AI Basics

Introduction to AI Basics

Public service teams are always working to deliver better services and use public money wisely. Artificial intelligence (AI) is one of the tools that can help. It is already being used in parts of the public service to:

- Make every day work faster by automating routine tasks.
- Find fraud and errors in tax and benefit systems.
- Support better decisions by spotting patterns in large amounts of data.
- Help more people access services through translation and transcription, including in te reo Māori.
- Track environmental changes using satellite images and data.
- Identify people or communities who might need extra support.

But what is artificial intelligence?

AI Capabilities

Digital.govt.nz defines an AI System as:

An Artificial intelligence (AI) system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment (Public Service AI Framework, 2025).

The following are examples of AI systems trying to match human abilities:

Analysing government data to forecast or detect risk

This field of AI is often called **predictive analytics**. It can be defined as machine learning to find patterns in data and make informed guesses about what might happen next.

Useful for:

- Detecting fraud or anomalies
- Forecasting service demand
- Prioritising resources or interventions

Seeing threats or issues in images

This field of AI is called **computer vision**. It can be defined as machines that interpret and understand visual information from the world.

Useful for:

- scanning medical images for signs of disease
- Monitoring traffic conditions

- Screening footage for workplace safety incidents

Listening to audio from meetings to create summaries

This field of AI is called **natural language processing** (NLP). It can be defined as enabling computers to understand, interpret, and respond to human language.

Useful for:

- Detecting sentiment or tone in public feedback
- Extracting key points from long policy documents
- Supporting chatbots answer common queries

Reflection Question

Consider your day-to-day work. How have you used AI? When would you like to have used AI to save time?

How do we define AI?

How do these systems acquire such abilities? These capabilities emerge when multiple disciplines and techniques come together to form the field of artificial intelligence. AI is not a single technology. It is a broad and evolving field made up of many domains and specialisations, some of which overlap with related areas such as robotics. Many of these domains depend on machine learning, which underpins much of the AI in use today.

In the next section, we take a closer look at some of the most common types of AI in our work, including machine learning. We place particular focus on how this relates to generative AI, a fast-evolving type of AI that has gained significant attention in recent years.

Types of AI:

Machine Learning

A type of artificial intelligence that allows machines to learn from data without being explicitly programmed. It does this by optimising model parameters (that is, internal variables) through calculations, such that the model's behaviour reflects the data or experience. The learning algorithm then continuously updates the parameter values as learning progresses, enabling the ML model to learn and make predictions or decisions.

Deep Learning

A more specialised machine learning technique in which more complex layers of data and neural networks are used to process data and make decisions.

Example: Health New Zealand has piloted deep learning tools to assist clinicians in screening for diabetic eye disease.

Generative AI

A type of AI system that can create or generate new content such as text, images, video and music based off models and patterns detected in existing datasets. (OECD)

Example: Landcare Research has explored using generative AI to create synthetic images for land-use planning, helping councils visualise development scenarios where real imagery is limited.

Large Language Model (LLM)

A very large deep learning model that is pre-trained on vast amounts of data.

Example: Some public service agencies are trialing large language models to help their people summarise documents, and to create written content.

Agentic AI

Agentic AI involves autonomous agents that take actions and can learn to react based on feedback information from their environment in a multi-step manner. It is often a combination of Robotic Process Automation (rules-based processes to handle repetitive tasks e.g. basic customer queries) and Generative AI.

Example: The UK government is looking to pilot agentic AI in their GOV.UK chat service, to enable the AI to take actions based on interactions with users.

What Powers AI?

All AI systems have one thing in common: they learn from data. This is called **training data**. It serves as the foundation for the model to learn underlying patterns, relationships, and characteristics needed for making predictions or decisions.

However, biases in training datasets can lead to skewed results or discrimination. To counteract this, it's essential to ensure diversity and representativeness in the data, apply bias-correction techniques, and continuously monitor and update models to maintain fairness and accuracy. More details about this are in Module Two.

In addition to quality training data, enabling AI requires a combination of other key elements. These include effective **algorithms**, sufficient **computing power** and, in many cases, access to **cloud-based or scalable infrastructure**.

AI systems also rely on organisational support – including clear goals, skilled people and governance processes that enable safe and responsible implementation.

We will cover these elements in more detail in subsequent modules. Together, these technical and organisational foundations help ensure that AI tools are effective, trusted and fit for purpose in the public service.