

- » Defining artificial intelligence
- » Understanding key AI concepts like machine learning, natural language processing, large language models, and robotics
- » Highlighting the distinction between AI and automation

## Chapter **1**

# What Is AI?

**A**rtificial intelligence, or AI, is transforming nearly every industry, including project management. From streamlining workflows to predicting outcomes, AI has the potential to make project managers more effective and efficient. But before I dive into how AI can benefit your projects, I want to help you understand what AI is, the key concepts that underpin it, and how it differs from automation. In this chapter, I break down the basics of AI, introduce you to the core concepts, and clarify the distinction between AI and automation.

## Setting Your Expectations for This Book

I designed this book to guide you through the process of understanding and implementing AI in your work, from the basics to more advanced applications. Part 1 lays the foundation by explaining why AI is important in project management and how it's transforming the field:

- » Chapter 1 explores the overall importance of AI in modern project management.
- » Chapter 2 covers AI's impact on project efficiency and decision-making.

- » Chapter 3 provides an overview of how using AI in project management provides measurable benefits like time savings, cost reduction, and risk mitigation, which can be tracked through key performance indicators (KPIs) and baseline metrics.

**Part 2 focuses on the practical steps of adopting AI tools and technologies:**

- » Chapter 4 offers guidance on what to look for in AI software and helps you choose the right AI tools for your specific projects.
- » Chapter 5 delves into how AI can automate tasks and workflows to streamline processes to save time.
- » Chapter 6 emphasizes the role of AI in making data-driven decisions, enabling project managers to leverage insights from vast datasets.
- » Chapter 7 explains how AI tools can enhance team collaboration, ensuring smoother communication and coordination across projects.

**Part 3 dives into practical applications of AI in everyday project management:**

- » Chapter 8 shows how AI can improve project planning and scheduling by offering predictive insights and dynamic adjustments to timelines.
- » Chapter 9 explains how to predict and manage project risks using AI and foresee potential challenges.
- » Chapter 10 focuses on how AI can optimize budgeting and cost control, ensuring that projects remain financially viable.
- » Chapter 11 covers how AI improves tracking project performance and automating reporting processes for better transparency and oversight.

**Part 4 addresses critical ethical, security, and change management considerations:**

- » Chapter 12 explores the ethical use of AI in project management, helping you navigate fairness, transparency, and accountability when using AI tools.
- » Chapter 13 focuses on protecting data and ensuring security in AI-powered projects, offering strategies for keeping sensitive information safe.
- » Chapter 14 helps you manage AI adoption within your organization, outlining strategies for overcoming resistance to change and guiding your team through the transition.

Finally, Part 5 offers practical advice and tips for project managers:

- » Chapter 15 provides ten tips for getting started with AI, offering a roadmap for integrating AI tools into your workflow.
- » Chapter 16 highlights common mistakes to avoid when using AI in projects, ensuring you can steer clear of potential pitfalls.
- » Chapter 17 rounds out the book by introducing ten essential AI tools every project manager should know, giving you the resources to fully leverage AI's capabilities.

Whether you're new to AI or looking to refine your AI strategies, this book covers everything you need to know for successfully integrating AI into project management.

## Understanding AI: The Basics

AI is fundamentally about simulating human intelligence within machines, enabling them to perform tasks that typically require human cognitive functions. These functions may include understanding language, recognizing patterns, making decisions, and solving complex problems.

AI is not a single entity but rather an umbrella term for a broad range of technologies and techniques that enable machines to learn from data and improve their performance over time. The idea behind AI is to allow machines to execute tasks that require judgment, insight, or creativity — things that were once thought to be exclusive to human abilities.

AI's relevance spans across various industries. In project management, AI offers ways to streamline operations, make data-driven decisions, and even anticipate challenges. While the concept of AI often conjures up images of highly autonomous systems that mimic human thinking, the reality is more nuanced. AI applications in project management typically involve specialized systems that optimize specific processes. Understanding these nuances helps you recognize where AI can be most effective in improving project outcomes.

