understanding of **AI concepts**.
- Basic understanding **of business concepts**.

Next, let's review the transformative potential of AI, its societal implications, and the importance of approaching it responsibly.

Prepare for the implications of responsible AI

- AI is the defining technology of our time. It's already enabling faster and more profound progress in nearly every field of human endeavor and helping to address some of society's most daunting challenges.

- For example, AI can help people with **visual disabilities** understand images by **generating descriptive text for images.**

- In another example, AI can help **farmers produce enough food** for the growing global population.

- At Microsoft, we believe that the computational intelligence of AI should be used to amplify the **innate** (Existing natural) creativity and **ingenuity** (Inventive skill or imagination; cleverness) of humans.

- Our vision **for AI is to empower every developer to innovate, empower organizations to transform industries, and empower people to transform society**.

Societal implications of AI

- As with all great technological innovations in the past, the use of AI technology has broad **impacts on society, raising complex and challenging questions** about the future we want to see.

- **AI has implications on decision-making across industries**, **data security and privacy**, and **the skills people need to succeed in the workplace**. As we look to this future, we must ask ourselves:
    - How do we **design, build, and use AI systems** that create a **positive impact on individuals and society**?
    - How can we **best prepare workers** for the **effects of AI**?
    - How can **we attain the benefits of AI** while respecting privacy?

The importance of a responsible approach to AI

- It's important to recognize that as new intelligent technology emerges and proliferates throughout society, with its benefits come unintended and unforeseen consequences.

- Some of these consequences have significant ethical **ramifications** (subsidiary consequences, esp. ones that cause complications) and the potential to cause serious harm.

- While **organizations can't predict the future** yet, it's our responsibility to make a **concerted effort to anticipate and mitigate the unintended consequences** of the technology we release into the world through **deliberate planning and continual oversight**.

Threats

- Each breakthrough in AI technologies brings a new reminder of our shared responsibility.

- For example, in 2016, Microsoft released a **chatbot on Twitter** called **Tay**, which could learn from **interactions with Twitter users**.

- The goal was to enable the chatbot to better replicate **human communication and personality traits**. However, within 24 hours, users realized that the chatbot could learn from bigoted rhetoric and turned **the chatbot into a vehicle for hate speech**.

- This experience is one example of why **we must consider human threats** when designing **AI systems**.

- Novel threats require a constant evolution in our approach to responsible AI.

- For example, because **generative AI enables people to create or edit videos, images, or audio files so credibly that they look real, media authenticity is harder to verify**. In response, Microsoft is teaming with **other technology and news stakeholders** to develop **technical standards** to address **deepfake-related manipulation**.

Note

To prepare for new types of attacks that could influence learning datasets, Microsoft developed technology such as **advanced content filters** and **introduced supervisors for AI systems** with automatic learning capabilities. Current generative AI models, such as those provided in Azure AI Services or Bing Chat, are built upon these insights.

Biased outcomes

- Another unintended consequence that organizations should keep in mind is that AI may reinforce societal or other biases without deliberate planning and design.

- It's important for developers to understand **how bias can be introduced into either training data or machine learning models.**

- This problem can be pervasive in prebuilt models because the user may not be handling the training data themselves.

- For example,
  consider a **large financial lending institution** that wants to **develop a risk scoring system for loan approvals**. When engineers test the system before deployment, they realize that it **only approves loans for male borrowers**.

  Since the system was trained on **past customer's data**, it reproduced the **historical sexist bias of loan officers**. Validating the system before deployment allowed us to identify and address the issue before the system was operative.

Note

At Microsoft, our researchers are exploring tools and techniques for detecting and reducing bias within AI systems. Prebuilt models are validated thoroughly, but nonetheless should be used wisely and their results should be always audited before taking action.

Sensitive use cases

- Another illustration of our responsibility to mitigate unintended consequences is with sensitive technologies like facial recognition.

- Recently, there has been a **growing demand for facial recognition technology**, especially from **law enforcement organizations** that see the potential of the technology for use cases like **finding missing children**.

- However, we recognize that these **technologies could put fundamental freedoms at risk**.

- For example, they could **enable continuous surveillance of specific individuals**. We believe society has a **responsibility to set appropriate boundaries** for the use of these technologies, which **includes ensuring governmental use of facial recognition technology** remains subject to the rule of law.

- While new laws and regulations must be written, they aren't a substitute for the responsibility that we all have while engaging with AI. By working together, businesses, governments, NGOs, and academic researchers alike can address sensitive use cases.

Note

Microsoft assesses and develops principles to govern our work with facial recognition technologies. We anticipate these principles will evolve over time as we continue to learn and partner with customers, other tech companies, academics, civil society, and others on this issue. Microsoft uses responsible AI practices to detect, prevent, and mitigate these issues, but any AI-related project should consider them as well.

Next, let's see how Microsoft's six guiding principles for responsible AI can be applied within other organizations.

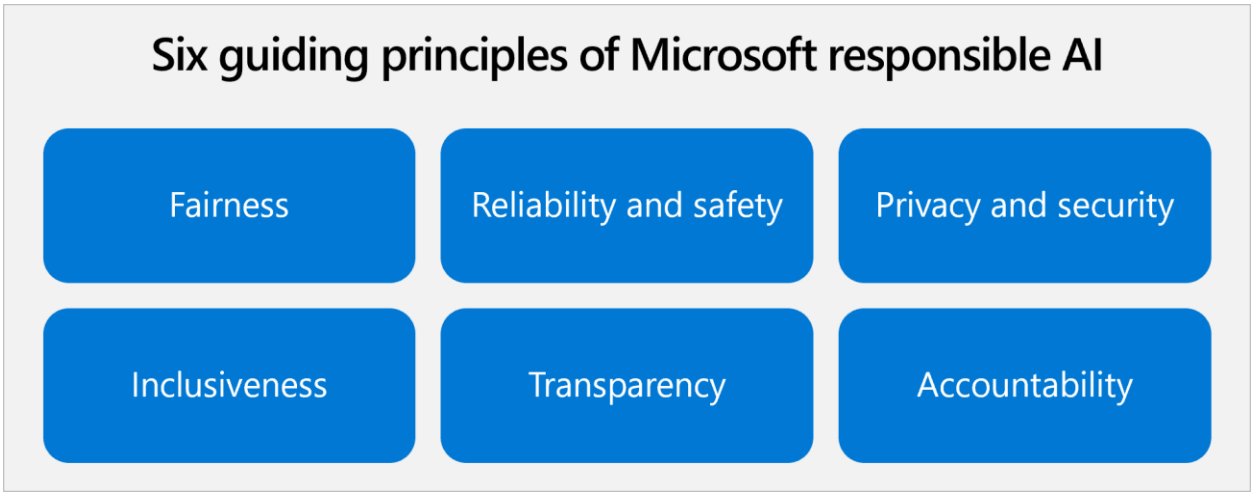
Identify guiding principles for responsible AI

Completed100 XP

- 12 minutes

In the last unit, we discussed some of the societal implications of AI. We touched on the responsibility of businesses, governments, NGOs, and academic researchers to anticipate and mitigate unintended consequences of AI technology. As organizations consider these responsibilities, more are creating internal policies and practices to guide their AI efforts.

At Microsoft, we've recognized **six principles** that we believe should guide AI development and use: fairness, reliability and safety, privacy and security, inclusiveness, transparency, and accountability. For us, these principles are the cornerstone of a responsible and trustworthy approach to AI, especially as intelligent technology becomes more prevalent in the products and services we use every day.



Fairness

- AI systems should treat everyone fairly and avoid affecting similarly situated groups of people in different ways.

- For example, when AI systems provide **guidance on medical treatment, loan applications, or employment, t**hey should **make the same recommendations to everyone with similar symptoms, financial circumstances, or professional qualifications**.

To ensure fairness in your AI system, you should:

- **Understand the scope, spirit, and potential uses of the AI system** by asking questions such as, how is the system intended to work? Who is the system designed to work for? Will the system work for everyone equally? How can it harm others?

- **Attract a diverse pool of talent.** Ensure the design team reflects the world in which we live by including team members that have different backgrounds, experiences, education, and perspectives.

- **Identify bias in datasets** by evaluating where the data came from, understanding how it was organized, and testing to ensure it's represented. Bias can be introduced at every stage in creation, from collection to modeling to operation. The Responsible AI Dashboard, available in the Resources section, includes a feature to help with this task.

- **Identify bias in machine learning algorithms** by applying tools and techniques that improve the transparency and intelligibility of models. When using prebuilt models, such as those delivered by **Azure OpenAI Service**, consider that Microsoft and OpenAI are working

to avoid biases. However, users should still be especially cautious with the results provided by the model.

- **Leverage human review and domain expertise.** Train employees to understand the meaning and implications of AI results, especially when AI is used to inform consequential decisions about people. Decisions that use AI should **always be paired with human review**. Include relevant subject matter experts in the design process and in deployment decisions. An example would be to include a **consumer credit subject matter expert** for a credit scoring AI system. You should use AI as a copilot, that is, an assisting tool that helps you do your **job better and faster** but requires some degree of supervising.
- **Research and employ best practices, analytical techniques, and tools** from other institutions and enterprises to help detect, prevent, and address bias in AI systems.

Reliability and safety

- To build trust, it's critical that AI systems **operate reliably, safely, and consistently under normal circumstances and in unexpected conditions**.
- These systems should be able to operate as they were **originally designed, respond safely to unanticipated conditions, and resist harmful manipulation**. It's also important to be able to verify that these systems are behaving as intended under actual operating conditions.
- How they behave and the variety of conditions they can handle reliably and safely largely reflects the range of situations and circumstances that developers anticipate during design and testing.

To ensure reliability and safety in your AI system, you should:

- **Develop processes for auditing AI systems** to evaluate the quality and suitability of data and models, monitor ongoing performance, and verify that systems are behaving as intended based on established performance measures.
- **Provide detailed explanation of system operation** including design specifications, information about training data, training failures that occurred and potential inadequacies with training data, and the inferences and significant predictions generated.
- **Design for unintended circumstances** such as accidental system interactions, the introduction of malicious data, or cyberattacks.
- **Involve domain experts** in the design and implementation processes, especially when using AI to help make consequential decisions about people.
- **Conduct rigorous testing** during AI system development and deployment to ensure that systems can respond safely to unanticipated circumstances, don’t have unexpected performance failures, and don’t evolve in unexpected ways.

AI systems involved in **high-stakes scenarios** that affect **human safety or large populations** should be tested both in **lab and real-world scenarios**.

- **Evaluate when and how an AI system should seek human input** for impactful decisions or during critical situations. Consider how an AI system should transfer control to a human in a manner that is meaningful and intelligible. Design AI systems to ensure humans have the necessary level of input on highly impactful decisions.
- **Develop a robust feedback mechanism** for users to report performance issues so that you can resolve them quickly.

Privacy and security

- As AI becomes more prevalent, protecting privacy and securing important personal and business information is becoming more critical and complex.
- With **AI, privacy** and **data security issues** require especially close attention because access to data is essential for AI systems to make accurate and informed predictions and decisions about people.

To ensure privacy and security in your AI system, you should:

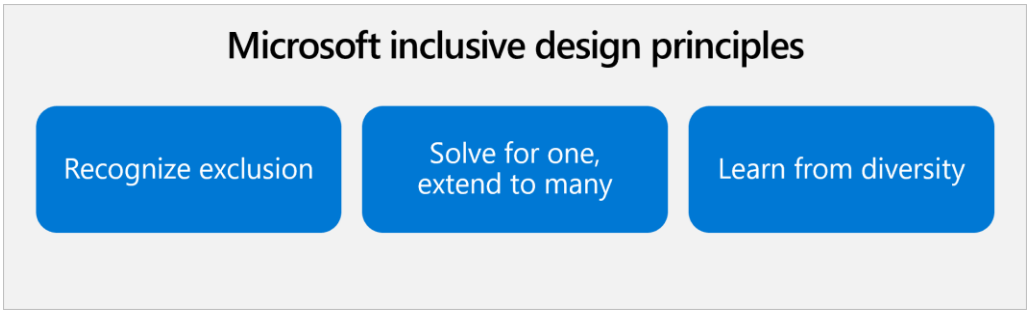
- **Comply with relevant data protection, privacy, and transparency laws** by investing resources in developing compliance technologies and processes or working with a **technology leader** during the development of AI systems. Develop processes to continually check that the AI systems are satisfying all aspects of these laws.
- **Design AI systems to maintain the integrity of personal data** so that they can only use personal data during the time it's required and for the defined purposes that have been shared with customers. Delete inadvertently collected personal data or data that is no longer relevant to the defined purpose.
- **Protect AI systems from bad actors** by designing AI systems in accordance with secure development and operations foundations, using role-based access, and protecting personal and confidential data that is transferred to third parties. Design AI systems to identify abnormal behaviors and to prevent manipulation and malicious attacks.
- **Design AI systems with appropriate controls** for customers to make choices about how and why their data is collected and used.
- **Ensure your AI system maintains anonymity** by taking into account how the system removes personal identification from data.
- **Conduct privacy and security reviews** for all AI systems.
- **Research and implement industry best practices** for tracking relevant information about customer data, accessing and using that data, and auditing access and use.

