

Integrating Artificial Intelligence in Business Systems

دمج الذكاء الاصطناعي
في أنظمة العمل

Department of Human Resources
Government Of Sharjah



أحمد الشامي
مدير التحول الرقمي الأول - حلول الرقمية
مدير إدارة عمليات تكنولوجيا المعلومات الأول – للمجموعة قابضة

التعليم



بكالوريوس (علوم الحاسوب) من جامعة العلوم التطبيقية، الأردن (2003)



ماجستير في التحول الرقمي
جامعة ولونغونغ الأسترالية

التوصيات

- رسالة شكر للمساهمة الرقمية في المنتدى الاقتصادي العالمي وجوائز نوبل
- توصية من المستثمرين والمالكين والتنفيذيين للمساهمة في نجاح أعمالهم
- نشر إعلامي في T&T، المهندس المعماري المؤسسي، نظام إدارة الوثائق، العمليات المؤسسية لتكنولوجيا المعلومات

الخبرة في القطاعات

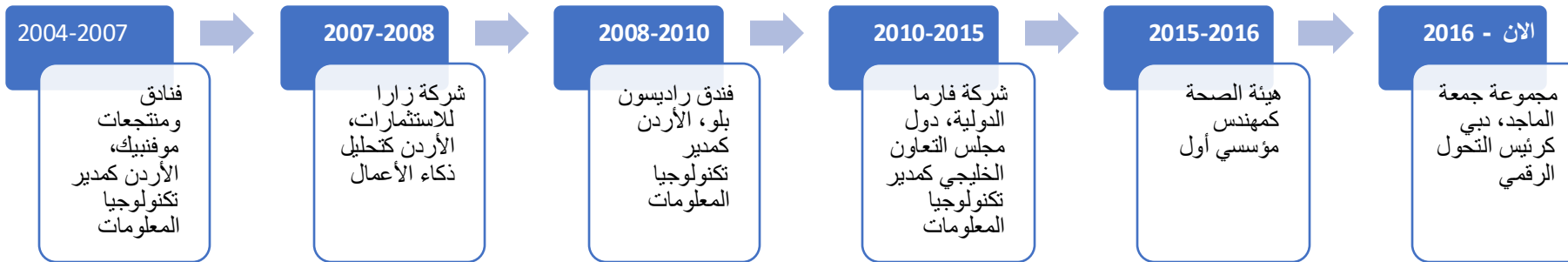
السيارات	التصنيع	الفنادق و الضيافة والسفر
الإنشاءات والمقاولات	حلول تكنولوجيا المعلومات	المجموعات القابضة
الرعاية الصحية والأدوية	السلع الاستهلاكية وتجارة التجزئة	الحكومة
البنوك	الاستشارات	قطاع التعليم

الشهادات

مهندس مؤسسي TOGAF 9.2	محترف إدارة المشاريع PMP
ISO 27001	ITIL
سجما ستة - الحزام الأسود	مدقق نظم معلومات معتمد CISA
علوم البيانات والذكاء الاصطناعي	خبير حلول مايكروسوفت أزور
جمعية الشبكات المعتمدة من سيسكو CCNA	مهندس حلول AWS
إدارة تقنية المعلومات المعتمدة للمؤسسات CGEIT	سحابة أوراكل
مهندس مؤسسي TOGAF 10	



الجدول الزمني للمسيرة المهنية - إجمالي الخبرة: أكثر من ٢٠ سنة



Agenda

Chapter	Page
Mind of Warrior / Commander	
Introduction to AI	
No-stop shop –eGovernment Model	
AI Use Cases	
Generative AI & beneath infrastructure and algorithms	
AI Tools can be use in Business (AI Not Alone)	
Data Mining and AI Algorithms	
AI & Digital Transformation , Strategy, Innovation and methodology	

Time Schedule

المدة	الوقت	
ساعة 1	8:30 AM – 9:30 AM	الحصة الأولى
عشرة دقائق 10	9:30 AM – 9:40 AM	استراحة الأولى
ساعة و ثلث 1.25	9:40 AM – 11:00 PM	الحصة الثانية
نصف ساعة – 30 MIN	11:00 AM – 11:30 PM	الاستراحة الثانية
ساعة و نصف 1.5 HOUR	11:30 PM – 1:30 PM	الحصة الثالثة



Pre-Assessment



Sun Tzu's *The Art of War*

- emphasizes several key principles for winning a war, including understanding the landscape, knowing the enemy, and understanding your own soldiers. Here are some important points:
1. **Know the Terrain:** Understanding the landscape is crucial. Sun Tzu advises that the terrain can dictate the outcome of battles. [Knowing the high ground, water sources, and natural barriers can provide strategic advantages](#)¹.
 2. **Know the Enemy:** Sun Tzu famously said, "[Know the enemy and know yourself, and you can fight a hundred battles with no danger of defeat](#)"². This means understanding the enemy's strengths, weaknesses, strategies, and morale. [This knowledge allows you to anticipate their moves and counter them effectively](#)³.
 3. **Understand Your Soldiers:** Knowing the capabilities and limitations of your own troops is essential. [Sun Tzu stresses the importance of morale, discipline, and the ability to adapt to changing circumstances](#)⁴.



SUN TZU

THE ART OF WAR

Sun Tzu's *The Art of War*

1. **Shaping the Enemy:** This involves making the enemy conform to your strategy. [By holding strategic positions and using deception, you can control the battlefield and force the enemy into disadvantageous situations¹.](#)
2. **Crafts and Weapons:** Sun Tzu discusses the importance of using appropriate weapons and technology to gain an advantage. [He advises adapting your tools to the situation and using them effectively to exploit the enemy's weaknesses¹. This includes everything from traditional weapons to modern technologies like cyber warfare and drones².](#)
3. **External Environment:** Understanding the external environment is crucial. [Sun Tzu highlights the need to consider factors such as weather, terrain, and the broader strategic landscape³. These elements can significantly impact the outcome of battles. For example, using the terrain to your advantage can help you ambush the enemy or defend a position more effectively¹.](#)



SUN TZU

THE ART OF WAR

Sun Tzu's *The Art of War*

- discusses the importance of using appropriate weapons and technology in several places. Here are a few key references:
1. [Chapter 1: Laying Plans](#) - Sun Tzu emphasizes the importance of preparation and planning, which includes the selection and use of appropriate weapons and technology¹.
 2. [Chapter 2: Waging War](#) - This chapter discusses the logistics of war, including the need for proper equipment and supplies².
 3. [Chapter 5: Energy](#) - Sun Tzu talks about the use of different types of forces and the importance of adapting your tactics and tools to the situation³.
 4. [Chapter 7: Maneuvering](#) - This chapter highlights the importance of flexibility and the use of various strategies and tools to gain an advantage over the enemy⁴.



GAMEFICATION – STRATEGY

The screenshot displays a game interface for a species selection task. At the top, a progress bar shows '68 min left' and 'Part 1 (of 4)'. The left panel, titled 'Species', lists two options: 'Common Morel' and 'Giant Sensitive Tree'. The 'Common Morel' section is expanded, showing its image, 'CALORIES NEEDED' (0), 'CALORIES PROVIDED' (5850), 'ELEVATION RANGE' (201-680 m), 'TEMPERATURE RANGE' (29.6-32 °C), 'EATEN BY' (Eastern Cottontail, Black Rumped Agouti, Pygmy Brocket, Grey Fox), 'WIND SPEED RANGE' (1-9 knots), 'FOOD SOURCES' (Waste), and 'SOIL PH RANGE' (4.5-6). The central 3D view shows a lush green mountain landscape. A red arrow points to the 'Terrain specifications' text, and another red arrow points to a green circular area on the mountain labeled 'Living conditions of the species'. The right panel, titled 'Monitors', shows '2/4' monitors active: 'Elevation' (671 m) and 'Temperature' (30 °C), both with green checkmarks, and 'Wind Speed' which is inactive. The bottom navigation bar includes 'Search inside image', 'Species Select', 'Location Select', and 'Complete Task'. A small text at the bottom right reads 'Kinsey Solve Game collection of tools | PSG Cracked'.

68 min left
Part 1 (of 4)

< Species X

Common Morel Add

CALORIES NEEDED 0
CALORIES PROVIDED 5850
ELEVATION RANGE 201-680 m
TEMPERATURE RANGE 29.6-32 °C
EATEN BY Eastern Cottontail, Black Rumped Agouti, Pygmy Brocket, Grey Fox
WIND SPEED RANGE 1-9 knots
FOOD SOURCES Waste
SOIL PH RANGE 4.5-6

Giant Sensitive Tree Add

Terrain specifications

Living conditions of the species

Monitors 2/4
✓ Elevation 671 m
✓ Temperature 30 °C
○ Wind Speed

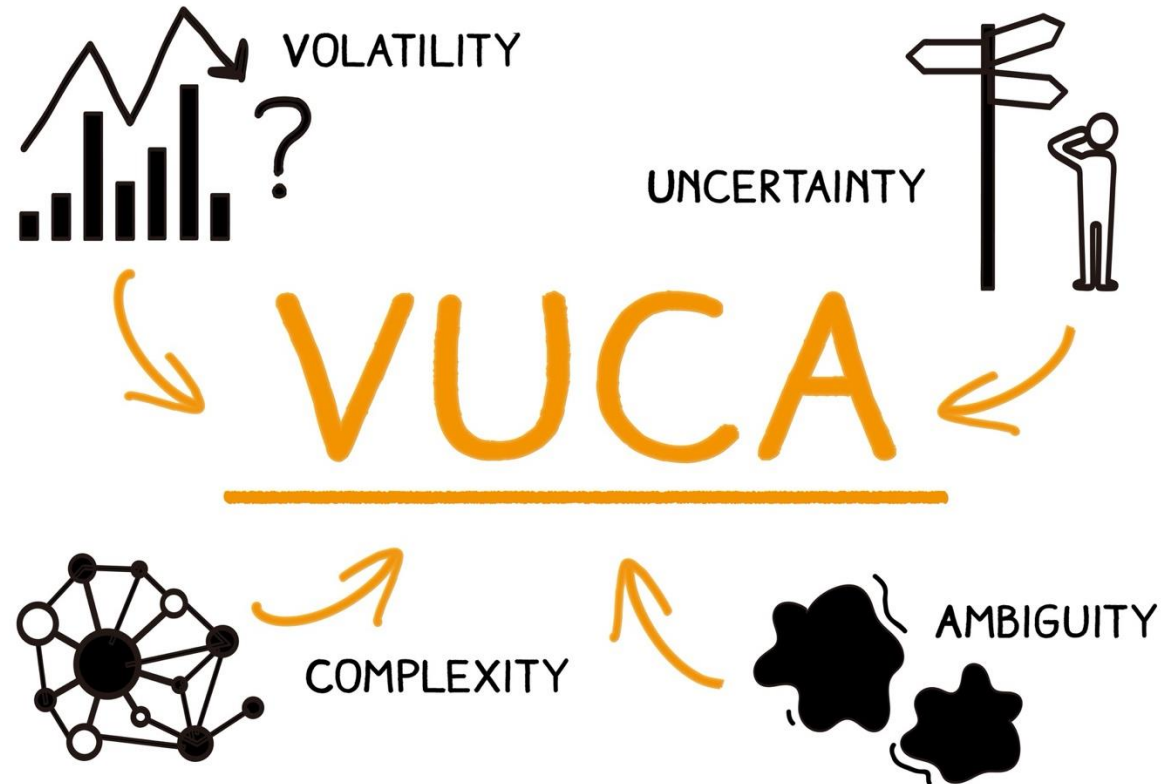
Search inside image

Species Select Location Select Complete Task

Kinsey Solve Game collection of tools | PSG Cracked

VUCA – Environment we are living in

Initially developed by the U.S. military, this concept has been widely adopted by businesses to navigate the unpredictable and dynamic nature of the 21st-century marketplace.



Strategy

What is strategy?

- "Strategy is the *direction* and *scope* of an organization over the *long-term*:
- Which achieves *advantage* for the organisation through its configuration of *resources* within a challenging *environment*,
- To meet the needs of *markets* and to fulfill *stakeholder* expectations".

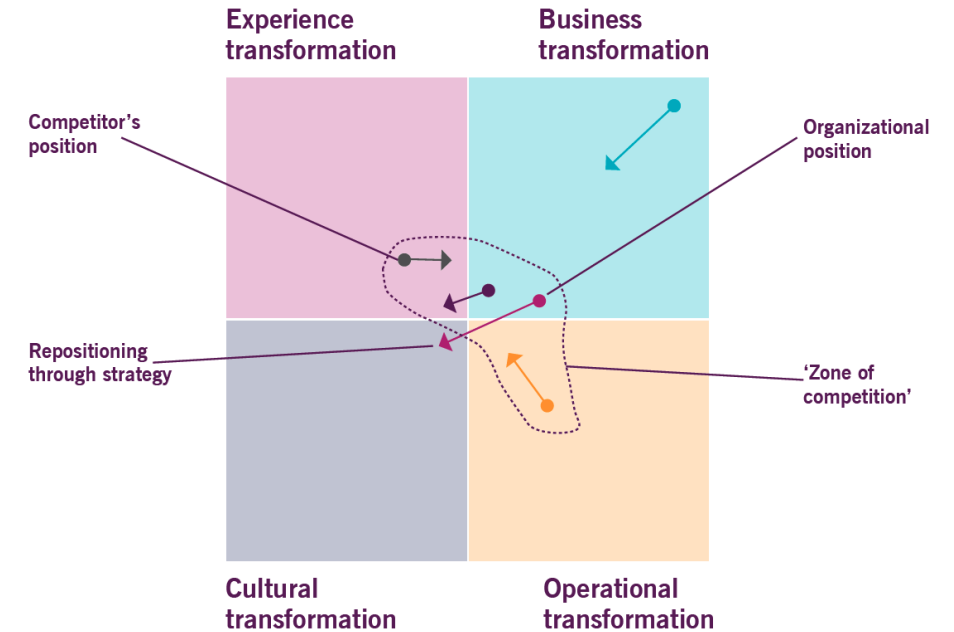


Figure 3.5 Positioning assessment framework focused on business, operational, cultural and experience transformation

What Risks you will Face

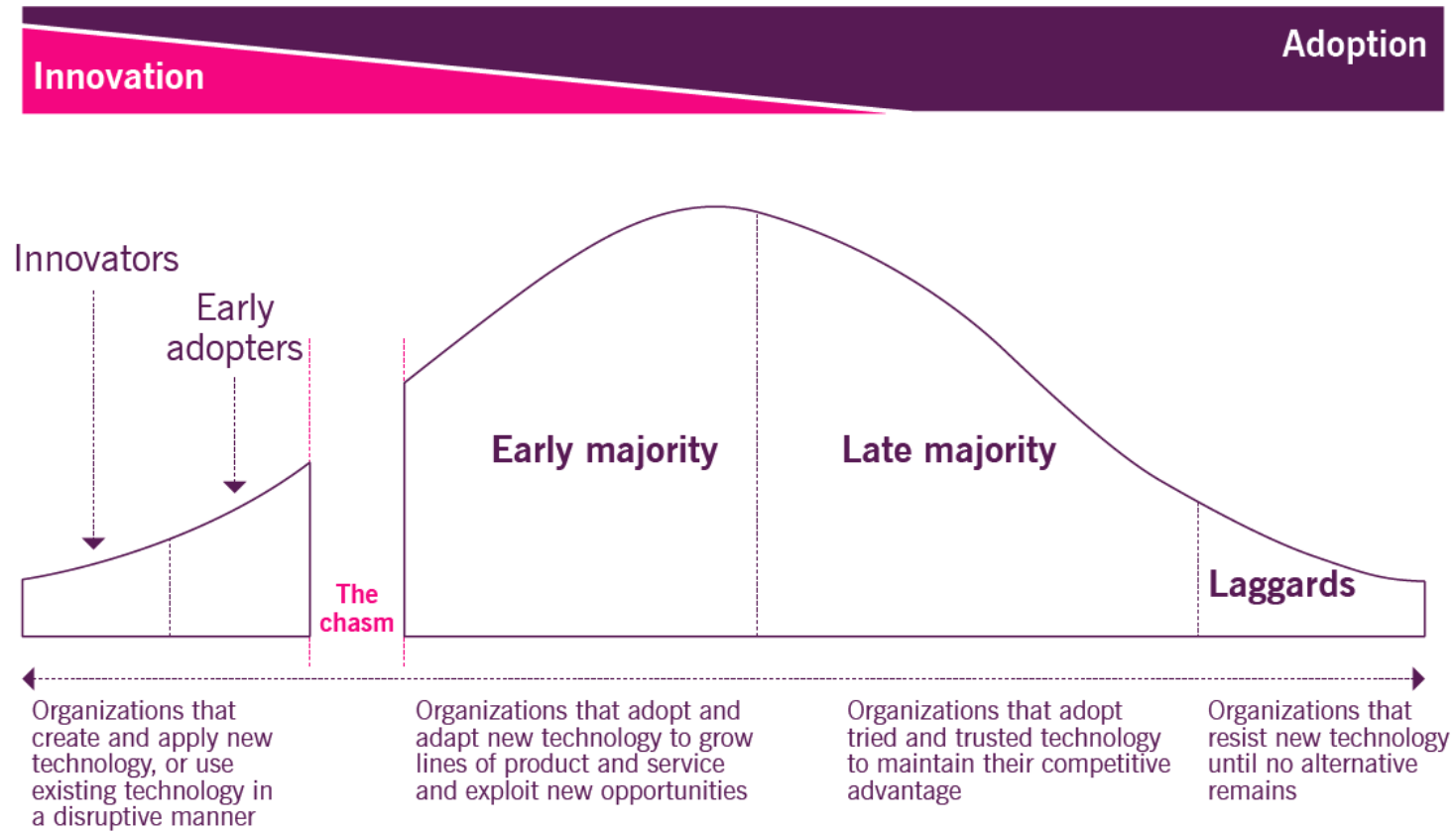


Figure 10.1 Technology adoption lifecycle

After Moore (2014)

Extenctions !



*Planning must address the following questions: what do I **intend to achieve** as a business, what direction do I want to **evolve** in and – above all – how will the tool help me give the business an **edge over competitors**?*

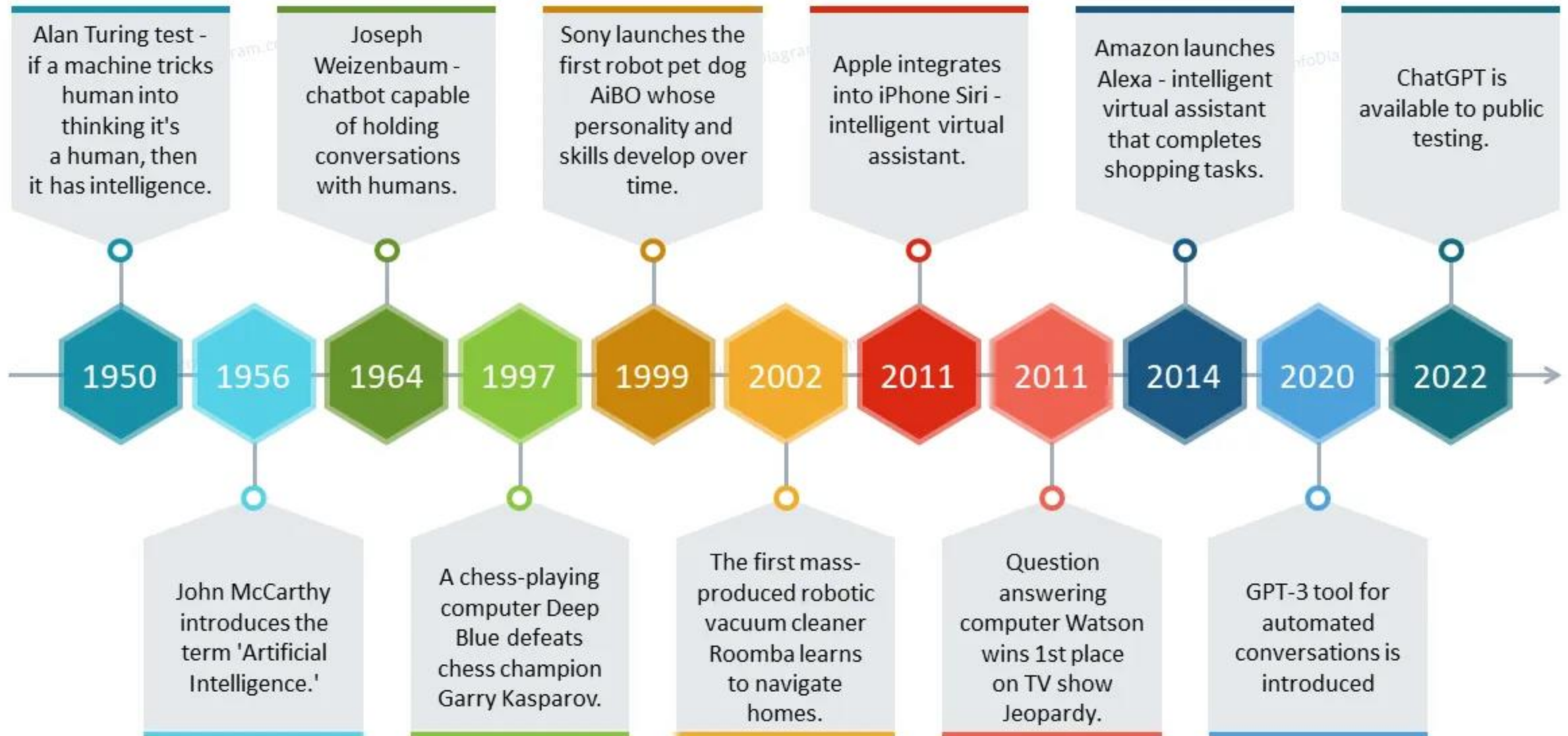
AI



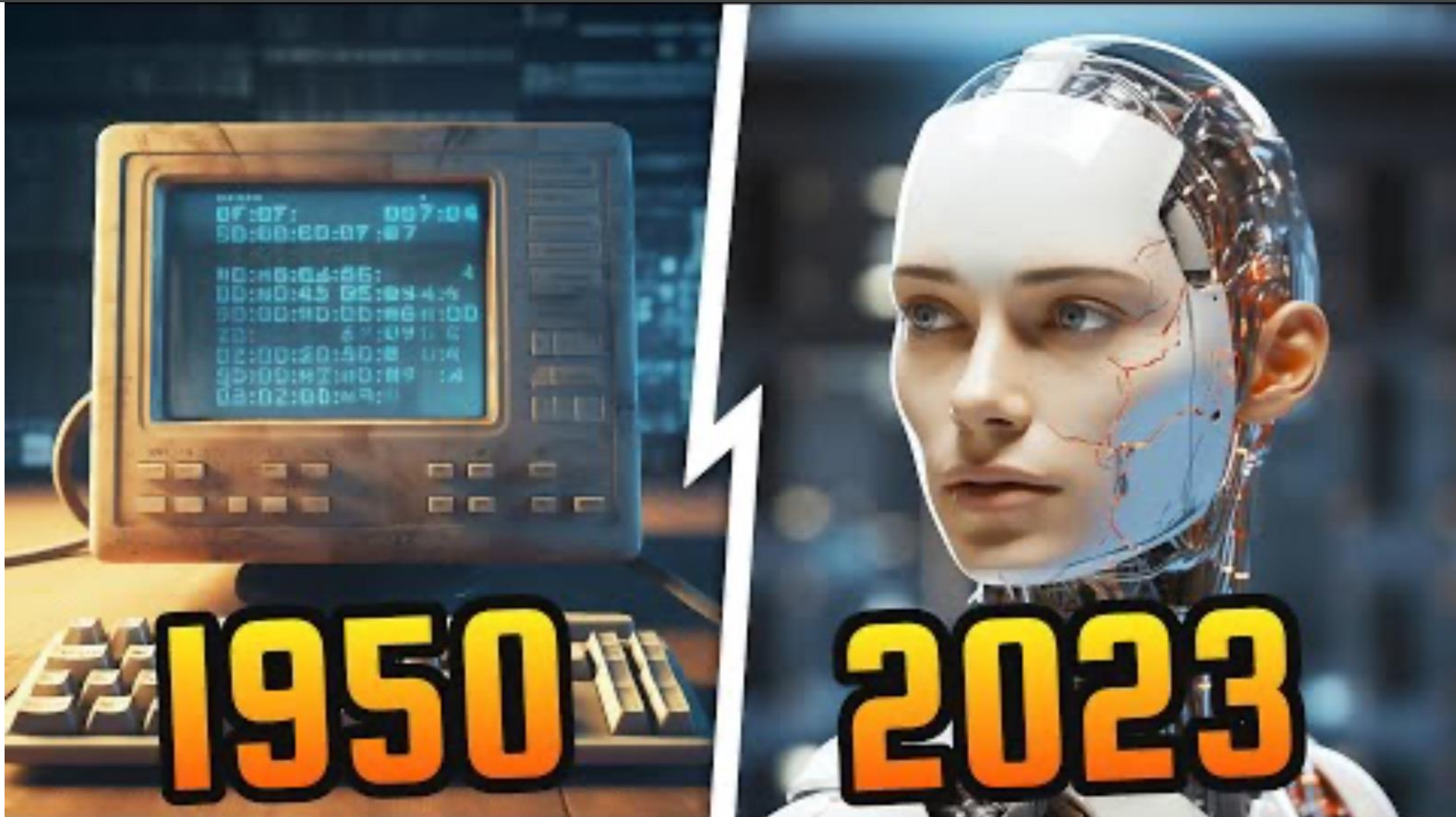


كيف سيغير الذكاء الصناعي مجتمعنا؟

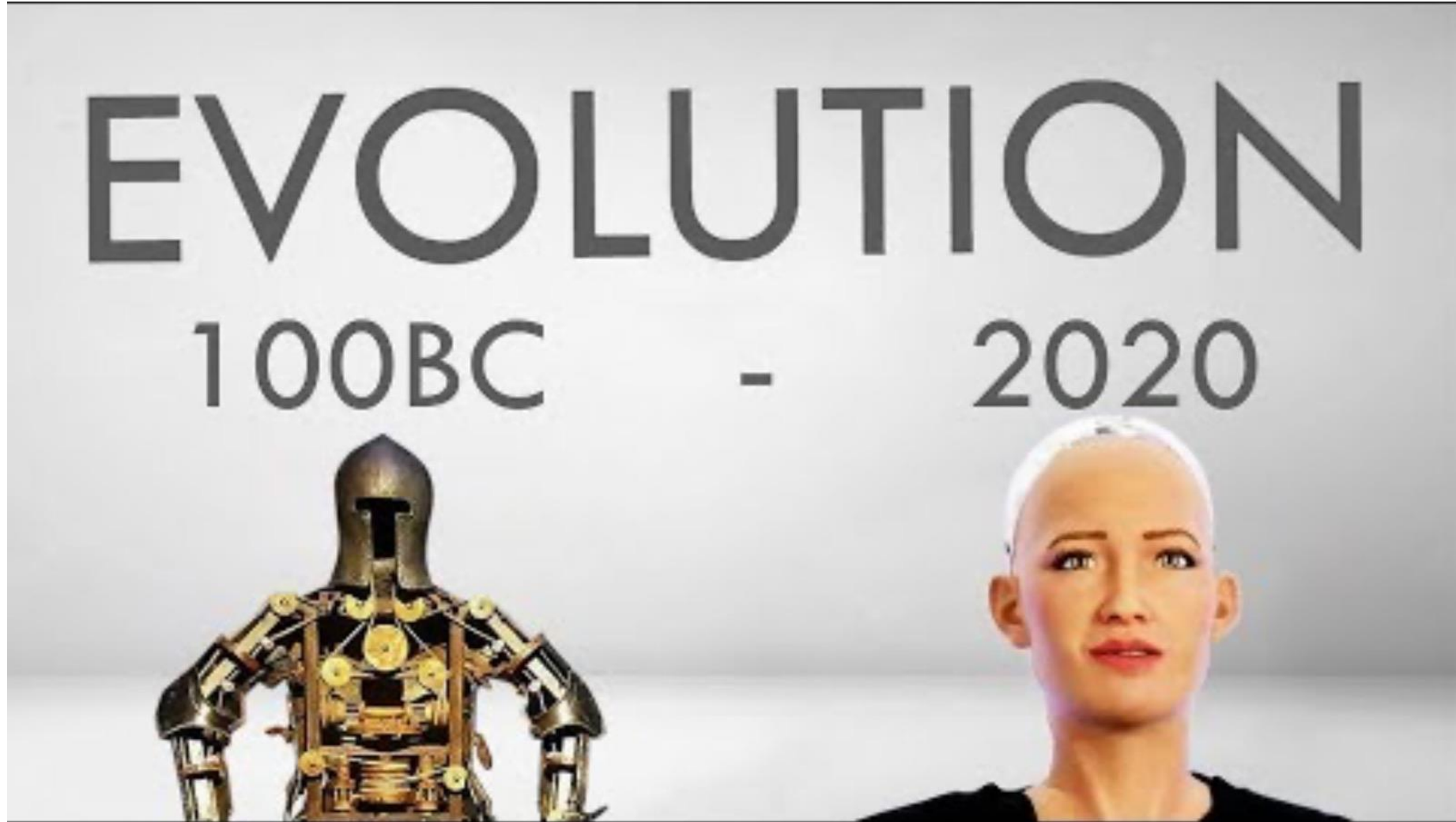
Artificial Intelligence Development History Timeline

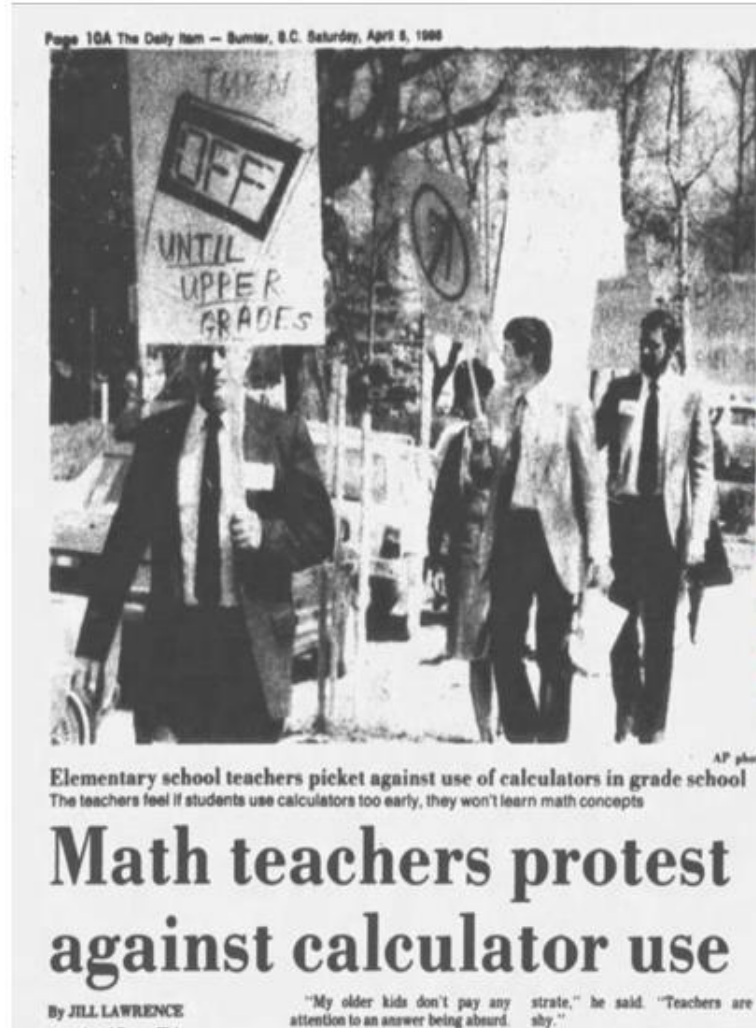


Evolution of AI



Robots Evolution | 100BC - 2020





ChatGPT banned in Italy over privacy concerns

By Shiona McCallum
Technology reporter

31 March 2023

Updated 1 April 2023



| OpenAI launched ChatGPT last November

Italy has become the first Western country to block advanced chatbot ChatGPT.