The two major types of AI that are commonly discussed are narrow AI (also known as weak AI) and general AI (strong AI). Narrow AI refers to systems that are designed for specific tasks and can outperform humans in that domain. For example, speech recognition, image classification, and recommendation algorithms are

typical examples of narrow AI. These systems are highly focused and excel in their designated tasks but lack the versatility of human intelligence. In contrast, general AI is the theoretical concept where machines could, in the long term, replicate human-like intelligence across a broad array of tasks. General AI is still a concept rooted more in science fiction than in practical reality.

In the realm of project management, narrow AI tools are most relevant. These tools help optimize specific aspects of projects, such as automating routine tasks, analyzing historical data to predict outcomes, or managing resources more efficiently. The true power of narrow AI in this context lies in its ability to process vast amounts of information quickly and provide actionable insights. This enables project managers to make informed decisions, enhance productivity, and mitigate risks effectively.



TIP

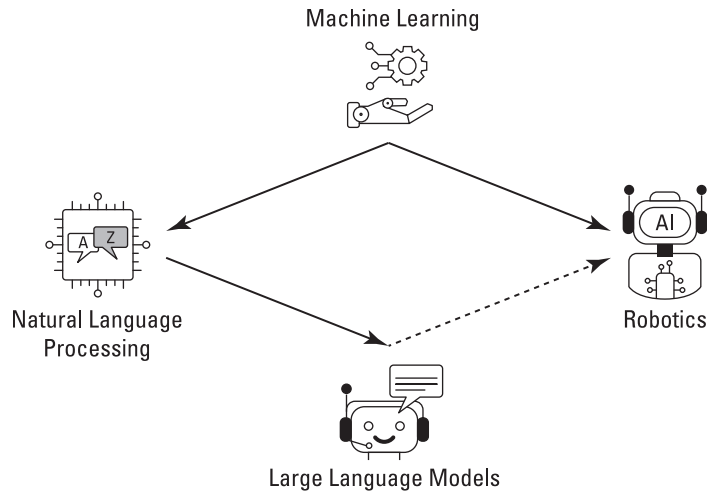
Recognize the distinction between narrow and general AI. When selecting AI tools for your projects, focus on those that specialize in optimizing specific areas of your workflow rather than trying to find a one-size-fits-all solution.

## Defining Key AI Concepts

To effectively harness the power of AI in project management, it's crucial to grasp some of the key concepts that form the foundation of AI. These core ideas include machine learning, natural language processing, large language models, and robotics. (See Figure 1-1.) Each of these technologies serves a distinct purpose and contributes to different aspects of project management, from automating routine tasks to generating insights that guide decision-making. Understanding these concepts will enable you to better assess how you can integrate AI into your workflow to drive efficiencies and improve overall project outcomes. In this section, I explain these key AI concepts and explore their applications in project management.

### Machine learning

Machine learning (ML) is a core subset of AI that enables computers to learn from and make decisions based on data. Unlike traditional programming, where specific instructions are given to perform tasks, ML allows systems to learn from examples and improve over time. This is achieved by training algorithms on large datasets, which helps the model recognize patterns and relationships within the data. The more data an ML model is exposed to, the more consistent it becomes in its predictions or classifications.



**FIGURE 1-1:**  
Relationships  
between different  
approaches to AI.

However, ML can't judge whether data is right or wrong. It simply detects what occurs more or less frequently in the data it's given. So, if the training data is biased, incomplete, or inaccurate, the ML model will learn and reinforce those errors, leading to flawed predictions or classifications. This concept is often summarized as "garbage in, garbage out" (GIGO); if the input data is flawed, the output will be as well. While ML models can improve with more data, their accuracy depends entirely on the quality, diversity, and reliability of the data they are trained on.