Inclusiveness

- At Microsoft, we firmly believe everyone should benefit from intelligent technology, meaning it must incorporate and address a broad range of human needs and experiences.

- For the **1 billion people with disabilities around the world**, AI technologies can be a game-changer. AI can improve access to education, government services, employment, information, and a wide range of other opportunities.

  Intelligent solutions such as **real-time speech to text transcription**, **visual recognition services**, and **predictive text functionality** are **already empowering people with hearing, visual, and other impairments.**



To ensure inclusiveness in your AI system, you should:

- **Comply with laws regarding accessibility and inclusiveness** that mandate the procurement of accessible technology.
- **Use the Inclusive 101 Guidebook**, available in the resources section of this module, to help system developers understand and address potential barriers in a product environment that could unintentionally exclude people.
- **Have people with disabilities test your systems** to help you figure out whether the system can be used as intended by the broadest possible audience.
- **Consider commonly used accessibility standards** to help ensure your system is accessible for people of all abilities.

Transparency

- Underlying the preceding values are two foundational principles that are essential for ensuring the effectiveness of the rest: **transparency** and **accountability.**

- It's critical that people understand **how AI systems come to conclusions** when they're used to **inform decisions that have an effect on people's lives**.

- For example, a bank might use an **AI system to decide whether a person is creditworthy**, or a company might use an **AI system to determine the most qualified candidates** to hire.

A crucial part of transparency is what we refer to as intelligibility, or the useful explanation of the behavior of AI systems and their components. Improving intelligibility requires that stakeholders

comprehend how and why they function so that they can identify potential performance issues, safety and privacy concerns, biases, exclusionary practices, or unintended outcomes. We also believe that people who use AI systems should be honest and forthcoming about when, why, and how they choose to deploy them.

To ensure transparency in your AI system, you should:

- **Share key characteristics of datasets** to help developers understand if a specific dataset is appropriate for their use case.
- **Improve model intelligibility** by applying simpler models and generating intelligible explanations of the model's behavior. For this task, you can use the **Responsible AI Dashboard**, available in the resources section.
  Reference: https://www.microsoft.com/en-us/ai/ai-lab-responsible-ai-dashboard
- **Train employees in how to interpret AI outputs** and ensure that they remain accountable for making consequential decisions based on the results.

Accountability

- The people who design and deploy AI systems must be accountable for how their systems operate. Organizations should draw upon industry standards to develop accountability norms.
- These norms can ensure that AI systems aren't the final authority on any decision that impacts people's lives and that humans maintain meaningful control over otherwise highly autonomous AI systems.

To ensure accountability in your AI system, you should:

- **Set up internal review boards** to provide oversight and guidance on the responsible development and deployment of AI systems. They can also help with tasks like defining best practices for documenting and testing AI systems during development or providing guidance for sensitive cases.
- **Ensure your employees are trained** to use and maintain the solution in a responsible and ethical manner and understand when the solution may require extra technical support.
- **Keep humans with requisite expertise in the loop** by reporting to them and involving them in decisions about model execution. When automation of decisions is required, ensure they're able to inspect, identify, and resolve challenges with model output and execution.
- **Put in place a clear system of accountability and governance** to conduct remediation or correction activities if models are seen as behaving in an unfair or potentially harmful manner.

We recognize that every individual, company, and region have their own beliefs and standards that should be reflected in their AI journey. We share our perspective with you as you consider developing your own guiding principles.

These principles provide a general idea of what we should do when developing and using AI. However, they need to be reflected on a more practical level. Next, let's explore how these principles can be *ensured with an AI governance system*.

Design a system for AI governance.

- Each organization has their own guiding principles, but ultimately these principles need to be part of a larger responsible AI strategy to be effective.

- This strategy should encompass how your organization brings these principles to life both **within your organization and beyond**.

- We recommend **establishing a governance system** that is tailored to your organization's unique characteristics, culture, guiding principles, and level of engagement with AI.

- The tasks of the board should include **designing responsible AI policies** and measures; attending they're being followed, and ensuring compliance.

- To help your organization get started, we have provided an overview of three common governance approaches:
    - A) hiring a **Chief Ethics Officer**,
    - B) establishing an **ethics office**, and
    - C) forming an **ethics committee**.

      The first approach is centralized, and the others are decentralized. All of them have their benefits, but we recommend combining them in a hybrid approach. A **governance system that reports** to the **board of directors** and has financial support, human resources, and authority is more likely to create real change across an organization.

Chief Ethics Officer

- Often organizations choose to consolidate their ethics initiatives by appointing a Chief Ethics Officer.

- This option has the advantage of centralized decision-making, so it enables organizations to quickly develop policies around ethics while ensuring there's accountability for each decision.

- Hiring this public-facing role can also be an effective way to showcase a company's commitment to engage with AI and other technology in a responsible and trustworthy manner.

- However, a Chief Ethics Officer alone may struggle to implement measures across an organization without the support of an ethics office. This drawback leads us to the next option.

Ethics office

- The second governance approach focuses on empowering employees across the organization.

- It involves forming a dedicated ethics team from different levels of the organization that is solely focused on ensuring the ethical principles are being followed by all employees. The ethics office can be independent or part of a broader risk, compliance, or legal team.

- If it's independent, it can be established without a leading role, but companies often choose a Chief Ethics Officer to head the office.

- The key advantage of ethics offices is their ability to **implement the policies on a scale** since they have **dedicated team members working at all levels of the company**. Ethics offices also prove adept at building a culture of integrity within an organization.

Ethics committee

- The last approach brings together a diverse array of outside experts and senior leaders from within the organization to address AI ethics.

- Ethics committees may even incorporate user groups, ethicists, or psychologists. Generally, they don't have members dedicated solely to ethics.

- This form of governance provides an organization with perspectives from people with a wide range of diverse backgrounds and expertise, unbiased opinions from external members, and buy-in from senior leaders across the company.

- Next, let's discuss best practices for AI governance, depending on the ownership of the AI model and the role involved.

Applying systems for AI governance

No matter which governance approach you choose, there are some good practices it should promote:

- **Make resources available:** Employees need guidance to learn responsible AI principles and incorporate them into their work. A handbook, a manual, or a training session can fulfill that task.
- **Create a centralized AI inventory:** Having a **list of all the AI models** and systems operating in your organization is **key to prioritize efforts and optimize resources**. Besides, it's also helpful **to make audits and compliance** tests easier.
- **Develop tools:** Checking compliance in every AI system in your organization can be draining. Consider building tools to automate this task: such tools would monitor and validate systems and raise a flag if anything shifts outside of performance metrics.

- The specific processes and policies for your AI governance system depend on whether your company is using third-party systems or developing AI in-house. Based on this factor, we have provided recommendations to help your company govern your AI engagements.

Third-party AI systems

- If your organization plans to use out-of-the-box third-party AI solutions, we **recommend learning about the third party's commitment to responsible AI design** to ensure it aligns with your own principles.

- For custom AI solutions, include your principles or standards in your request for proposal. Before deploying any third-party AI solution, **create guidelines on how to safely operate and monitor the system**. Train employees in these guidelines and ensure they're being followed. Finally, your governance system should ensure the AI system has been rigorously tested.

First-party AI systems

If your organization also plans to develop AI solutions or integrate AI into your existing products and services, there are some tasks for each team role.

Your **ethical governance system** should:

- Review or provide advice before the release of any new AI system, especially for sensitive use cases.
- Ensure employees from all levels of the company feel free to surface ethical concerns before you sell AI or AI-integrated products and services.
- Analyze the case and provide guidance to mitigate the risks if concerns arise while designing, developing, or selling the AI system.
- Create processes to monitor the AI systems you deploy or sell to detect and mitigate model drift and decay over time.

Your **developers** should:

- Be given detailed and thorough standard guidance that can help them design and develop AI solutions to reflect your organization's ethical principles.
- Have guidelines and checklists for specific AI technologies, such as face recognition or generative AI.

Engage with external stakeholders

- As the use of AI becomes more common, we consider it a shared responsibility across the public and private sectors to engage with AI responsibly.

- Collaboration between enterprises, public organizations, governments, and nonprofits is crucial to ensure best practices while maximizing the potential of AI to deliver broad benefits.

- Organizations can contribute to these collective efforts in many ways.

- At Microsoft, we have focused on **joining industry initiatives, influencing policy, addressing future labor and workplace needs, and considering how our technologies can be used to improve the lives of people around the world**.

- For example, we have joined the **Partnership on AI (PAI)**, a group of researchers, nonprofits, nongovernmental organizations (NGOs), and companies dedicated to ensuring that AI is developed and utilized in a responsible manner.

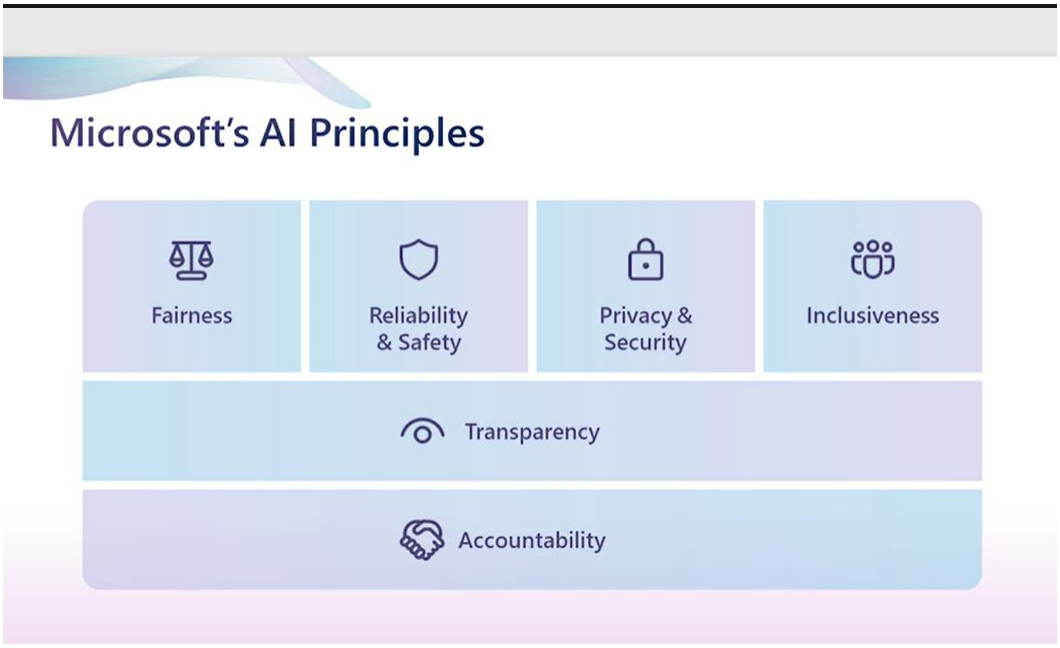
Next, let's discover how an AI governance system works in a real company using Microsoft as an example.

Discuss practices for responsible AI at Microsoft

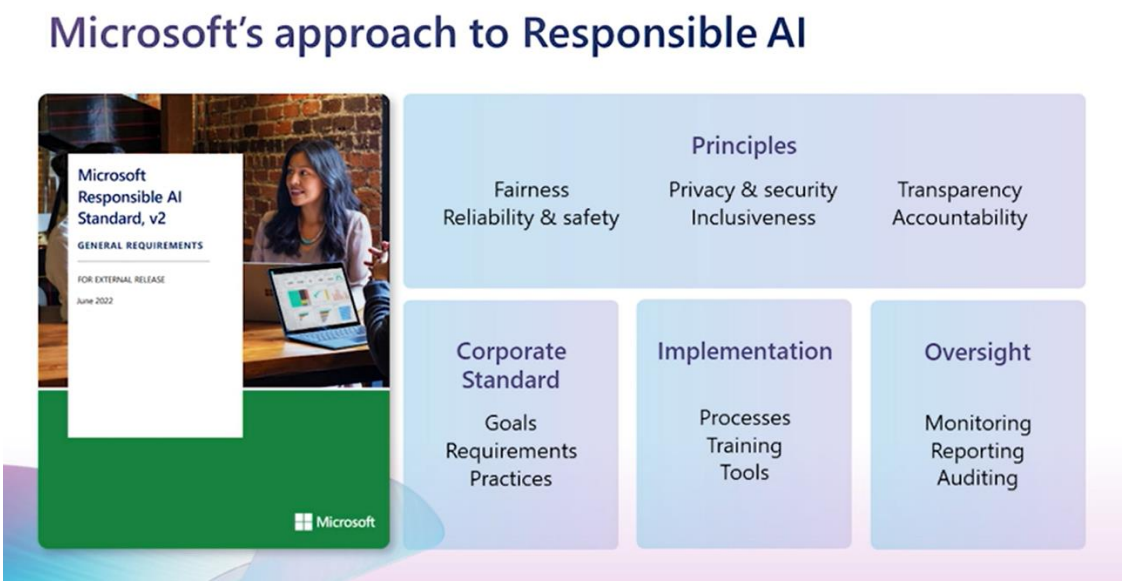
- It can be challenging to design and implement an effective AI governance system. In this unit, we take Microsoft as the example and explain how Microsoft ensures responsible AI is followed across the company. Based on this use case, consider how you could apply these ideas in your own organization.