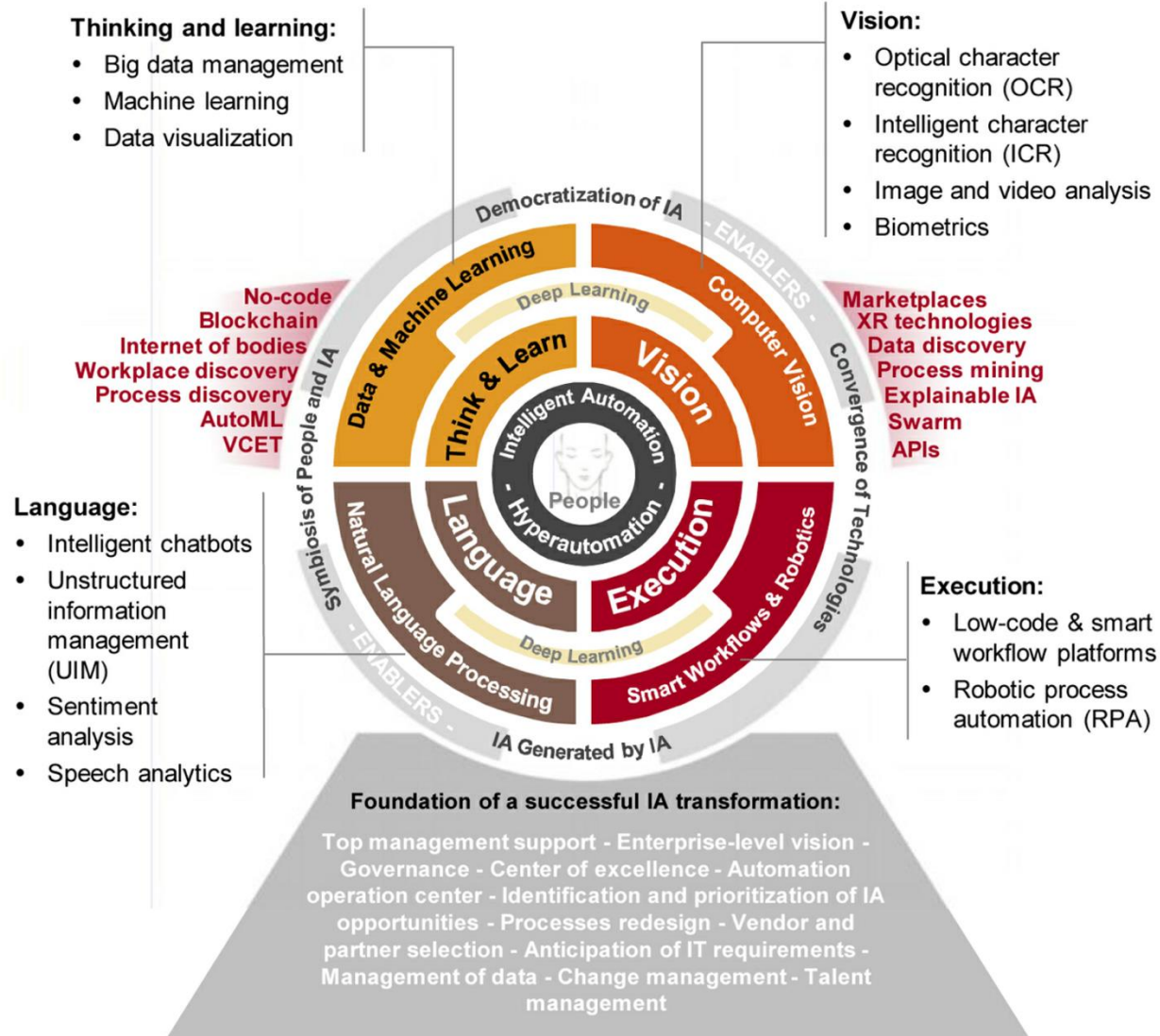
The Italian data-protection authority said there were privacy concerns relating to the model, which was created by US start-up OpenAI and is backed by Microsoft.

What is AI?

Views of AI fall into four categories:

Thinking humanly	Thinking rationally
Acting humanly	Acting rationally

The roadmap to a successful Intelligent Automation transformation

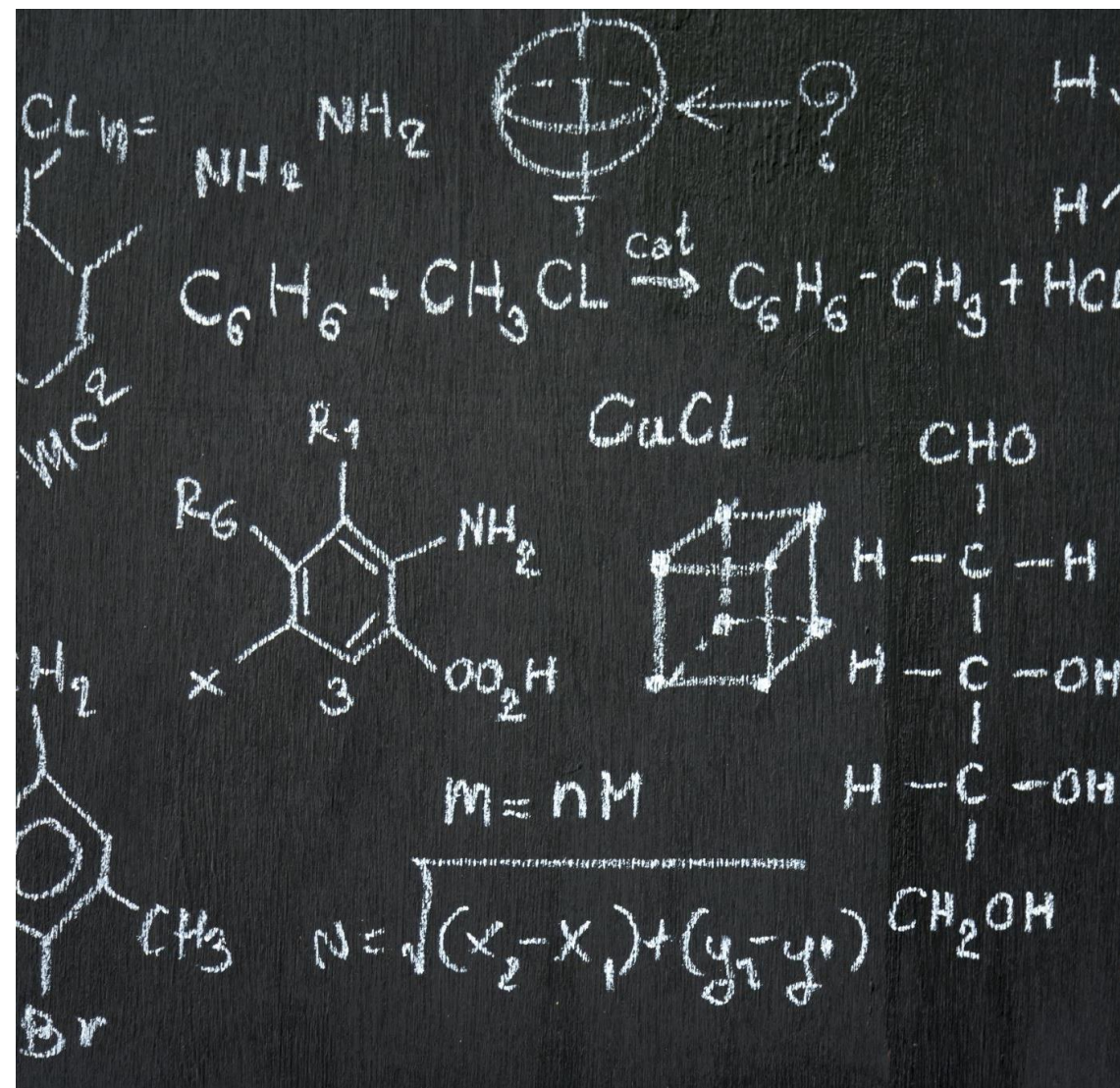


Patterns

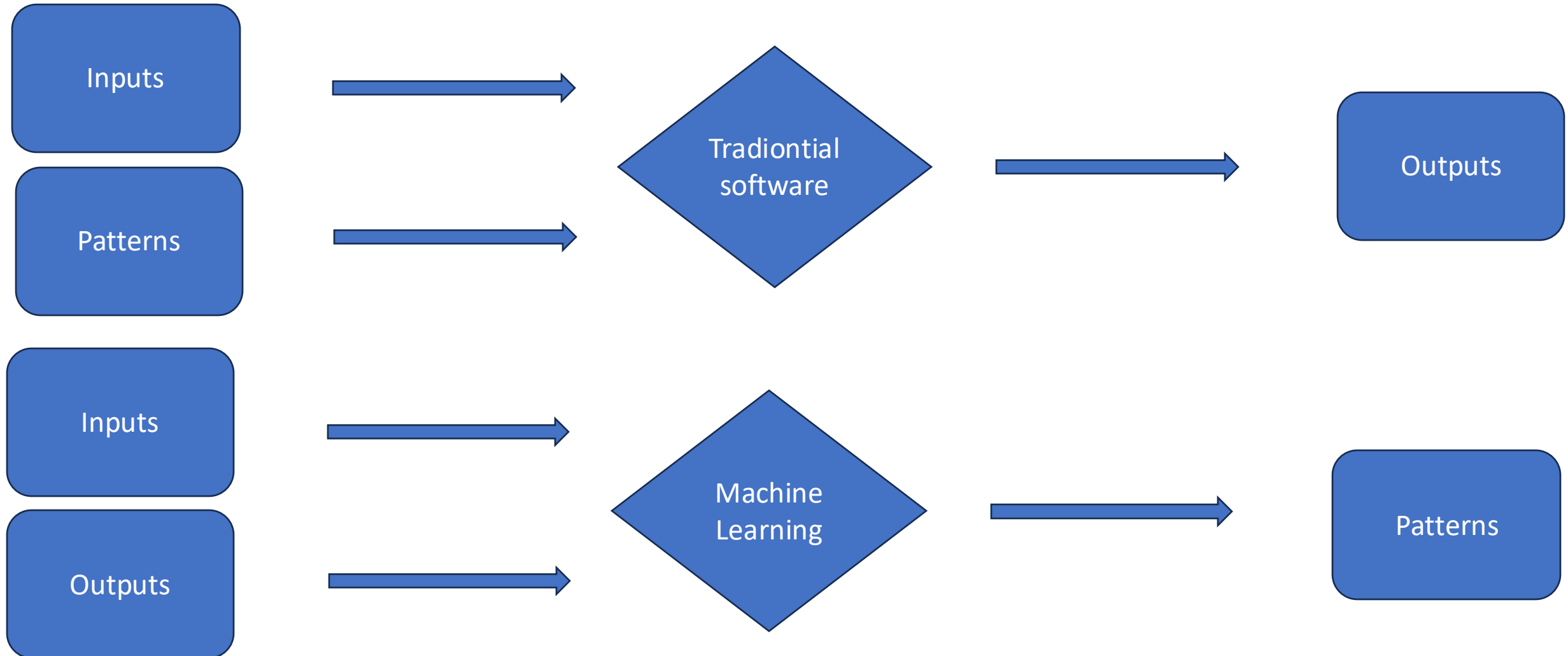
☆ □ ☆ □ ☆ □	☆ □
○ △ ○ △ ○ △	△ ○
↑ ↓ ↑ ↓ ↑ ↓	↑ ←
◇ ○ ◇ ○ ◇ ○	○ ◇
▮ ⊕ ▮ ⊕ ▮ ⊕	□ ▮

Machine Learning

- Machine Learning is an approach to
 - (1) learn
 - (2) complex patterns from
 - (3) existing data and use these patterns to make
 - (4) predictions on
 - (5) unseen data



ML Solutions learn patterns from inputs and outputs



AI applications are transforming every industry

Government



- Campaign Content and Planning
- Citizen Experience
- Public Security
- Policy Planning Support

Finance



- High Frequency Trading
- Risk Modeling
- Equity Research
- Asset Management
- Underwriting
- Investment Planning
- Security

Agriculture



- UAV / Satellite Crop Field Analysis
- Disease Recognition
- Comprehensive Strategic Crop Planning

Energy



- Strategic Oil Drilling
- Risk Minimization
- Geological Analysis
- Demand Prediction
- Adjustment of Resource Generation

Healthcare



- Personalized Healthcare
- Diagnostic Tools
- Integrated Wellness and Health Systems
- Behavior Tracking
- Security

Education



- Personalized Education
- Learning Content Indexing-to-Skill & Search
- Custom Teaching Methods
- Smart View Devices

Science



- Data Analysis and Experiments
- Predictive Modeling
- Theorem Proving
- Personalized Education
- Deductive Reasoning
- Experiment Planning

Business Solutions



- Interactive Chatbots that learn from experience with customers
- Regulatory Support
- Prediction
- Marketing



NVIDIA Corp
NASDAQ: NVDA

Summary

Chart

Financials

Analysis

Earnings

Compare

1D 5D 1M 3M YTD 1Y 3Y 5Y **Max** Line Indicators Financials Projection



Compare to



INTC
INTEL CORPO...
31.81
-9.40%



QCOM
QUALCOMM I...
165.84
+1.56%



AMD
ADVANCED MI...
157.18
+2.22%



AMBA
AMBARELLA INC
43.26
+2.26%



AVGO
Broadcom Inc.
1,340.48
+3.56%



GOOG
ALPHABET INC...
+ >

Saudi Arabia and UAE race to buy Nvidia chips to power AI ambitions

Gulf nations acquire thousands of GPUs amid global shortage of semiconductors needed to build large language models

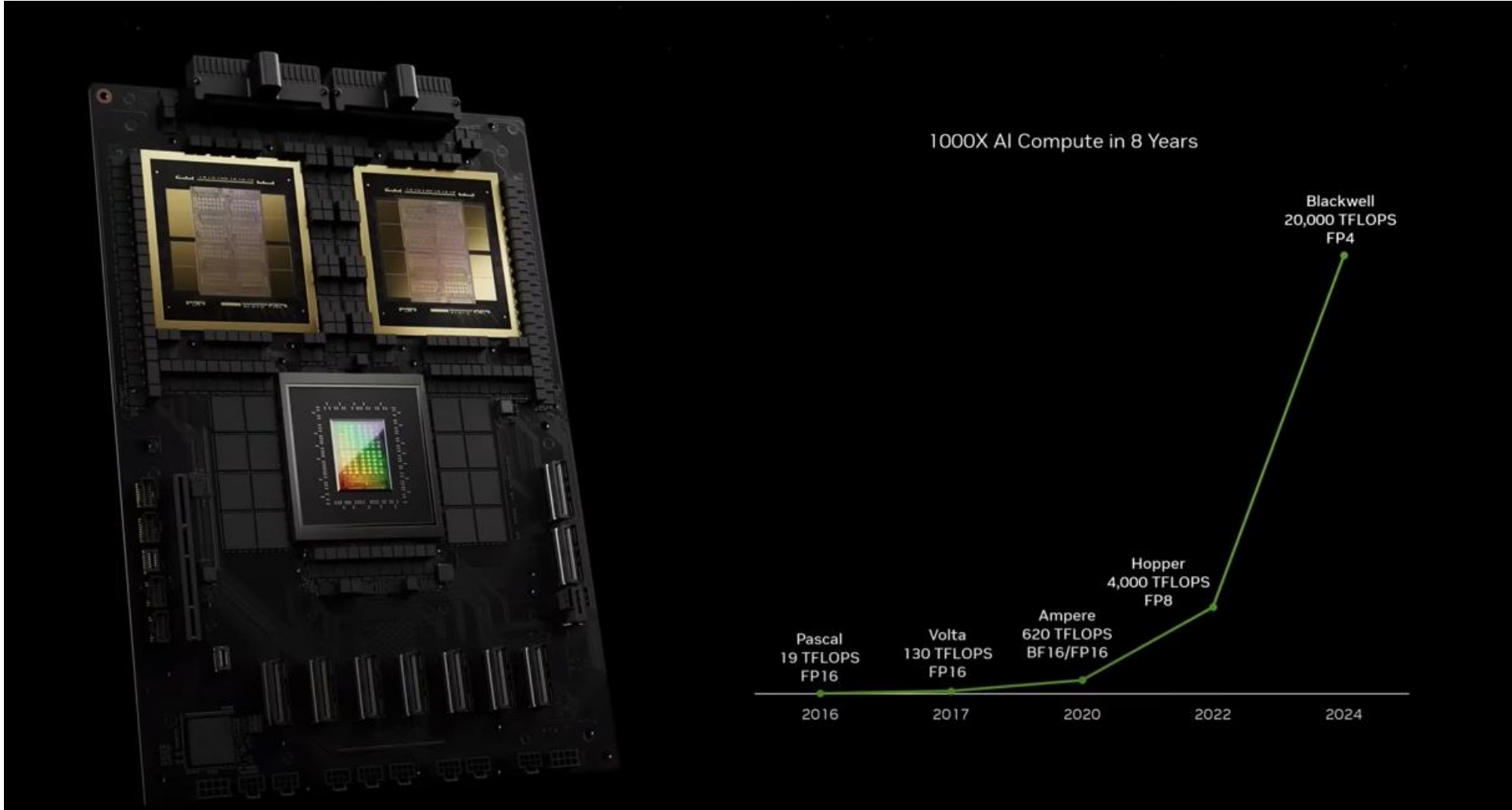


Saudi Arabian Crown Prince Mohammed bin Salman, left, and Nvidia chief Jensen Huang. The Gulf state's interest in AI has sparked concerns over the technology's potential misuse © FT montage/Bloomberg

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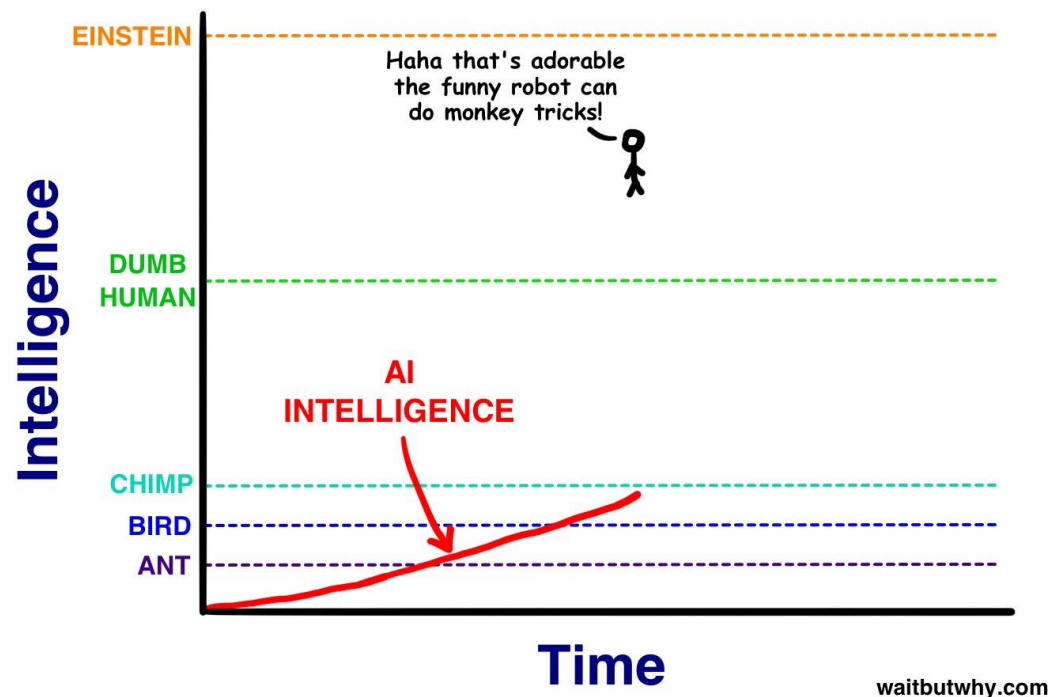
According to people familiar with the moves, Saudi Arabia has bought at least 3,000 of Nvidia's H100 chips — a \$40,000 processor described by Nvidia chief Jensen Huang as “the world's first computer [chip] designed for generative AI” — via the public research institution King Abdullah University of Science and Technology (Kaust).

\$120,000,000

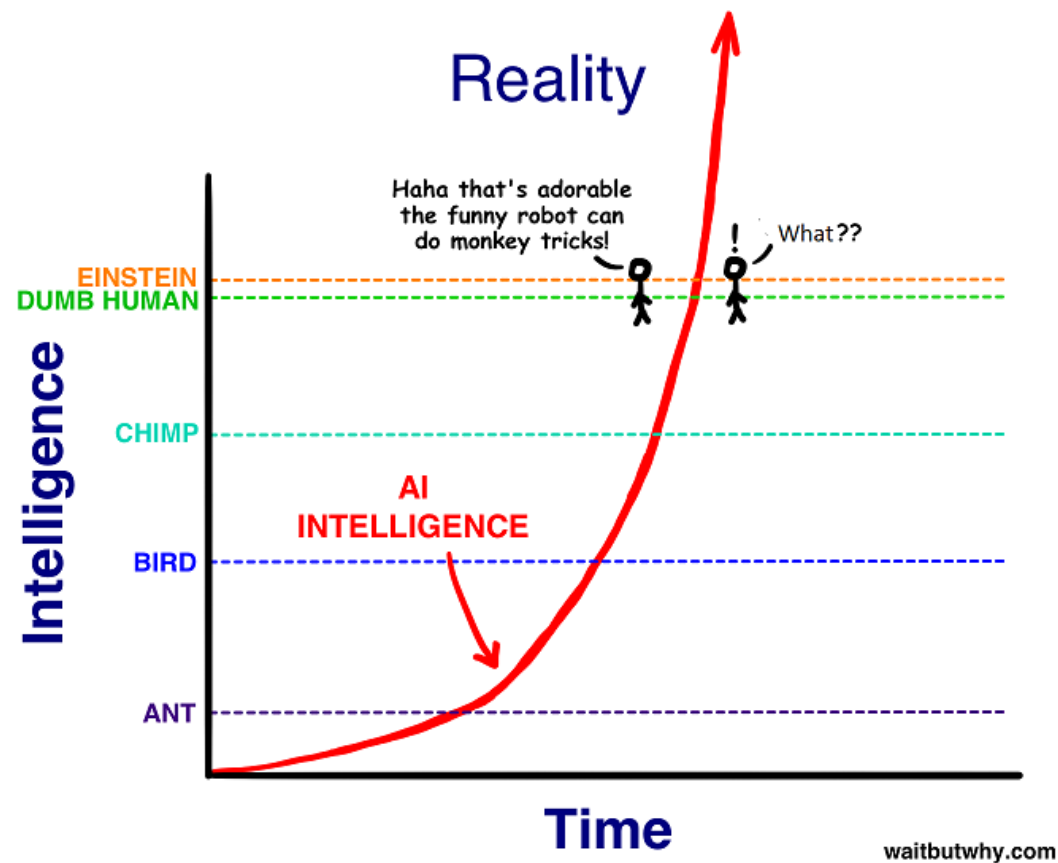


Exponential AI evolution

Our Distorted View of Intelligence

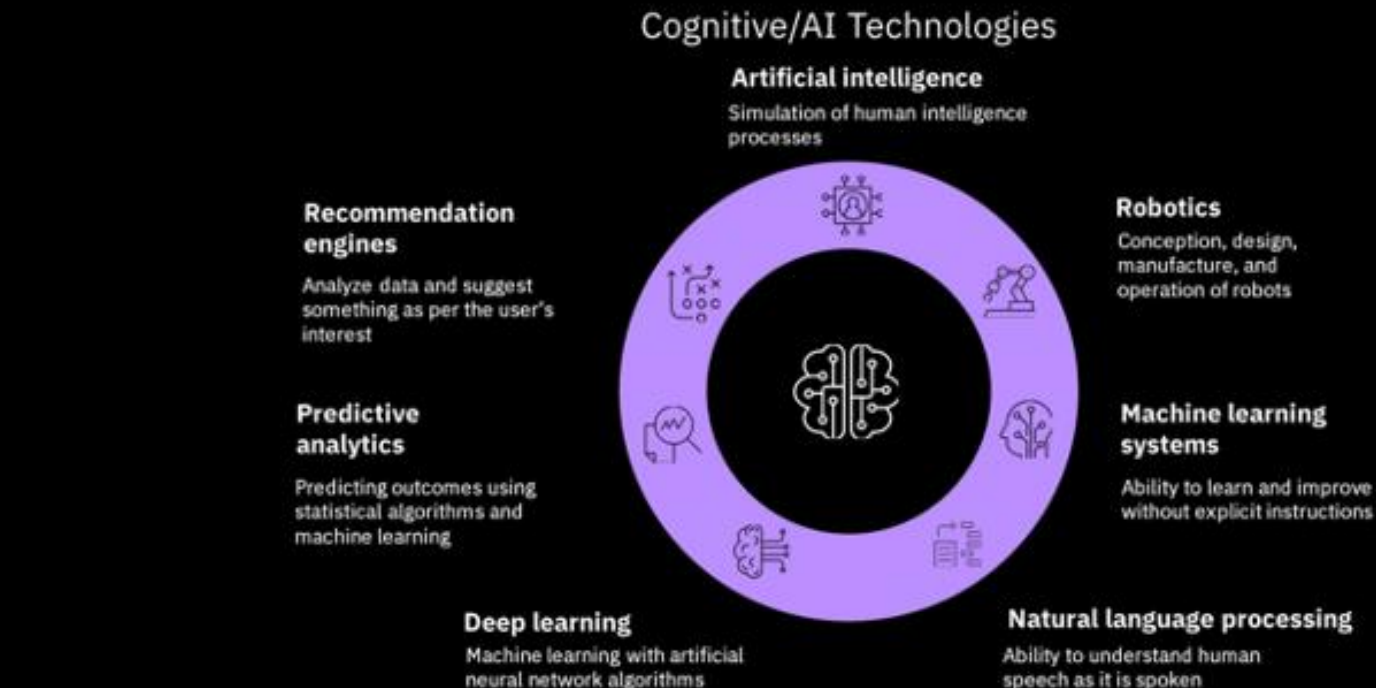


Reality



AI systems are underpinned by advanced technologies

AI systems are underpinned by advanced technologies

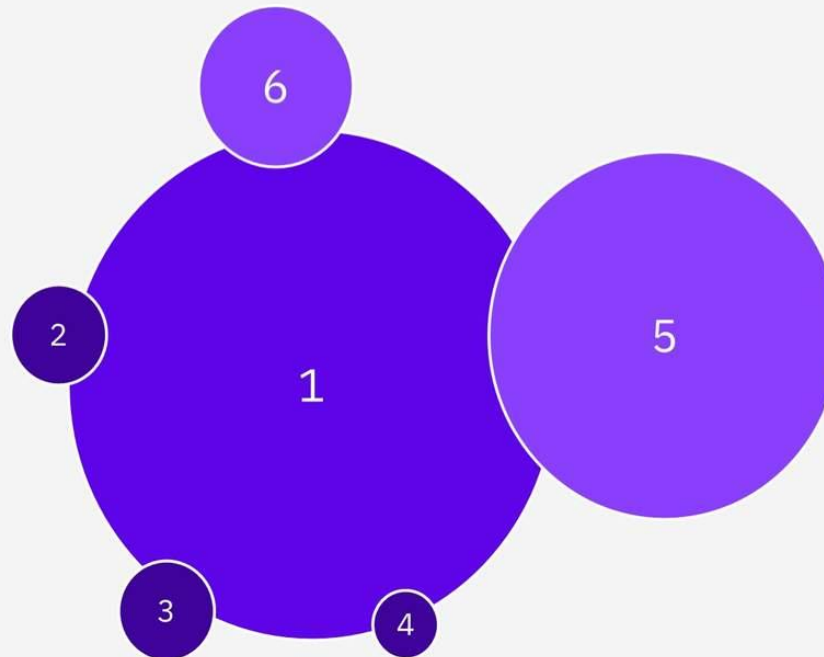


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Six key AI technologies transforming our world