In the context of project management, machine learning can significantly enhance processes such as task scheduling, resource allocation, and risk management. By analyzing historical project data, ML can identify trends, predict delays, and recommend optimized resource allocation strategies. It can also forecast the success of different project timelines and help predict where bottlenecks are likely to occur. As a project manager, leveraging ML tools can help you make data-driven decisions that reduce uncertainty and increase project efficiency. Chapter 6 gives more details on how ML can be used to analyze data and enhance project decisions.



When implementing ML in your project, ensure you have access to clean, high-quality data. The quality of the data directly affects the accuracy of the model's predictions.

## Natural language processing

Natural language processing (NLP) is a specialized area of AI that focuses on enabling machines to understand, interpret, and generate human language. NLP bridges the gap between human communication and computer understanding, allowing for smoother interaction between AI systems and users. This technology

powers tools such as chatbots, language translation services, and speech recognition systems. It's also what enables you to have a conversation with certain AI tools that's very like a conversation you would have with another human. NLP enables AI to analyze text or speech, extract meaningful insights, and respond in a way that mimics human conversation.

In project management, you can use NLP to automate repetitive tasks like report generation, document analysis, or summarizations of meeting notes. Additionally, NLP-driven chatbots can assist teams by answering common questions, managing communication between departments, and even scheduling tasks. You can also use NLP tools to analyze team feedback, customer reviews, or stakeholder communications, which helps you gain deeper insights into project progress and areas that need attention.



TIP

Use NLP tools to automate routine communication tasks, such as responding to frequently asked questions or generating weekly project summaries, to save time and improve productivity.

## Large language models

Large language models (LLMs) are a type of machine learning model that is particularly advanced in understanding and generating human language. Trained on vast amounts of text data, LLMs like OpenAI's GPT or Google's BERT are designed to process and generate highly coherent and contextually relevant text. These models use complex deep learning architectures, such as transformers, to analyze the context of words in a sentence and generate responses that sound highly human-like.

For project managers, LLMs can be particularly useful in automating complex communication tasks. For example, LLMs can draft detailed project reports, generate meeting notes, or even provide real-time answers to project team members' inquiries. By incorporating LLMs into project workflows, you can save significant time on administrative tasks.



TIP

Use large language models for tasks that require content generation, such as drafting project updates or summarizing large documents. Be sure to review the outputs for accuracy because LLMs can sometimes generate incorrect or irrelevant information.

## Generative AI

Generative AI is a subset of ML that focuses on creating new content rather than just analyzing or classifying existing data. It relies on deep learning algorithms,

which are a type of artificial neural network designed to recognize complex patterns in large datasets. These algorithms consist of multiple layers of interconnected nodes (neurons) that process and transform data through weighted connections, allowing the model to learn and generate realistic outputs. LLMs, such as GPT-4, are built using deep learning techniques and trained on vast amounts of text data to predict and generate coherent, contextually relevant content. This process is a key aspect of NLP, which enables AI to understand and generate human-like text.

Unlike traditional AI, which primarily classifies or analyzes structured data, generative AI actively produces original content by identifying and replicating patterns from unstructured data, such as text, images, or code. This ability makes it a powerful tool for applications such as automated content creation, brainstorming, and problem-solving, particularly in fields like project management where efficient communication and documentation are essential.

In project management, generative AI can be particularly useful for enhancing communication, automating documentation, and improving decision-making. For example, if a project manager needs to prepare a risk assessment report, a generative AI tool can analyze previous project risks, industry trends, and real-time data to generate a detailed, structured report with potential risks, mitigation strategies, and action plans. Additionally, generative AI can help draft project proposals, create stakeholder updates, and even generate task summaries from meeting notes, saving valuable time. By automating these repetitive yet critical tasks, project managers can focus more on strategy, collaboration, and problem-solving, making projects run more efficiently and reducing administrative burden.

## Robotics

Robotics is another significant area of AI that deals with the creation of machines that can perform tasks autonomously or semiautonomously, often replicating or enhancing human physical abilities. Robotics integrates AI to allow machines to make decisions and perform complex tasks with minimal human intervention. These tasks can range from simple repetitive actions, such as picking and placing items in manufacturing, to more complex tasks like navigating environments or interacting with humans in service settings.