- In the following **video**, Natasha Crampton, Vice President and **Chief Responsible AI Officer at Microsoft**, provides an overview of how Microsoft enforces responsible AI practices.

- Microsoft's AI Principles

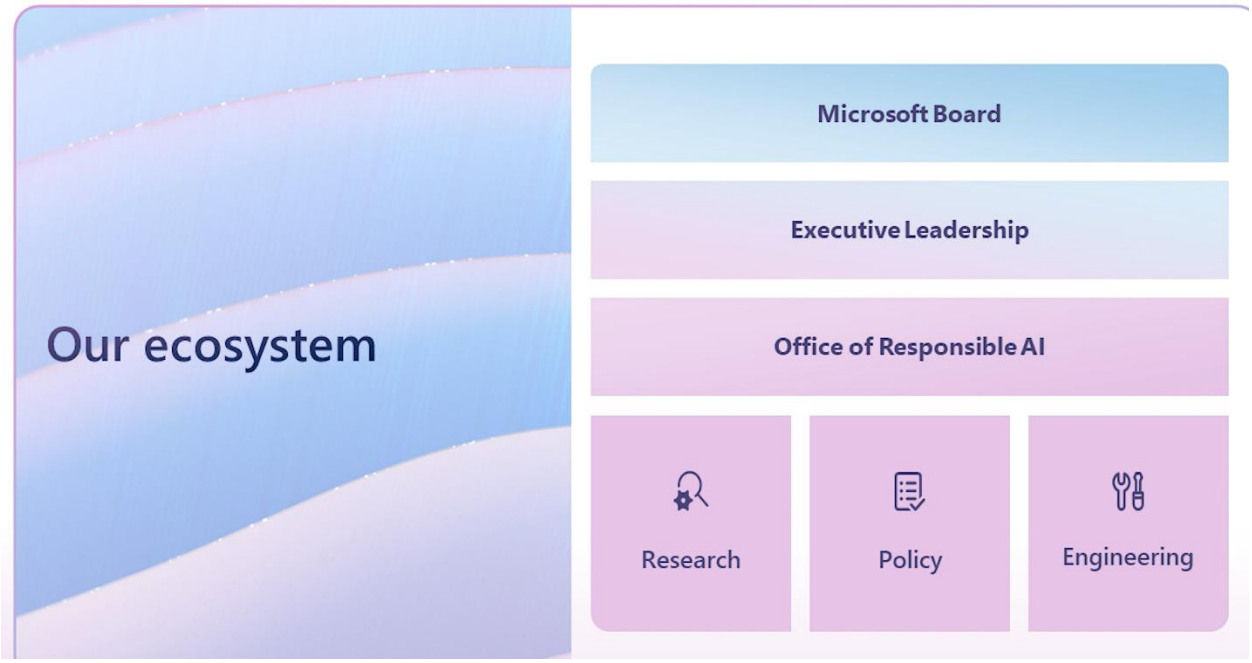


- Microsoft’s approach to Responsible AI



- The Standard’s Goals at a glance

- Our Ecosystem



- Our governance structure uses a hub-and-spoke model to provide the accountability and authority to drive initiatives while also enabling responsible AI policies to be implemented at scale.

- That is, it combines the **centralized** and **decentralized approaches** discussed in the last unit.

Centralized governance

- There are three bodies at Microsoft to provide centralized governance:
  - the Senior Leadership Team,
  - the Office of Responsible AI, and
  - the Aether Committee.
- An important hallmark of our approach to responsible AI is having this ecosystem to **operationalize responsible AI across the company**, rather than a single organization or individual leading this work.

Senior Leadership Team

- The Senior Leadership Team is ultimately accountable for the company's direction on responsible AI.

- This group is the **final decision-maker on the most sensitive, novel, and significant AI development and deployment matters**. It sets the company's AI principles, values, and human rights commitments.

Office of Responsible AI

The Office of Responsible AI implements and maintains our commitment to responsible AI governance by working with stakeholders across the company to:

- Develop and maintain our governance framework.
- Define roles and responsibilities for governing bodies.
- Implement a company-wide reporting and decision-making process.
- Orchestrate responsible AI training for all employees.

The **Office of Responsible AI** has four key functions:

- **Internal policy**: Setting the company-wide rules for enacting responsible AI and defining roles and responsibilities for teams involved in this effort.
- **Enablement**: Readiness to adopt responsible AI practices, both within our company, and among our customers and partners.
- **Case management**: Review of sensitive use cases to help ensure that our development and deployment work upholds our AI principles.
- **Public policy**: Help to shape new laws, norms, and standards. The goal of this policy is to ensure that the promise of AI technology is realized for the benefit of society at large.

Aether Committee

- The Aether Committee (AI, Ethics, and Effects in Engineering and Research) serves an **advisory role to the senior leadership**, the Office of Responsible AI, and other teams across the company.
- It provides guidance on questions, challenges, and opportunities with the development and fielding of AI technologies.
- The Aether Committee has **six working groups** that focus on specific subjects, grounded in our AI principles. The working groups develop tools, best practices, and tailored implementation guidance related to their respective areas of expertise.
- Learnings from the working groups and main committee is key in developing new policies, and declining or placing limits on sensitive use cases.

Decentralized governance

- Enacting responsible AI at scale across an organization relies on a strong network across the company to help implement organization-wide rules, drive awareness, and request support on issues that raise questions about application of our AI principles.

Responsible AI Champs

- Our network includes Responsible AI Champs, employees nominated by their leadership teams from within key engineering and field teams.
- They serve as responsible AI advisors (in addition to their full-time roles), focusing on informing decision-makers, instead of policing.

The **Responsible AI Champs** have **five key functions**:

- Raising awareness of responsible AI principles and practices within teams and workgroups.
- Helping teams and workgroups implement prescribed practices throughout the AI feature, product, or service lifecycle.
- Advising leaders on the benefit of responsible AI development–and the potential effect of unintended harms.
- Identifying and escalating questions and sensitive uses of AI through available channels.
- Fostering a culture of customer-centricity and global perspective, by growing a community of Responsible AI evangelists in their organizations and beyond.

To develop and deploy AI with minimal friction to engineering practices and customers, we're investing in patterns, practices, and tools. Some engineering groups have assembled teams to help them follow the company-wide rules and accelerate the development of implementation patterns, practices, and tools.

Every employee

- The final and most important part of our approach to responsible AI is the role that every employee plays, with support from their managers and business leaders.
- Responsible AI is a key part of mandatory employee training and we have released more educational assets that enable employees to delve deeper into areas of responsible AI.
- We also have numerous responsible AI development tools to enable our employees to develop responsibly.
- These resources empower all our employees to advance the company's important work with AI, and, at the same time, they're responsible for upholding our responsible AI principles and following the company-wide practices we have adopted in pursuit of that end.

We expect every Microsoft employee to:

- Develop a **general understanding of our AI principles**.
- Report and **escalate sensitive uses**.
- Contact their **Responsible AI Champ** when they need guidance on responsible AI.

Next, let's see this governance model in action in flagging and addressing sensitive use cases of AI.

Put responsible AI frameworks in action

- As discussed in the previous unit, Microsoft has developed and refined its own internal process to govern AI responsibly.

- This unit explains how **this governance system works in a real situation**. While every organization needs its **own unique governance frameworks** and **review processes**, we believe that **our sensitive use framework** can serve as a helpful starting point.

- One of **Microsoft's early steps** in our **responsible AI governance** process was to use a sensitive users review trigger. The framework **helped our internal and customer-facing teams** identify when specific use cases need more guidance.

Microsoft sensitive use case framework

Per our responsible AI governance documentation, we consider an AI development or deployment scenario a "**sensitive use**" if it falls into one or more of the following categories:

- **Denial of consequential services**: The scenario involves the use of AI in a way that may directly result in the denial of consequential services or support to an individual (for example, financial, housing, insurance, education, employment, or healthcare services).
- **Risk of harm**: The scenario involves the use of AI in a way that may create a significant risk of physical, emotional, or psychological harm to an individual (for example, life or death decisions in military, safety-critical manufacturing environments, healthcare contexts, almost any scenario involving children or other vulnerable people, and so on).
- **Infringement on human rights**: The scenario involves the use of AI in a way that may result in a significant restriction of personal freedom, opinion or expression, assembly or association, privacy, and so on (for example, in law enforcement or policing).

We **train our employees** to use **this framework to determine whether an AI use case** should be **flagged for further review**—whether they're a seller working with a customer or someone working on an internal AI solution.

We also train our **Responsible AI Champs** for their role as liaison between employees and central governance teams.

Microsoft sensitive use case review process

- The review process for sensitive use cases has three stages: identification, assessment, and mitigation.

- To better illustrate this process, a real-world case study joins the explanation of each step. In this case study, a customer came to us for a face recognition system.

Identification

- If an employee identifies that a use case falls into one of the three categories (denial of consequential services, risk of harm, or infringement of human rights), they report it.

- Reporting is done via a central submission tool and then routed to their local Responsible AI Champ, an individual who is responsible for driving awareness and understanding of the company's responsible AI policies, standards, and guidance.

- In this case, a law enforcement agency approached us to develop a facial recognition system to augment existing identity verification methods. The scenarios included using facial recognition to check drivers' identities during traffic stops, to speed up the check-in process in prisons, and to verify prisoners' identities while moving through the facility. An employee submitted these three use-cases through the central intake tool for responsible AI review.

Assessment

- The **Responsible AI Champ**, working with the **Office of Responsible AI and the Microsoft team** involved in the use case, investigates the case to gather the relevant facts, follows a guided process to assess the effect of the proposed system on individuals and society, and reviews past cases to determine if guidance already exists for a similar scenario.

- If earlier guidance doesn't exist, or if the case requires more expertise and evaluation, the Responsible AI Champ presents the case to the Sensitive Uses Working Group of the Aether Committee.

- In this face recognition case, the Responsible AI Champ worked closely with the Office of Responsible AI, the account teams, and the customers to assess the risks. It was decided that all three cases needed to be escalated to the Aether Sensitive Uses Working Group for further input, as they touched on one or more of the sensitive uses of AI.

Mitigation

- The Sensitive Uses Working Group deliberates with a diverse group of experts to provide insight and recommendations for how to address the risks associated with the particular use case.

- If the situation requires further escalation, cases can rise all the way up to the Aether Committee itself, which directly advises the Senior Leadership Team. Ultimately, the Senior Leadership Team makes decisions on novel, high-impact cases.

Note

When reviewing sensitive use cases, we recommend bringing together a diverse group of people with varied backgrounds and expertise. It's also important to create an inclusive space where everyone feels comfortable sharing their ideas and perspectives.

- Once the case has been reviewed, the Responsible AI Champ works with the Office of Responsible AI to provide advice to the project team on mitigation strategies that align to our responsible AI practices and principles.

- These mitigation strategies could include technical approaches, employee training and governance approaches, or alterations to the scope of the project.

- At times, our teams have been advised not to proceed with certain projects because we were unable to deliver them in a way that upholds our principles.

- In the use case, the Aether Sensitive Uses Working Group took separate decisions for each of the scenarios. After careful consideration, they determined that we wouldn't support the patrolling scenario to identify "persons of interest," during traffic stops.

- As the state of the technology and the broader ecosystem weren't sufficiently mature enough to mitigate the harmful consequences for when the technology performs imperfectly, the Aether working group considered this scenario a premature use case.

We explained the issues to the customer, and they decided not to pursue that scenario.

Note

Backed by research: attempting to identify individuals in uncontrolled environments can infringe on human rights, resulting in improper arrests due to misidentification. Studies have shown that AI is more likely to mistake the identities of women and minorities, which could also lead to those populations being disproportionately detained.[1]

For the in-facility use cases, we decided we could support the design and development of a proof of concept (POC), with safeguards in place to ensure appropriate human control over the solution, and a bi-directional feedback loop between the customer and Microsoft could be established. It was also important that the customer implemented a training program for personnel interacting with the solutions, and that the customer would reengage with Microsoft on deployments beyond these supported scenarios.

The evolution of responsible AI governance

- Now that you've seen our process in action, there's an important point we'd like to reiterate—we are at the beginning of developing AI governance.

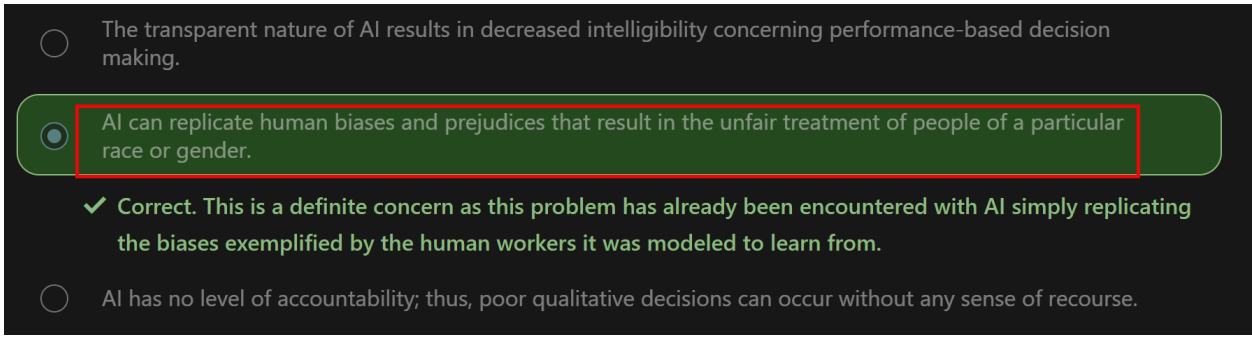
- The processes around AI are evolving rapidly. Going forward, we plan to refine our governance policies as we invest further in AI, and we recommend other businesses do the same.