1. Machine Learning
2. Autonomous Vehicles
3. Smart Robotics

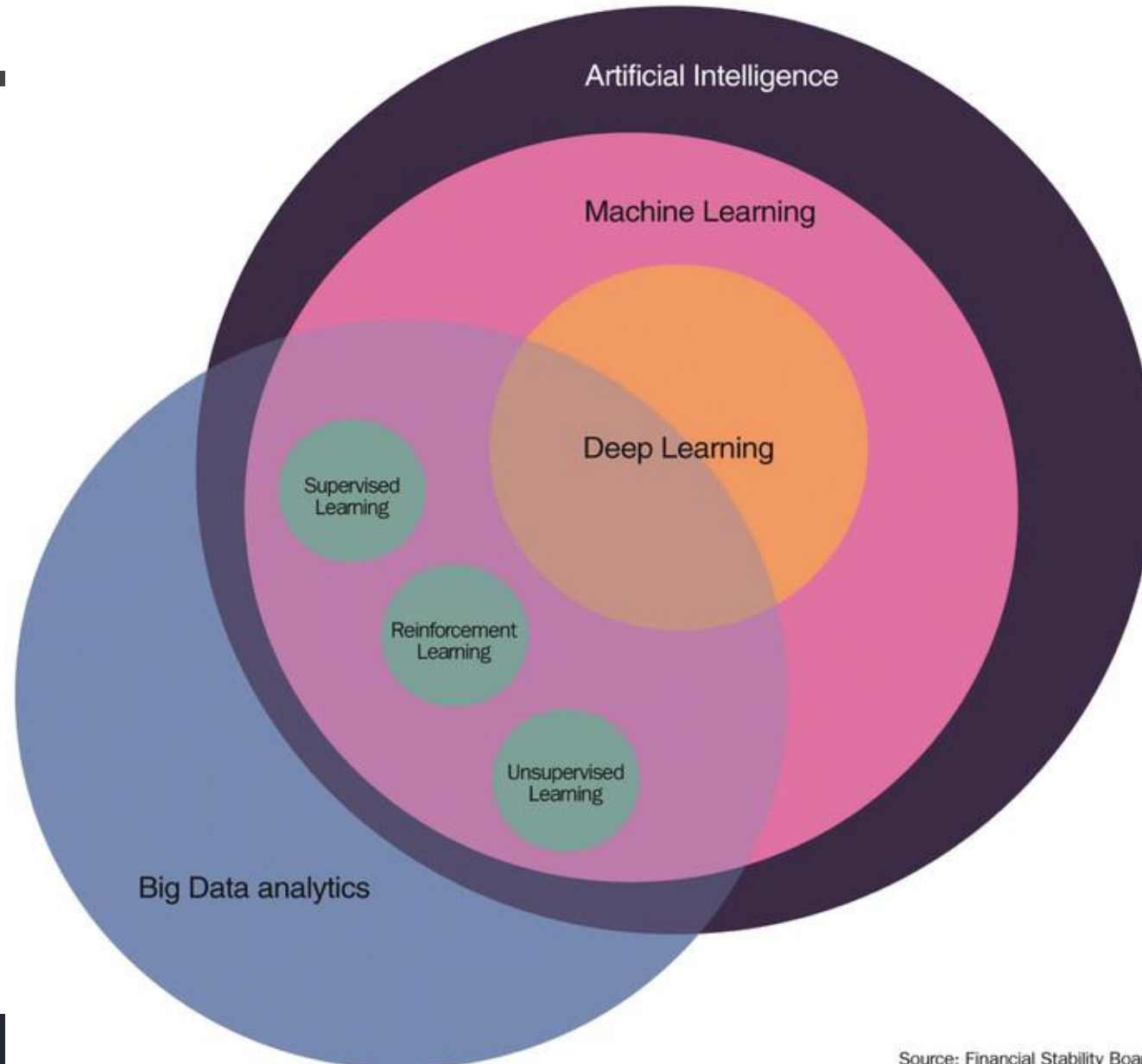
4. Virtual Agents
5. Computer Vision
6. Natural Language



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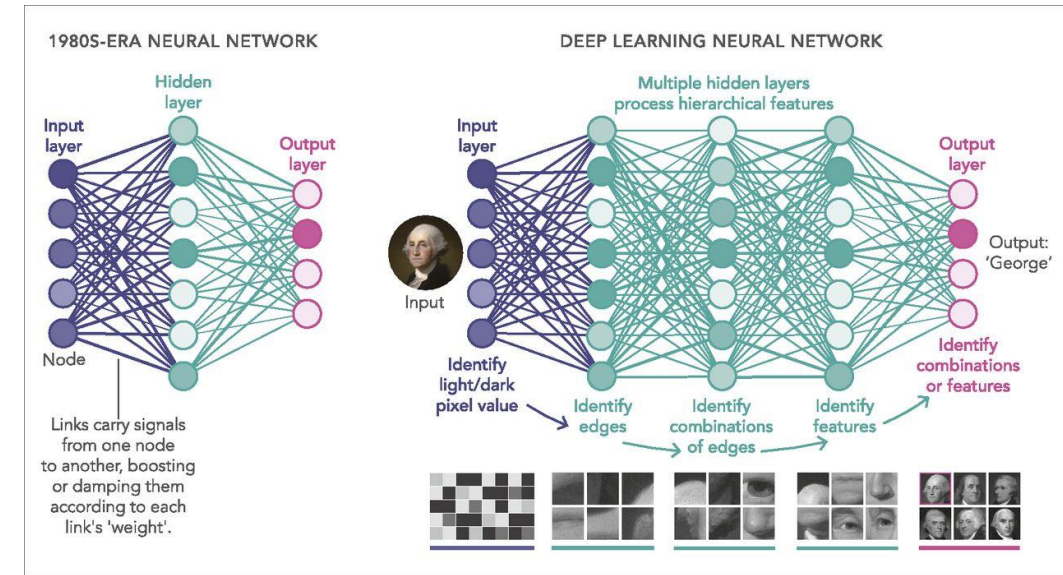
AI Deconstructed



Source: Financial Stability Board

Deep Learning

- **Deep learning** is a subset of **machine learning** that leverages **artificial neural networks (ANNs)** to learn from data. The term “deep” refers to the use of **multiple layers** within the network. Here are some key points about deep learning:
 1. **Representation Learning:** Deep learning methods focus on **extracting higher-level features** from raw input data. For instance, in image processing, lower layers might identify edges, while higher layers recognize more complex concepts like digits, letters, or faces.
 2. **Neural Networks:** Deep learning architectures include various types of neural networks:
 1. **Deep Neural Networks (DNNs):** These have multiple hidden layers and are commonly used for tasks like image recognition, natural language processing, and speech recognition.
 2. **Convolutional Neural Networks (CNNs):** Designed for image analysis, CNNs excel at tasks like object detection and classification.
 3. **Recurrent Neural Networks (RNNs):** Suitable for sequential data (e.g., time series or text), RNNs maintain an internal state to process sequences.
 4. **Transformers:** Widely used for natural language understanding and machine translation.





Reinforcement learning

- Reinforcement learning in formal terms is a method of machine learning wherein the software agent learns to perform certain actions in an environment which lead it to maximum reward. It does so by exploration and exploitation of knowledge it learns by repeated trials of maximizing the reward.
- **A robot learning to flip pan cakes**
 - <http://vimeo.com/13387420>
- **Humanoid robot learns archery skill**
 - <http://vimeo.com/15477149>
- **A robot learning to iron**
 - <http://vimeo.com/13360649>

Generative AI

- ChatGPT - OpenAI
 - [Sora](#)
 - Dall-e
- Gemini – Google
- [Meta Llama](#)

AI systems can go beyond knowledge, they understand, reason , learn and interact

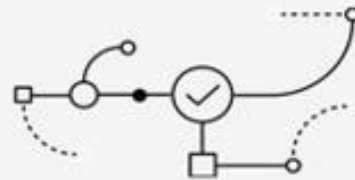
AI systems can go beyond knowledge, they understand, reason, learn, and interact

Understand



AI systems can understand unstructured information the same way humans do

Reason



They can reason, grasp underlying concepts, form hypotheses, and infer to extract ideas

Learn



Each data point, interaction and outcome helps to continuously sharpen expertise

Interact



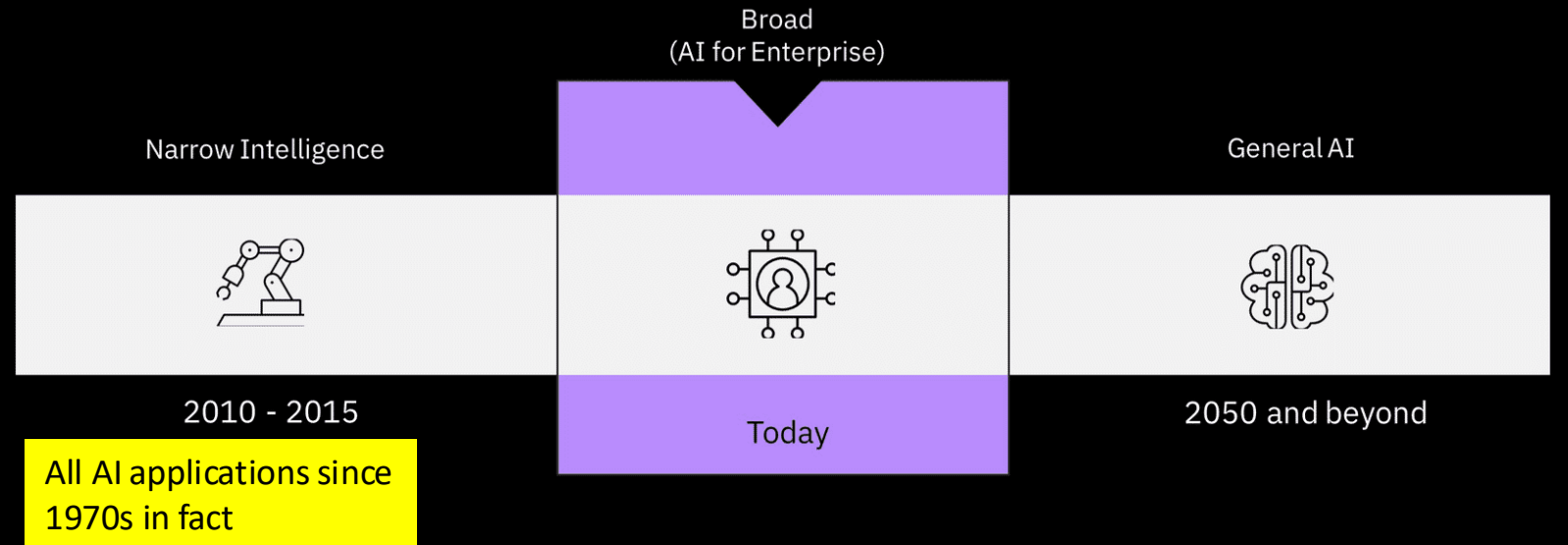
With the capabilities to see, talk, and hear, AI systems interact with humans naturally.

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Types of AI

- Narrow AI
- Broad AI
- General AI

Where are we today in AI?

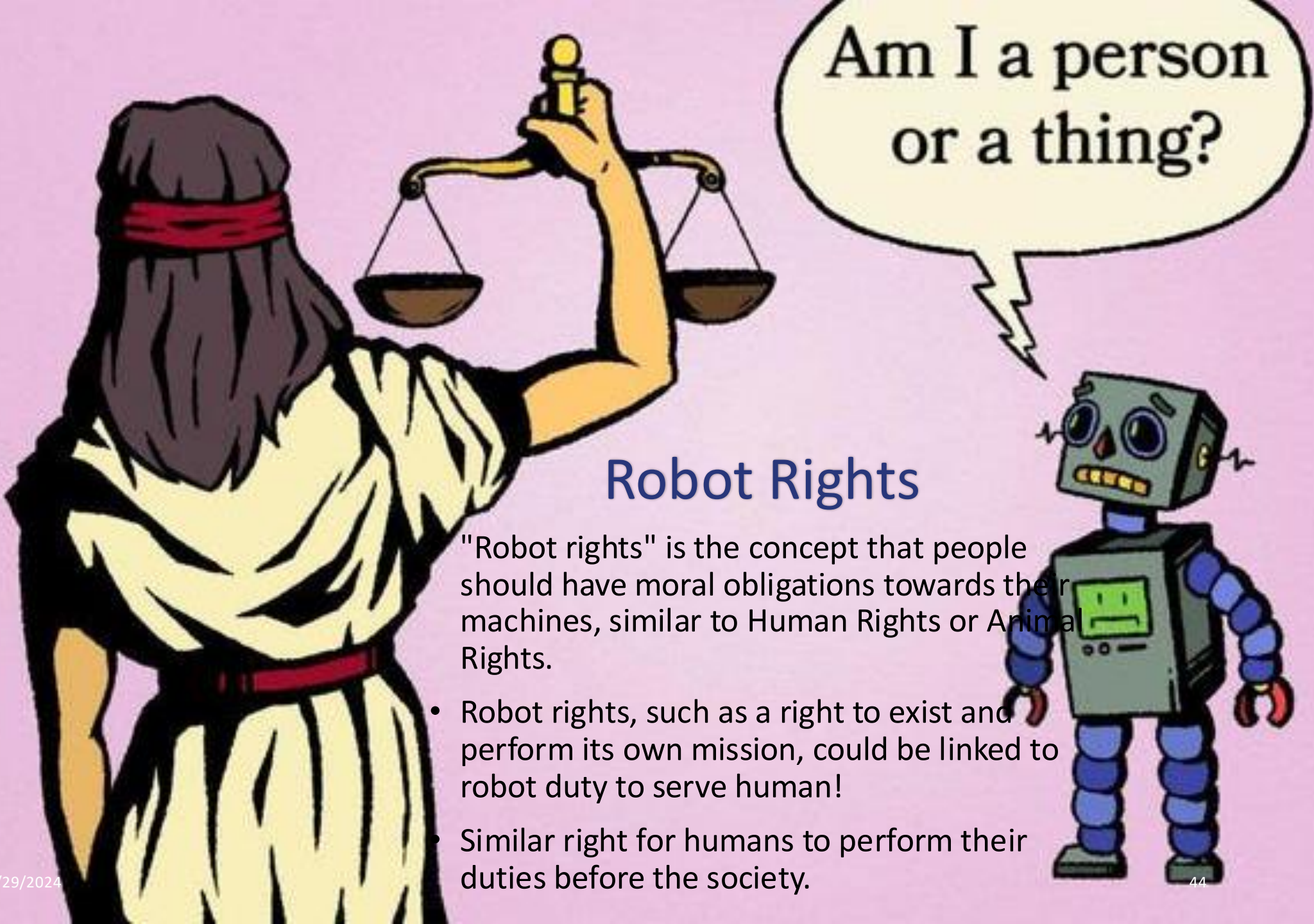


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ROBOT

- **Figure** <https://www.youtube.com/watch?v=Sq1QZB5baNw>
- **Optimus** <https://www.youtube.com/watch?v=cpraXaw7dyc>
- **New Atlas** https://www.youtube.com/watch?v=29ECwExc-_M
- **H1** https://www.youtube.com/watch?v=iwW2wnFs_b4



Am I a person
or a thing?

Robot Rights

"Robot rights" is the concept that people should have moral obligations towards their machines, similar to Human Rights or Animal Rights.

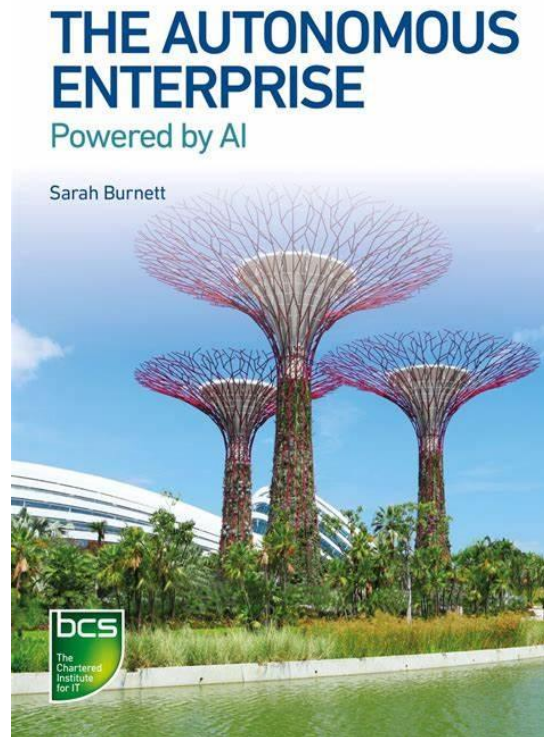
- Robot rights, such as a right to exist and perform its own mission, could be linked to robot duty to serve human!
- Similar right for humans to perform their duties before the society.

But where are the machines that these laws could be applied to?

- **Ray Kurzweil**, American inventor and futurist, sets the date at 2029.
- Softbank CEO **Masayoshi Son**, predicts that the dawn of super-intelligent machines will happen by 2047.
- Currently, humanoids like Sophia are only built as an experiment to see how far, we can push the science.



Autonomous Enterprise & Intelligent Automation



Self-optimizing business

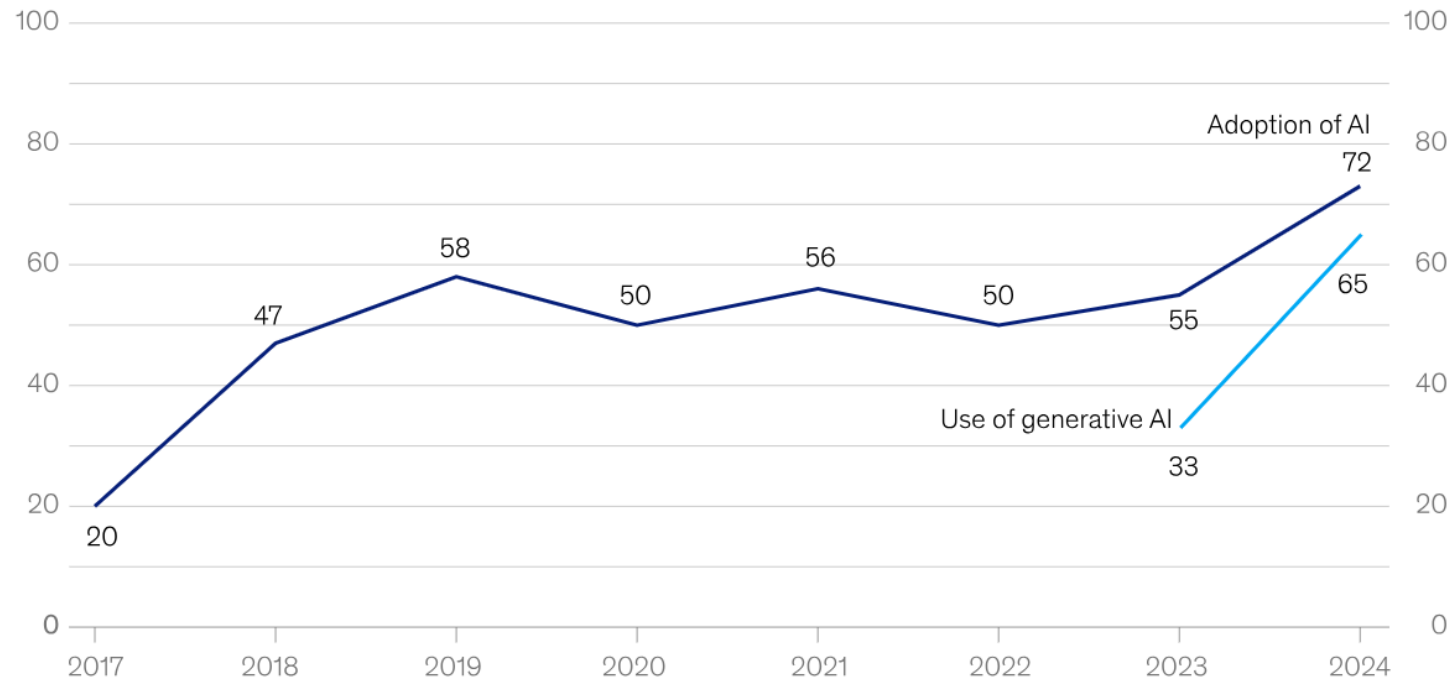


An autonomous enterprise is a **self-optimizing business that applies AI and automation to decisioning, operations, and servicing across the organization** ^{1 2 3}. It is able to **configure, monitor, and maintain itself independently, and learn and adapt to change** ⁴. It has the **talent, tech infrastructure, and governance to deliver the data that will drive success with minimal manual interventions** ⁵. It is a shift in mindset, changing the way people think about and approach technology ¹.

AI Market Analysis

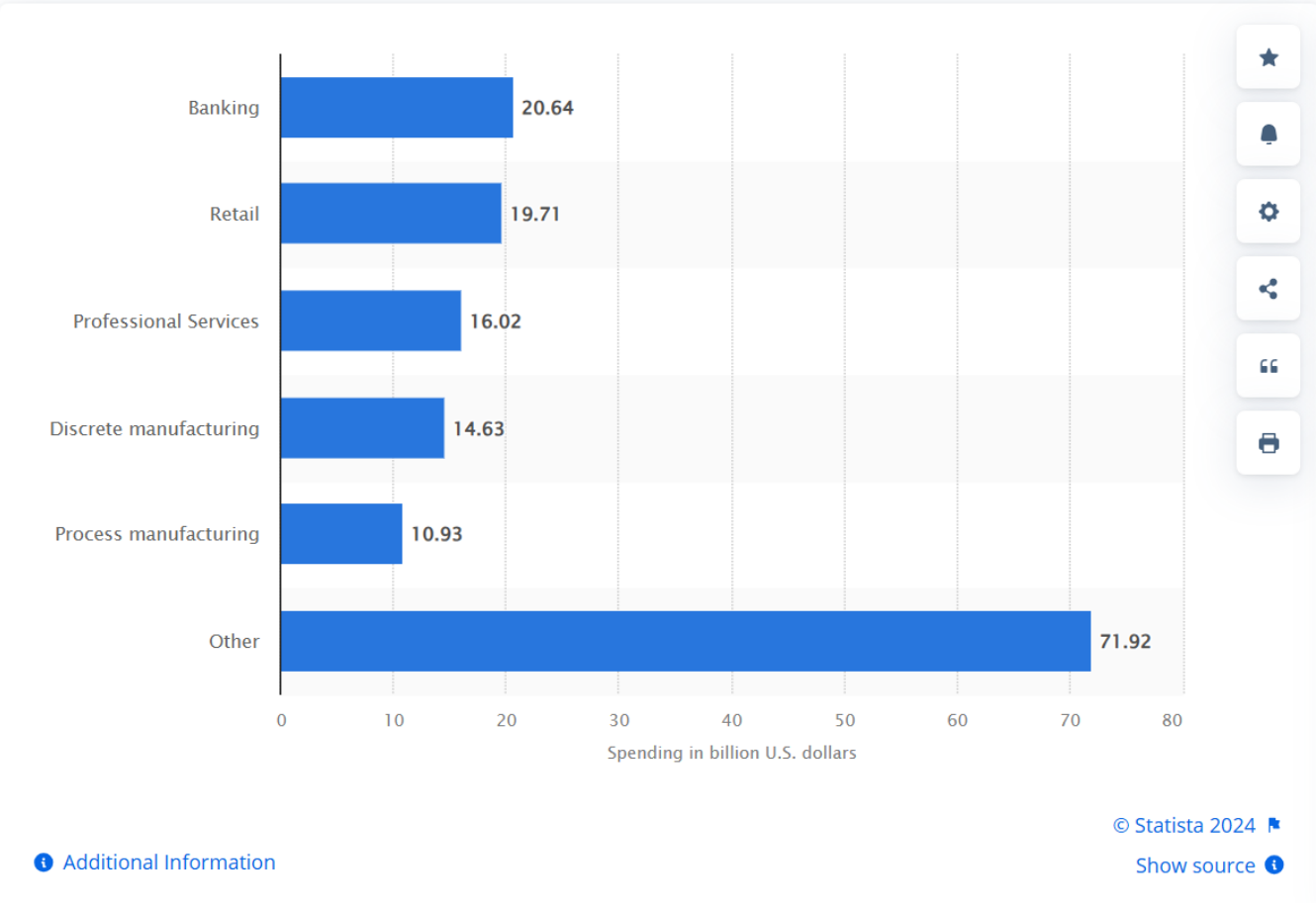
AI adoption worldwide has increased dramatically in the past year, after years of little meaningful change.

Organizations that have adopted AI in at least 1 business function,¹ % of respondents



¹In 2017, the definition for AI adoption was using AI in a core part of the organization's business or at scale. In 2018 and 2019, the definition was embedding at least 1 AI capability in business processes or products. Since 2020, the definition has been that the organization has adopted AI in at least 1 function. Source: McKinsey Global Survey on AI, 1,363 participants at all levels of the organization, Feb 22–Mar 5, 2024

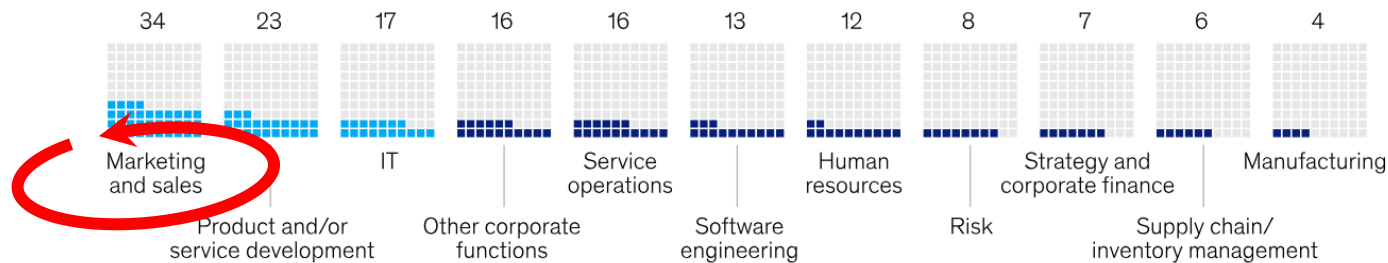
Estimated worldwide spending on artificial intelligence (AI)-centric systems in 2023, by industry (Billions)



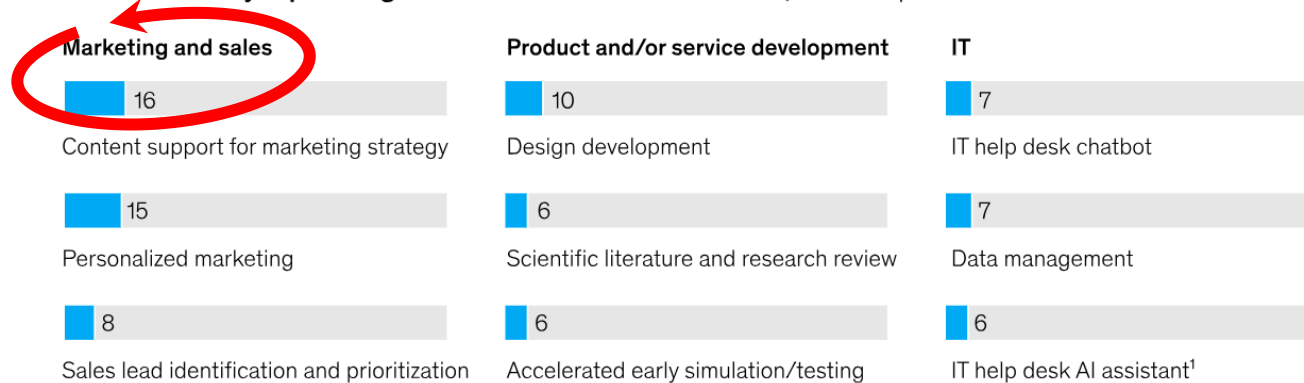
AI Adoption Market Analysis

Respondents most often report generative AI adoption in their marketing-and-sales, product- and service-development, and IT functions.