In industries such as manufacturing, logistics, or supply chain management, robotics plays a vital role in automating labor-intensive tasks, reducing errors, and improving efficiency. For project managers working in these industries, understanding robotics is crucial for overseeing projects that involve physical automation. Robotics may also have a role in projects related to construction, where robots are increasingly used to carry out tasks that are dangerous or difficult for human workers.



TIP

When working with robotics in project management, ensure that you thoroughly evaluate the integration of AI-driven robotics with existing systems to avoid disruptions and maintain smooth project operations.

## Agentic AI

Agentic AI refers to artificial intelligence systems that can operate autonomously, make decisions, and take actions to achieve specific goals with minimal human intervention. The term *agentic* comes from the concept of agency, which refers to the ability of an entity to act independently and make choices. Unlike traditional AI models that passively generate responses or insights based on inputs, agentic AI actively engages with its environment, monitors changes, and adapts its behavior accordingly. These systems are designed to plan, reason, and execute tasks, often incorporating reinforcement learning, goal-directed reasoning, and real-time decision-making to improve their effectiveness over time. Because they can assess situations, weigh alternatives, and take initiative in achieving set objectives, they function more like intelligent agents rather than simple tools.

A defining characteristic of agentic AI is its ability to interact with external systems, coordinate multistep tasks, and optimize workflows autonomously. For example, in project management, an agentic AI could automatically adjust schedules, allocate resources, and send progress reports based on real-time data, reducing the need for manual oversight. In supply chain operations, such AI might predict disruptions, reroute shipments, and negotiate with suppliers without requiring human intervention. While this level of autonomy increases efficiency, it also raises questions about control, accountability, and ethical considerations because these systems must be designed to align with human objectives and prevent unintended consequences. The more autonomous and goal-driven AI becomes, the more critical it is to establish guidelines and safeguards that ensure it remains beneficial, transparent, and aligned with human values.

# Mastering the Art of Prompt Engineering

Now that you're familiar with the key AI concepts, it's time to explore a critical aspect of working with AI: prompt engineering. A prompt is the input or instruction given to an AI system, typically in the form of a question or command, that directs the AI to generate a response. Not all AI systems interpret prompts the same way, and the quality of the AI's output largely depends on how the prompt is crafted. Prompt engineering — the process of designing precise and effective

prompts to guide AI — is particularly valuable for NLP models and LLMs. This section explains how to use prompt engineering to maximize the value of these AI tools.

## Understanding where prompt engineering fits

Prompt engineering is particularly important for AI systems that process human language, such as NLP models and LLMs, because they respond dynamically based on the prompt's content. This makes prompt engineering critical for tasks like summarizing reports, generating project plans, or brainstorming solutions.



TIP

Be specific. The clearer your prompt, the better the AI's response. Include details and context to guide the AI.

There are numerous schools of thought on how to write the best AI prompts. Here are some key points to keep in mind:

- » Provide relevant context, a persona, or other key background information. Identify who you are in relation to the task. For example, "I am a project manager working on a large-scale real estate project" gives the AI tool helpful details, which will lead to better outputs.
- » Give clear and concise instructions. Be specific about the task you want the AI to perform and provide. Rather than saying, "Help with project management," say, "List three ways AI can automate task assignments in a software project." This reduces ambiguity and directs the AI to deliver focused, relevant answers.
- » Focus on what you want the AI tool to do rather than what you *don't* want it to do. This approach, known as positive instruction, offers a clear goal and direction, allowing the tool to generate more relevant and accurate responses. So, instead of saying, "Don't make the agenda too detailed," say, "Design an agenda with five discussion topics and one action item per topic." The latter prompt is more specific, helps the AI tool understand your intent better, and reduces the likelihood of unintended or negative outcomes.
- » Consider specifying the audience you're speaking to. Are you writing for a cross-functional team, other project managers, executives, or someone else? Understanding who your audience is enables the AI tool to properly adjust the tone and level of detail included in the output.
- » Describe the format you want in the output. You might be looking for a short email, a bulleted list, or a comprehensive project timeline. Specifying the structure tells the AI tool how to format the output for your needs.