- Every organization needs to customize its review process based on its own AI needs and maturity, but hopefully our process can serve as a helpful starting point.

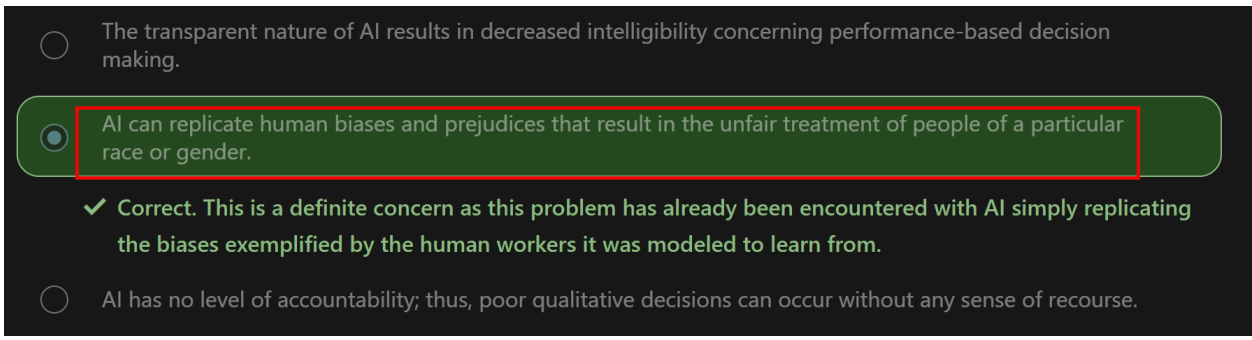
Next, let's wrap up everything you've learned with a knowledge check.

Knowledge Check

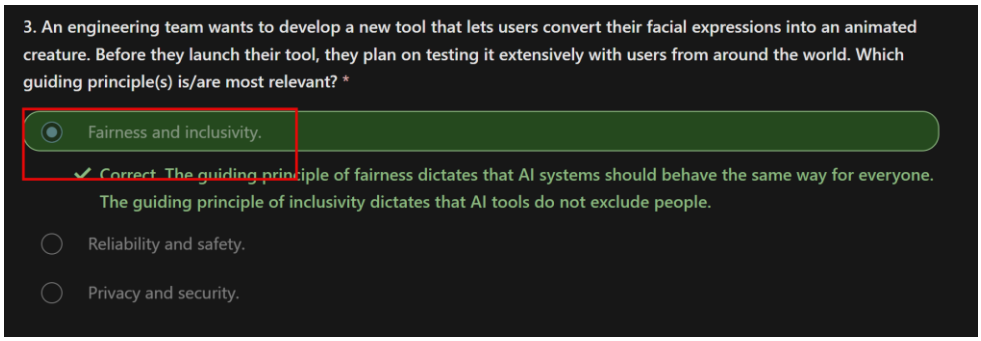
1. An expert suggests using a pool of training data that has been gathered from observations of human workers performing tasks and making decisions. What is an unintended consequence that must be anticipated?



2. Why is explainability such an important aspect of responsible AI in the financial services industry?



3. An engineering team wants to develop a new tool that lets users convert their facial expressions into an animated creature. Before they launch their tool, they plan on testing it extensively with users from around the world. Which guiding principle(s) is/are most relevant?



Summary

Through this module, we discussed the importance of embracing AI in a responsible, ethical way. We walked through some of the steps Microsoft is taking to prioritize responsible AI in the hope that our experience can help others. However, we recognize that we don't have all the answers. Every

individual, company, and region has their own beliefs and standards that should be reflected in their path towards responsible AI. We should also recognize that as organizations and as a society, our steps towards responsible AI need to continually evolve to reflect new innovations and lessons from both our mistakes and accomplishments. The processes, tools, and resources mentioned can be a starting point from which organizations can create their own AI strategy.

Now that you have reviewed this module, you should be able to:

- Describe the importance of engaging with AI in a responsible manner.
- Identify six guiding principles to develop and use AI responsibly.
- Describe successful practices to responsible AI governance.

Use these resources to discover more

Tip

To open a hyperlink, right-click and choose **Open in new tab or window**. That way you can see the resource and easily return to the module.

- To assess how committed your organization currently is in responsible AI practices and which next steps to take, read our Responsible AI Maturity Model.
- To learn more about collaborative industry initiatives on responsible AI, read the Partnership on AI homepage.
- To learn more about Microsoft tools to help building transparent models and avoiding biases and unfair outcomes, read the Responsible AI Dashboard homepage.
- To learn more about open-source tools to build fair AI systems, read the FairLearn homepage.
- To learn more about inclusive design practices, read the Microsoft Inclusive Design homepage and the Inclusive 101 Guidebook.

References

1. Reuters, "Microsoft turned down facial-recognition sales on human rights concerns." Joseph Menn, 17 April 2019.

Scale AI in your organization

This module provides insights for a full adoption of AI in your organization. It covers AI strategy, assigning responsibilities, and empowering business users and subject matter experts so they can use AI themselves.

Learning objectives

In this module, you will:

- **Plan AI projects** and **investments.**
- Organize **your staff for AI responsibilities**.
- Identify how **no-code AI tools** can help business users and subject matter experts.

Prerequisites

- Basic understanding of AI concepts.
- Basic understanding of business concepts.

This module is part of these learning paths

- Discover Microsoft AI for leaders in finance
- Discover Microsoft AI for leaders in healthcare
- Discover Microsoft AI for leaders in manufacturing
- Discover Microsoft AI for leaders in retail
- Discover Microsoft AI for leaders in sustainability
- Transform your business with Microsoft AI
- Introduction

Introduction

- How do companies keep up as industries **evolve**? The answer is *innovation*.
- Even if companies "do everything right" with their existing business models, they lose competitiveness if they don't **embrace innovative disruptions**.[1]
- The capacity to pivot as a **business and foster innovation** is crucial to long-term success. Innovative companies generally lead their industry's market share, attract top talent, and create cutting-edge products and services.
- Today, innovation means keeping up to date with AI. AI breakthroughs are happening all of the time, especially in terms of prebuilt models and generative AI.
- Implementing AI systems is faster and easier than ever. Additionally, this **new wave of AI is making use cases possible** that were inconceivable a few years ago.
- In this context, automating two or three of your business processes isn't enough to keep your competitive edge. To stay relevant, **organizations need to incorporate AI throughout the company**.
- AI can **power up every role and process in your business**.

This module prepares you to **achieve meaningful AI adoption in sensible, strategical steps**.

Learning objectives

In this module, you will:

- **Plan AI projects** and **investments.**
- Organize **your staff for AI responsibilities**.
- Identify how **no-code AI tools can help business users and subject matter experts**.

Prerequisites

- Basic understanding of AI concepts.
- Basic understanding of business concepts.

Next, let's look at some key factors that organizations need to consider as they evaluate and prioritize AI investments.

Evaluate and prioritize AI investments.

- Adopting AI throughout an organization **implies a serious investment**. However, investing in AI projects requires a different perspective than most investments.
- If you use AI to improve or automate an existing process, then it's possible to measure **return on investment (ROI) in the straightforward**, **traditional way**. But there are a few characteristics of AI initiatives that make it **difficult to estimate their costs and benefits**.
- First, most AI models require upfront investment before it's even possible to measure effectiveness.
- It's hard to predict the accuracy of the model and its business impact until you've prepared data and completed model training and testing.
- Additionally, it's hard to predict the amount of long-term maintenance a model needs. Individual models improve over time in ways that are difficult to calculate in advance.
- With AI initiatives, you need to think like a venture capitalist. That means **being willing to invest and take risks amid uncertainties**. But you don't have to guess.
- Instead, you can use a framework to help prioritize AI investments.

Apply a horizon-based framework

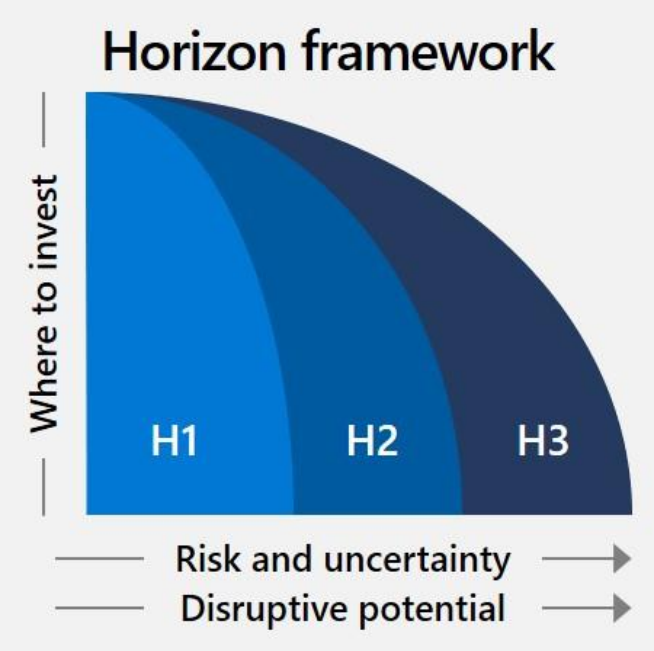
- At Microsoft, we use a **horizon-based framework** to evaluate and prioritize AI investments. This groups AI projects into **three horizons**, from improving core business functions to creating **brand new revenue streams**.

- The risk and uncertainty of specific applications depends on a company's level of AI **maturity, size, business objectives, and more**.

Horizon 1: Running (operate and optimize the core business)

- Not every AI application involves revolutionary changes. In fact, using AI to improve or automate existing processes is **becoming essential to remaining competitive**. Horizon 1 (H1) represents AI initiatives that optimize core business functions.

- For example, perhaps you manufacture electronic components. While you might manually inspect quality for 100 parts per hour, an AI model with image recognition capabilities could inspect 1,000 parts per hour.



Horizon 2: Growing (improve market position)

- Horizon 2 (H2) initiatives take **advantage of emerging opportunities**. These initiatives might **create new services or new customer experiences**.

- For example, a manufacturer of electronics might use **IoT to collect operational data and AI to suggest optimal times for maintenance**. These initiatives facilitate a brand-new customer experience and help the manufacturer differentiate from competitors.

Horizon 3: Transforming (change market position)

- Horizon 3 (H3) involves **disruptive and innovative new business models**. These are revolutionary applications that **might cross industry boundaries** or even **create new customer needs.**

- For example, the **same electronics manufacturer could sell** "electronics-as-a-service"—which means they **use AI models to predict which electronic devices work best for your current system and needs**.

- Ultimately, the company is selling a personalized service rather than a single product, creating new revenue streams and opportunities.

Map scenarios and use cases to the framework

- Using this framework, you can then map **AI scenarios into quadrants**.

- The "**tactical**" spectrum represents initiatives that are **confined to a single team or use case.**

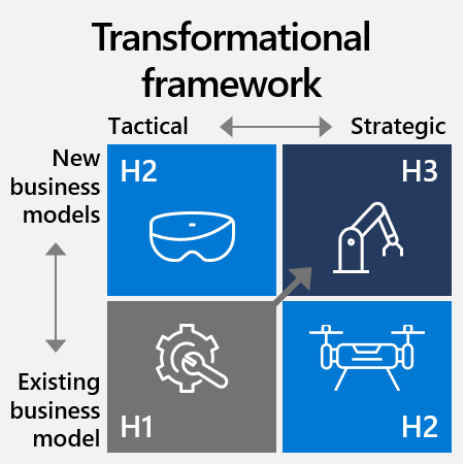
- The "**strategic**" side represents larger **business initiatives that might affect the entire organization.**

- To go back to the earlier manufacturing example, you **might place automation of quality control in the lower left quadrant**.

- It's an initiative that digitizes and optimizes an existing business model without requiring systemic changes.

- Scenarios that fall below the **middle line help the organization survive more than thrive**. They might address competitive and disruptive threats, improve operations, or empower employees in the organization.

- Scenarios above the middle line help companies create new value propositions, revenue streams, or business models.



- As you map initiatives, it's helpful to involve the **Chief Financial Officer (CFO) office** and **other stakeholders** to ensure you've made the right assumptions around the opportunity valuation.

Prioritize investments and organize phases

- We recommend prioritizing initiatives in phases:
    - start with foundational initiatives in the **bottom left of the Prioritization framework** quadrant and
    - move towards transformational initiatives in the **top right of the quadrant**.

- We recommend this approach because it's helpful to grow capabilities and get buy-in before you move to more complex projects.

- Begin by **forming technical teams** that can prepare data appropriately and familiarize themselves with AI models.