Respondents' organizations regularly using generative AI (gen AI), by function, % of respondents

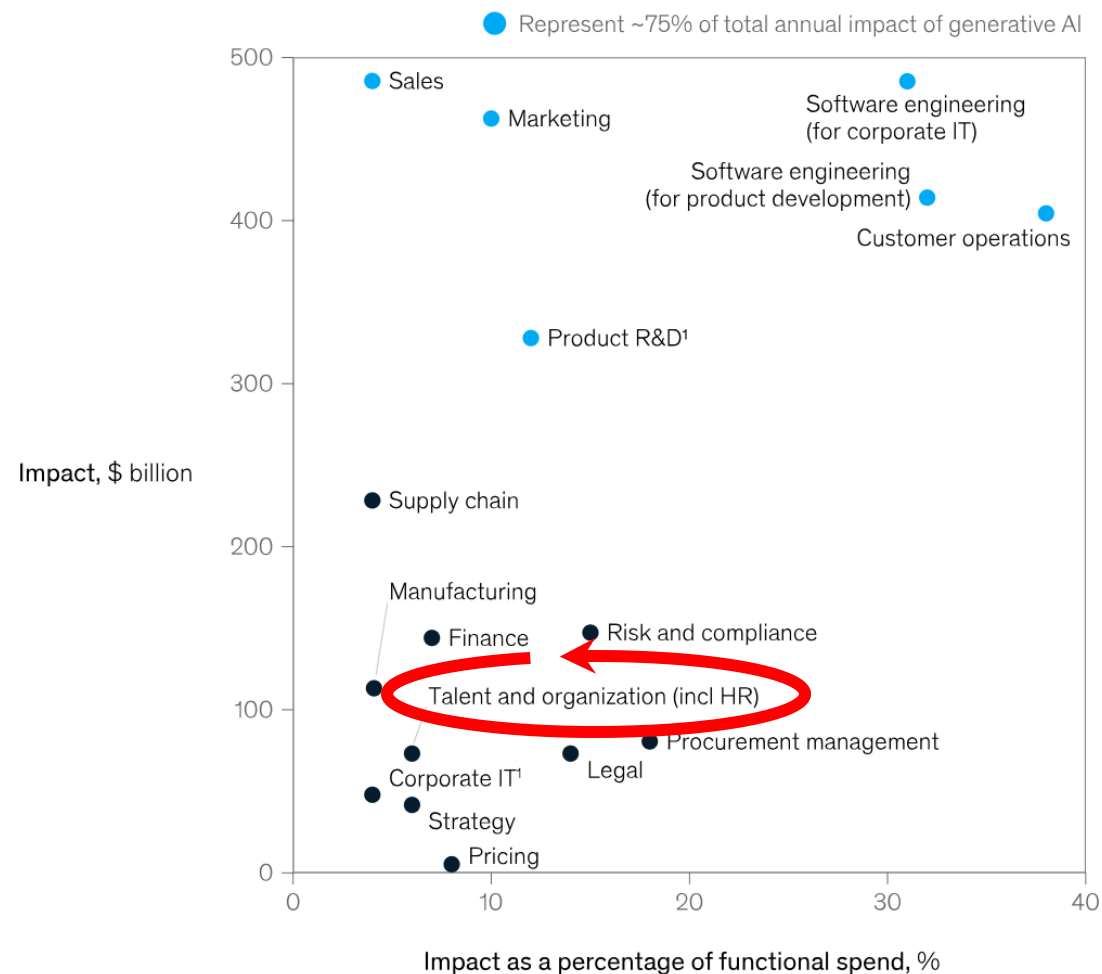


Most commonly reported gen AI use cases within function, % of respondents



¹Eg, providing real-time assistance and script suggestions to help desk employees during human-to-human conversations.
Source: McKinsey Global Survey on AI, 1,363 participants at all levels of the organization, Feb 22–Mar 5, 2024

Using generative AI in just a few functions could drive most of the technology's impact across potential corporate use cases.



Note: Impact is averaged.

¹Excluding software engineering.

Source: Comparative Industry Service (CIS), IHS Markit; Oxford Economics; McKinsey Corporate and Business Functions database; McKinsey Manufacturing and Supply Chain 360; McKinsey Sales Navigator; Ignite, a McKinsey database; McKinsey analysis

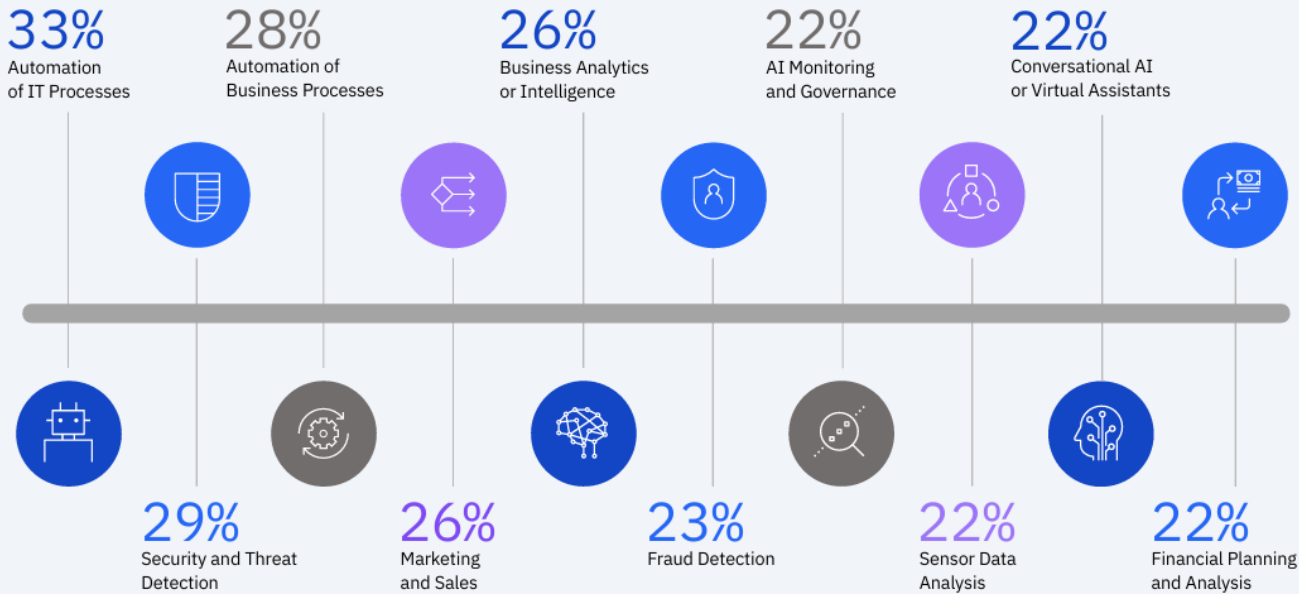
McKinsey & Company

What are the top ten factors driving AI adoption?

43%	Advancements in AI that make it more accessible
42%	Need to reduce costs and automate key processes
37%	Increasing amount of AI embedded into standard off-the-shelf business applications
31%	Competitive pressure
31%	Demands due to the COVID-19 pandemic
25%	Pressure from consumers
23%	Directives from leadership
22%	Company culture
22%	Labor or skills shortages
20%	Environmental pressures

How are companies planning to invest in AI over the next 12 months?

44%	Research and development
42%	Embedding AI into current applications and processes
39%	Reskilling and workforce development
32%	Building proprietary solutions
28%	Off-the-shelf AI solutions
26%	Off-the-shelf tools to build their own applications and models



How organizations are using AI today

Use cases

Organizations are applying AI in a wide variety of use cases today, with the most advanced adoption happening in areas like IT operations, security and threat detection and business process automation. Today, a third of companies are already using AI to automate their IT processes—AIOps—which helps them preserve application performance while also making resource allocation more efficient. Businesses are also applying AI techniques like natural language processing (NLP) to fields like marketing, sales and customer care.

A large proportion of companies interested in or deploying AI are looking to automate but what, exactly, they are trying to automate varies from sector to sector. Nearly half of companies that have applied AI-based automation have done so to drive greater IT efficiency, but they are also using automation to give time back to employees (49%) and address skills gaps. There are also large regional disparities with certain techniques like robotic process automation (RPA). For example, Chinese companies are nearly twice as likely to employ RPA as US firms.

Around 40% of larger companies are using AI to improve customer service agent productivity, create a more personalized experience for customers and employees, and streamline how customers and employees find information and resolve frequently asked questions.

Only 2% of Chinese companies aren't using AI in customer care, with the most common reasons being improved customer service agent productivity (61%), streamlining how employees and customers find information (55%) and personalization (54%). English-speaking countries—the US, the UK, Australia and Canada—are much more likely to say they aren't using AI for customer care (14%–18%).

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What types of automation software or tools are organizations very or somewhat interested in using?

80%	Integration of apps and data
78%	Network performance management
76%	Business process management (BPM)
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[GVAGA3JP \(ibm.com\)](https://www.ibm.com/gvaga3jp)

How are companies using or considering using NLP solutions?

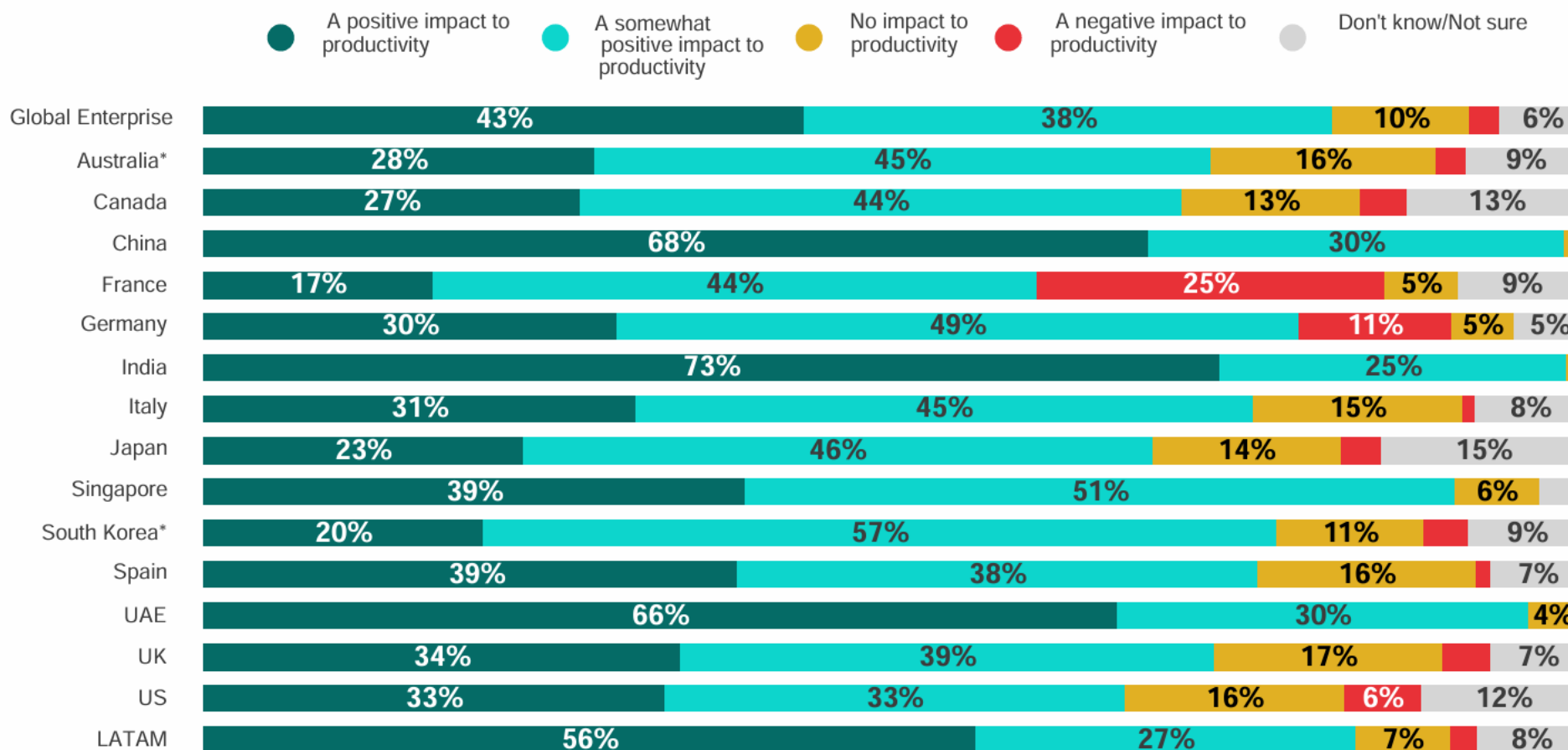
38%	Customer care
36%	Security
32%	Business development
30%	Sales
29%	Marketing
28%	Human resources or employee services
26%	Finance
25%	Supply chain or procurement
23%	Market research
20%	Corporate governance or ESG
18%	Legal or compliance

How are organizations using AI to improve customer and employee care?

36%	Improve customer service agent productivity
35%	Create more personalized experiences
34%	Streamline how customers and employees use it to find information
31%	Survey or feedback analysis
28%	Decrease call wait times
26%	More targeted or personalized advertising
25%	Email or text classification
25%	Identify new revenue streams or cross-sell or upsell opportunities
24%	Manage increasing call center volume
23%	Address labor or staffing shortages (for example, in contact centers)
16%	Sentiment analysis

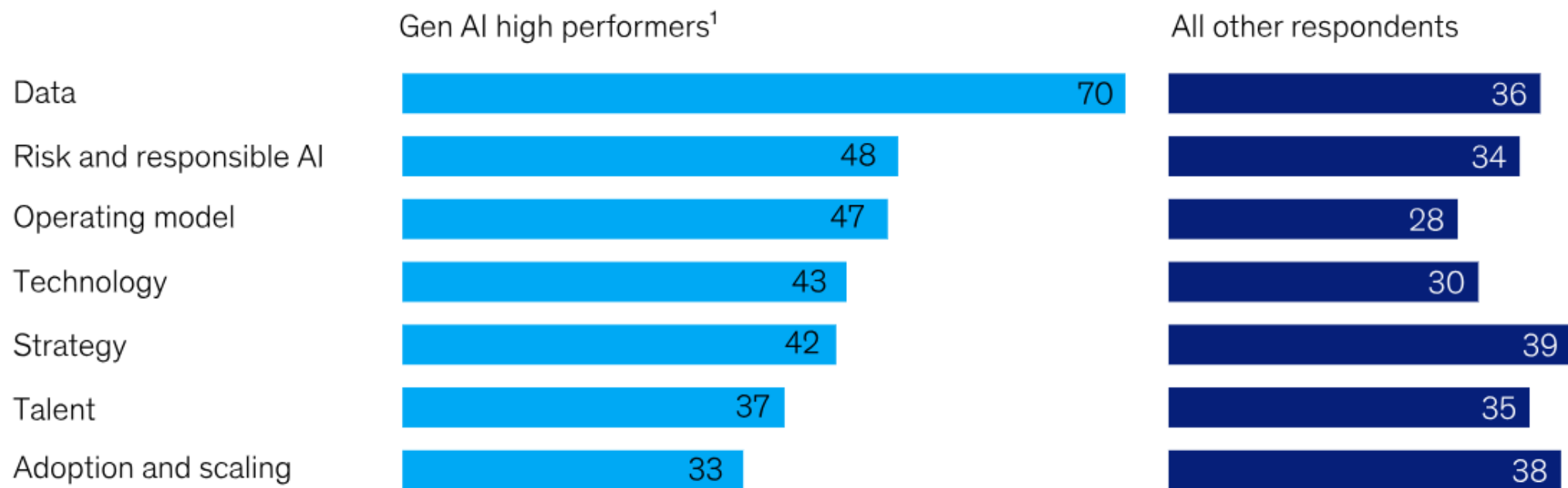
AI and automation investments have perceived positive impacts among a majority of IT Professionals at enterprises (81%).

How has investing in AI and automation impacted your employees' overall productivity? It has had...



Generative AI high performers report experiencing a range of challenges in capturing value from the technology.

Elements that have posed challenges in capturing value from generative AI (gen AI), % of respondents



Note: Figures do not sum to 100%, because respondents could choose multiple answer options.

¹Respondents who said that at least 11% of their organizations' EBIT in 2023 was attributable to their use of generative AI. For respondents at AI high performers, n = 46; for all other respondents, n = 830. Respondents who said "don't know/not applicable" are not shown.

Source: McKinsey Global Survey on AI, 1,363 participants at all levels of the organization, Feb 22–Mar 5, 2024

From one-stop shop to no-stop shop: An e-government stage model

Non-stop shop government model

- AI applications in government, particularly in the context of a non-stop shop government model, can play a transformative role, as outlined in the attached paper. In a “non-stop shop” model, the use of AI can facilitate proactive and predictive government services, minimizing or eliminating the need for citizens to fill out forms or trigger government services themselves. Below are key AI applications in this context:

Non-stop shop government model

- **1. Data Collection and Management:** AI can be utilized to collect and manage data from various sources automatically, minimizing the need for citizens to provide the same information multiple times. Through data integration and AI algorithms, governments can gather information from pre-existing databases, making service delivery smoother and less redundant. The use of AI can help facilitate seamless data integration across departments, which is a critical component in transitioning from one-stop to no-stop shop government models .
- **2. Proactive Service Delivery:** AI can help governments transition from reactive to proactive service delivery by predicting citizen needs based on life events or other key data points. For instance, AI can analyze data and automatically initiate services, such as issuing visas, renewing identity documents, or offering financial aid when the system predicts a citizen will need them, without requiring a formal request .
- **3. Personalization and Recommender Systems:** AI-powered recommendation engines can personalize the citizen experience, tailoring government services to the individual based on their data and past interactions. AI could suggest or automatically provide services relevant to a citizen's current life event, whether it's related to education, health, or legal documentation .
- **4. Predictive Analytics:** AI-driven predictive models can foresee future citizen needs and initiate services before a life event occurs. For example, a predictive system could automatically send a new passport before the current one expires or predict the need for social services based on employment data .
- **5. Fraud Detection and Security:** In the backdrop of fully integrated government services, AI can be used to monitor and detect fraudulent activity across databases. This enhances security as sensitive citizen data is shared across departments. AI algorithms can detect anomalies that may indicate misuse of government services .

Austria - Family Allowances

Citizens had to manually apply for family allowances by filling out forms.



Data from hospitals is shared directly with the government, and allowances are processed automatically.



Automatic processing of family allowances when a child is born, with no citizen action required.

Australia - Service Redesign



Citizens submitted manual requests for services.

Redesign of forms and data integration efforts to provide proactive services without citizen-initiated requests.

Integrated systems automatically provide services based on data, reducing the need for manual requests.

Slovakia - Service-Centric Model

- Citizens had to actively search for government services.
- A model for transforming government services to focus on citizen needs and creating service-centered and proactive e-government models.
- After AI/Proactive Services: The government now anticipates citizen needs and delivers services accordingly, without requiring citizen requests.

Maliu, China - Public Service Delivery

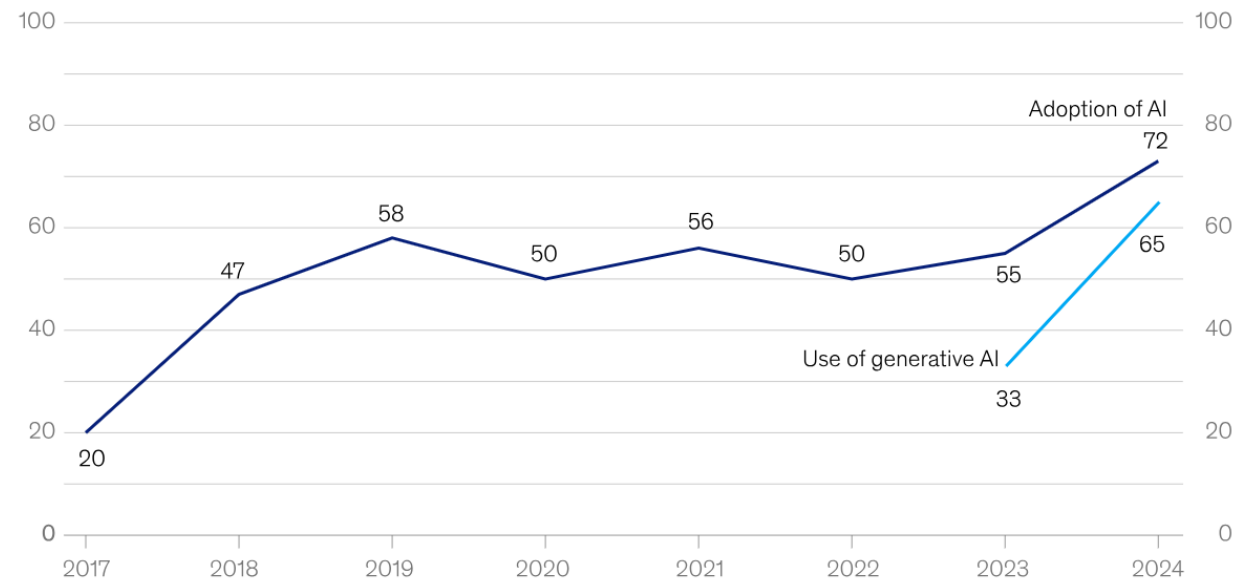
- Government services were reactive, and citizens needed to submit formal requests for assistance.
- Establishing a service-oriented government focusing on public service delivery and proactively addressing community needs.
- After AI/Proactive Services: Services are provided proactively, with the government addressing community needs before formal requests are made.

External Analysis

AI Market Analysis

AI adoption worldwide has increased dramatically in the past year, after years of little meaningful change.

Organizations that have adopted AI in at least 1 business function,¹ % of respondents



¹In 2017, the definition for AI adoption was using AI in a core part of the organization's business or at scale. In 2018 and 2019, the definition was embedding at least 1 AI capability in business processes or products. Since 2020, the definition has been that the organization has adopted AI in at least 1 function.
Source: McKinsey Global Survey on AI, 1,363 participants at all levels of the organization, Feb 22–Mar 5, 2024

McKinsey & Company

ML & AI Use Cases

The below showcases the ML & AI use cases.

Finance

Investment Prediction

Revenue Forecasting

Loan & process Automation

Robo Advisors

Fraud detection

Risk & ROI quantification

Trading & Crypto (Dimtech)

Retail

Predicting Customer Behavior

Visual Search

Voice Search

Video Search

Virtual Assistants & Chatbots

Price & Inventory Prediction

Price Elasticity of Demand &
Price Optimization

Supply Planning

Association Rule & Market Basket Analysis

Marketing

RFM Analysis

Customer segmentation

Customer Lifetime Value

Churn Analysis

Recommender System & Personalization

A/B Testing for better Marketing Strategy

Media Mix Modeling

HR

Documents Intelligence

Job-to-Resume matching

HR Bot

Knowledge Mining

IOT

Computer Vision

Predictive Maintenance

Digital Twins

Metrics Advisor

Healthcare

Extract Health Information

Text Analytics for Healthcare

Automating Administrative Tasks

Charity

Knowledge Mining

Knowledge Graph Building

AI Assistant

Domains of Artificial Intelligent

Gen AI

GPT 4 – Advanced Cognitive capabilities
GPT 4o– Text & Image as Input/Output

GPT 3 – Summarization, translation,
Category Recognition (Extraction from
Documents, images, etc)

Embedding – Similarity Search

Whisper – Voice Recognition

DALL-E: Text to Image

AI Assistant & Agents

AI Services Custom AI Services

Computer Vision

Natural Language Processing

Speech Solution

Documents Intelligence

Machine Learning

Finance ML Services

Marketing ML Services

Retail ML Services

IOT ML Services

HR ML Services

Healthcare ML Services

Charity ML Services

Knowledge Mining

Search Engine

Retrieval Augmented Generation –
Creation of Private GPT on top of
Organizational Data

Visual Search

Video Search

Recommender Systems

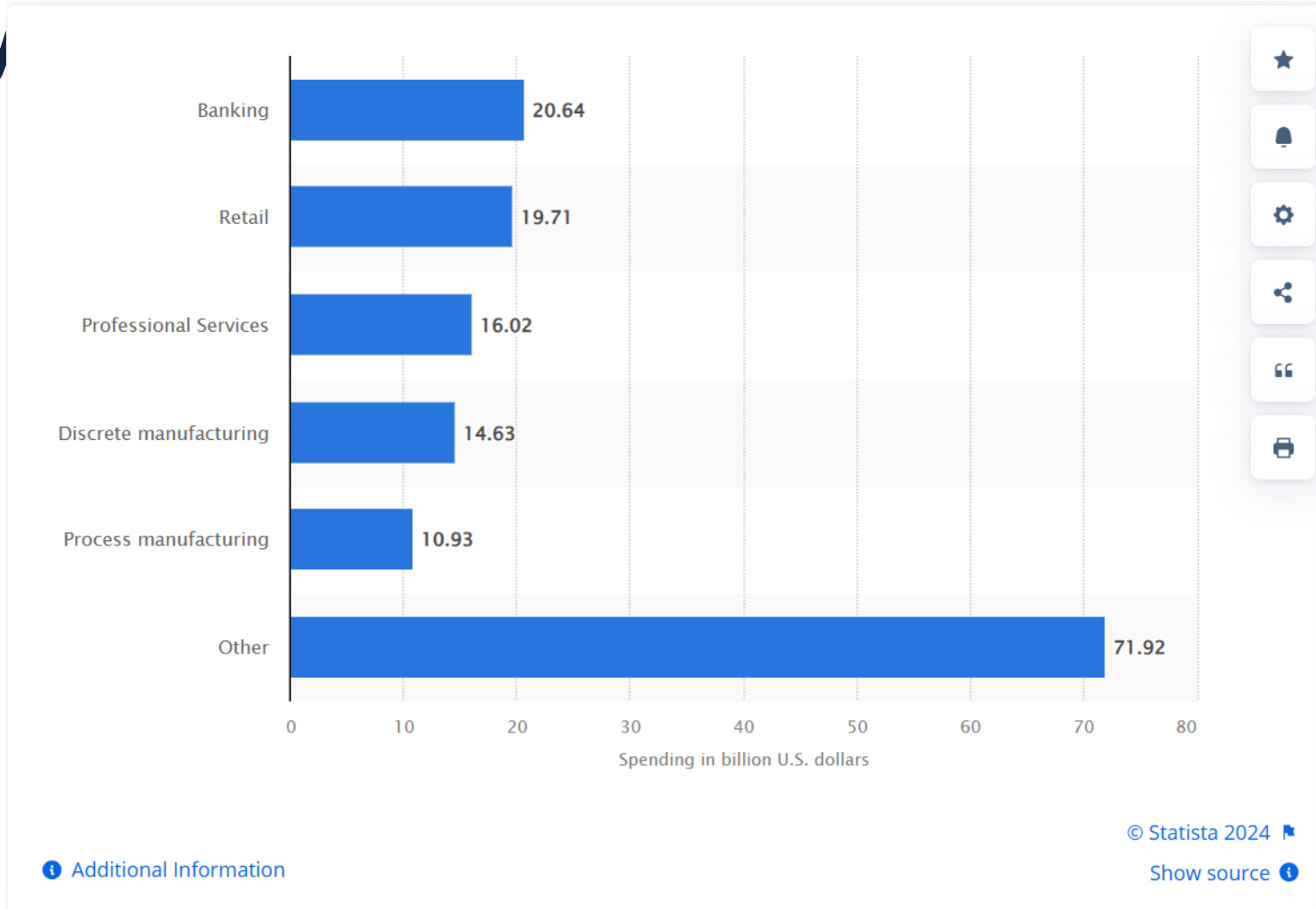
Chat Bot

Conversational Language Understanding

Intent & Entity Recognition

Q&A Chatbot

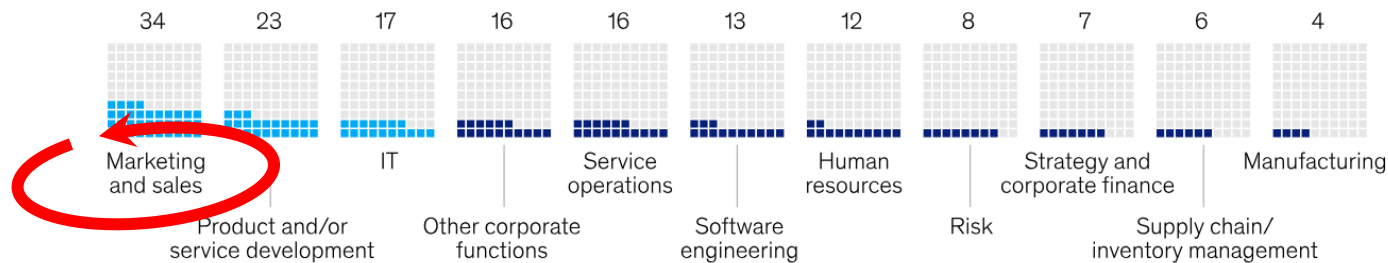
Estimated worldwide spending on artificial intelligence (AI)-centric systems in 2023, by industry



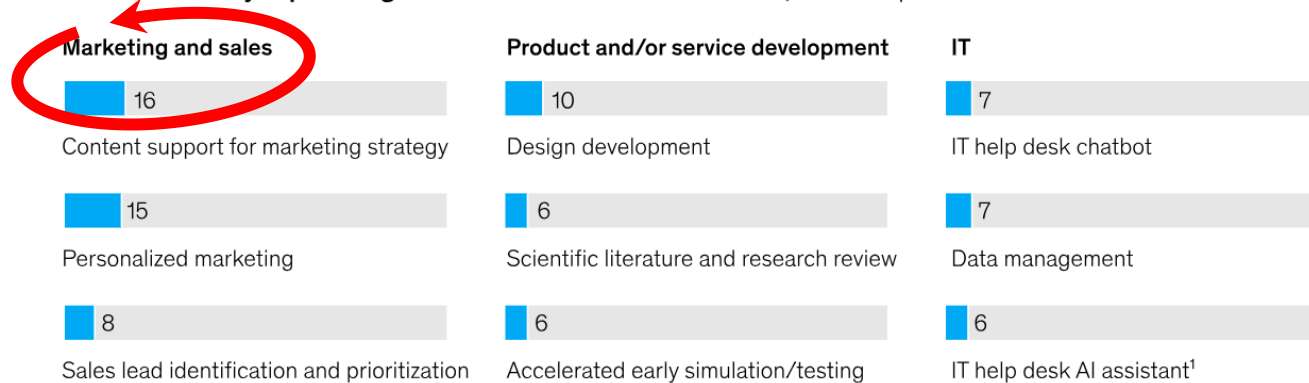
AI Adoption Market Analysis

Respondents most often report generative AI adoption in their marketing-and-sales, product- and service-development, and IT functions.

