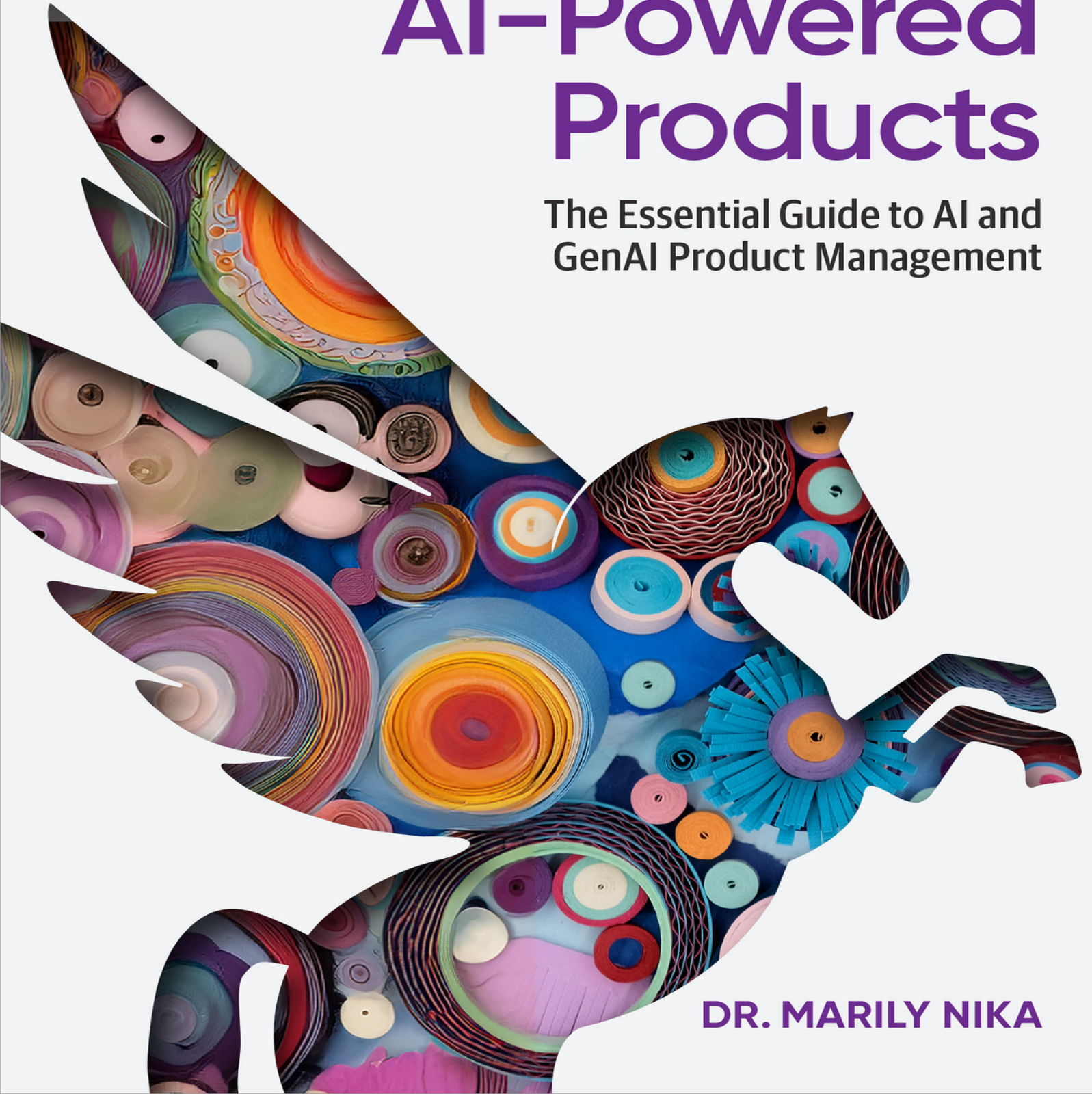


O'REILLY®

Building AI-Powered Products

The Essential Guide to AI and
GenAI Product Management



DR. MARILY NIKA

Praise for *Building AI-Powered Products*

Marily Nika has written the handbook for product leaders navigating this time of change brought on by AI. Her insights on leveraging AI as a tool will change how we build. Rather than making products less personal, she shows how AI can make our work more meaningful and transformative.