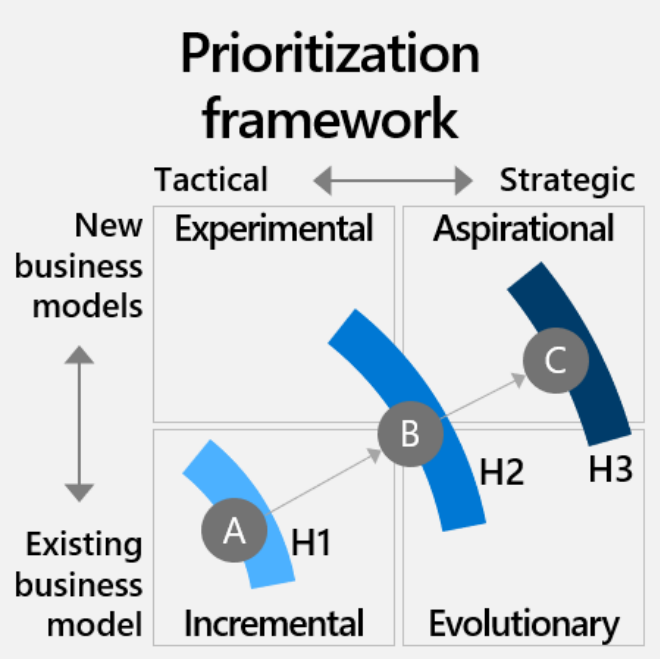
- Starting with foundational initiatives also helps **establish trust across the business and manage expectations related to AI initiatives**.

- The success and value you're able to demonstrate in **early initiatives pave the way for the more transformational projects.**

- Another reason to **start at the bottom left of the prioritization framework quadrant is that the technology used to support H1 initiatives is typically more accessible** than advanced use cases.

- There are **countless out-of-the-box AI models** you can apply to common use cases. These applications cost less and their effect on **the business is easier to estimate**.

- As you build maturity with these accessible models, you can **experiment with more complex AI initiatives and hone your objectives.**



- H2 and H3 initiatives **require more sophisticated data science capabilities**, which may result in unintended or unexpected outcomes.
- These initiatives often **require businesses to work with partners** to create a custom model that **can't be bought off the shelf**.
- These solutions require the m**ost resources, time, and risk, but they offer the greatest reward**.
- Achieving a **lasting competitive advantage requires solutions** that aren't easily duplicated.

Define clear value drivers and KPIs for your AI investments

- Once you've chosen AI initiatives, it's important to identify value drivers and key performance indicators (KPIs) for each project.
- The framework provides a useful way to think about any investment—including AI initiatives.

Expand table

Value	Sample category	Definition	AI example
Financial drivers	Sales	The revenue earned from products or services.	Use targeted marketing to improve accuracy in classifying prospects.

Value	Sample category	Definition	AI example
Financial drivers	Cost management	Process of planning and controlling the budget of a business. In addition to employee time and effort, the costs of AI models include cloud compute, which varies depending on the model's workload.	Improve prediction models for scheduling equipment maintenance to improve sustainability.
Financial drivers	Capital productivity	Measure of how physical capital is used in providing goods and services.	Enhance employee productivity and resource allocation with insight into operations.
Quality measures	Quality	The degree to which products or services meet customer or business expectations.	Improve product quality with automated inspection processes.
Quality measures	Cycle times	The time it takes to complete a process.	Accelerate product inspections with image recognition.
Quality measures	Satisfaction (customer and/or employee)	How happy customers are with a company's products or services (which contributes to market share, competitive differentiation, and more).	Improve customer engagement with personalized discounts and product bundles.

- As you invest in initiatives, it's important to develop market and financial models to help balance potential risk and return.
- Consider factors such as the **total addressable market (TAM), net present value (NPV),** and **internal rate of return (IRR).**
- Work with the CFO office and **other key stakeholders** to ensure the **financial models make sense within the context of the business**.
- These metrics can help secure their buy-in and ensure support throughout the process.
- Moving forward, we advise **putting systemic processes in place to manage and evaluate value throughout the project lifecycle**.
- We recommend taking an **agile approach that happens in stages**—after you invest in an initiative, evaluate the initial results.

- Then you can **determine whether to continue, adjust your approach**, or take another path. Continue to evaluate value at major milestones throughout the project.

Next, let's take a look at the AI-related roles and responsibilities that should be established in every AI organization.

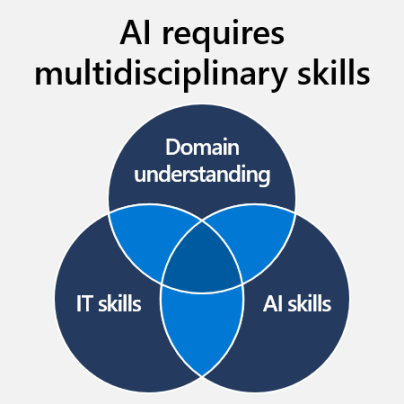
Establish AI-related roles and responsibilities

Completed100 XP

- 10 minutes
- Any strategy for AI adoption needs to address your existing business capabilities. We covered this in the module "Create business value from AI."
- The goal of this module is to prepare your company for AI initiatives. The question now is: within your organization, who is responsible for what tasks when it comes to AI? In this unit, dive into how you can assign AI-related responsibilities in your organization.

Enabling AI in your organization is a collective responsibility

- Everyone has a role to play in AI transformation, not **just IT.** It's important to empower people from all functions across your company to actively contribute ideas about AI applications.
- It's key to **foster collaboration between business and technical teams when planning design and implementation**. After deployment**, teams across the technical and operational sides of the business need to be involved in maintaining** AI solutions over time:
    - Measuring business performance and ROI from the AI solution.
    - Monitoring model performance and accuracy.
    - Acting on insights gained from an AI solution.
    - Addressing issues that arise and deciding how to improve the solution over time.
    - Collecting and evaluating feedback from AI users (whether they're customers or employees).



- It's the ultimate responsibility of the **senior executive leadership team** to own the overall **AI strategy and investment decisions**, creating an AI-ready culture, change management, and responsible AI policies.

- As for the other leaders across an organization, there's **no single model to follow**, but different roles can play a part.

- Your organization needs to **determine a model that's suited to your strategy and objectives**, the teams within your business, and your AI maturity.

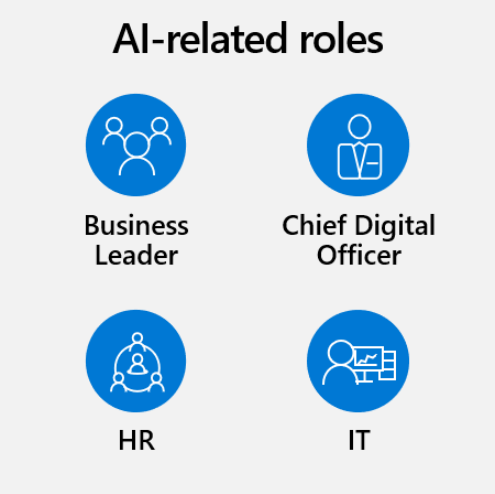
Line of business leader

This person is a business executive responsible for the operations of a particular function, line of business, or process within an organization.

- **Source ideas from all employees**: People from every department and level should feel free to contribute ideas, ask questions, and make suggestions related to AI.

  We've discovered that ideas for our most impactful application of AI have come from our employees within business functions, **not from outside or above**.

- **Identify new business models**: The **real value of AI lies in business transformation**: driving new business models, enabling innovative services, creating new revenue streams, and more.



- **Create optional communities for exchanging ideas**: They provide opportunities for IT and business roles to connect on an ongoing basis. You can implement this measure virtually through tools such as Yammer, or in-person at networking events or lunch-and-learn sessions.
- **Train business experts to become Agile Product Owners**: A Product Owner is a member of the Agile team responsible for defining the features of the application and streamlining execution. Including this role as part or all of a business expert's responsibilities allow them to dedicate time and effort to AI initiatives.

Chief Digital Officer

The Chief Digital Officer (CDO) is a change agent who oversees the transformation of traditional operations using digital processes. Their goal is to generate new business opportunities, revenue streams, and customer services.

- **Cultivate a culture of data sharing across the company**: Most organizations generate, store, and use data in a siloed manner. While each department may have a good view of their own data, they may lack other information that could be relevant to their operations. Sharing data is key to efficiently using AI.
- **Create your AI manifesto**: This is the 'north star' that clearly outlines the organization's vision for AI and digital transformation more broadly. Its goal isn't only to solidify the company's strategy, but to inspire everyone across the organization and help them understand what the transformation means for them. The CDO needs to work with other members of senior executive leadership team to create the document and message it to the company.
- **Identify catalyst projects for quick wins**: Kick-start AI transformation by identifying work that can immediately benefit from AI, that is, H1 initiatives. Then, showcase those projects to prove its value and gain momentum among other teams (H2 and H3).
- **Roll out an education program on data management best practices**: As more people outside of IT become involved in using or creating AI models, it's important to make sure

everyone understands data management best practices. Data needs to be cleaned, consolidated, formatted, and managed so that it's easily consumable by AI and can avoid biases.

Human Resources leader

A Human Resources (HR) director makes fundamental contributions to an organization's culture and people development. Their wide-ranging tasks include implementing cultural development, creating internal training programs, and hiring according to the needs of the business.

- **Foster a "learning culture"**: Consider how to encourage **a culture championed** by leadership that embraces challenges and acknowledges failure as a valuable part of continual learning and innovation.
- **Design a "digital leadership" strategy**: Make a plan to help line of business leaders and the senior executive leadership team build their **own AI literacy** and lead teams through AI adoption. Keep in mind that any AI strategy should comply with responsible AI principles.
- **Create a hiring plan for new roles such as data scientists**: While upskilling your employees is the long-term goal, in the short-term you may need to hire some new roles specifically for AI initiatives. New roles that may be required include data scientists, software engineers, and DevOps managers.
- **Create a skills plan for roles impacted by AI**: Creating an AI-ready culture requires a sustained commitment from leadership to educate and upskill employees on both the technical and business sides.
    - **On the technical side**, employees need core skills in building and operationalizing AI applications. It can be helpful to partner with other companies to get your teams up to speed, but AI solutions are never static. They require constant adjustments to exploit new data, new methods, and new opportunities by people who also have an intimate understanding of the business.
    - **On the business side**, it's important to train people to adopt new processes when an AI-based system changes their day-to-day workflow. Training includes teaching them how to interpret and act on AI predictions and recommendations using sound human judgment. You should manage that change thoughtfully.

IT leader

While the Chief Digital Officer is charged with creating and implementing the overall digital strategy, an **IT director** oversees the day-to-day technology operations.

- **Launch Agile working initiatives between business and IT**: Implementing Agile processes between business and IT teams can help keep those teams aligned around a common goal. Implementation requires a cultural shift to facilitate collaboration and reduce turf wars. Tools such as Microsoft Teams and Skype are effective collaboration tools.
- **Create a "dark data" remediation plan**: Dark data is unstructured, untagged, and siloed data that organizations fail to analyze. It isn't classified, protected, or governed. Across

industries, companies stand to benefit greatly if they can bring dark data into the light. To do so, they need a plan to remove data siloes, extract structured information from unstructured content, and clean out unnecessary data.

- **Set up agile cross-functional delivery teams and projects**: Cross-functional delivery teams are crucial to running successful AI projects. People with intimate knowledge of and control over business goals and processes should be a central part of planning and maintaining AI solutions. Data scientists working in isolation might create models that lack the context, purpose, or value that would make them effective.
- **Scale MLOps across the company**: Managing the entire machine learning lifecycle at scale is complicated. Organizations need an approach that brings the agility of DevOps to the machine learning lifecycle. We call this approach MLOps: the practice of collaboration between data scientists, AI engineers, app developers, and other IT teams to manage the end-to-end machine learning lifecycle. Learn more about MLOps in the corresponding units of the module "Leverage AI tools and resources for your business."

The function of business workers isn't just to deliver insights to data scientists. AI must help them work better and faster. In the next unit, let's see how this goal can be achieved with no-code tools that don't require data science expertise or mediation.

Empower business users with AI

Completed100 XP

- 3 minutes

In this unit, we explore the potential of putting business users at the center of AI efforts.

AI creates most value when business users participate

- AI can empower all people to achieve more, not just developers and data scientists. In fact, **McKinsey predicts that latest generative AI has the potential to automate as much as 58.5 percent of scenarios** requiring to apply expertise.
- These scenarios were especially hard to automate without this technology.[2] Organizations can achieve most of this automation from business users and subject matter experts working directly with AI and generative AI.

Let's take some real examples:

- **Pharmaceutical companies:** Workers in this sector deal with a vast amount of biomedical data. With a range of AI models, employees can quickly understand and derive key insights from this information to take on the next wave of challenges in medicine. They can iterate and test new hypotheses faster if they can use AI on their own, without relying on data science teams.
- **Sales:** The first attempt by Microsoft to use AI to score marketing leads failed. Salespeople realized the models were returning highly improbable results. This error came from a **misalignment between data scientists and salespeople**, and leads were being **erroneously disqualified**. We realized we needed a collaborative forum, one where we

technologists and salespeople would share how AI models were being used, underscoring the need for highly accurate data. Sellers now share with the technologists what types of data are most useful to them in scoring the leads. Based on those learnings, the results coming from the AI models have improved dramatically.