Respondents' organizations regularly using generative AI (gen AI), by function, % of respondents

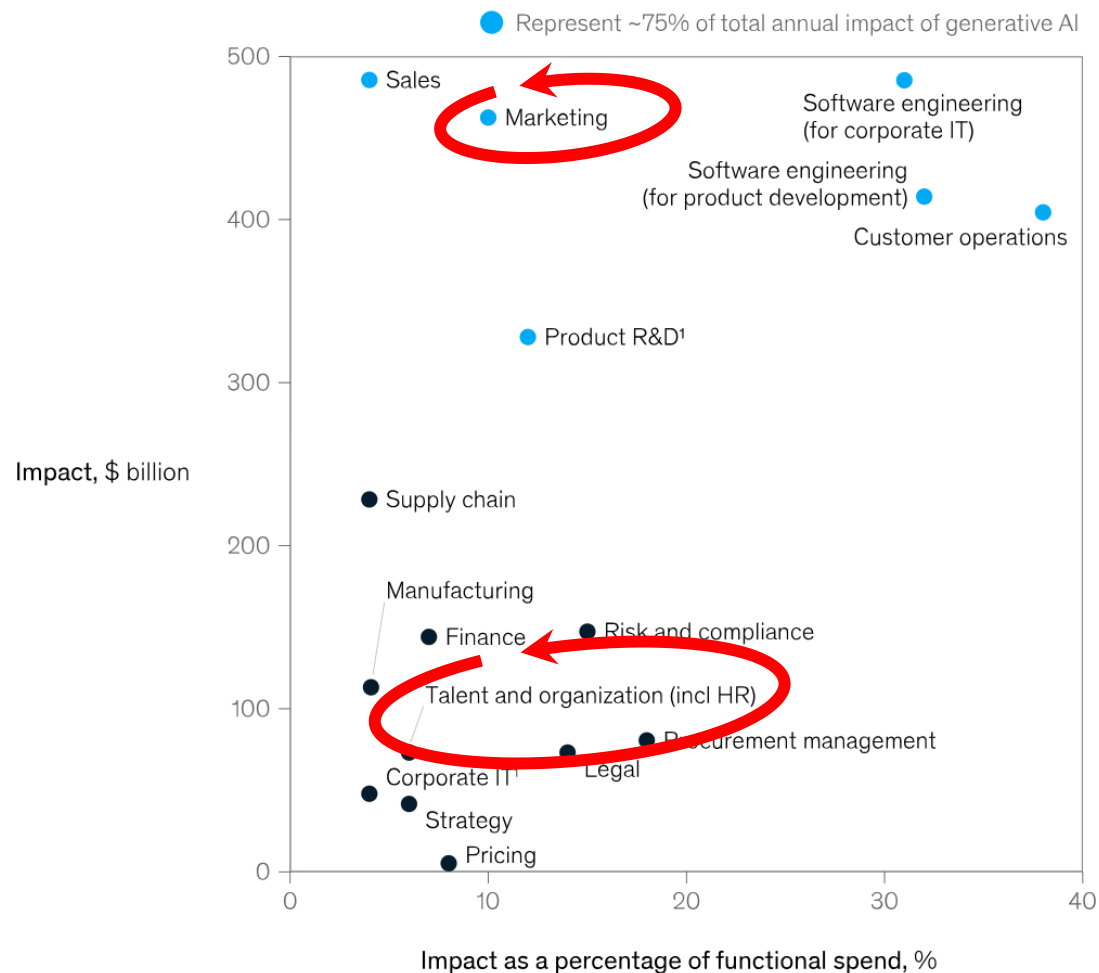


Most commonly reported gen AI use cases within function, % of respondents



¹Eg, providing real-time assistance and script suggestions to help desk employees during human-to-human conversations.
Source: McKinsey Global Survey on AI, 1,363 participants at all levels of the organization, Feb 22–Mar 5, 2024

Using generative AI in just a few functions could drive most of the technology's impact across potential corporate use cases.



Note: Impact is averaged.

¹Excluding software engineering.

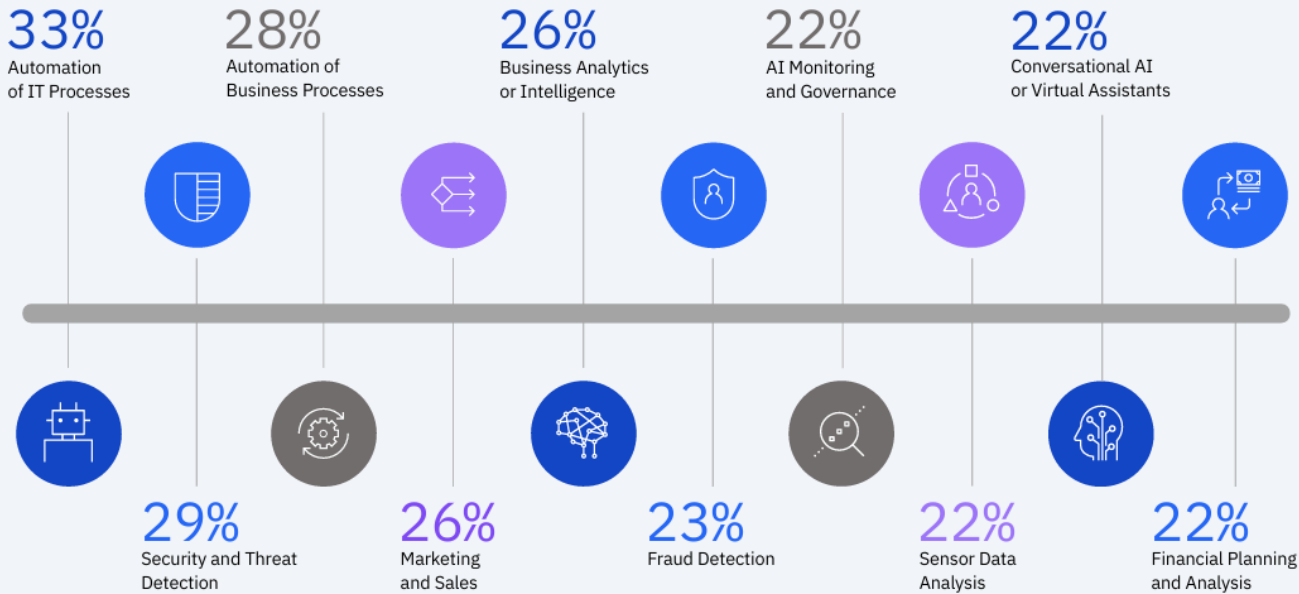
Source: Comparative Industry Service (CIS), IHS Markit; Oxford Economics; McKinsey Corporate and Business Functions database; McKinsey Manufacturing and Supply Chain 360; McKinsey Sales Navigator; Ignite, a McKinsey database; McKinsey analysis

What are the top ten factors driving AI adoption?

43%	Advancements in AI that make it more accessible
42%	Need to reduce costs and automate key processes
37%	Increasing amount of AI embedded into standard off-the-shelf business applications
31%	Competitive pressure
31%	Demands due to the COVID-19 pandemic
25%	Pressure from consumers
23%	Directives from leadership
22%	Company culture
22%	Labor or skills shortages
20%	Environmental pressures

How are companies planning to invest in AI over the next 12 months?

44%	Research and development
42%	Embedding AI into current applications and processes
39%	Reskilling and workforce development
32%	Building proprietary solutions
28%	Off-the-shelf AI solutions
26%	Off-the-shelf tools to build their own applications and models



How organizations are using AI today

Use cases

Organizations are applying AI in a wide variety of use cases today, with the most advanced adoption happening in areas like IT operations, security and threat detection and business process automation. Today, a third of companies are already using AI to automate their IT processes—AIOps—which helps them preserve application performance while also making resource allocation more efficient. Businesses are also applying AI techniques like natural language processing (NLP) to fields like marketing, sales and customer care.

A large proportion of companies interested in or deploying AI are looking to automate but what, exactly, they are trying to automate varies from sector to sector. Nearly half of companies that have applied AI-based automation have done so to drive greater IT efficiency, but they are also using automation to give time back to employees (49%) and address skills gaps. There are also large regional disparities with certain techniques like robotic process automation (RPA). For example, Chinese companies are nearly twice as likely to employ RPA as US firms.

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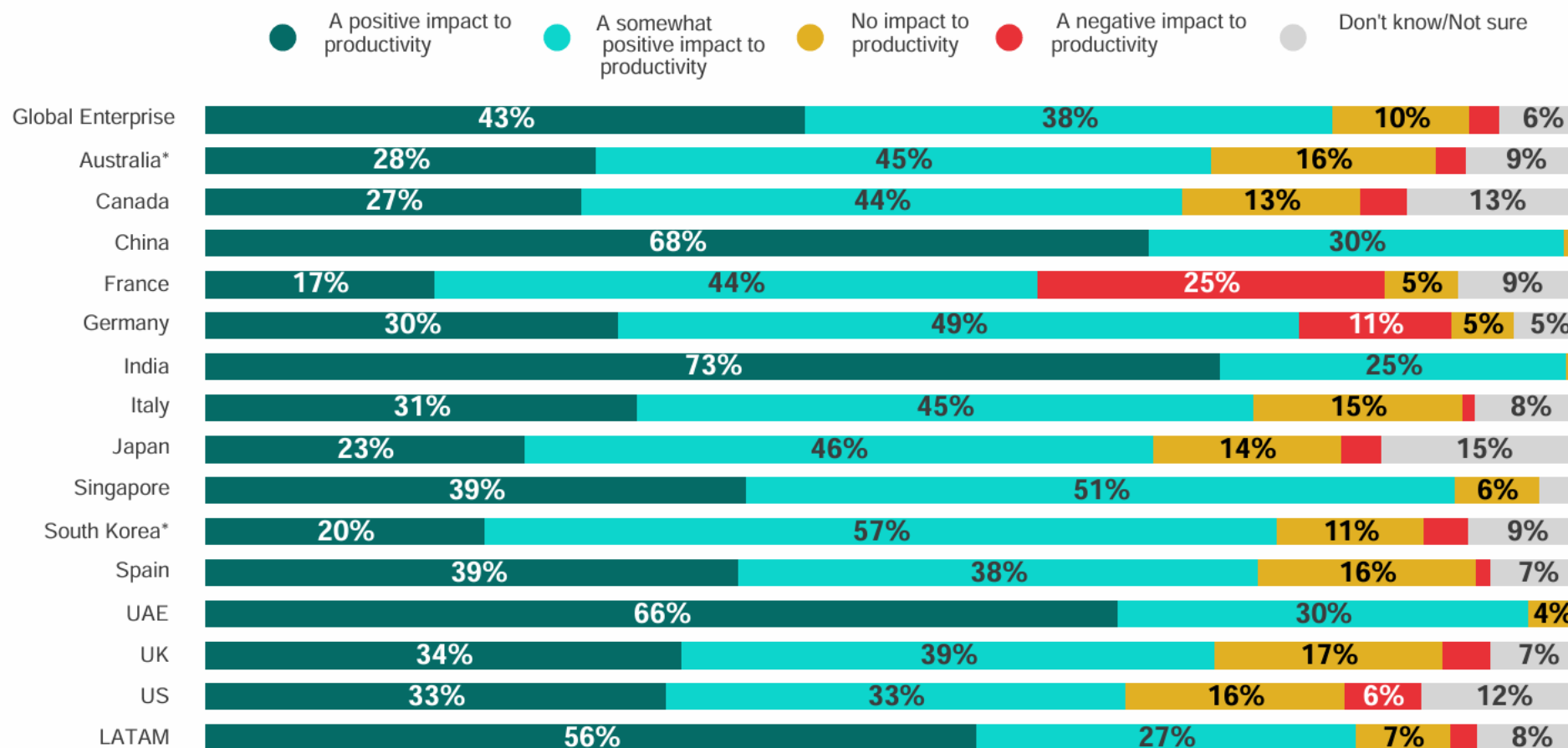
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How are organizations using AI to improve customer and employee care?

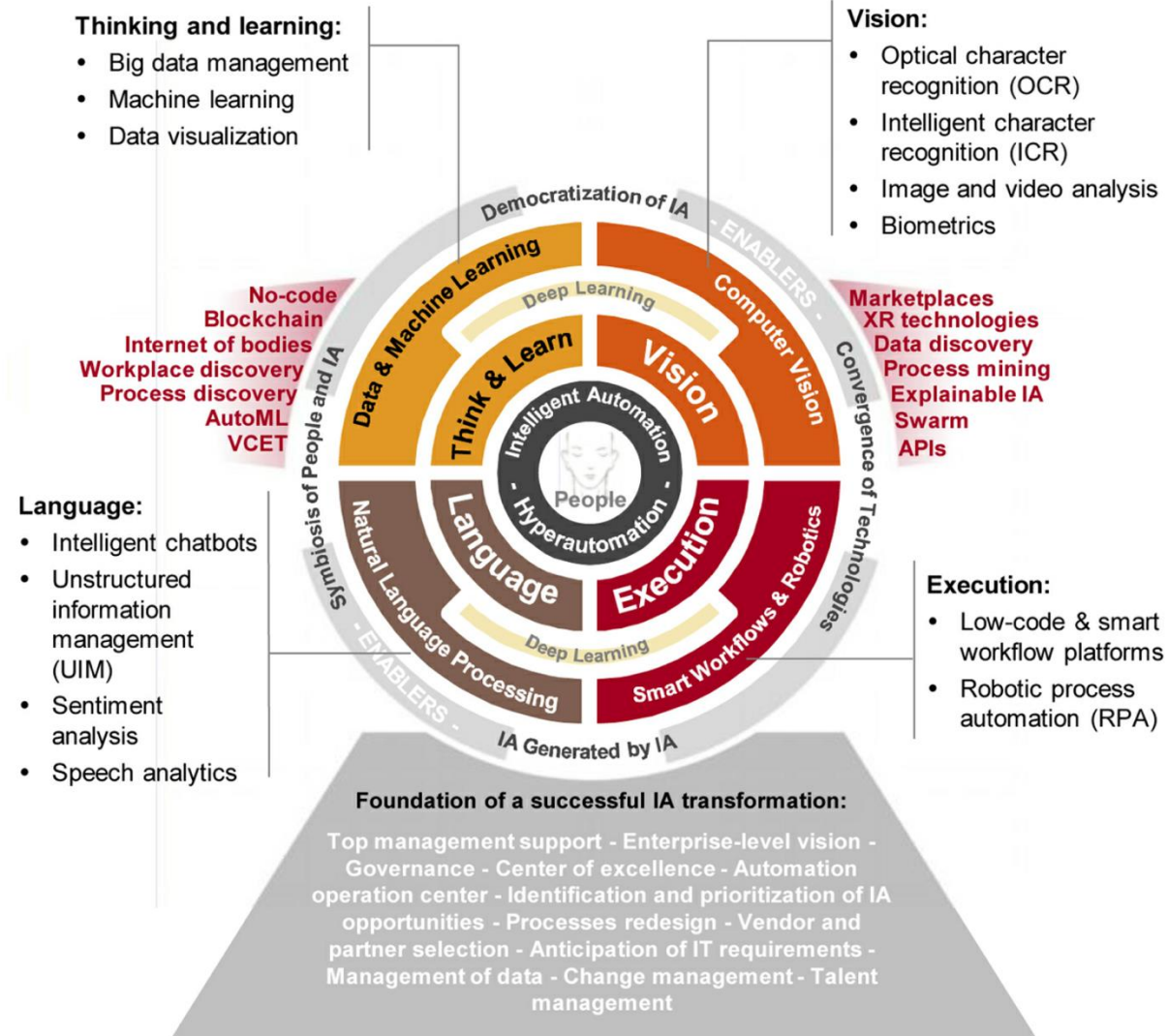
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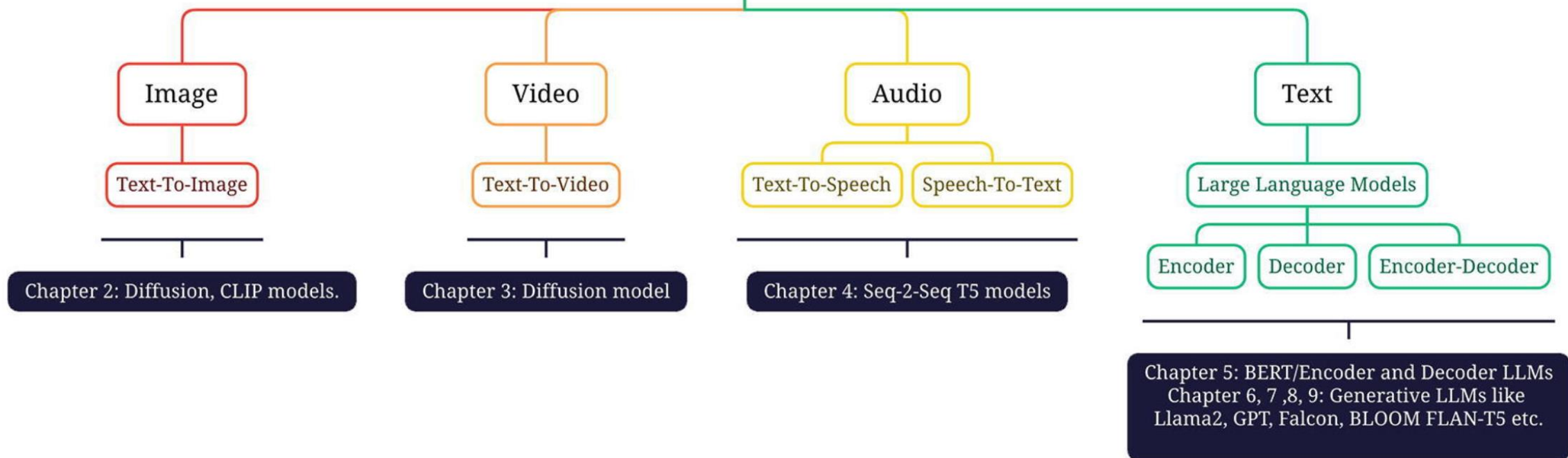


The roadmap to a successful Intelligent Automation transformation



GENERATIVE AI

Generative AI Chapters



Generative AI

Section	
Introduction to Generative AI	Generative AI Impact on Market Generative AI history Definition and Glossry
How it works	Neural Networks CNN Token, Vector, Embedding Transformers (Encoders , Decoders) Types and Techniques Generative models
Use Cases for Generative AI	Intelligent Automation Generative AI in Services Sectors & Government Generative AI Role in Non-stop shop Government
How to use Generative AI	Prompt Engineering
Live Demonstration & Application	CHAT GPT 4.0 with plugins Ms. Copilot Gemeni MID JOURNEY FIRE FLY COPilot
Risks and Mitigation	Generative AI Cons AI Ethics

Writing and Content Creation

Tool	Description
ChatGPT	Versatile chatbot and writing assistant.
Jasper	AI-powered marketing content generator.
GrammarlyGO	AI-powered content creation and editing.
Copy.ai	Creative content producer.
Writesonic	Marketing content generator.

Coding and Development

Tool	Description
GitHub Copilot	AI pair programmer.
TabNine	Intelligent code completion.
Amazon CodeWhisperer	AI coding assistant.
Replit Ghostwriter	Coding assistant.
Codeium	Free coding tool.

Image Generation

Tool	Description
DALL-E 2	Image generation from text.
Midjourney	Artistic image generator.
BlueWillow	Customized image generator.
Stockimg	Professional image generator.

Video Creation

Tool	Description
Runway	Video and image magic tools.
Synthesia	Text-to-video converter.
Lumen5	Video creation from text.

Other Notable Tools

Tool	Description
Wordtune	Casual writing assistant.
Autoresponder	Automated chat replies.
Conversica	AI sales assistant.
ClickUp AI	Role-based AI solution.
Pictory	Text-to-audio and video.

Generative AI Tools and Their Versatility

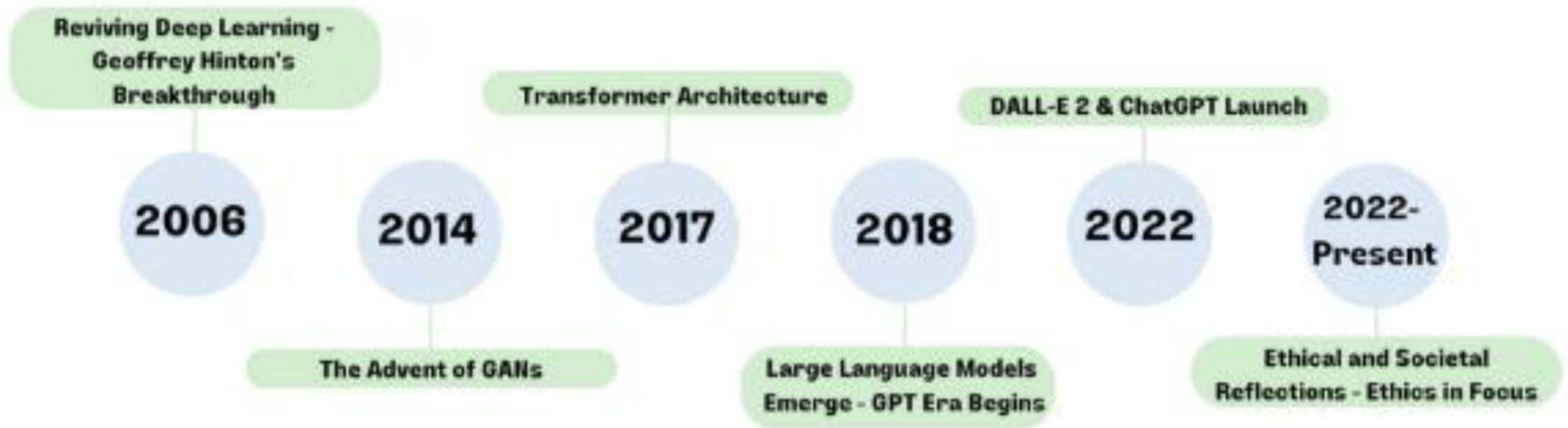


- Generative AI tools are capable of performing various tasks such as writing, coding, image generation, and video creation.
- One of the top generative AI tools is ChatGPT, a conversational AI model developed by OpenAI.
- Another top generative AI tool is Ms. CoPilot, which is designed to assist with various tasks.
- Gemini is another popular generative AI tool that can be used for various purposes.

Fundamentals of Generative Models

- ability to “dream up” new data,
- generative models have become a cornerstone of AI,
- reshaping how we interact with technology, create content, and solve problems.

Generative AI evolution Timeline



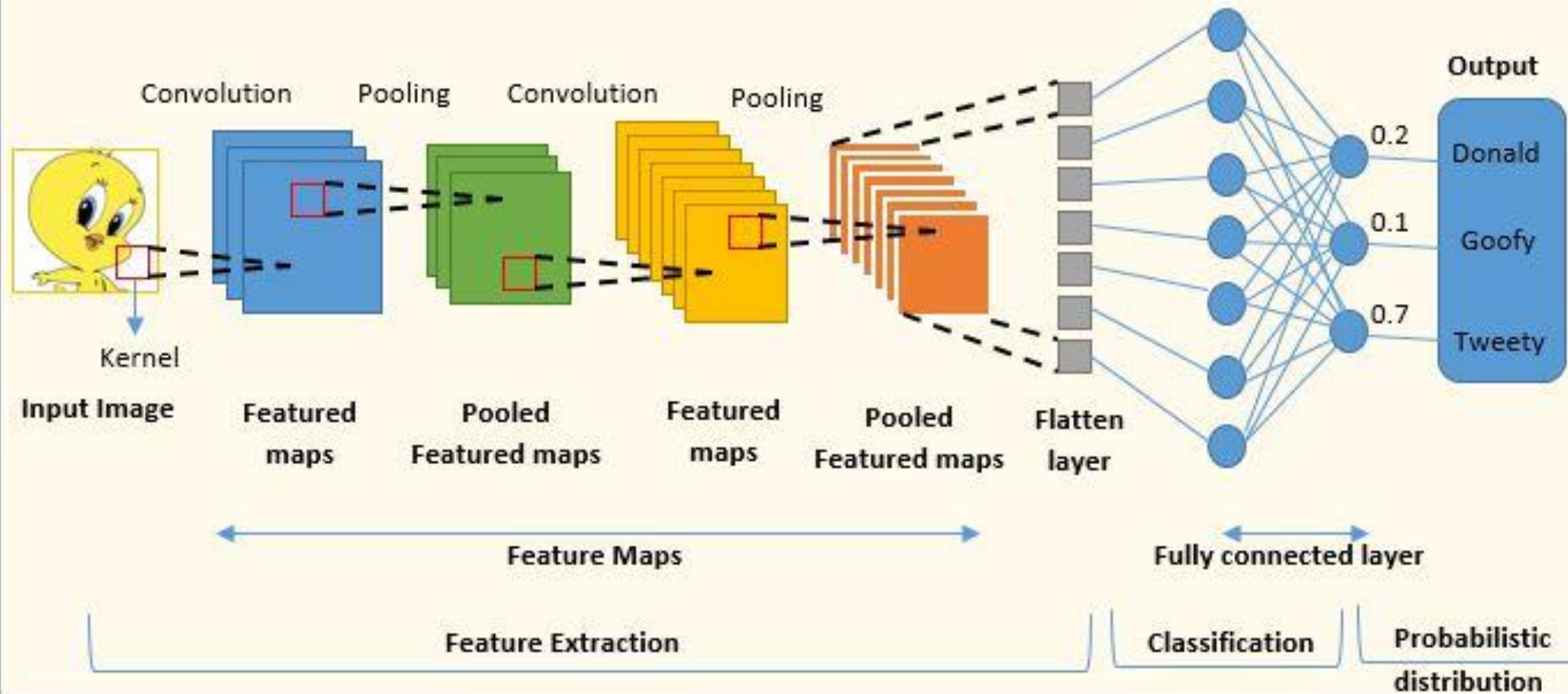
Neural Networks: The Backbone of Generative AI

- Neural networks form the foundation of Generative AI, enabling machines to generate new data instances that mimic the distribution of real data.
- At their core, neural networks learn from vast amounts of data, identifying patterns, structures, and correlations that are not immediately apparent.
- This learning capability allows them to produce novel content, from realistic images and music to sophisticated text and beyond. The versatility and power of neural networks in Generative AI have opened new frontiers in creativity, automation, and problem-solving, fundamentally changing our approach to content creation and data analysis.