- » Break down complex prompts into small, manageable chunks. This can help the AI tool better understand your intent and generate more accurate and relevant responses. For example, if you want to generate a comprehensive project plan for a new software development project, you could start by providing a brief overview of the project goals and scope. Then, you'd break down the project into smaller phases or milestones, such as requirements gathering, design, development, testing, and deployment. Providing a structured breakdown guides the AI tool's thought process and helps ensure that it generates a more complete and accurate project plan.

## Refining prompts for NLP and LLMs

Don't be afraid to make mistakes with AI. Doing so is part of the learning process. Just like when you were learning to ride a bike, you probably fell a few times before you got the hang of it. Prompt engineering is nearly always iterative. After receiving an initial response, you will likely need to refine the prompt by adding context or rephrasing it. Through trial and error, you'll learn how to fine-tune your prompts to get more useful outputs. Over time, this skill will improve your ability to work with NLP-based AI systems effectively.



REMEMBER

For complex tasks, break your prompt into smaller questions to get more focused answers.



REMEMBER

In project management, prompt engineering enhances the use of AI for tasks such as drafting reports, summarizing meetings, or analyzing risks. For example, asking, "Summarize the key action items from the last project meeting" is more effective than a vague request for a summary. Similarly, prompts like "Generate a progress report that highlights task completion rates and identifies any project risks" can help streamline routine tasks.

## Knowing the Difference between AI and Automation

AI and automation are often used interchangeably, but they are distinct concepts that serve different purposes in project management. While both technologies can enhance efficiency and reduce manual effort, their capabilities and applications vary significantly. Automation is designed to perform repetitive tasks following predefined rules, streamlining processes that do not require complex

decision-making. In contrast, AI involves machines learning from data, adapting to new information, and making informed decisions based on patterns and insights. Understanding the difference between AI and automation is crucial for leveraging their strengths effectively and determining which tool is best suited for different tasks within project management.

## Understanding automation in project management

Automation refers to the use of software or machines to execute predefined tasks without human intervention. In project management, automation typically involves systems that follow a set of rules to complete repetitive, predictable activities efficiently. These can be as simple as sending email reminders or as complex as automatically tracking time and expenses across multiple team members.

Automation excels in processes that require speed, consistency, and precision. For example, a project management tool might automatically generate weekly status reports based on task completion data, reducing the time spent on manual data entry. By automating routine administrative work, project managers can focus on more strategic decision-making and problem-solving.

However, the key limitation of automation is that it cannot adapt to changes or new information unless specifically programmed to do so. It follows strict guidelines and cannot handle unstructured problems or make decisions based on analysis beyond its preset capabilities. This is where AI surpasses traditional automation.



TIP

Start by automating repetitive tasks in your project management processes, such as scheduling meetings or generating status reports, to free up time for higher-level work.

## Defining artificial intelligence in project management

Artificial intelligence involves machines that not only execute tasks but also learn and adapt based on data. AI systems are capable of analyzing information, identifying patterns, and making decisions without human intervention. AI can process vast amounts of data to recognize trends, optimize processes, and even predict outcomes, providing much more dynamic and flexible solutions than automation alone.

For project managers, AI has the potential to go beyond automating tasks. It can analyze historical project data to predict future risks, recommend the best course of action for resource allocation, or provide insights into how project timelines can be optimized. While automation handles repetitive tasks, AI helps in making smarter decisions by learning from past data and adjusting its actions accordingly.

AI's ability to handle complexity means it's ideal for managing unpredictable elements of projects, such as adjusting timelines when a project falls behind or recommending alternative vendors if supply chain disruptions occur.



TIP

Use AI to improve decision-making in your project management processes, such as predicting potential delays or risks based on historical data and real-time inputs.