—Deb Liu, president and CEO, Ancestry.com

Marily says that all PMs will be AI PMs, and I believe it. This book is the guide to get there. She provides a blend of frameworks, case studies, and practical advice to help you transition your career and build successful products powered by AI.

—Lenny Rachitsky, author, *Lenny's Newsletter*, and podcast host

In a time when AI is reshaping industries at an unprecedented pace, Marily Nika's book provides the essential frameworks and insights that product managers need to lead with confidence and stay ahead. This timely guide sets the foundation for success in the AI-driven future, as experienced by students of Marily's course offered on Maven.

—Gagan Biyani, CEO and cofounder, Maven Learning, Inc.

In a world full of AI noise, Marily offers a refreshing and pragmatic take on what it takes to build products with AI. If you are a PM, this is an essential read. It is filled with practical frameworks and tools that you can apply right away.

—Amit Fulay, vice president of product,
Microsoft

Marilyn Nika's book arrives at a pivotal moment in the evolution of AI and product management. Her deep expertise and practical frameworks provide invaluable guidance for leaders aiming to leverage AI's transformative potential. This work is a significant contribution to the field.

—Karim R. Lakhani, professor of business administration and chair, Digital, Data, and Design Institute, Harvard University

Building AI-Powered Products

The Essential Guide to AI and GenAI
Product Management

Dr. Marily Nika

O'REILLY®

Building AI-Powered Products

by Dr. Marily Nika

Copyright © 2025 Marily Nika. All rights reserved.

Printed in the United States of America.

Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

O'Reilly books may be purchased for educational, business, or sales promotional use. Online editions are also available for most titles (<http://oreilly.com>). For more information, contact our corporate/institutional sales department: 800-998-9938 or corporate@oreilly.com.

Acquisitions Editor: David Michelson

Development Editor: Sarah Grey

Production Editor: Elizabeth Faerm

Copyeditor: Audrey Doyle

Proofreader: Vanessa Moore

Indexer: BIM Creatives, LLC

Interior Designer: Monica Kamsvaag

Cover Designer: Susan Thompson

Illustrator: Kate Dullea

February 2025: First Edition

Revision History for the First Edition

- 2025-02-14: First Release

See <http://oreilly.com/catalog/errata.csp?isbn=9781098152703> for release details.

The O'Reilly logo is a registered trademark of O'Reilly Media, Inc. *Building AI-Powered Products*, the cover image, and related trade dress are trademarks of O'Reilly Media, Inc.

The views expressed in this work are those of the author and do not represent the publisher's views. While the publisher and the author have used good faith efforts to ensure that the information and instructions contained in this work are accurate, the publisher and the author disclaim all responsibility for errors or omissions, including without limitation responsibility for damages resulting from the use of or reliance on this work. Use of the information and instructions contained in this work is at your own risk. If any code samples or other technology this work contains or describes is subject to open source licenses or the intellectual property rights of others, it is your responsibility to ensure that your use thereof complies with such licenses and/or rights.

978-1-098-15270-3

[LSI]

Preface

Artificial intelligence (AI) has been a core area of research and development for computer scientists and engineers for decades. While the potential of AI remained constrained by hardware and software for years, recent breakthroughs have allowed product managers to harness AI's power, scaling it into practical and impactful solutions.

In 2023, the launch of OpenAI's ChatGPT and similar large language models transformed the landscape of digital products, empowering product managers to infuse AI into user experiences in ways that were unimaginable just a year before. In the span of a year, the market has seen a Cambrian explosion of generative AI models, from image generation tools like Midjourney, Stable Diffusion, and DALL-E to advanced search solutions like Deepseek—and even multimodal AI systems like Google's Gemini. As of 2024, most tech companies are focused on integrating some aspect of AI into their products, with many prioritizing the transition from task-specific AI solutions to general-purpose AI and building new user experiences with multimodal AI and personalized AI agents.