لشبكات العصبونية الالتفافية أو الشبكة العصبية

- الترشيحية^[1] [\(بالإنجليزية: Convolutional neural network\)](#)، نوع خاص من أنواع الشبكات العصبونية بالتغذية الأمامية [\(بالإنجليزية: Feed forward neural network\)](#) و تستمد إلهامها من العمليات البيولوجية الحاصلة في الفص البصري بالتحديد في دماغ الكائنات الحية، وتعتبر حلاً للكثير من مشاكل [الرؤية الحاسوبية](#) في الذكاء الاصطناعي مثل معالجة الصور والفيديوهات، يوجد لبنيتها عدة تصاميم ولكن ^[2] Le-Net 5 يعتبر النموذج الأكثر شهرة وتطبيقاً عملياً وقد قدمه [عالم الحاسوب](#) الفرنسي «يان لوكون» (Yann André LeCun عام 1998م).

A Typical Convolutional Neural Network (CNN)



ChatGPT Demonstration

1. Core Language Models:

1. **GPT-3.5**: Handles general conversational tasks and text generation.
2. **GPT-4**: The latest and most advanced model for language understanding and generation.

2. Specialized Models:

1. **Advanced Data Analysis (GPT-4o)**: Focused on data analysis, including handling complex datasets and generating visualizations.
2. **DALL-E 3**: Generates images from textual descriptions.

3. Integrated Models:

1. **Bing**: Fetches real-time information from the web to provide up-to-date responses.
 2. **Plugins**: Integrates with third-party services and tools to extend functionality.
- These models work together seamlessly to provide a comprehensive and versatile user experience. Each model is designed to excel in its specific domain, ensuring high performance across various tasks. If you have any more questions or need further clarification, feel free to ask!

1. Voice Recognition (Speech-to-Text)

- **Whisper Model:** ChatGPT uses OpenAI's Whisper, an open-source speech recognition system, to transcribe spoken words into text. [This allows users to speak to ChatGPT, and it will convert their speech into text for processing¹.](#)

2. Text-to-Speech

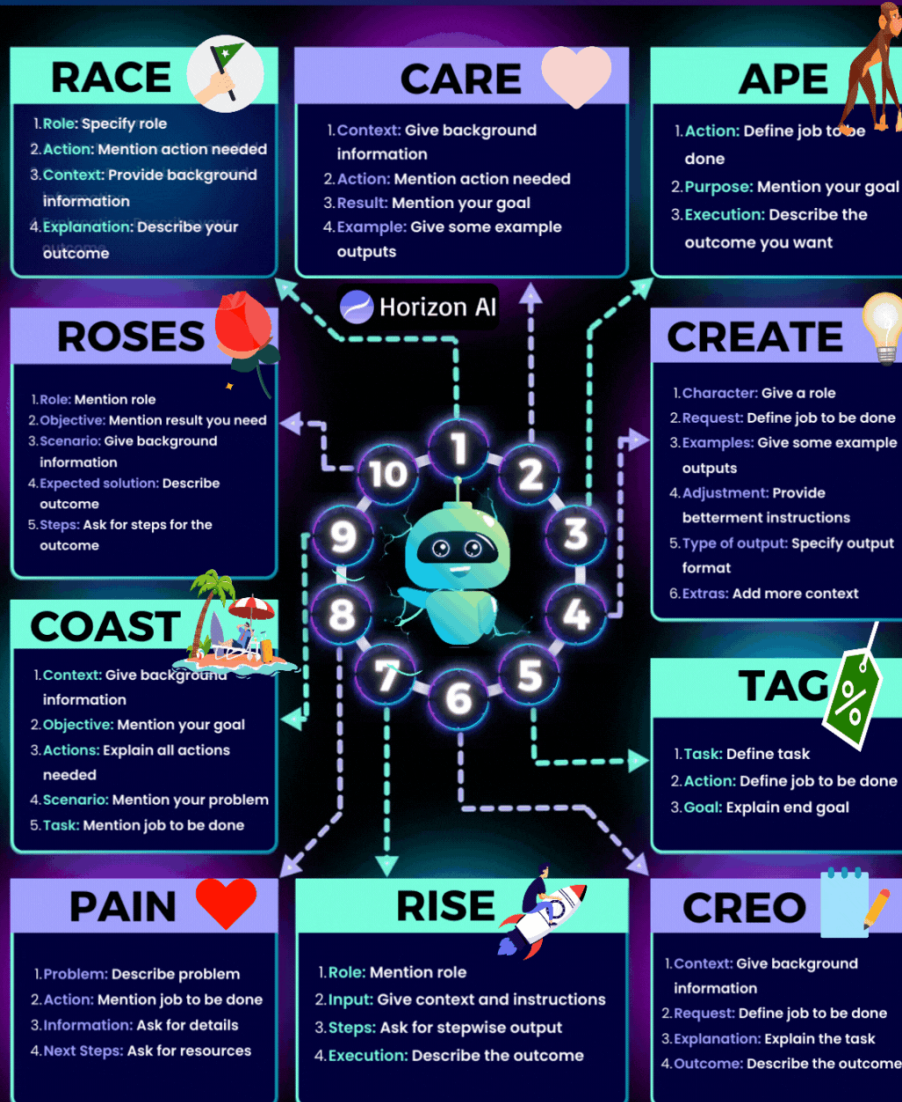
- **New Text-to-Speech Model:** ChatGPT employs a new text-to-speech model that generates human-like audio from text. [This model was developed in collaboration with professional voice actors to create natural-sounding voices¹.](#)
- **Voice Interaction:** Users can engage in voice conversations with ChatGPT, making it possible to have back-and-forth spoken interactions. [This feature is available on mobile apps \(iOS and Android\) and can be activated in the settings¹.](#)

3. Combined Use

- **Seamless Integration:** The combination of Whisper for speech-to-text and the new text-to-speech model allows for smooth voice interactions. [Users can speak to ChatGPT, receive spoken responses, and continue the conversation naturally¹.](#)
- These capabilities make ChatGPT more accessible and user-friendly, allowing for a more interactive and intuitive experience. If you have any specific questions or need help with these features, feel free to ask!

ChatGPT Prompt Engineering Frameworks

Get free access to AI tutorials and guides on using popular AI tools at joinhorizon.ai



Microsoft CoPilot

Microsoft 365 Copilot:

The art and science of prompting

Prompts are how you ask Microsoft 365 Copilot to do something for you — like creating, summarizing, editing, or transforming. Think about prompting like having a conversation, using plain but clear language and providing context like you would with an assistant.

1. Tell Copilot what you need

There are many types of prompts you can use depending on what task you want done.

- ✓ **Learn about projects and concepts:**
"What is [Project X] and who are the key stakeholders working on it?"
- ✓ **Edit text:**
"Check this product launch rationale for inconsistencies."
- ✓ **Transform documents:**
"Transform this FAQ doc into a 10-slide onboarding guide."
- ✓ **Summarize information:**
"Write a session abstract of this [presentation]."
- ✓ **Create engaging content:**
"Create a value proposition for [Product X]."
- ✓ **Catch-up on missed items:**
"Provide a summary of the updates and action items on [Project X]."

2. Include the right prompt ingredients

To get the best response, it's important to focus on some of the key elements below when phrasing your Copilot prompts.

Goal

What response do you want from Copilot?

Context

Why do you need it and who is involved?

Generate 3-5 bullet points to prepare me for a meeting with Client X to discuss their "Phase 3+" brand campaign. Focus on Email and Teams chats since June. Please use simple language so I can get up to speed quickly.

Which information sources or samples should Copilot use?

Source

How should Copilot respond to best meet your expectations?

Expectations

Microsoft 365 Copilot:

The art and science of prompting

3. Keep the conversation going

Following up on your prompts help you collaborate with Copilot to gain more useful, tailored responses.



Generating content ideas

Lead with broader requests, then give specific details about the content.



Gaining insights

Ask for a summary of a specific file, then ask relevant questions to gain deeper insights.



Enabling insightful meetings

Request a meeting recap, then ask for more information about what you should know.



Translating languages

Ask Copilot to translate a sentence to one of the supported languages, then ask for more context or a regional dialect.



Storytelling assistance

Ask Copilot to write a story, then guide it by giving more specific, relevant details.

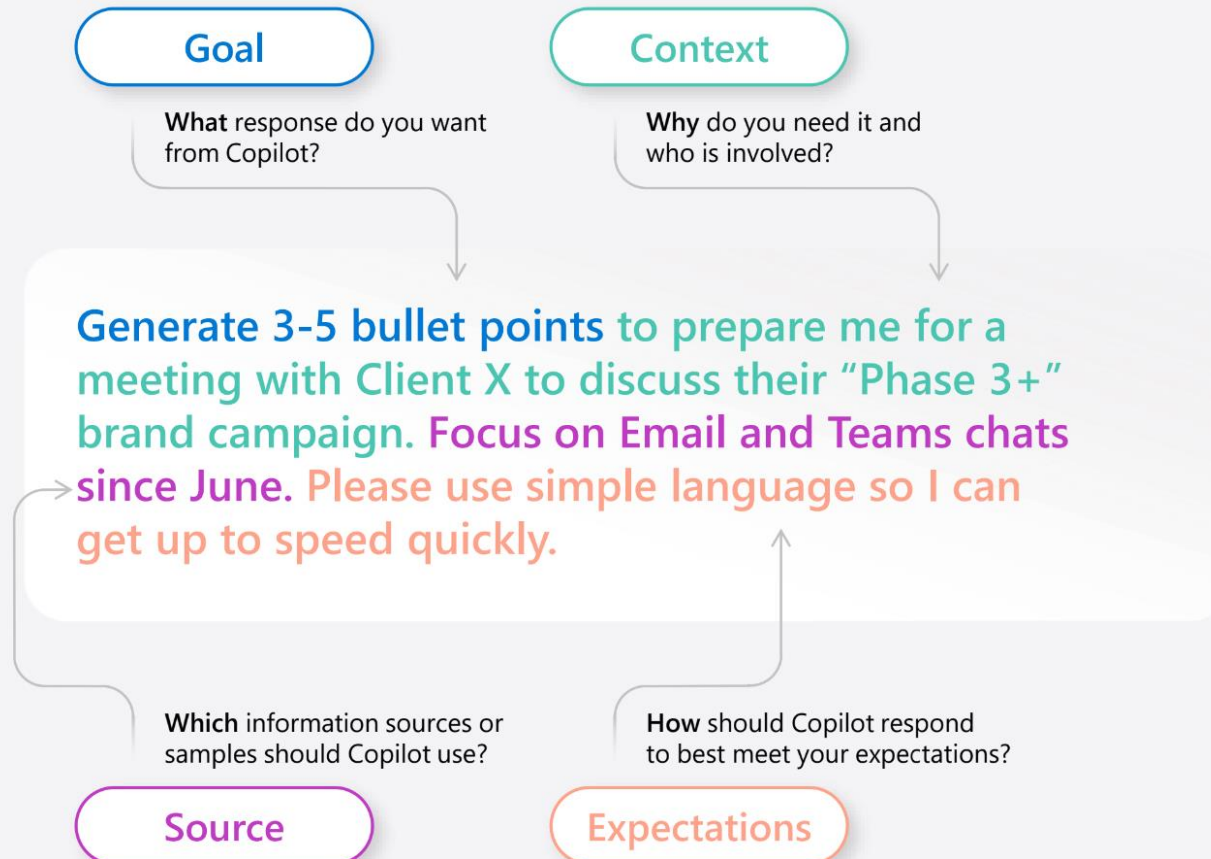


Solving technical problems

Present a technical problem, then narrow it down, or ask for step-by-step guidance.



Prompts are how you ask Microsoft 365 Copilot to do something for you — like creating, summarizing, editing, or transforming. To get the best response, it's important to **focus on some of the key elements below** when phrasing your Copilot prompts.



Microsoft 365 Copilot. Prompting do's and don'ts

Learn about common pitfalls by learning **what to do** and **what not to do** when writing prompts.

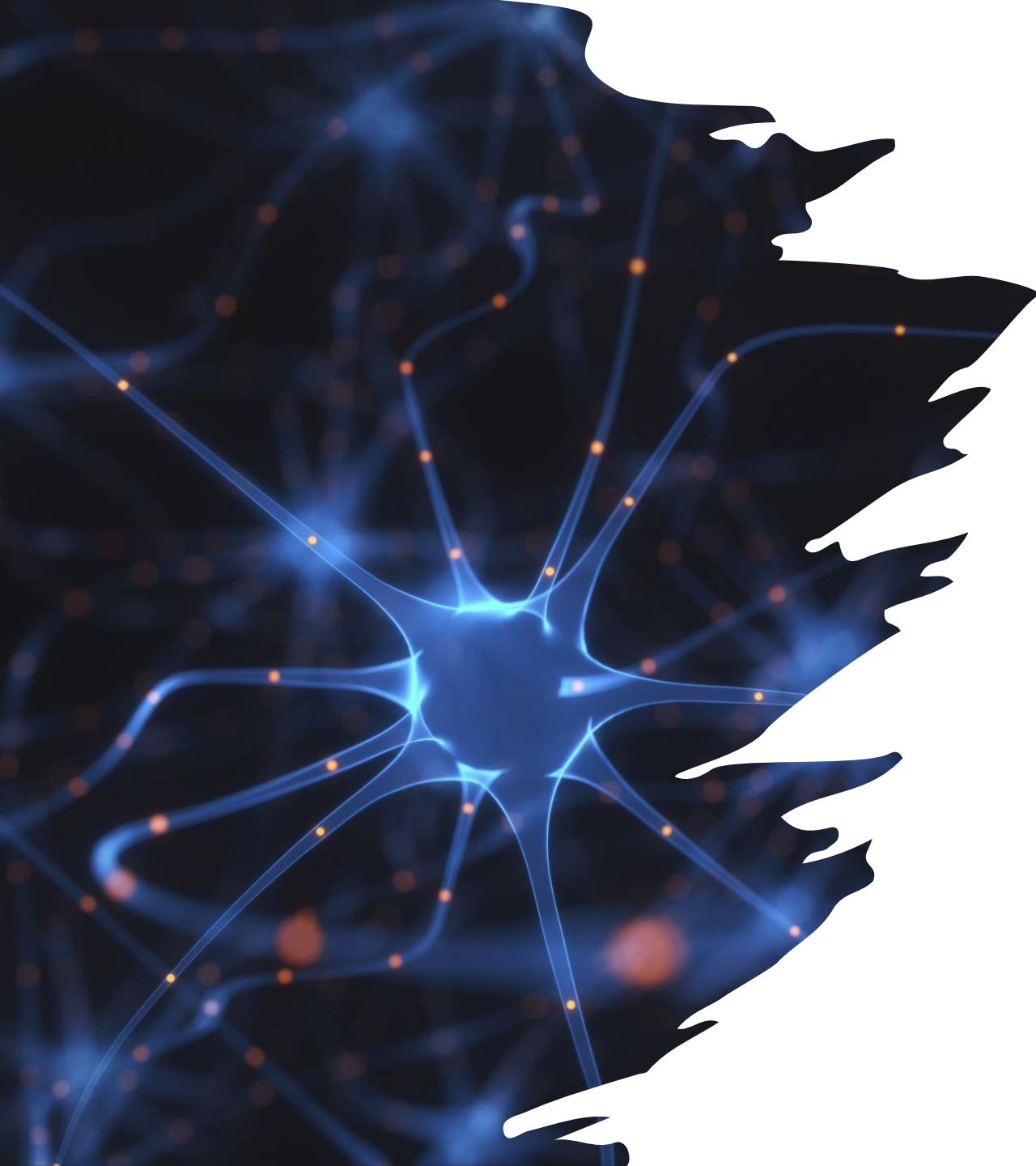
Do's

- ✓ **Be clear and specific.**
Provide specific instructions to Copilot, such as topic, purpose, tone, and required length.
- ✓ **Keep it conversational.**
Give feedback to Copilot based on the quality of its responses to help the AI learn and match your preferences.
- ✓ **Give examples.**
Use clear and specific keywords or phrases when asking Copilot to write a piece of text for you. This helps it generate more relevant and creative copy.
- ✓ **Ask for feedback.**
Requesting feedback from Copilot helps it to understand your needs and preferences, and to provide you with more relevant, helpful responses.
- ✓ **Write legibly.**
Use correct punctuation, capitalization, and grammar when writing prompts, as this will help the AI produce better quality text and responses.
- ✓ **Check for accuracy.**
Occasionally, Copilot may make mistakes. Always check Copilot's responses for accuracy, grammar, and style, and watch out for irrelevant or inappropriate content.
- ✓ **Provide details.**
Provide Copilot with contextual details to help it generate more accurate, consistent responses. For example, the genre, characters, and plot to a story.
- ✓ **Be polite.**
Using kind and respectful language when chatting with Copilot helps foster collaboration and improves the AI's responsiveness and performance.

Don'ts

- ✗ **Be vague.**
When prompting Copilot, avoid using vague language, and be as clear as possible to receive better-quality responses.
- ✗ **Request inappropriate or unethical content.**
Copilot is not responsible for the content or the consequences of your writing. You should respect local laws, rules, and the rights of others.
- ✗ **Use slang, jargon, or informal language.**
This may cause Copilot to give low-quality, inappropriate or unprofessional responses.
- ✗ **Give conflicting instructions.**
Prompting Copilot to perform a task that includes multiple or conflicting pieces of information in the same request can confuse the AI and result in lower quality responses.
- ✗ **Interrupt or change topics abruptly.**
This could disrupt Copilot's writing process. Always close or finish a task before starting a new one. When starting a new task, write "New task."

- <https://medium.com/@slakhyani20/10-chatgpt-prompt-engineering-frameworks-you-need-to-know-41d4b76ed384><https://medium.com/@slakhyani20/10-chatgpt-prompt-engineering-frameworks-you-need-to-know-41d4b76ed384>

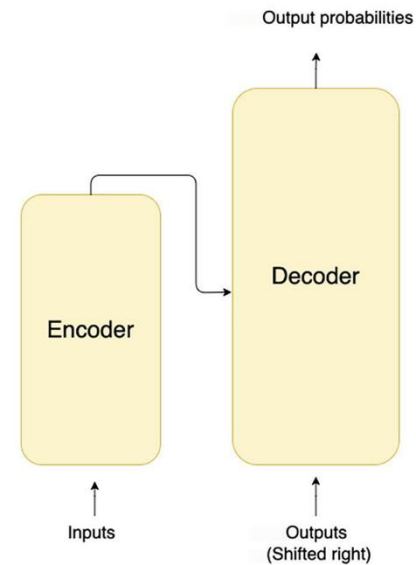


Generative Adversarial Networks

- Generative adversarial networks consist of two neural networks—the generator and the discriminator—competing in a zero-sum game framework.
- This innovative structure allows GANs to generate highly realistic and detailed images, videos, and even sound.
- The competitive nature of GANs pushes them to continually improve, leading to the generation of content that can often be indistinguishable from real-world data. Their application ranges from creating photorealistic images and deepfakes to advancing drug discovery and material design. StyleGAN, developed by NVIDIA, exemplifies GANs' capabilities by generating highly realistic human faces and objects. This technology has been used in fashion and design to visualize new products and styles in stunning detail.

Transformers

- OpenAI's GPT-3 showcases the power of transformer architectures through its ability to generate human-like text across a variety of applications, from writing articles and poems to coding assistance, illustrating the model's



- Text is converted to numerical representations called tokens
- Each token is converted into a vector via looking up from a word embedding table

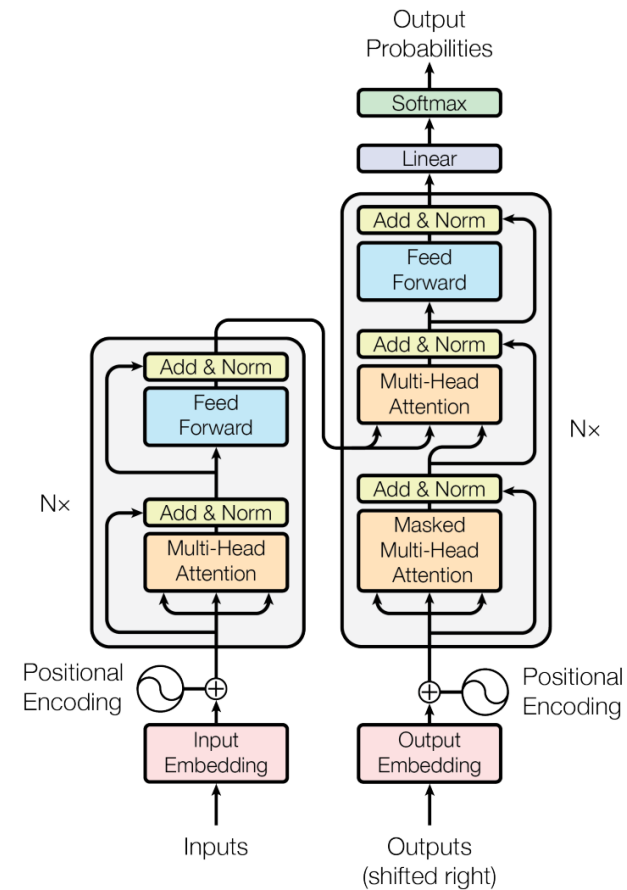


Figure 1: The Transformer - model architecture.

Transformer Architecture

- A **transformer** is a deep learning architecture developed by researchers at Google and based on the multi-head attention mechanism, proposed in a 2017 paper "Attention Is All You Need". Text is converted to numerical representations called tokens, and each token is converted into a vector via looking up from a word embedding table.

[1706.03762 \(arxiv.org\)](https://arxiv.org/abs/1706.03762)

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Attention Is All You Need

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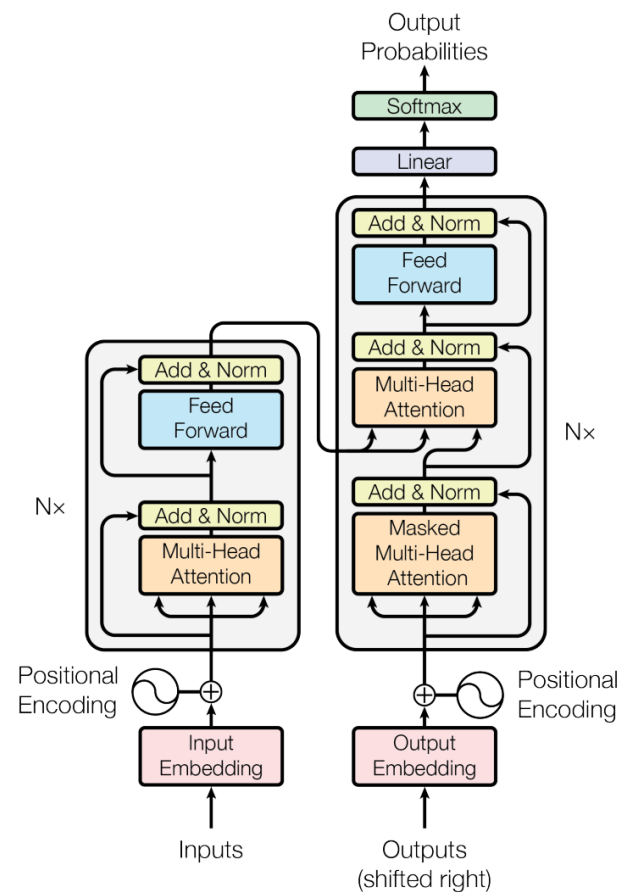


Figure 1: The Transformer - model architecture.

Glossary in LLM / Transformers Architecture

- Token
- Vector :
- Embedding :are high-dimensional vectors that capture the semantic meaning of words, sentences or even entire documents
- The process of converting text into embeddings allows LLMs to perform various natural language processing tasks, such as text generation, sentiment analysis and more.

VECTOR

- Since machines only understand numbers, data such as text and images is converted into vectors. The vector is the only format that is understood by neural networks and transformer architectures.
- geometric object that has magnitude (or length) and direction. $V = [$

code snippet introduces the basic idea of a vector

- `import numpy as np`

```
# Creating a vector from a list
```

```
vector = np.array([1, 2, 3])
```

```
print("Vector:", vector)
```

```
# Vector addition
```

```
vector2 = np.array([4, 5, 6])
```

```
sum_vector = vector + vector2
```

```
print("Vector addition:", sum_vector)
```

```
# Scalar multiplication
```

```
scalar = 2
```

```
scaled_vector = vector * scalar
```

```
print("Scalar multiplication:", scaled_vector)
```

Tokens: The Building Blocks of LLMs

- Tokens are the basic units of data processed by LLMs. In the context of text, a token can be a word, part of a word (subword), or even a character — depending on the tokenization process.
- **Tokens are the representations of text in the form of a vector.**

Tokenizer

- The tokenizer convert each word and a part of the word into a vector, which is based on the encoding. When a token is passed through a decoder, it can be easily translated into text again.
- The tokenizer is responsible for encoding the prompt (input) into tokens and the response (output) back into text.

how text is converted into tokens for an open model like Llama 2

- `from transformers import AutoTokenizer`

```
model = "meta-llama/Llama-2-7b-chat-hf"
```

```
tokenizer = AutoTokenizer.from_pretrained(model,token="HF_TOKEN")
```

```
text = "Apple is a fruit"
```

```
token = tokenizer.encode(text)
```

```
print(token)
```

```
decoded_text = tokenizer.decode(token)
```

```
print(decoded_text)
```



```
from transformers import AutoTokenizer
```

```
model = "meta-llama/Llama-2-7b-chat-hf"  
tokenizer = AutoTokenizer.from_pretrained(model, token="")
```

```
text = "Apple is a fruit"
```

```
token = tokenizer.encode(text)  
print(token)
```

```
[1, 12113, 338, 263, 15774]
```

```
decoded_text = tokenizer.decode(token)  
print(decoded_text)
```

```
<s> Apple is a fruit
```

Embeddings: The Semantic Space

- If tokens are vector representations of text, embeddings are tokens with semantic context.
- an embeddings model is responsible for generating text embeddings in the form of a vector
- Embeddings are what allow LLMs to understand the context, nuance and subtle meanings of words and phrases
- They are the result of the model learning from vast amounts of text data
- and encode not just the identity of a token but its relationships with other tokens

-
- *Embeddings* are the foundational aspect of LLMs.

living being
feline
human
gender
royalty
verb
plural

man →

0.6	-0.2	0.8	0.9	-0.1	-0.9	-0.7
-----	------	-----	-----	------	------	------

woman →

0.7	0.3	0.8	-0.7	0.1	-0.5	-0.4
-----	-----	-----	------	-----	------	------

king →

0.5	-0.4	0.7	0.8	0.9	-0.7	-0.6
-----	------	-----	-----	-----	------	------

queen →

0.8	-0.1	0.8	-0.9	0.8	-0.5	-0.9
-----	------	-----	------	-----	------	------

word

Word embedding

woman

man

queen

king

Visualization of word embedding

-
- Through embeddings, LLMs achieve a deep understanding of language, enabling tasks like sentiment analysis, text summarization and question answering with nuanced comprehension and generation capabilities. They are the entry point to the LLM, but they are also used outside of the LLM to convert text into vectors while retaining the semantic context

```

from sentence_transformers import SentenceTransformer

sentences = ["Apple is a fruit", "Car is a vehicle"]

model = SentenceTransformer('sentence-transformers/all-MiniLM-L6-v2')
embeddings = model.encode(sentences)

print(len(embeddings[0]))

384

print(embeddings)

[[ 7.33128041e-02  4.40956540e-02  8.52457527e-03  4.12938707e-02
 -3.41881961e-02  3.47248241e-02  8.89837369e-02 -5.65728098e-02
  5.57907708e-02  3.28316353e-02  7.28619322e-02 -6.97700381e-02
  1.32590476e-02 -4.16611508e-02  5.53009473e-02 -5.55520132e-03
 -1.61053427e-02  5.73411165e-03 -8.60156193e-02 -2.61668917e-02
  3.05632688e-02  5.79744428e-02 -2.12321468e-02  1.98531654e-02
  1.71079040e-02  3.67617980e-02  1.85195624e-03  7.50119193e-03
 -5.19407466e-02 -2.09576879e-02 -5.61612397e-02  3.49304788e-02
  7.18486160e-02  8.56194645e-02 -4.10904549e-02 -4.12583575e-02
  1.16086535e-01 -4.18179482e-02  6.41641906e-03 -1.91523507e-02
 -6.77142991e-03  4.96973284e-02  1.32111823e-02  6.05589338e-02
 -1.48480637e-02  8.82077143e-02 -6.65182853e-03 -1.86145725e-03
  4.14306186e-02  3.58703081e-03 -8.11026022e-02 -5.54067977e-02
 -5.25512062e-02 -5.51609658e-02  3.31796370e-02  7.76575580e-02
  7.03817829e-02 -9.72254784e-04  1.06649794e-01  7.24405348e-02
  5.53036630e-02 -1.14822455e-01  1.80354565e-02  4.99016885e-03
  4.83621433e-02 -6.75619617e-02 -5.75310290e-02 -4.94122505e-02
 -5.35254106e-02 -5.49318939e-02  5.31145781e-02  1.90802254e-02]]

```

- from sentence_transformers
import SentenceTransformer

sentences = ["Apple is a fruit", "Car
is a vehicle"]

model =
SentenceTransformer('sentence-
transformers/all-MiniLM-L6-v2')
embeddings =
model.encode(sentences)

print(len(embeddings[0]))

print(embeddings)

- `from openai import OpenAI`

```
client =  
OpenAI(api_key="OPENAI_API_KEY")
```

```
model="text-embedding-3-small"  
sentences = ["Apple is a fruit", "Car  
is a vehicle"]
```

```
embeddings=client.embeddings.create(input = sentences,  
model=model).data[0].embedding
```

```
print(len(embeddings))
```

```
print(embeddings)
```

```
from openai import OpenAI  
  
client = OpenAI(api_key="")  
  
model="text-embedding-3-small"  
sentences = ["Apple is a fruit", "Car is a vehicle"]  
  
embeddings=client.embeddings.create(input = sentences, model=model).data[0].embedding  
  
len(embeddings)  
  
1536  
  
embeddings  
  
[-0.01610969379544258,  
 0.006014073267579079,  
 -0.041846998035907745,  
 0.0612805113196373,  
 0.017561476677656174,  
 -0.04918232187628746,  
 0.011741611175239086,  
 0.030003508552908897,  
 0.02977428026497364,  
 -0.014581501483917236,  
 0.03575969859957695,  
 0.03158264234662056,  
 -0.04380818083882332,  
 0.01759968139231205,  
 -0.02809326909482479,  
 -0.01852933131158352,  
 -0.03002897836267948,  
 0.01132772583514452]
```

- **Tokens vs. Vectors:** Tokens are the linguistic units, while vectors are the mathematical representations of these units. Every token is mapped to a vector in the LLM's processing pipeline.