Pharmaceutical companies and sales are just two examples. AI provides business users and subject matter experts with limitless opportunities to do things that weren't possible before. With access to AI, they can uncover hidden insights, find critical information, improve collaboration, and even automate repetitive tasks.

AI for everyone

- At Microsoft, we're working to ensure that any user—from accountant to researcher—can achieve more with AI.
- It **shouldn't require a background in data science to benefit** from AI experiences.
- We believe AI should be used to enhance human capabilities.
- **AI works best as a copilot, not a replacement**.
- The right AI tools help employees better apply their expertise and complement it with AI-powered insights, making them more innovative and effective.
- To accomplish AI for everyone, we're weaving intelligence into business applications that people use every day.
- We also want to make it possible for anyone to add AI capabilities to apps, no matter their technical experience.
- We're working to democratize AI development with no-code tools and platforms so business users can create their own AI models. We're also making prebuilt models for common scenarios accessible to non developers.

- Finally, we're committed to advancing the responsible development and use of AI.
- We believe it's critical to take a human-centered approach to AI development and governance.
- This approach should value diverse perspectives and emphasize listening, learning, and responding as technology evolves. Together, we can ensure the next generation of AI is designed, built, and used responsibly.
- But how does this approach work in complex jobs where expertise is key? Next, let's look at some examples of how business users can work with AI already embedded in the applications they use every day.

Empower subject matter experts with AI

Completed100 XP

- 5 minutes
- Human beings are incredible. We have so many unique capabilities that no machine can replicate—creativity, empathy, inventiveness, and imagination.
- Business value comes from human expertise.
- At Microsoft, we believe the right AI tools can amplify these capabilities to help everyone achieve more. You should consider AI as a copilot, which helps you fulfill your potential.
- Business users in every industry can take advantage of a wide array of AI solutions. For example, subject matter experts like researchers and engineers can use AI to apply their expertise more effectively and efficiently.

- In this unit, we discuss what knowledge workers can do with available AI tools that don't require coding or data science expertise, from software as a service (SaaS) to low-code products.

- The goal is to gain independence from data science teams so these subject matter experts can focus on what they do best. Let's look at some examples of how anyone can work with and even create AI to achieve more.

Build AI without code

- Employees don't need to be data scientists to be able to use AI in their everyday work. Microsoft is working hard to deliver business users AI-powered products and services.

- The latest advances in AI technologies focus on prebuilt models, like GPT models, which everyone can use. You can use these models from a wide range of Microsoft products, such as **Bing, Microsoft 365, or Microsoft Dynamics 365**.

Note

Nearly a third of white-collar workers (27 percent) have tried to incorporate prebuilt generative AI models such as GPT in their work routines.[3]

- For more complex solutions, business users may want to create their own AI models or integrate a model into an app themselves. With no-code tools and platforms such as those provided by Microsoft Power Platform and Azure AI Services, now business users can add AI capabilities to their apps and automate their workflow—regardless of their technical expertise.

- The module Leverage AI tools and resources for your business gives you a more detailed overview of the AI products and services available for these cases.

AI for reasoning

- Real transformation happens when everyone can use a wide range of AI models to reason over complex, unstructured information.

- The availability of a **wide range of models means people can choose which AI models to use for different purposes** and what information sources to analyze with them.

- AI for reasoning is exactly that. It's highly valuable for people with business-critical expertise like researchers, operations managers, field technicians, marketers, business developers, and more.

- With powerful AI applications, they can apply their knowledge more efficiently and effectively, speed up learning cycle iterations, and deliver real business impact at a rate never before possible.

Let's see some examples.

- **Pharmaceutical industry**: Some pharmaceutical companies are using AI to test molecules as a first step in their drug development process. This procedure enables them to accelerate drug discovery.
- **Food industry**: Food processing industries are applying AI to generate new recipes based on existing recipes, sales data, and customer preferences. These initiatives allow experts to launch new products faster than with traditional research.

Research-related use cases are numberless and apply in almost every industry. In many scenarios, you can use prebuilt AI models such as GPT, which can be embedded in many options, to extract insights from papers, documentation, or research results. However, the same AI can also be used to find new ideas and create content, such as ads or keywords for marketing campaigns.

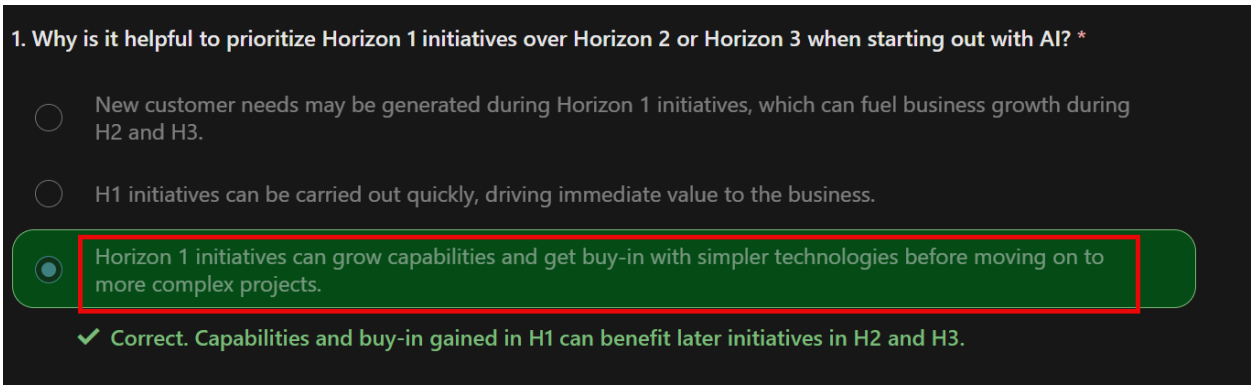
Note

Gartner predicts that, **by 2025, large organizations will leverage generative AI to create 30 percent of their outbound marketing messages.**[4]

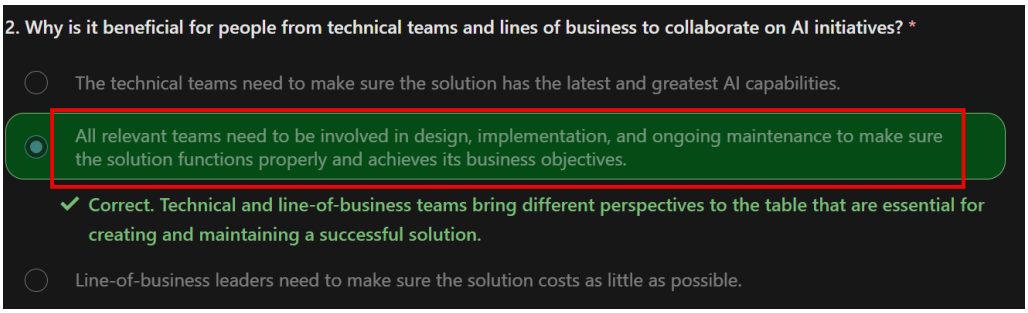
Next, let’s wrap up everything you’ve learned with a knowledge check.

Knowledge Check

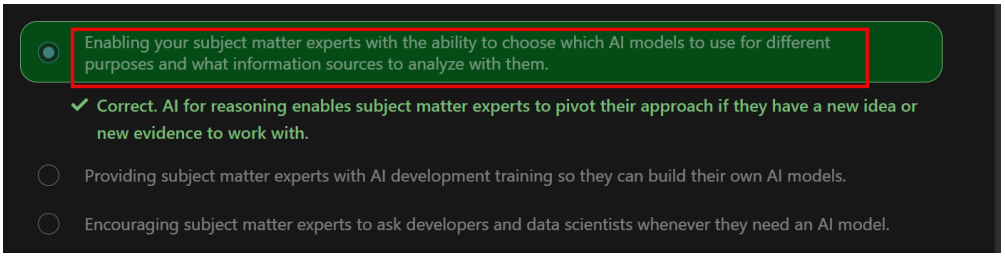
1. Why is it helpful to prioritize Horizon 1 initiatives over Horizon 2 or Horizon 3 when starting out with AI?



2. Why is it beneficial for people from technical teams and lines of business to collaborate on AI initiatives?



3. What is AI for reasoning?



Summary

This module has provided the framework for a full adoption of AI in your organization. Everyone in an organization has a role to play to achieve this transformation. At the highest levels, leaders need to prioritize AI use cases strategically and create environments and structures where innovative ideas can flourish. Those ideas come to life and succeed long-term thanks to collaboration across lines of business and technical teams. Finally, business users and subject matter experts can use AI themselves thanks to prebuilt models embedded in everyday applications and AI for reasoning.

Now that you have reviewed this module, you should be able to:

- Plan AI projects and investments.
- Organize your staff for AI responsibilities.

- Identify how no-code AI tools can help business users and subject matter experts.

Use these resources to discover more

Tip

To open a hyperlink, right-click and choose **Open in new tab or window**. That way you can see the resource and easily return to the module.

- To learn more about AI strategy and the importance of assessing your organization's capabilities to deliver AI projects, check our "Create business value from AI" module.
- To learn more about AI technologies and available Microsoft products and services that help you adopt AI, check our "Leverage AI tools and resources for your business" module.
- To learn more about how to scale AI capabilities across your organization, visit our AI at Scale homepage.

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Define a Microsoft AI strategy to create business value in sustainability

This module is **designed to help sustainability professionals** adopt **Microsoft AI solutions**. It discusses common use cases and real customer stories.

Learning objectives

- Identify AI use cases in sustainability.
- Examine available AI tools and resources for sustainability scenarios.
- Discover insights from sustainability-specific AI success stories.

Introduction

Completed100 XP

- 2 minutes

- The **sustainability industry** faces many imposing challenges. In a context where AI is revolutionizing every job and sector, decision makers must realize that **AI plays a decisive role in finding solutions.**

- This module covers the most frequent **sustainability** scenarios in **which AI proves helpful**.

- However, it can **sometimes be difficult to find the right tools** and **partnerships** to carry out these AI use cases.

- To help with this task, this module provides insights on which Microsoft AI products and services can support each use case.

- Microsoft AI delivers **state-of-the-art AI models**, including the **latest generative AI**. Moreover, it offers AI for every worker to use no matter their skills.

- AI can **boost productivity** while embedded in everyday apps or in more complex AI systems. You can learn more about Microsoft AI products and services in the "Leverage AI tools and resources for your business" module.

- It's not enough to use **AI for sustainability projects**. AI practices and solutions must be sustainable to comply with the ethical standards of **responsible AI**.

- These requirements **include fairness, reliability, privacy, security, inclusivity, transparency, and accountability issues**.

- They're thoroughly kept during development and maintenance of all **Microsoft AI products** and services.

Learning objectives

In this module, you will:

- Identify **AI use cases in sustainability**.
- Examine available **AI tools and resources** for **sustainability scenarios**.
- Discover insights from **sustainability-specific AI success stories**.

Prerequisites

- Basic understanding of **AI concepts**.
- Basic understanding of **sustainability concepts**.

Next, let's discuss some key ideas and principles that you should consider when planning AI-powered sustainability initiatives.

Explore AI goals and challenges in sustainability

- 8 minutes

- When you **adopt AI in a sustainability project**, what can you expect? What potential obstacles must you watch for?

- The main goal for AI projects in sustainability is to build a **better, fairer world and economy**.

- As the **use cases** and success stories in this module show, **AI is a powerful tool** to achieve **greener energy, transportation, industrial production**, and so on.

- AI is especially good at **optimizing processes**, and so it can **help sustainability professionals** achieve **more with less effort**.

- **AI can be a powerful accelerant** for the scale and pace of sustainability solutions needed to **address the climate crisis**.

- Microsoft's journey to use AI to advance sustainability started in 2017 with the **AI for Earth** grants program.

- Since then, it has become increasingly clear that AI is an essential technology for making meaningful climate progress.

- For example, **AI can accelerate sustainability** by helping to integrate **new sources of renewable energy onto the grid, optimize energy and water consumption, anticipate hazardous weather events, and speed up the discovery of low carbon building materials**.