Building AI-Powered Products: The Essential Guide to AI and GenAI Product Management is a road map for navigating the complexities of creating AI-driven products. Drawing on my experiences at Google and Meta, and complemented by insights from the AI Product Academy, this guide aims to equip product managers, entrepreneurs, and business leaders with the tools and frameworks to confidently integrate AI into their work.

Why AI Product Management?

AI product management is uniquely challenging. Unlike traditional product development, AI systems are probabilistic, depend on high-quality data, and demand continuous learning and optimization. Concepts such as large language models, retrieval-augmented generation, and model fine-tuning are critical to understand, yet they often feel inaccessible to nontechnical PMs. This is why I founded the AI Product Academy, which provides AI Product Management certifications, and it is the reason I wrote this book: to bridge the gap between niche AI technologies and solve user pain points in impactful ways. The book offers actionable guidance, practical tools, and case studies to help you navigate the intricate AI Product Development Lifecycle, tackle strategic and ethical considerations, and build products that are both innovative and user centric.

Who Should Read This Book?

This book is for product leaders of all levels who want to learn how to manage, build, and land AI and generative AI-powered products as well as AI product organizations. I have designed the content to be relevant to different audiences, from technical professionals eager to explore AI's possibilities, to business leaders looking to staff their own organizations with AI product leaders and gain a competitive edge. Approximately 8,000 professionals have taken my AI PM Bootcamp to date, and most of them fall into these three categories:

Seasoned product leaders

Staffing and leading AI product organizations

Product managers

Transitioning to AI or refining their skills to manage AI-powered products

Entrepreneurs and innovators

Exploring AI's potential to transform their businesses

Engineers and data scientists

Understanding product- and user-focused aspects of AI development

What This Book Covers

AI is not the product; the experience is the product. To bring value to users, AI needs to be integrated into an experience, enhancing it or contributing to solving an unmet need. This book is for building AI and generative AI experiences, from ideation to rollout. It is absolutely critical for anyone looking to collaborate with technical teams to bring AI products to life.

This book is structured to guide you through every stage of building AI-powered products, from initial ideation to market deployment:

Chapter 1, “The Role of AI Product Managers”

Explains the unique responsibilities of AI product managers and their role in translating technical advancements into user-driven solutions

Chapter 2, “The AI Product Development Lifecycle”

Introduces the AI Product Development Lifecycle framework to systematically guide products through ideation, prototyping, testing, and deployment

Chapter 3, “Essential AI PM Knowledge”

Covers essential AI concepts, including the AI lifecycle and fundamentals of AI algorithms and how they translate into user impacting features

Chapter 4, “The AI PM’s Day-to-Day”

Discusses the unique workflow of an AI product manager, highlighting the collaborative aspects, diverse stakeholders, and continuous learning required to succeed

Chapter 5, “Strategic Thinking in AI”

Offers strategies for leading diverse teams of engineers, designers, and stakeholders

Chapter 6, “Setting Goals and Measuring Success”

Explores how to define success metrics, balance trade-offs such as accuracy versus speed, and manage AI-specific risks

Chapter 7, “AI Tools for Product Managers ”

Highlights the tools and technologies that are critical throughout the AI Product Development Lifecycle

Chapter 8, “Building AI Agents”

Delves into autonomous AI agents, exploring multi-agent systems, reinforcement learning, and practical applications in real-world products

O’Reilly Online Learning

NOTE

For more than 40 years, *O’Reilly Media* has provided technology and business training, knowledge, and insight to help companies succeed.

Our unique network of experts and innovators share their knowledge and expertise through books, articles, and our online learning platform. O’Reilly’s online learning platform gives you on-demand access to live training courses, in-depth learning paths, interactive coding environments, and a vast collection of text and video from O’Reilly and 200+

other publishers. For more information, visit <https://oreilly.com>.