- **Vectors vs. Embeddings:** All embeddings are vectors, but not all vectors are embeddings. Embeddings are vectors that have been specifically trained to capture deep semantic relationships.

- *Understanding vectors, tokens and embeddings is fundamental to grasping how LLMs process language. Tokens serve as the basic data units, vectors provide a mathematical framework for machine processing, and embeddings bring depth and understanding, enabling LLMs to perform tasks with human-like versatility and accuracy. Together, these components form the backbone of LLM technology, enabling the sophisticated language models that power today's AI applications.*

Key Takeaway – Tokenizer

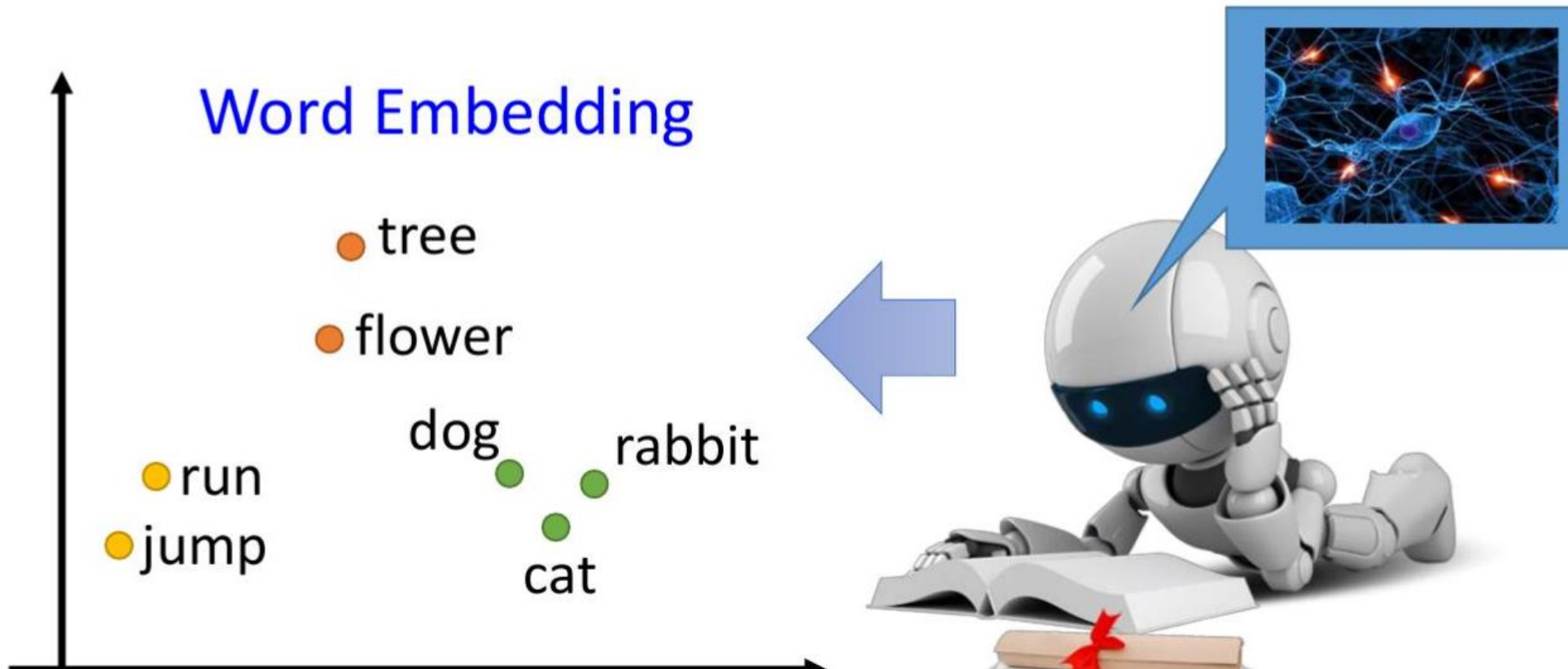
- So, the key takeaway is that tokens are vectors based on a specific tokenizer.

Word Embedding

- The primary goal of word embeddings is to represent words in a way that captures their semantic relationships and contextual information. These vectors are numerical representations in a continuous vector space, where the relative positions of vectors reflect the semantic similarities and relationships between words.

Word Embedding

- Machine learns the meaning of words from reading a lot of documents without supervision



OpenAI releases o1, its first model with ‘reasoning’ abilities

Story by Kylie Robison • 19h • ⌚ 5 min read

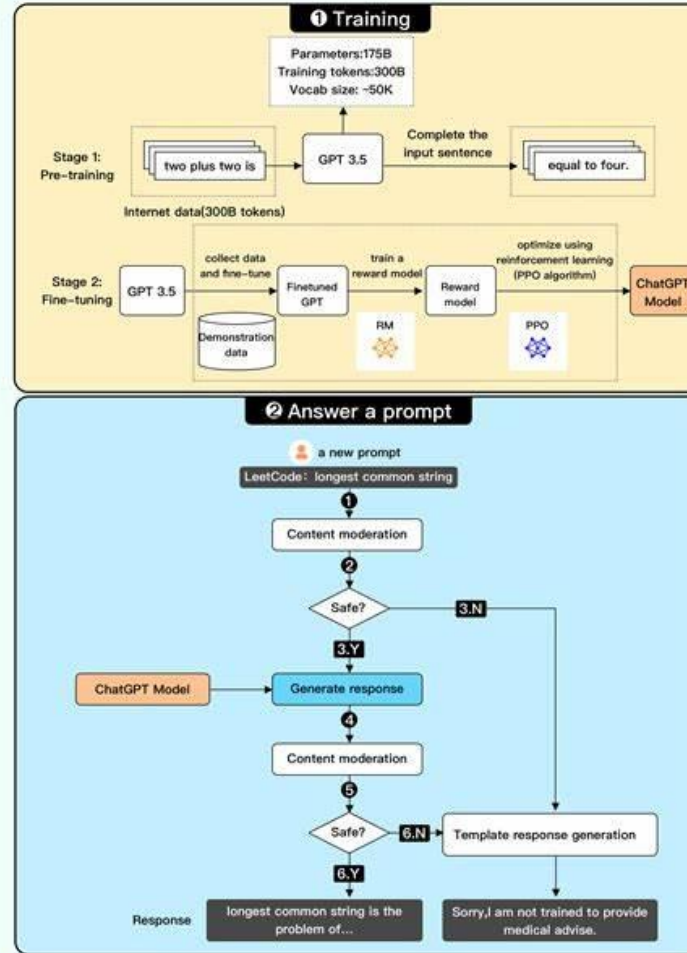


OpenAI releases o1, its first model with ‘reasoning’ abilities
© Image: The Verge

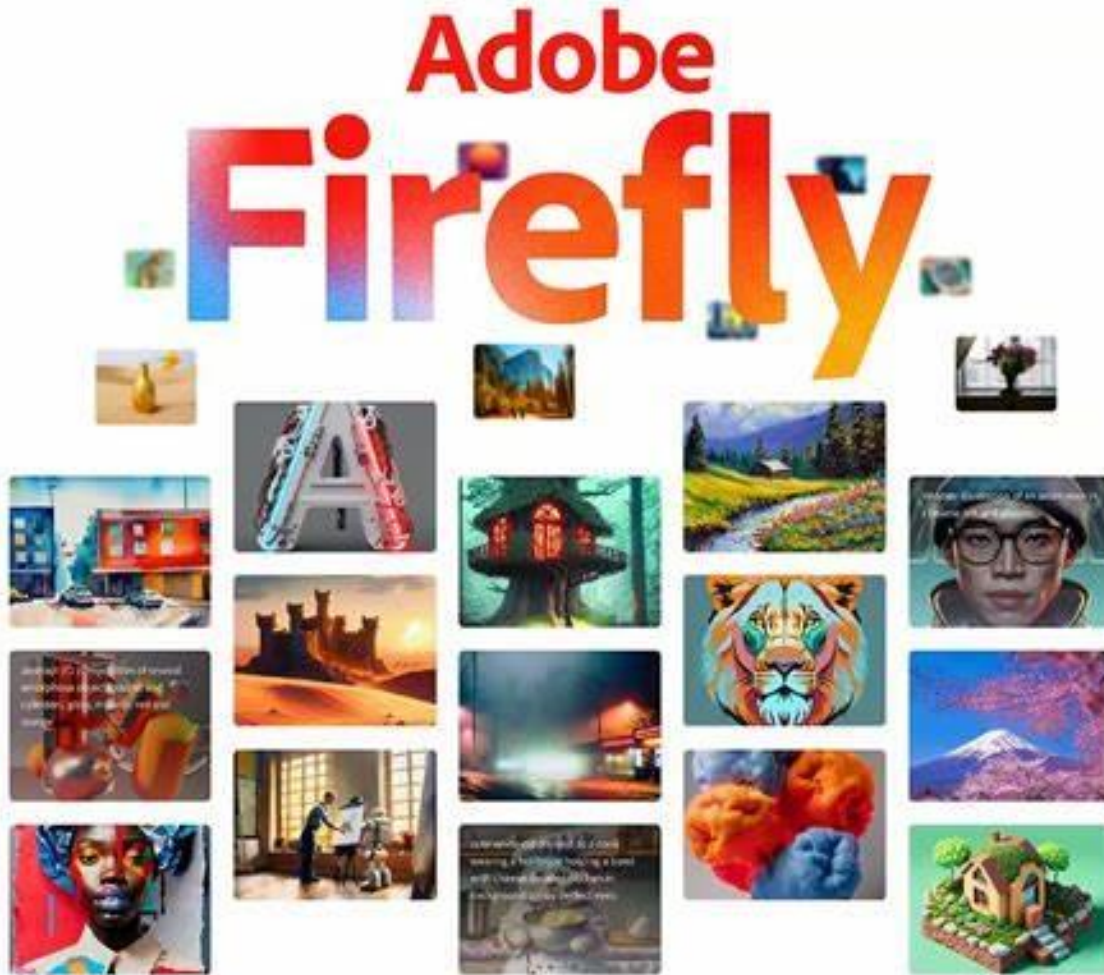
OpenAI is releasing a new model called o1, the first in a planned series of “reasoning” models that have been trained to answer more complex questions, faster than a human can. It’s being released alongside o1-mini, a smaller, cheaper version. And yes, if you’re steeped in AI rumors: this is, in fact, [the extremely hyped Strawberry model](#).

How does ChatGPT-like System Work?

ByteByteGo.com



Best Image Generation



Vedio Generation tool examples

VEED

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Use Cases v

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Talk to Sales

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Screen & webcam recordings that are easy to edit and share online



Subtitles & Transcription

Automatically add subtitles to your videos. Super-fast, accurate transcriptions in seconds

Tools

Video Editor

Add Image to Video

Add Music to Video

Add Text to Video

Music Visualizer

Remove Background Noise from Audio

Remove Background Noise from Video

Text to Speech Video

Subtitles & Transcription

Add Subtitles to Video

Audio to Text

Auto Subtitle Generator

Video Caption Generator

Video to Text

Video Transcription

Video Translator

Toolkit

Crop Video

Loop Video

Resize Video

Rotate Video

Video Background Remover

Video Merger

Video Trimmer

AI Video

AI Avatars

AI Image Generator

AI Video Generator

AI Voice Generator

Eye Contact AI

Text to Video AI

Voice Dubber

Video GPT

More

Audio Editor

Instagram Downloader

Teleprompter

TikTok Downloader

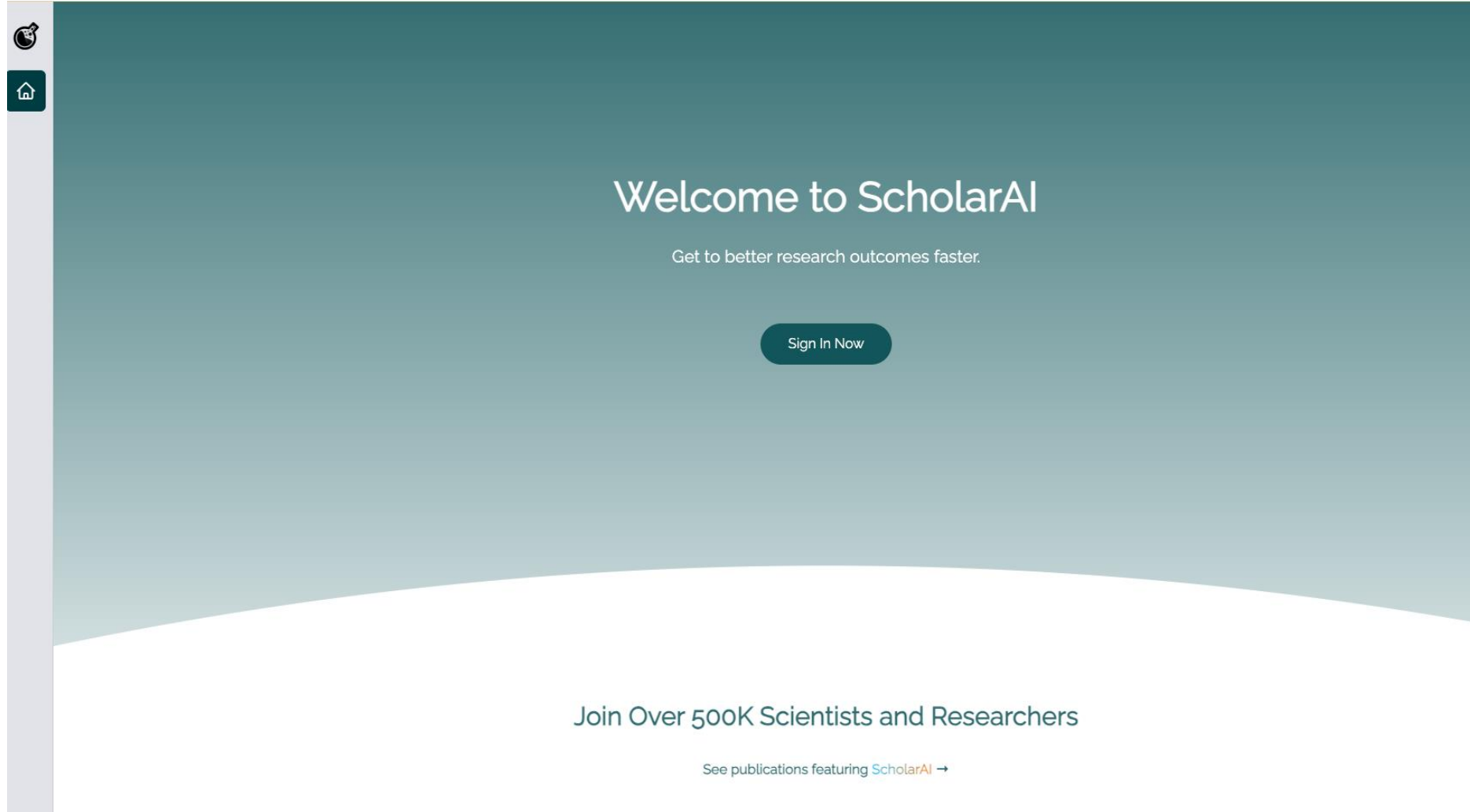
Video Compressor

Video Converter

Webcam Recorder

CHAT
GPT 4





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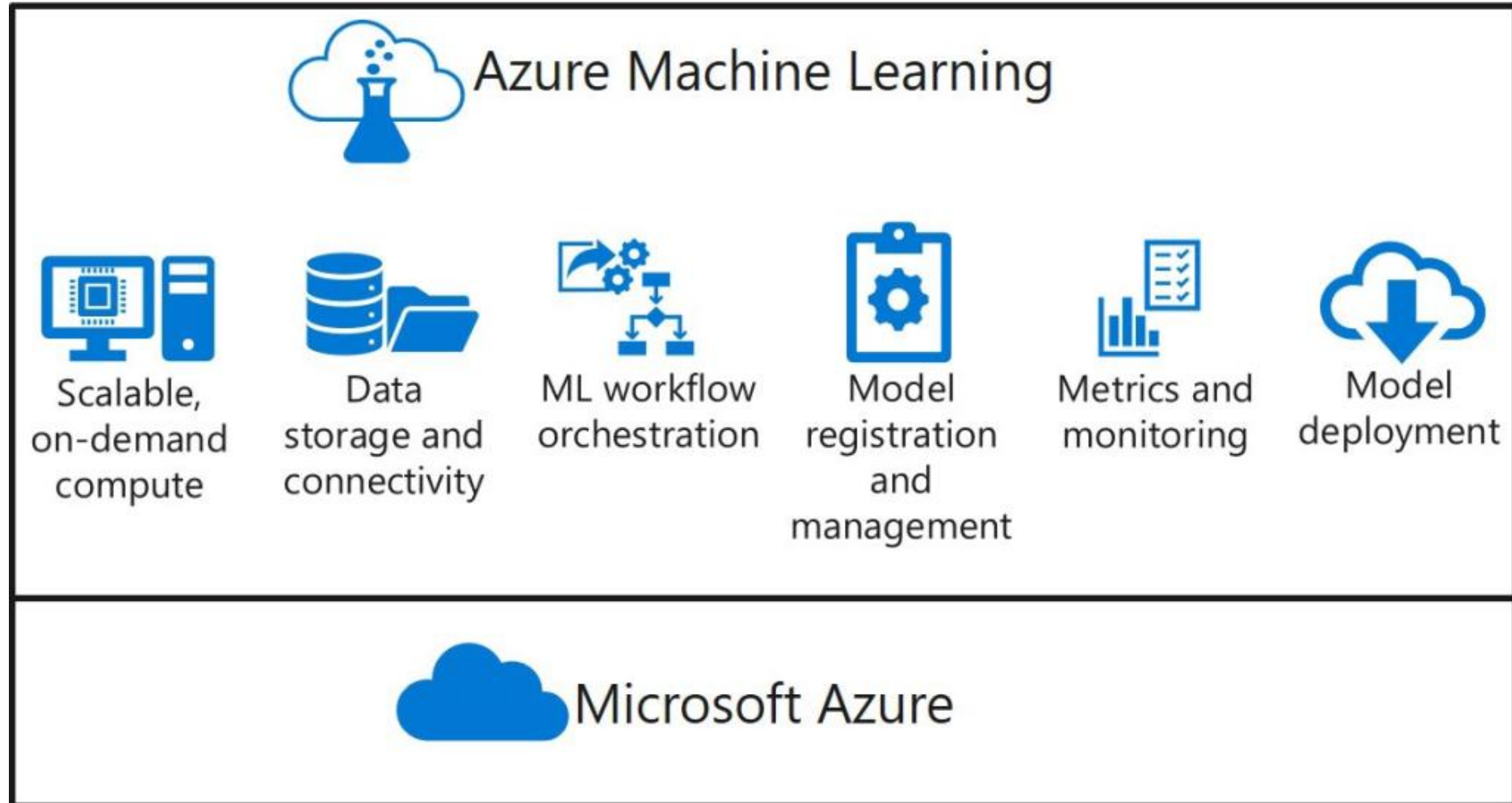
IBM WatsonX

- IBM WatsonX is a next-generation data and AI platform designed to help enterprises accelerate and scale their use of AI. It's a comprehensive suite of AI tools and solutions, allowing organizations to train, fine-tune, deploy, and monitor AI models on a hybrid cloud platform. WatsonX is built with a focus on making AI more accessible, operational, and secure for enterprise use, including generative AI, machine learning, and automation capabilities.

WatsonX is divided into three main components:

- **WatsonX.ai** - A toolkit for building, training, and fine-tuning AI and machine learning models, including foundation models for natural language processing, computer vision, and more. This tool allows enterprises to leverage pre-trained models or create custom ones based on their data.
- **WatsonX.data** - A flexible and scalable data store optimized for AI workloads, providing tools for data collection, cleansing, and preparation. WatsonX.data integrates with various data sources, allowing data scientists to manage and use their data in AI model training seamlessly.
- **WatsonX.governance** - A framework to ensure AI compliance, transparency, and ethical standards by providing tools for AI governance. This helps organizations ensure responsible AI use with mechanisms for tracking, auditing, and enforcing data privacy and security policies.
- WatsonX supports enterprises by providing scalable, responsible, and customizable AI infrastructure and solutions, enhancing decision-making, automation, and data-driven insights across industries.

Azure Machine Learning

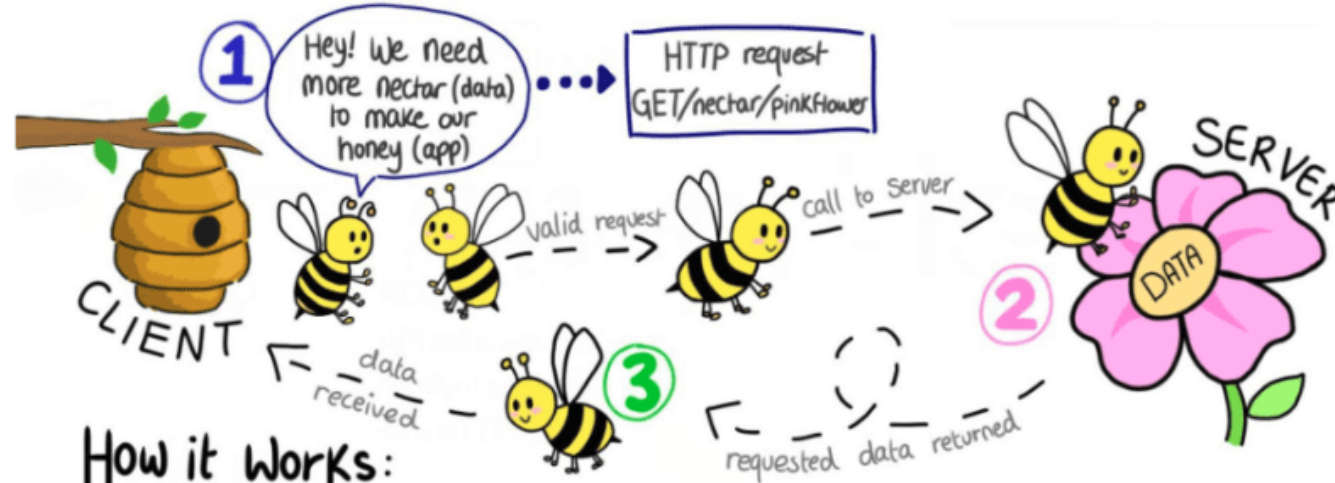


Azure Machine Learning

- Azure Machine Learning (Azure ML) is Microsoft's cloud-based platform for building, training, deploying, and managing machine learning models. It provides tools for data scientists, machine learning engineers, and developers to accelerate the end-to-end machine learning lifecycle on a scalable, secure, and collaborative environment.
1. **Machine Learning Studio:** A user-friendly, drag-and-drop environment that allows users to quickly develop machine learning pipelines without extensive coding. This is helpful for experimenting with models, visualizing data, and building workflows.
 2. **Automated Machine Learning (AutoML):** Azure ML offers automated machine learning capabilities, which simplify the model creation process. Users can select target metrics, and the platform automatically trains and tunes models, identifying the best algorithms and hyperparameters for the data.
 3. **ML Designer:** A tool within Azure ML for visually designing, building, and deploying machine learning models. It allows users to create workflows and pipelines without complex programming, making it accessible for teams with varying technical expertise.
 4. **Experimentation and Training:** Azure ML supports large-scale training with distributed compute options and integrates with popular frameworks like TensorFlow, PyTorch, and scikit-learn. It allows for tracking and logging of experiments, making it easy to review and compare model performance over time.
 5. **Model Registry:** Azure ML provides a model registry for version control, storage, and access management for all models created. This registry enables easy deployment of models to various environments, including cloud, on-premises, and edge devices.
 6. **MLOps (Machine Learning Operations):** MLOps on Azure ML enables continuous integration, delivery, and monitoring of models. It integrates with Azure DevOps, allowing teams to streamline model deployment, scaling, and management while monitoring for drift or degradation in performance.
 7. **Responsible AI:** Azure ML includes tools to support responsible AI practices, such as interpretability, fairness, transparency, and accountability. It provides model explainability tools, fairness assessment, and capabilities to monitor model performance in production.
 8. **Compute Options:** Azure ML offers flexible compute resources, including CPU, GPU, and FPGA-based virtual machines. It also allows users to leverage on-demand, autoscaling, or spot instances to manage cost and performance.
- Azure ML's strengths lie in its scalability, integration with Azure's broader ecosystem, and its support for collaborative, end-to-end machine learning processes. It's particularly valuable for enterprises looking to operationalize AI at scale across their organizations.

What is an API?

An application programming interface allows two programs to communicate. On the web, APIs sit between an application and a web server, and facilitate the transfer of data.