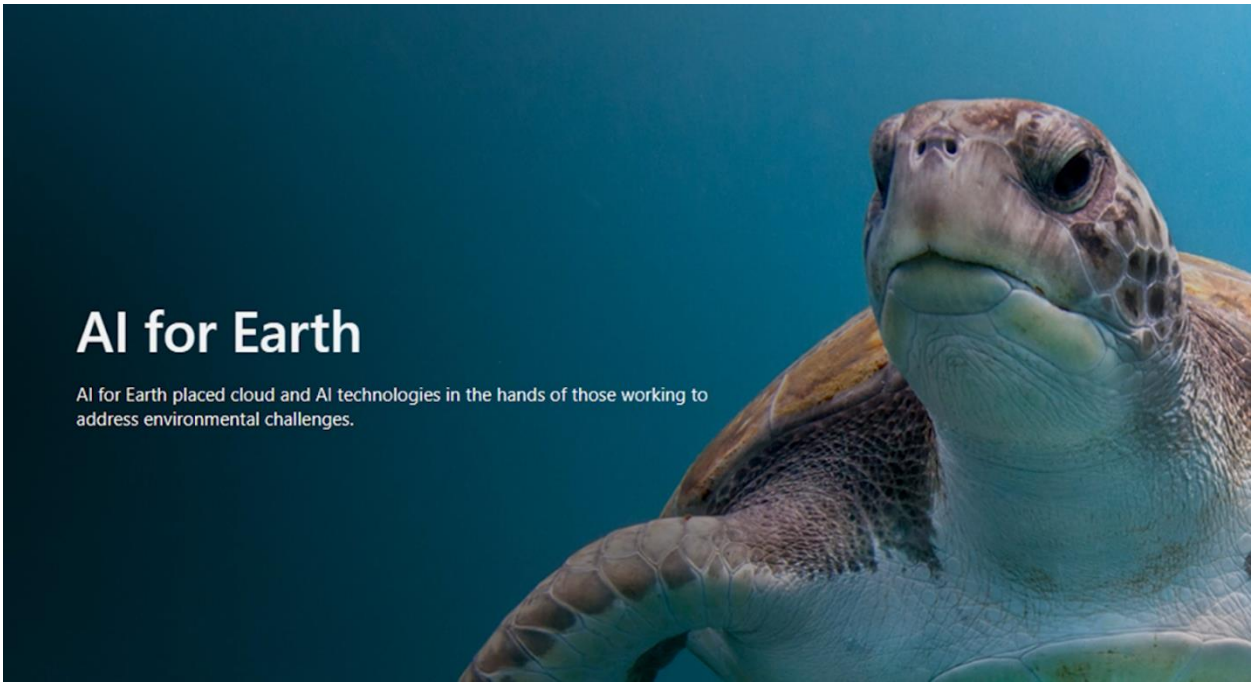
- Microsoft remains committed to creating a **more sustainable future**, which starts with our goals to being a **carbon negative, water positive, and zero waste company by 2030**.

- We will continue to leverage AI to better monitor our emissions and accelerate progress, all while increasing our use of clean energy to power datacenters.

- In the following video, **Melanie Nakagawa**, **Chief Sustainability Officer** at Microsoft, discusses how Microsoft is pursuing these sustainability goals.

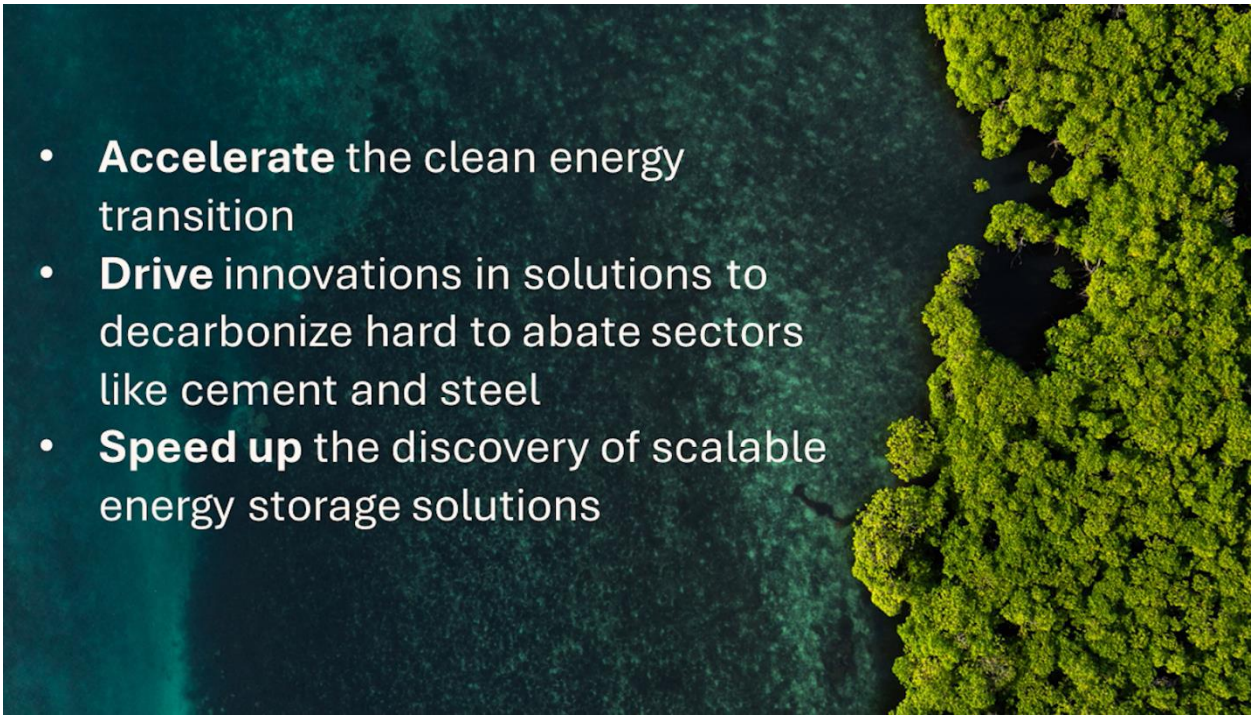
VIDEO

AI for earth – 2017

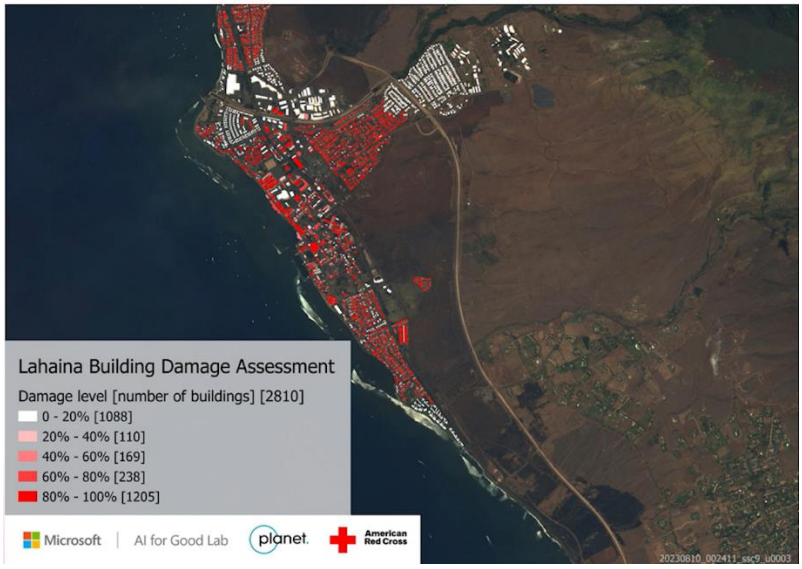


Microsoft remains committed to creating a **more sustainable future**, which starts with our goals to being a **carbon negative, water positive, and zero waste company by 2030**

How AI help in sustainability

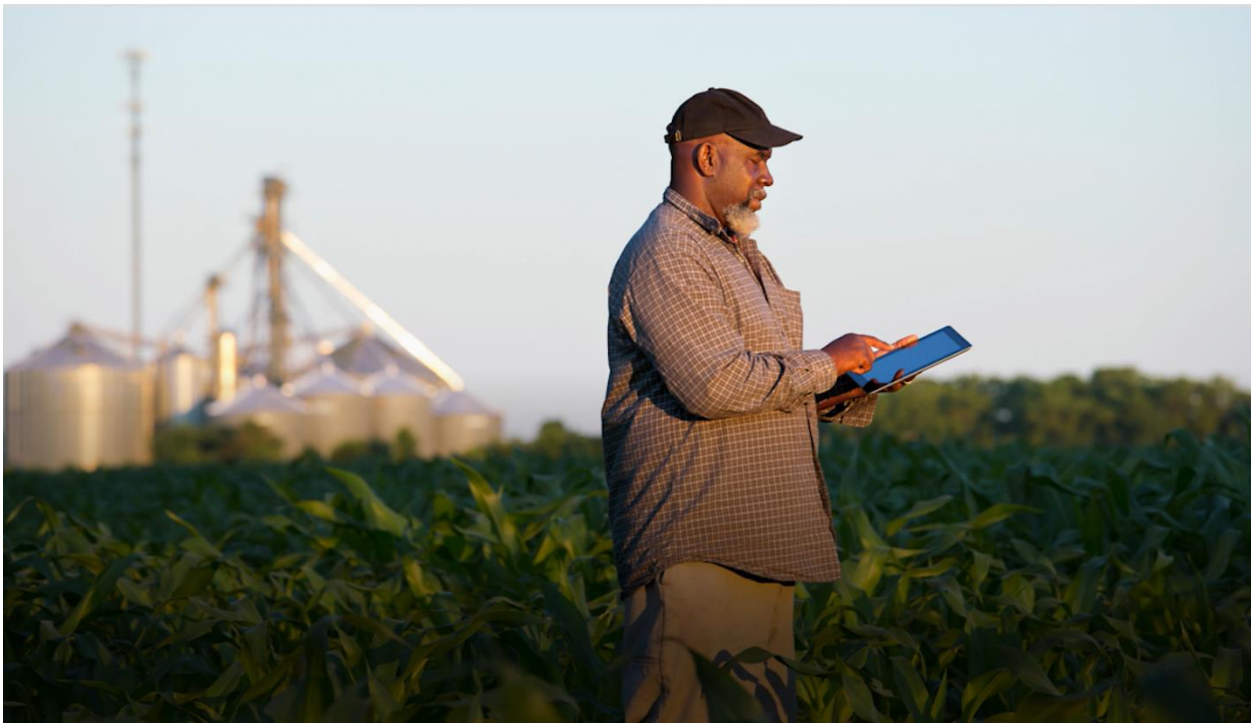


Use Case – Lahaina Building Damage Assessment



- Help maps to view damage level

User Case – Agriculture



Use Case – Water wastage

Use Case – Batteries

Next, let's find out specific scenarios in which Microsoft AI can power your sustainability initiatives.

Discover AI use cases in sustainability.

Completed100 XP

- 6 minutes
- Sustainability initiatives can take many forms, and sustainable projects can take place in a wide range of sectors.
- Let's see some examples of how AI can improve their efficiency.

Agriculture

- Data-based decision making can substantially improve **farming productivity and sustainability**. This management style is known as **precision farming**.
- It involves using information such as **soil maps, climatic data, and crop data to estimate the treatment the crop needs and at what time**.
- These practices help use the **right measure of pesticides or nutrients required**, which minimizes waste and eventual pollution.
- Farmers can combine them with other **sustainable AI practices**, such as intelligent harvesting or AI-powered pest detection and control.
- Microsoft drives **FarmVibes**, a project that focuses on **delivering tools for farmers to achieve sustainable, precision agriculture**.
- It works on predicting weather variations and advising sustainable and profitable management practices. These efforts include the development of AI-powered soil and crop health monitoring systems. The AI models within the project are available under the name FarmVibes.AI.

Energy

- A sustainability priority in the energy sector is to integrate new sources of **renewable energy** onto the grid. In this task, AI can also prove helpful.
- The Global Renewables Watch, built on Microsoft AI, detects solar and wind installations, and tracks the transition towards greener energy.
- Second, another priority is to **reduce emissions of oil and gas** in production sites. AI and Internet of Things (IoT) technologies make this goal viable.
- For example, **Accenture** and **Microsoft** help identify and remedy methane leaks using AI anomaly detection models.[4] In this project, developers used Microsoft SynapseML to build

a fully scalable, distributed AI system.

- Third, **predictive maintenance** is another fruitful strategy to protect the environment in the energy industry. AI can forecast when drills or other machinery will start malfunctioning.

  This prediction enables us to repair or replace assets before an accident interrupts operations and causes environmental or human damage.

  For instance, **Schneider Electric** uses **Azure Machine Learning** to do **predictive maintenance** in their pumps and other oil field equipment.[5]

Industrial

- AI can help manufacturing and industrial companies optimize their **energy and water consumption**.

  For instance, Metinvest uses Azure Data Factory and Azure Machine Learning to detect the **silicon content in the cast iron**, which helps minimize the fuel the process requires.[6]

- Another common scenario is using AI to discover **low-carbon building materials**. Traditional concrete has a high carbon footprint, but AI can help scientists find more sustainable alternatives.

Natural resources

- There are many ways in which AI can help ***biodiversity conservation***. Usually, the first step for ecologists to protect an ecosystem is to **monitor and map wildlife populations**. This task involves identifying the species that they can record with their cameras and sensors, which is very time consuming.

- However, **AI systems** can automatically detect and classify animals.

  For example, Microsoft project Guacamaya **identifies wildlife in the Amazon**. Experts use an audio AI model to identify birds by their songs and computer vision to detect other animals.[7]

  The **Bavarian Forest National Park** in **Germany** is also using this strategy for the same task.[8] Microsoft is developing a range of tools to enable similar initiatives.

- A complementary approach is to use AI to actively protect natural resources. It can be useful to **prevent wildfires**, as Microsoft project Terrafuse forecasts wildfire risk. Likewise, AI can help **fight illegal hunting or fishing**. Following this approach, OceanMind uses Microsoft AI to flag suspicious behavior in ships.