How to Contact Us

Please address comments and questions concerning this book to the publisher:

O'Reilly Media, Inc.

1005 Gravenstein Highway North

Sebastopol, CA 95472

800-889-8969 (in the United States or Canada)

707-827-7019 (international or local)

707-829-0104 (fax)

support@oreilly.com

<https://oreilly.com/about/contact.html>

We have a web page for this book, where we list errata, examples, and any additional information. You can access this page at <https://oreil.ly/bldg-ai-pwr-d-prdcts>.

For news and information about our books and courses, visit <https://oreilly.com>.

Find us on LinkedIn: <https://linkedin.com/company/oreilly-media>.

Watch us on YouTube: <https://youtube.com/oreillymedia>.

Acknowledgments

I would like to thank my husband, Ray, for his unwavering support throughout this journey. My gratitude also goes to Professor Karim R. Lakhani, whose encouragement led me to first explore teaching in 2018, and Jessie Li, whose research assistance was invaluable in shaping this book.

Closing Thoughts

All product managers will be AI product managers in the future. AI and generative AI empower us to solve problems and scale solutions in ways that were unimaginable just a decade ago. As you navigate this book, I hope it equips you with the knowledge, frameworks, and confidence to build impactful AI-powered products that align with user needs and business goals.

—Dr. Marily Nika

Chapter 1. The Role of AI Product Managers

The first AI team I ever worked for was designing something special: smart home-assistant devices that could understand a wide variety of accents, and even recognize who was talking and what they were instructing the assistant to do. It was the early days of voice assistants and smart homes. I had always been interested in the conjunction of language and tech, and I knew many voice systems didn't really "get" different ways of speaking. The Speech team's goal was to make an AI that did.

That was a really complicated task. We wrangled enormous datasets, refined algorithms, and spent months trying to figure out how to embed this technology into user-facing products. Speech technologies, and more specifically, **speech recognition**, enables machines to transcribe what humans are saying. Similarly, **text-to-speech synthesis** gives computers the ability to "speak," given written words as an input.

I didn't realize at first that I had found myself at the heart of AI and innovation. This experience showed me the exciting world of AI product management.

The field of AI has existed for many decades. It **originated back in the 1950s**, when scientists attempted to develop computers that would emulate the way human brains work, and in particular when Alan Turing suggested that machines can also be taught to reason, just like humans.

AI is a field of computer science that gives computers intelligence. It enables machines to perform nontrivial cognitive tasks comparable to tasks humans can perform, such as reasoning, sensing, speech processing, visual perception, problem-solving, and most importantly, as **Oracle notes**, learning from data and adapting. While **AI is not new**, hardware limitations had obscured its potential until recently. The industry is only now starting to unlock the vast potential of AI, a breakthrough made possible by leaps in chip technology, unprecedented computational power, and an abundance of data. These advancements, coupled with sophisticated algorithms and cutting-edge machine learning (ML) techniques, are setting the stage for AI to reach capabilities that were previously unimaginable.

Organizations with vast amounts of data are in a unique position to embrace AI and ML. They stand to gain a significant competitive advantage, both in their operations (e.g., predictions that inform planning, such as for restocking inventories or identifying the right price point) and in their offerings (unique, smart solutions that offer personalization, recommendations, automation, content generation, and more). Now more than ever, those organizations need professionals who can understand AI and its potential, leverage it, and “serve” it to customers.

Today, AI is ubiquitous. It drives increasingly complex and consequential decisions, such as college admissions and medical diagnoses. I write this in 2024, and in the past year alone, AI has advanced tremendously with the emergence of *generative AI*, a subtype of AI that produces content, sometimes abbreviated as “GenAI.”