## Key differences between AI and automation

The main difference between AI and automation lies in the complexity of the tasks they handle and the level of decision-making involved. Automation operates on predefined rules and can execute tasks only as programmed. It is most effective for routine, repetitive activities that require speed and accuracy but do not involve decision-making or learning.

In contrast, AI mimics human intelligence, allowing it to learn from data and adjust its responses over time. AI can identify patterns, predict outcomes, and recommend actions, making it suitable for more complex tasks. For instance, AI can analyze the efficiency of a project team, recognize underperforming areas, and recommend improvements, whereas automation can only send reminders or track time spent on tasks.

AI's adaptability means it's ideal for managing uncertainty in projects. Automation, while useful, requires continuous updates to handle new scenarios. AI, on the other hand, can adjust its actions based on changing conditions without needing to be reprogrammed.

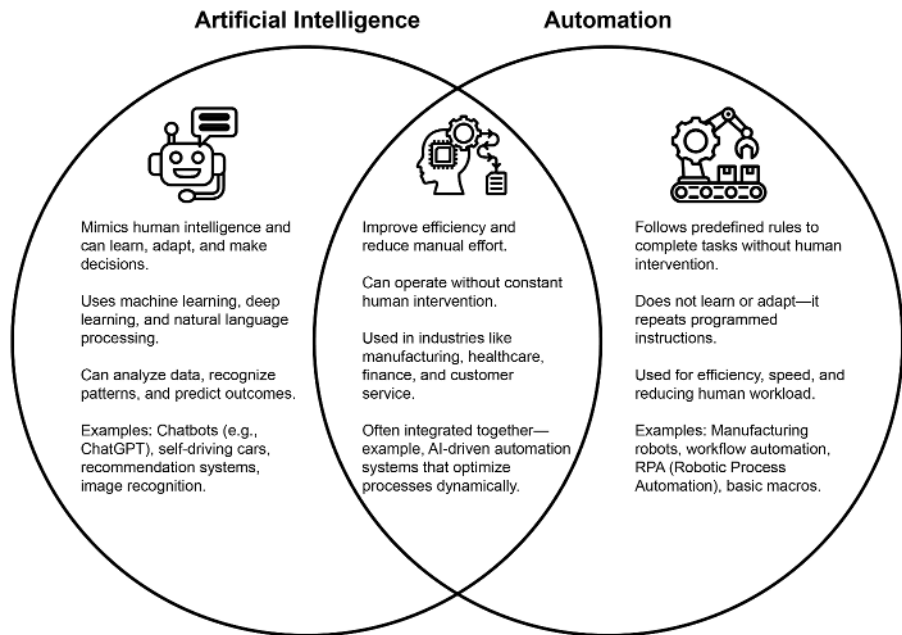
Both AI and automation have their places in project management, so knowing when to use each is key to optimizing project workflows. Automation is best suited for activities that require high efficiency and accuracy without the need for human judgment. For example, automating reminders for team members to submit status updates is simple, and effective AI should be implemented for tasks where data analysis and predictive insights are critical. For instance, if a project manager needs to predict resource constraints or identify the likelihood of meeting a deadline based on current progress, AI can provide valuable recommendations. AI is particularly useful in scenarios where the project environment is dynamic and quick, data-driven decisions need to be made.

Ultimately, a combination of both AI and automation will provide the most benefits. Automation can handle repetitive tasks efficiently, while AI can manage the more complex, decision-oriented aspects of project management, leading to better performance overall.



TIP

Use automation for repetitive tasks and AI for tasks that involve analyzing data, learning from patterns, and making decisions based on complex information. Figure 1-2 shows tasks automation and AI have in common and where they differ. Check out Chapter 5 for more on using AI to automate specific project management tasks.