Smart cities

- AI technologies can also improve the cities we live in. AI systems can enable better, greener management of cities, including water supply, mobility, waste management, and safety.

- For example, the **Société du Canal de Provence** (France) is using **Microsoft AI** to gain a better understanding of water use and offer consumption forecasting to their customers.[9] In the context of increasingly common droughts, the goal is to push toward a **sustainable use of water**.

- It's also possible to achieve **greener city lights management** with AI. Valencia (Spain) improved energy conservation and reduced light pollution by combining Microsoft IoT and AI solutions.[10]

  In conclusion, there are many scenarios in which Microsoft AI products and services can support sustainability initiatives.

- The **Microsoft ecosystem** allows you to easily connect these AI solutions with the many features included in Microsoft Cloud for Sustainability. Among the functionalities covered, sustainability professionals can minimize the environmental impact of facilities, get the data analytics of water consumption, or achieve greener mobility with optimized routes and logistics.

Discover how Microsoft AI powers the global energy transition – An EDP success story

- The energy sector is one of the key actors in the journey towards a greener future. EDP provides a good example of how energy organizations can embrace AI to deliver renewable energy.

The organization

- **EDP** is a **Portuguese electricity and natural gas company**. Today, 87 percent of the electricity they generate is green. After 40 years of experience in the sector, it's now one of the **largest renewable energy providers** in the world, as it serves more than nine million clients in 29 markets.

- In 2016, their goal to become a **data-driven organization** led them to migrate to **Microsoft Azure**. Now, their focus is to **adopt AI and IoT technology**.

The challenge

- EDP is working hard to **build a decarbonized, less polluted world**. Their objective isn't only to reinforce their leading position in the renewable energy market, but also set an example and support customers to move towards decarbonization.

  Related to this goal, EDP commits to produce **100 percent renewable energy by 2030** and

to become **net zero by 2040**. To keep these impressive promises, they rely on Microsoft AI and IoT to help them with several projects.

The solution

The organization developed several AI and IoT solutions based on Azure Machine Learning and Azure AI Services, focusing on generative AI in **Azure OpenAI Service**.

- **Installation of electric chargers**: EDP is using geographical data, customer demand, road information, and other insights to detect the best places to install electric chargers on public roads. This project aims to encourage electric vehicles and green mobility.
- **Proactive power lines maintenance**: Vegetation can easily obstruct aerial power lines. The Analytics4Vegetation project ensures the maintenance of such power lines in Portugal. It detects vegetation and identifies which power lines potentially need maintenance. Furthermore, it helps maintenance management by predicting optimal time until new maintenance action in the area.
- **Power transformers**: There are more than 100,000 power transformers in Portugal. EDP is using Azure Machine Learning to predict their power curve, ensuring optimal efficiency.
- **Data and AI strategy and governance plan**: EDP is implementing a full strategy and governance plan for their data and AI to back their AI initiatives and embrace corporate AI culture.
- **Generative AI adoption**: The organization is committed to implementing generative AI. They're accelerating their adoption across all business units to generate business value.
- **Training and upskilling on AI for business**: Effective AI adoption relies on empowering employees to incorporate AI into their routines. For this purpose, EDP is using Microsoft training materials on AI for business, such as Transform your business with Microsoft AI.

The results

- Now, the staff in EDP reports they feel more **inspired to innovate**. The organization is providing the tools and support required to experiment with AI and transform the way they do business.
- Above all, the organization is achieving its **energy transition goals** thanks to these AI initiatives. Furthermore, it's also gaining resilience to move forward in this transition journey.

Next, let's discuss another sustainability success story, this time focused on protecting natural resources.

Discover how Microsoft AI protects natural resources – A Department of Natural Resources success story

Completed100 XP

- 3 minutes

Previously, we discussed the benefits of using AI solutions to monitor wildlife populations. It's a common AI scenario to help sustainability experts protect ecosystems. Now, let's explore in detail one specific success story.

The organization

- The **Washington State Department of Natural Resources (DNR)** was founded in 1957 as the ward of Washington's state trust lands and other natural resources. It manages these lands to ensure their health and productivity. So, their duty is double: to generate revenue and preserve ecosystems for present and future generations.

- The DNR oversees **5.6 million acres of public lands**. Furthermore, it manages a large diversity of lands, with different biomes and needs.

- Proper management requires technical expertise on **specific habitats, such as forests, coastlines, and aquatic lands.**

The challenge

- Within the DNR, the Aquatic Resources Division conducts several programs for overseeing 2.6 million acres of submerged aquatic lands. Among them, the **Nearshore Habitat Program** gathers hundreds of hours of underwater video footage a year to monitor marine vegetation. One of the goals is to track the abundance and distribution of native eelgrass, a species of seagrass.

- This task involves analyzing around **350 hours of video footage**, **identifying, classifying, and geolocating eelgrass**. The process required the manual work of two scientists and congested their workloads for three months. This process was a waste of highly specialized, valuable resources.

The solution

- The experts of the **Nearshore Habitat Program** decided to partner with Microsoft to solve this problem with AI. They found that the best approach was **automated video classification**, using **AI models** to identify eelgrass.

- The technical basis for the use case is **Azure AI Services**' functionalities for image recognition. The video is uploaded to Azure, split into frames, and analyzed by the models included in Azure AI Services. The models are managed, built, and deployed in **Azure Machine Learning**, so the task can be done by any scientist instead of data scientists. Finally, the team uses **Microsoft Power BI** to create reports of the results.

The results

- The solution is already saving months of experts' time and boosting their **productivity**. The process now takes only weeks instead of months, and one person instead of two.

- In the medium term, the goal is to **fully automate the process** and **replicate** it for other monitoring projects.

Next, let's examine a sustainability use case in the mobility sector.

Discover how Microsoft AI enables green mobility – A Stadtwerke München success story

Completed100 XP

- 3 minutes

One of the pillars of smart cities is achieving green mobility for citizens. In **Munich (Germany),** they're taking great steps to deliver sustainable bus services. Let's see how they're doing it.

The organization

- **Stadtwerke München (SWM)** is the municipal utilities company in Munich. It supplies the city with **electricity, heating, drinking water, transport, and telecommunications**. Their mobility services include the municipal subway, bus, tramway, and bike networks.

- SWM is committed to **making Munich greener.** It generates green electricity to cover 90 percent of the city's needs, **and 80 percent of the city's public transport** fleet is already electric. Their goal now is to focus on the bus fleet, which is being converted to battery electric.

The challenge

- Munich is a hectic city with a population of more than one and a half Million inhabitants. Operating its **bus system** is demanding, with **500 buses circulating during peak times**. The electric buses must have autonomy to run **at least 280 km**.

- on a single charge. Considering that it **takes 3-4 hours to charge a bus**, charging must take place between **closing down and restarting service**. So, the whole **bus charging system** is synchronized to a tight schedule, which leaves little place for repairs and unexpected events.

- Besides, any solution must be scalable. SWM manages **vast amounts of data**: each subway train alone sends over 2,000 data points every 10 seconds; geothermal solutions gather five gigabytes of data every hour, as do each of the 30 digitized areas of infrastructure. The organization requires a robust platform capable of operating with such volumes of data, such as Microsoft Azure.

The solution

- SWM developed a smart connectivity solution to improve the efficiency of the bus charging system. This tool called **INSIGHT** is built upon Microsoft products such as **Azure AI Services, Azure Machine Learning, and Azure IoT**. Its design ensures transparent, sustainable processes.

- In INSIGHT, **an IoT device gathers real-time data from the electric buses**, such as battery charge, engine speed, or activation of warning lights. There are around 120 sensors on each bus. The device sends this data to INSIGHT, which is based on Azure infrastructure. There,

the solution creates a digital twin of each bus, which enables it to track every datapoint.

- At this point, the system feeds the **digital twin data to the AI models** built and stored in **Azure Machine Learning**. These models can make a 14-day forecast to predict how much a bus will consume on any given day.

The results

- The solution **provides real-time insights into the condition** of each bus. The impact is clear: employees can fix malfunctions faster and optimize repairs.

- Furthermore, it enables predictive maintenance, so a potential incident can be dealt with before it happens.

- These improvements result in **better scheduling** for the bus system, which benefits all its users.

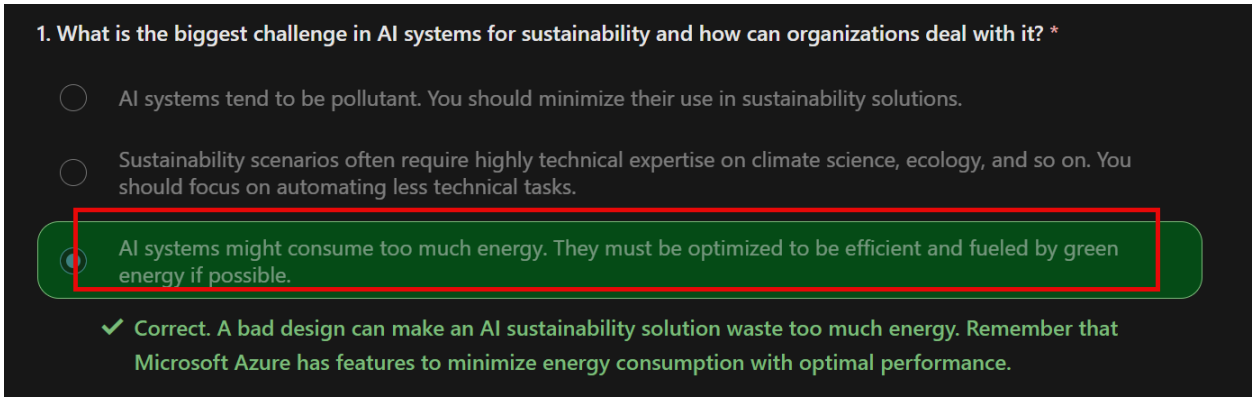
- A better, friendlier mobility service encourages citizens to use it instead of less sustainable options.

- Additionally, the solution improves the **charging load management system**. Since AI predicts how much energy each bus needs for the day, buses are only charged when necessary. This system is more efficient and sustainable.

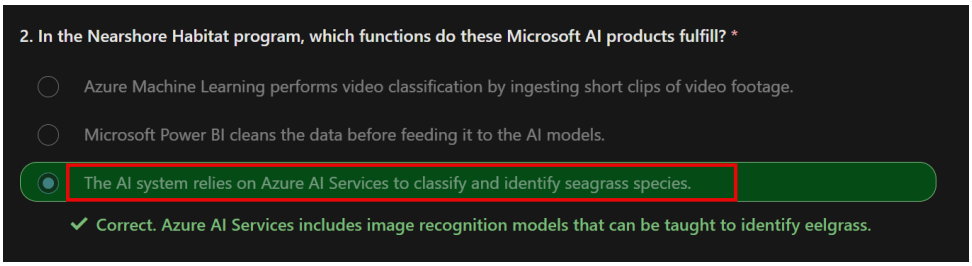
Next, let's wrap up everything you've learned with a knowledge check.

Knowledge Check

1. **What is the biggest challenge in AI systems for sustainability and how can organizations deal with it?**



2. **In the Nearshore Habitat program, which functions do these Microsoft AI products fulfill?**



Summary

he world needs sustainability solutions to build a better future. We must rethink the way we approach many industrial processes to ensure they're energetically efficient, reduce pollution and waste, and so on. This task involves many sectors, such as farming, manufacturing, land management, and mobility. This module illustrates with real examples that leading organizations are using AI to boost their sustainability initiatives.

Microsoft offers a wide range of AI products and services to enable these sustainability scenarios. Microsoft Cloud for Sustainability is tailored to the sector's needs, but you can also use Azure Machine Learning and Azure AI Services, among others. The latest generative AI models are also available via Azure OpenAI Services.

Now that you have reviewed this module, you should:

- Identify AI use cases in sustainability.
- Examine available AI tools and resources for sustainability scenarios.
- Discover insights from sustainability-specific AI success stories.

Use these resources to discover more

Tip

To open a hyperlink, right-click and choose **Open in new tab or window**. That way you can see the resource and easily return to the module.

- To learn more about what Microsoft can do for your sustainability organization, visit our Microsoft Cloud for Sustainability website.
- Stay up to date with Microsoft AI, visit our AI website.
- To learn more about Microsoft commitment to responsible AI, visit our Responsible AI website.
- To learn more about the models delivered by Azure OpenAI Service, read our technical documentation on Azure OpenAI Service.
- To learn more about privacy and security in Azure OpenAI Service, read our legal documentation on Azure OpenAI Service.

- To learn more about all the prebuilt AI models available at Azure AI Services, read our technical documentation on AI Services.
- To learn more about the services included in Azure Machine Learning, visit our Azure Machine Learning website.
- To learn more about the initiatives within the FarmVibes project, visit the FarmVibes website.
- To access the AI models developed within the FarmVibes project, visit the FarmVibes.AI repository.
- To learn more about SynapseML, visit the SynapseML website.
- To learn more about the Global Renewables Watch initiative, visit the Global Renewables Watch website.
- To learn more about Microsoft research to monitor wildlife, visit the Accelerating Biodiversity Surveys with AI website.
- To learn more about the Terrafuse project, visit the Terrafuse website.

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   PDF
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