This chapter introduces the business role of the AI product manager (AI PM). I’ll discuss what distinguishes this role from regular product management and what skill sets it

requires. We'll also explore the diverse landscape of AI, including how AI products leverage different AI technologies, to give you a comprehensive view of both the day-to-day work lives of AI PMs and the broader context in which they operate.

The Stages of AI Evolution

GenAI is often conflated with traditional AI, but in reality, it's just one subset of a larger, more complex AI landscape. This distinction is crucial to understanding AI's full potential, yet it's a misconception I encounter daily. While GenAI has become a hot topic and the technology has made remarkable strides recently, it is by no means a replacement for traditional AI.

When we talk about "AI," it's important to clarify that this term encompasses a range of technologies and approaches, each with its own specific set of use cases. To assume that "AI" *just* refers to GenAI oversimplifies a vast, multifaceted field. Modern-day AI is classified into four groups: traditional, generative, general intelligence, and superintelligence.

Figure 1-1 highlights how these four types of AI vary in scope and capability, illustrating an evolving landscape where AI ranges from specialized tasks to broader, potentially transformative applications. The diagram emphasizes the layered complexity of AI, showing how each category contributes uniquely to our understanding and advancement of intelligent systems.

THE LANDSCAPE OF AI AND ITS USE CASES

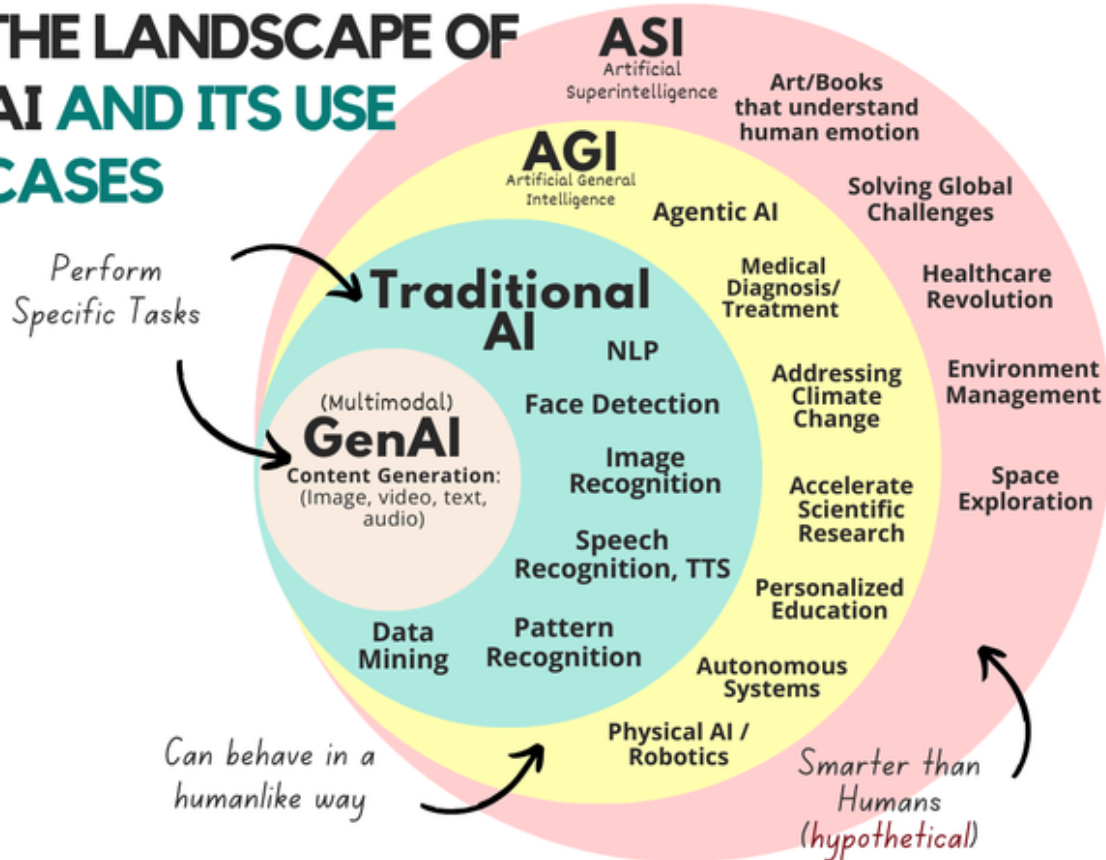


Figure 1-1. The four types of AI (source: Dr. Marily Nika)