**FIGURE 1-2:**  
A Venn diagram of AI and automation.



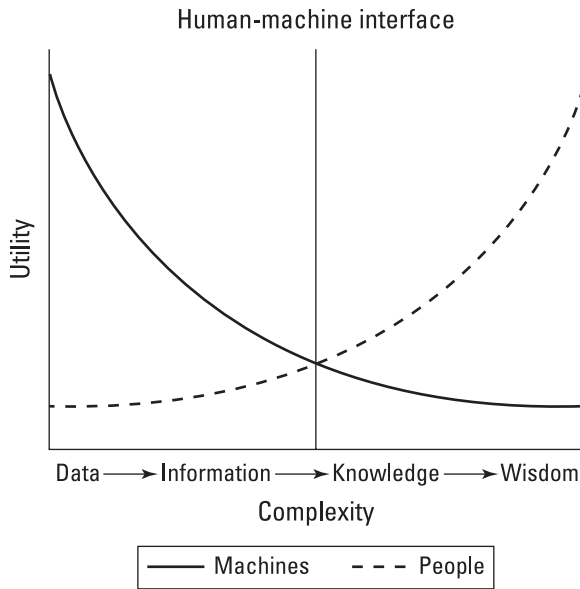
TIP

Implement automation to handle routine tasks first, and then explore AI tools to enhance your decision-making process, especially in areas like risk management and forecasting.

## Managing the information value chain

To understand why generative AI is such a game changer, let's look at the information value chain, which is shown in Figure 1-3. It begins with data — simple facts like a phone number. By organizing data, we create information — for example, linking a name to a number. This information helps us make decisions and act.

When we further organize information — filtering and finding patterns — it becomes knowledge. Finally, by applying judgment and intuition, knowledge turns into wisdom.



**FIGURE 1-3:**  
The information value chain.

Computers excel at processing data quickly, but as we move up the value chain to tasks involving judgment, people outperform machines. For example, project management tasks like scheduling or tracking resources are ideal for automation because computers handle these better than humans. However, when it comes to decision-making, human judgment is essential.

The balance between people and machines is shifting with AI's growth. As AI improves, it takes on more advanced tasks, moving the human-machine interface further along the chain. This shift is driving digital transformation — where more tasks can be automated, leaving humans to focus on high-level decisions. To stay competitive, project managers need to strategically adopt these technologies and decide what to automate.

## EMMA'S JOURNEY INTO PROJECT MANAGEMENT WITH AI

Emma is a project manager at a mid-sized marketing firm, known for her ability to juggle multiple projects while keeping her team on track. Recently, she started hearing more about the role of AI in project management. Colleagues mentioned AI-powered tools that could automate workflows, help with data analysis, and improve risk management. Curious, but unsure where to begin, Emma decided to explore how AI could benefit her work.

Her first challenge was simply understanding what AI actually is. She'd heard terms like machine learning and automation but didn't fully grasp the differences. Emma started by searching for articles and videos on the basics of AI, but quickly found herself overwhelmed by technical jargon. She realized she needed a structured approach to learning, starting with the fundamentals.

That's when she came across a comprehensive guide to AI in project management. This book laid out exactly what she needed, starting with an introduction to what AI is and how it's different from simple automation. Emma learned that AI goes beyond automating routine tasks. It can draft documents, predict risks, allocate resources, and provide data-driven insights that would allow her to make better decisions.

With a clearer understanding, Emma moved on to learning about the specific tools available. The book provided a roadmap for choosing the right AI tools for her projects. Emma started with AI-powered task automation tools, which helped her streamline repetitive tasks like sending reminders and generating reports. She then dived into AI tools for data analysis, which transformed how she planned her project timelines and resource allocation.

As Emma continued to apply AI, she faced resistance from some team members who worried AI might replace their jobs. However, using strategies she learned from the book, she addressed their concerns by explaining that AI would enhance their work rather than replace it. Emma also involved her team in testing new AI tools, helping them feel more engaged with the changes.

Within months, Emma was not only comfortable using AI but had transformed how her team approached projects. They were more efficient, made more informed decisions, and handled risks better. Emma's journey into AI started with confusion, but by seeking out the right resources and taking a step-by-step approach, she mastered AI's potential and led her team into a new era of project management.