Traditional AI (1950s-Present)

Traditional AI has a long history that began in the 1950s and represents AI's foundational technologies. These systems are designed to perform specific tasks through rule-based or pattern recognition systems. Traditional AI includes some of the most essential applications we interact with on a daily basis:

Vision

Traditional AI has made strides in computer vision tasks such as image recognition, object detection, and face recognition. These technologies enable systems to interpret and analyze visual inputs, forming the basis for everything from photo tagging on social media platforms to advanced

medical imaging technologies that help doctors diagnose diseases.

Speech

Speech recognition and speech-to-text technologies, such as those used in voice assistants like Siri and Alexa, have been in development for decades. These technologies convert spoken language into text, enabling machines to respond to voice commands. Text-to-speech (TTS) systems, which do the reverse, give computers the ability to speak in a humanlike manner.

Natural language processing (NLP)

NLP tasks such as language translation, sentiment analysis, and other tasks using chatbots have brought significant breakthroughs. Think of Google Translate or chatbots used in customer service; these rely on AI to understand human language in a more sophisticated way than simple keyword recognition.

Robotics

Traditional AI in robotics has led to the development of industrial robots, autonomous vehicles, and drones. These robots can perform complex tasks such as assembly in manufacturing plants or navigating streets autonomously.

Data analysis

Traditional AI excels in predictive analytics, data mining, and pattern recognition. It can analyze vast datasets and uncover hidden patterns, allowing organizations to make data-driven decisions and automate processes that once required human intuition.

Generative AI (Late 2010s-Present)

GenAI represents the more recent wave of AI innovation and has captivated the public's attention with its ability to create content. This content can be text, images, video, or even music, but GenAI does not replace the tasks handled by traditional AI. Instead, it opens up new dimensions:

Content creation

The ability to generate media such as images, video, and text from a given prompt is one of GenAI's core strengths. Applications range from creative arts (helping artists design graphics or write music) to business (automatically generating product descriptions for ecommerce websites).

Deepfakes

GenAI can also be used to create synthetic media, sometimes known as *deepfakes*, which can convincingly mimic real people's voices or appearances. While this technology raises ethical concerns, it also has legitimate applications in entertainment and simulation environments.

Personalized media

GenAI is being used to tailor content experiences to individuals. Platforms such as Netflix and Spotify are using AI to suggest shows and music that align with user preferences. This trend is reshaping media consumption, making it more personalized than ever before.

Design and art

AI tools such as **DALL-E** and **Adobe Firefly** assist artists in generating concepts or mockups. These tools reduce the time to produce creative work, empowering artists to focus on refining their ideas.

Game development

GenAI is making games more interactive and dynamic by allowing game developers to create procedurally generated worlds, characters, and environments, making each player's experience unique.

Artificial General Intelligence (2030s?)

Artificial general intelligence (AGI) is the next frontier in AI research, and while we are not there yet, it holds the promise of machines capable of understanding, learning, and applying knowledge across a wide range of tasks—essentially mimicking human cognitive functions:

Problem-solving

AGI will be able to tackle complex, multidomain problems. Imagine AI systems capable of medical diagnosis one moment and strategic business planning the next.

Research and development

In R&D, AGI could dramatically accelerate scientific discovery by generating hypotheses, running simulations, and performing experiments much faster than humans can.

Personal assistants

AGI could evolve today's virtual assistants into highly capable systems that can manage vast areas of daily life, from personal schedules to creative problem-solving.

Healthcare

AGI will likely make huge strides in healthcare, offering personalized medicine, diagnosing complex conditions, and even proposing novel treatments.