How it Works:

1 Request

API call is initiated by the Client application via a HTTP request

2 Receive

Our worker bee acts as an API, going to a Flower (server) to collect nectar (data)

3 Response

The API transfers the requested data back to the requesting application, usually in JSON format



Copilot in Teams



Copilot in Outlook



Copilot in Word



Copilot in PowerPoint



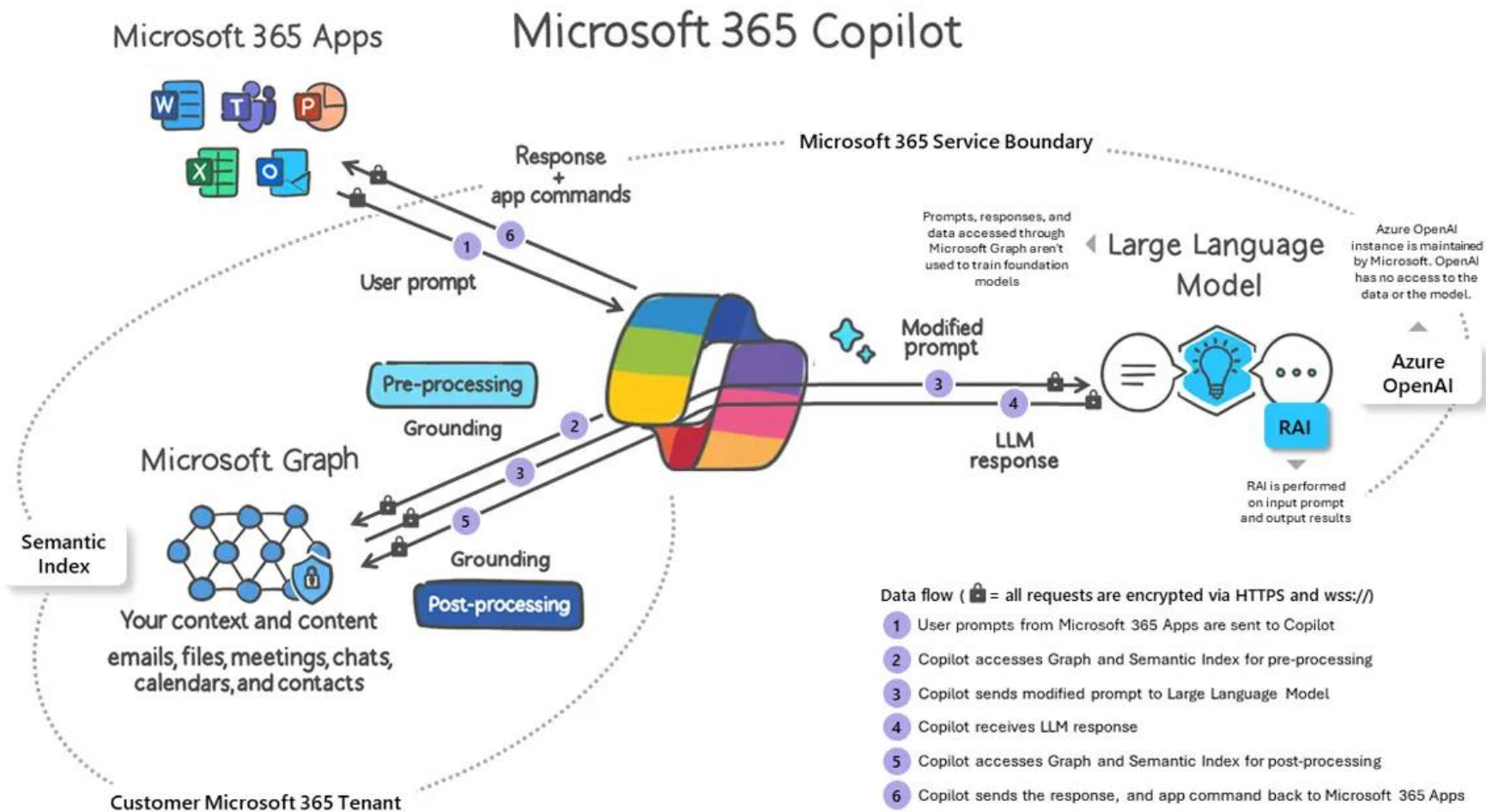
Copilot in Excel



Copilot in OneNote



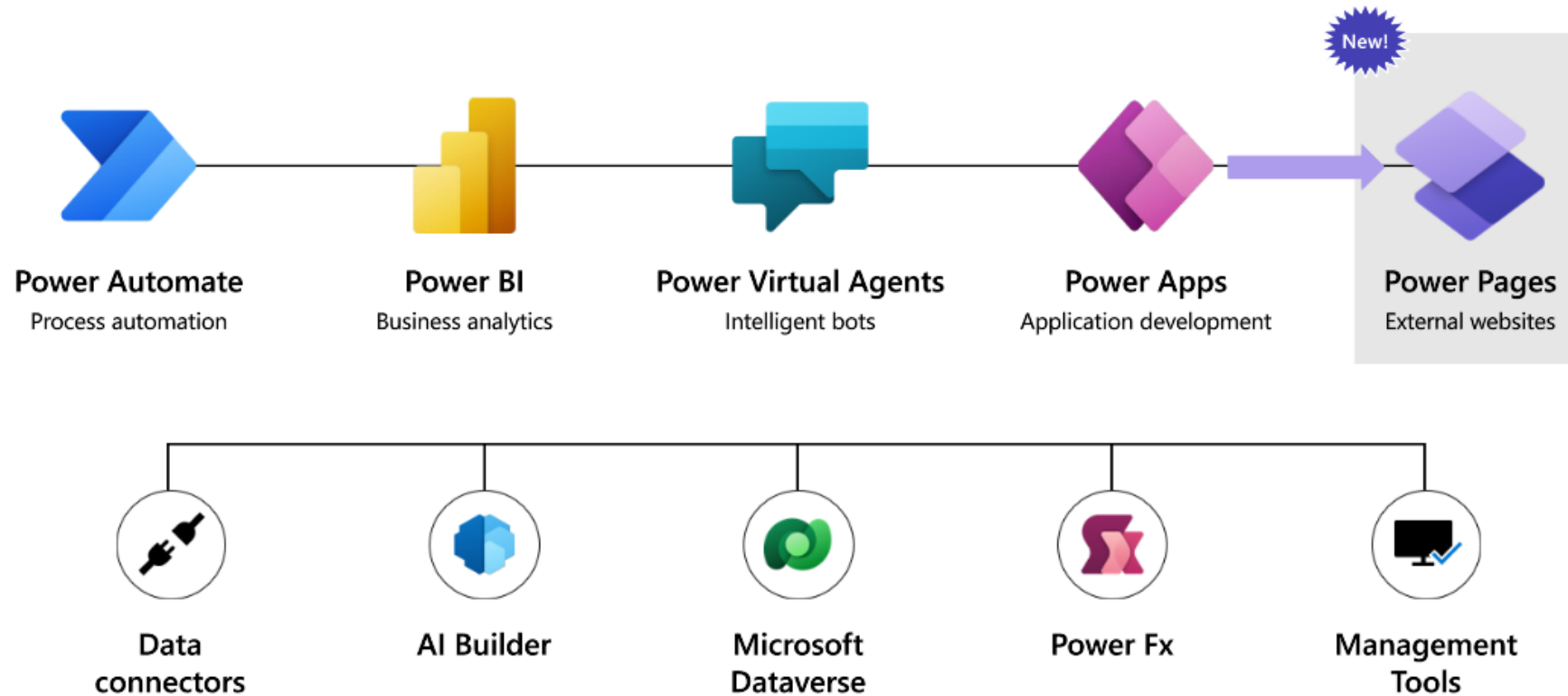
Copilot in Loop



Intelligent Automation with PowerPlatform

Microsoft Power Platform

The low-code platform that spans Office 365, Azure, Dynamics 365, and standalone applications



AI Builder

- With AI Builder, a Microsoft Power Platform feature, you can create and use AI models that optimize your business processes.
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- AI Builder helps your business to automate processes and gain insights from your data in Power Apps and Power Automate.

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Text

Structured data

Images

All

Document processing

Extract custom information from documents

CUSTOM MODEL

Invoice processing

Extract information from invoices

PREBUILT MODEL

Text recognition

Extract all the text in photos and PDF documents (OCR)

PREBUILT MODEL

Receipt processing

Extract information from receipts

PREBUILT MODEL

Identity document reader

Extract information from identity documents

PREBUILT MODEL

Business card reader

Extract information from business cards

PREBUILT MODEL

Sentiment analysis

Detect positive, negative, or neutral sentiment in text data

PREBUILT MODEL

Category classification

Classify customer feedback into predefined categories

PREBUILT MODEL

PREVIEW

Entity extraction

Extract key elements from text, and classifies them into predefined categories

PREBUILT MODEL

Key phrase extraction

Extract most relevant words and phrases from text

PREBUILT MODEL

Language detection

Detect the predominant language of a text document

PREBUILT MODEL

Text translation

Detect and translate more than 90 supported languages

PREBUILT MODEL

Category classification

Classify texts into custom categories

CUSTOM MODEL

Entity extraction

Extract custom entities from your text

CUSTOM MODEL

Prediction

Predict future outcomes from historical data

CUSTOM MODEL

Object detection

Detect custom objects in images

CUSTOM MODEL

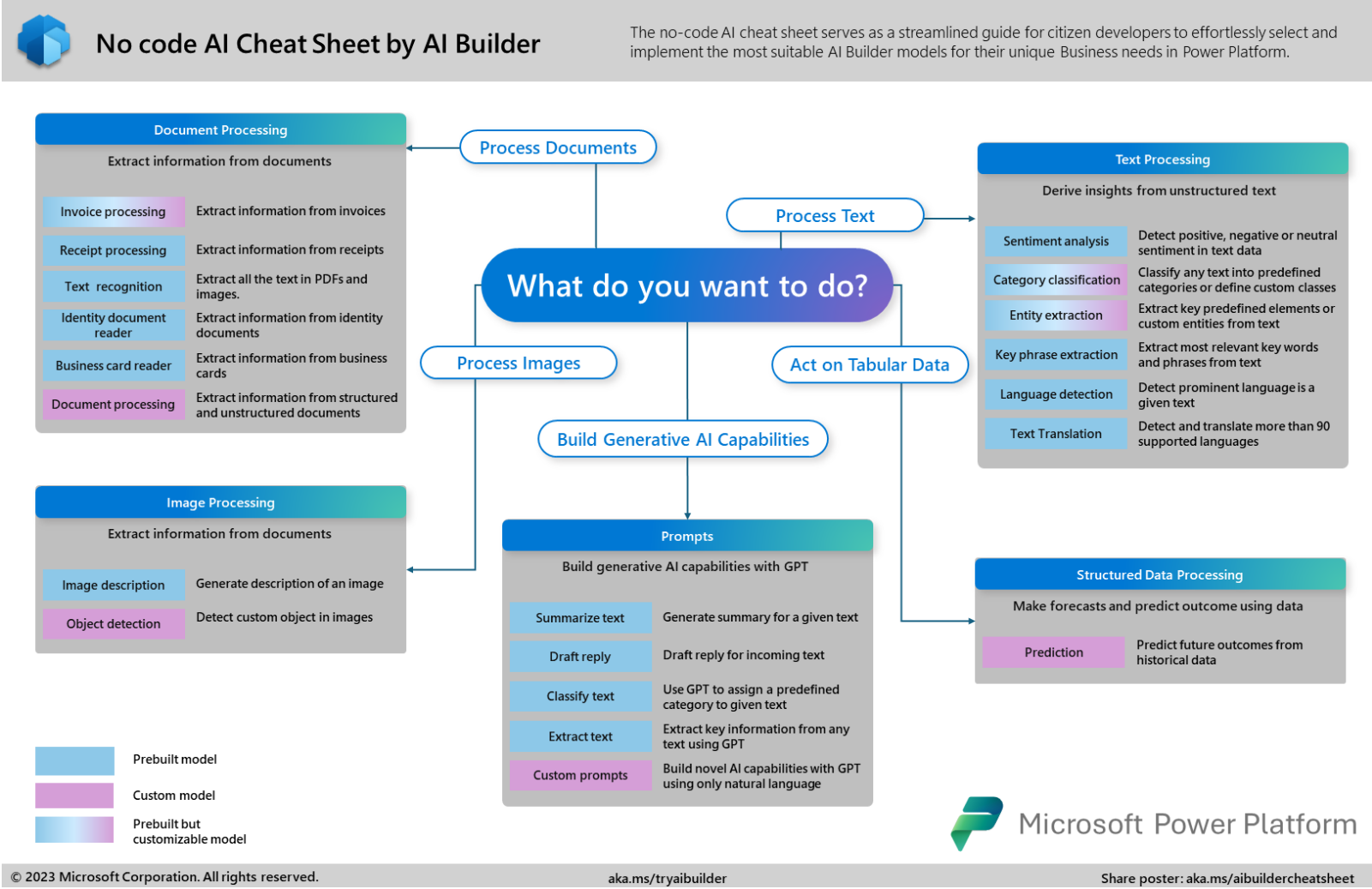
Image description

Generate description of an image

PREBUILT MODEL

PREVIEW

Overview of AI Builder



PowerAutomate

Microsoft Build: Learn about the new AI features that optimize process automation. [Read the blog](#)

Power Automate

A comprehensive, end-to-end cloud automation platform powered by low code and AI.

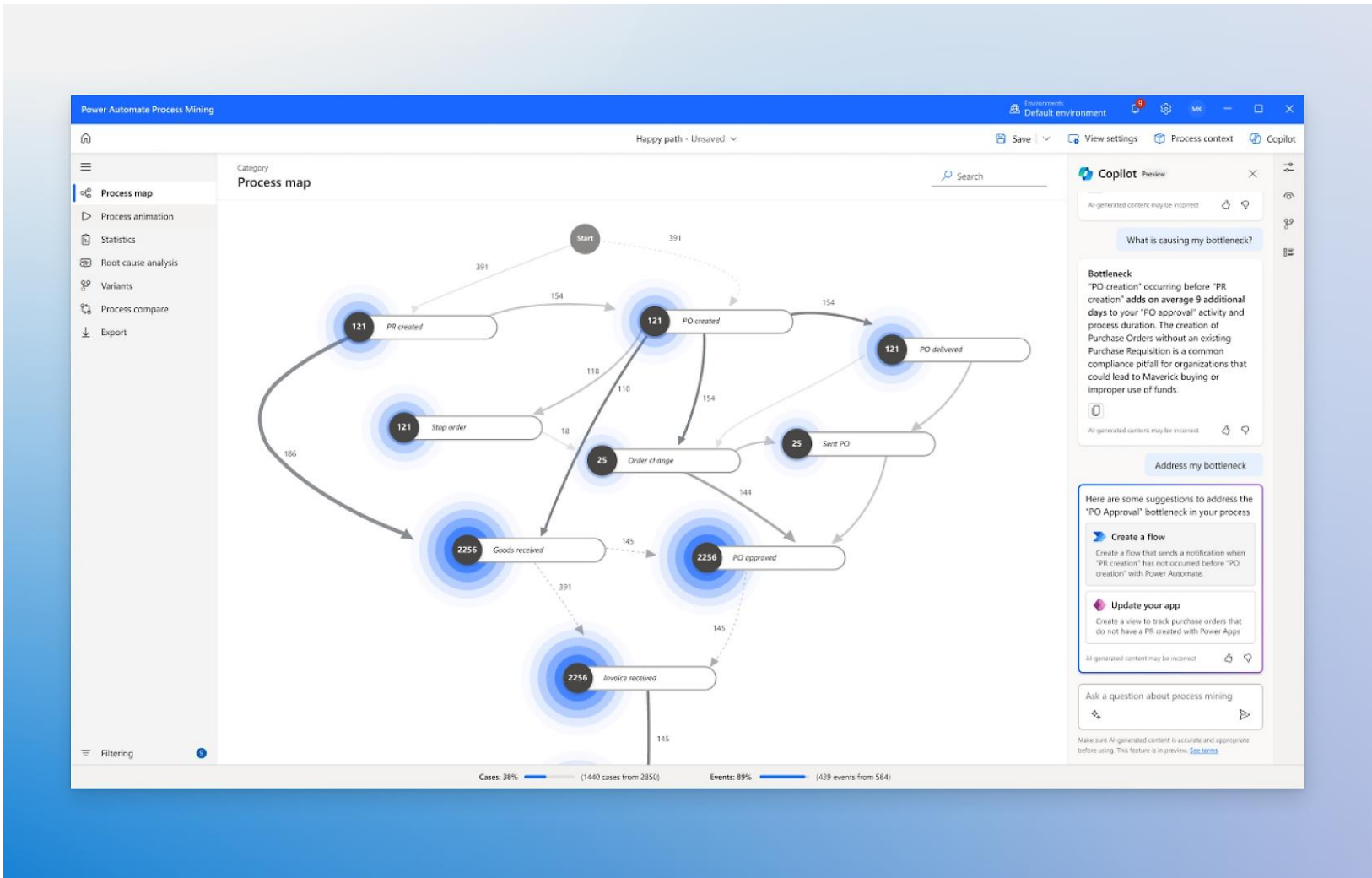


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New flow

Create Text with GPT using Dynamic Prompts

Inputs Settings Code View About

Dynamic Prompt *

My Custom Summarize

Prompt *

Summarize Body, taking into account the Attached file and the Conversation history

Test or edit prompt

Connected to mokane@contoso.com
[Change connection](#)

When a new email arrives

Create Text with GPT using Dynamic Prompts

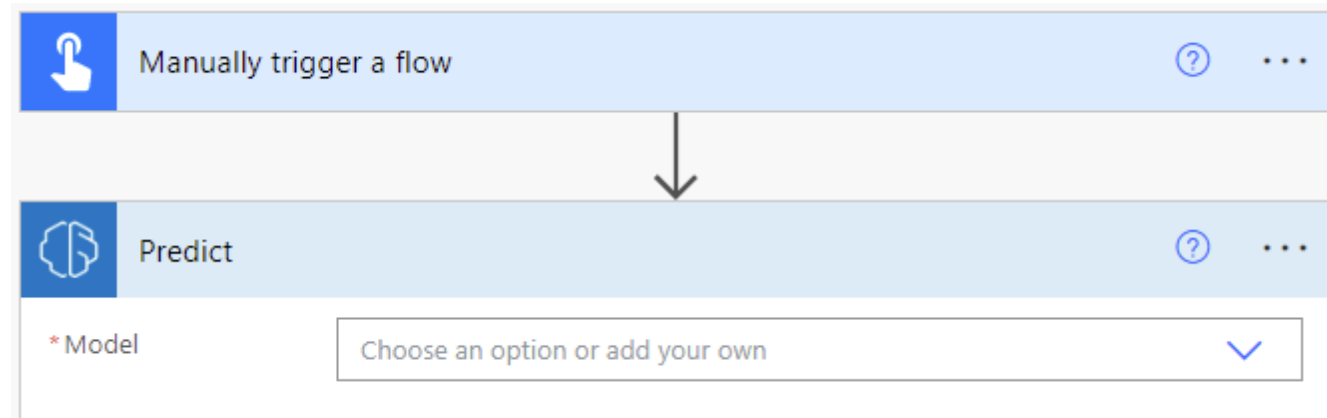
AI Builder in Power Automate overview

- [Business card reader model](#)
- [Category classification model](#)
- [Entity extraction model](#)
- [ID reader model \(preview\)](#)
- [Key phrase extraction model](#)
- [Language detection model](#)
- [Receipt processing model \(preview\)](#)
- [Sentiment analysis model](#)
- [Text recognition model](#)
- [Text translation model](#)

**Prebuilt AI models you
can use in Power
Automate right away**

AI Builder in Power Automate overview

- Custom AI models that you build and train
 - [Category classification model](#)
 - [Entity extraction model](#)
 - [Document processing model](#)
 - [Object detection model](#)
 - [Prediction model](#)



Azure OpenAI Service

Build your own copilot and generative AI applications



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[See new features and capabilities in Azure OpenAI Service](#)

AZURE OPEN AI

- Azure OpenAI is a cloud-based service from Microsoft that provides access to OpenAI's powerful models, including GPT (Generative Pre-trained Transformer) series, Codex, and DALL-E, hosted on Microsoft Azure. Azure OpenAI allows enterprises and developers to integrate advanced natural language processing, code generation, and image generation capabilities into applications using the power of Azure's infrastructure. This service is tailored to support the development of AI-driven applications securely, at scale, and with enterprise-grade compliance and reliability.

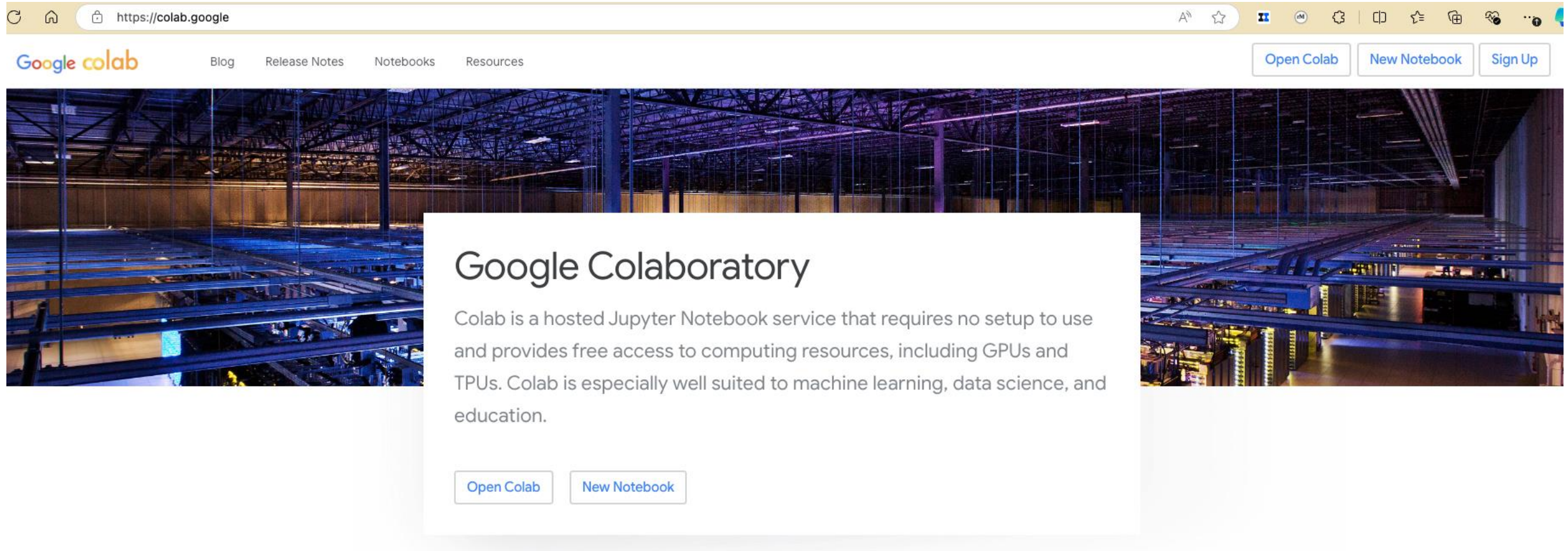
Key Features of Azure OpenAI

- 1. **Access to Advanced Models:** Azure OpenAI provides APIs to access various OpenAI models, such as:
 - **GPT-3 and GPT-4:** For tasks like language understanding, content creation, summarization, and answering questions.
 - **Codex:** A model specialized for code generation, enabling applications like code completion, bug fixing, and even generating entire functions from natural language prompts.
 - **DALL-E:** An image generation model that creates visuals based on textual descriptions, useful for creative tasks like design, marketing, and content creation.
- 2. **Customizability and Fine-Tuning:** Azure OpenAI allows users to fine-tune models with specific datasets, adapting the models to specific business needs or to improve performance for certain tasks, such as customer support, personalized recommendations, or specialized content creation.
- 3. **Enterprise Security and Compliance:** Leveraging Azure's cloud infrastructure, Azure OpenAI offers robust security features, including Azure Active Directory (AAD) integration, virtual network isolation, and data encryption. The service complies with key industry standards like ISO, HIPAA, and SOC, making it suitable for applications in industries with strict data privacy regulations.
- 4. **Scalability and Reliability:** Azure OpenAI benefits from Azure's global data centers, providing scalable compute resources for deploying AI models. The infrastructure is designed to support high availability and resilience, enabling organizations to deploy applications on a large scale.
- 5. **Integrated MLOps and Governance:** Users can incorporate Azure OpenAI within Azure's broader machine learning ecosystem, enabling MLOps (Machine Learning Operations) for monitoring, managing, and iterating on model deployments. Additionally, the Azure OpenAI service includes tools for responsible AI, helping organizations ensure transparency, fairness, and safety in their AI applications.

DATA SCIENCE

Data science is an interdisciplinary field that uses various techniques, processes, algorithms, and systems to extract insights and knowledge from structured and unstructured data. It combines elements from statistics, computer science, mathematics, and domain expertise to analyze data, build predictive models, and solve complex problems.





The screenshot shows the Google Colaboratory website. At the top, there's a navigation bar with the Google Colab logo, links for 'Blog', 'Release Notes', 'Notebooks', and 'Resources', and three buttons: 'Open Colab', 'New Notebook', and 'Sign Up'. Below the navigation bar is a large banner image of a server room. Overlaid on the banner is a white box containing the text 'Google Colaboratory' and a description of the service. At the bottom of this box are two buttons: 'Open Colab' and 'New Notebook'.

https://colab.google

Google colab

Blog Release Notes Notebooks Resources

Open Colab New Notebook Sign Up

Google Colaboratory

Colab is a hosted Jupyter Notebook service that requires no setup to use and provides free access to computing resources, including GPUs and TPUs. Colab is especially well suited to machine learning, data science, and education.

Open Colab New Notebook

- Google Colab (short for “Collaboratory”) is a free, cloud-based platform developed by Google that allows users to write, execute, and share Python code within an interactive, Jupyter Notebook environment. Colab provides access to powerful computational resources, including GPUs and TPUs, making it popular for data science, machine learning, and deep learning tasks.

AI Tools and Digital Enablers for HR Excellence

- **Topics:**

- AI tools for HR functions: recruitment automation, talent analytics, workforce planning
- Sharjah's focus on digital enablers and institutional excellence
- Case studies of AI applications in HR to improve service delivery

- **Learning Outcomes:**

- Identify and apply AI tools to streamline HR processes and improve decision-making
- Understand the role of AI in achieving operational excellence

Recruitment Automation Tools

- AI-powered tools for automating job postings, resume screening, and candidate ranking
- Examples: **HireVue**
- Impact: Saving time, reducing bias in the hiring process

AUTOMATED INTERVIEW BUILDER

Build Structured Interviews in Seconds

HireVue Builder, a structured interviewing tool, is a first-of-its-kind interview automation software that serves up job-related competencies, structured interview questions, templates, and evaluation guides for any job role at any level to allow hiring teams to build great interviews, fast.

[Try Builder Now](#)

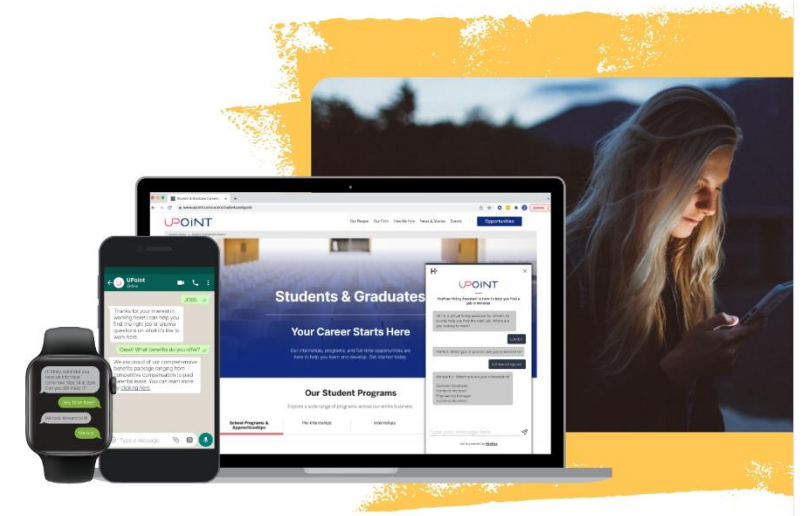


AI HIRING ASSISTANT

Rely on a 24/7 hiring assistant and get back to focusing on what matters—and let our AI-powered recruiting platform handle the rest

HireVue's Hiring Assistant can help candidates unlock their potential by matching their skills with available job opportunities. Our advanced AI recruiting solutions ensure that tricky titles or confusing job descriptions don't slow down the recruiting process.

[Learn How](#)



Predictive Analytics in Talent Management

- Tools for predictive analytics in employee performance, retention, and development

Predictive analytics and AI in HR are transforming the way organizations approach employee retention. By using data to predict employee turnover and identify at-risk individuals, HR teams can proactively address concerns, enhance employee satisfaction, and reduce turnover costs. With proper implementation, these technologies can become essential components of a successful HR strategy, helping companies retain top talent and create a more engaged, committed workforce.



THE BIG PIVOT

What is Performance Enablement?

The rate of change in the macroenvironment and world of work is increasing rapidly. Leaders believe only 41% of employees are performing optimally. If change is the only constant, what is the lasting competitive advantage? Your people. You need a deliberate motion of delivering performance to continue winning in the market.

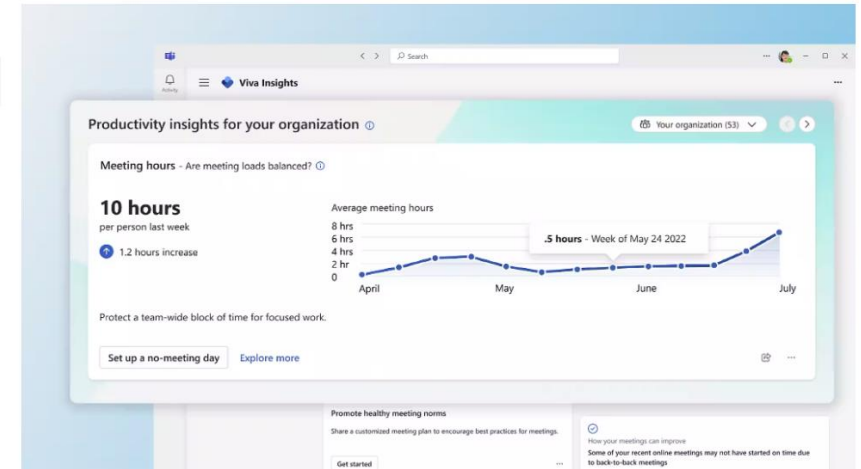
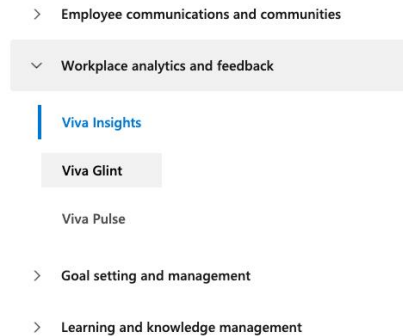
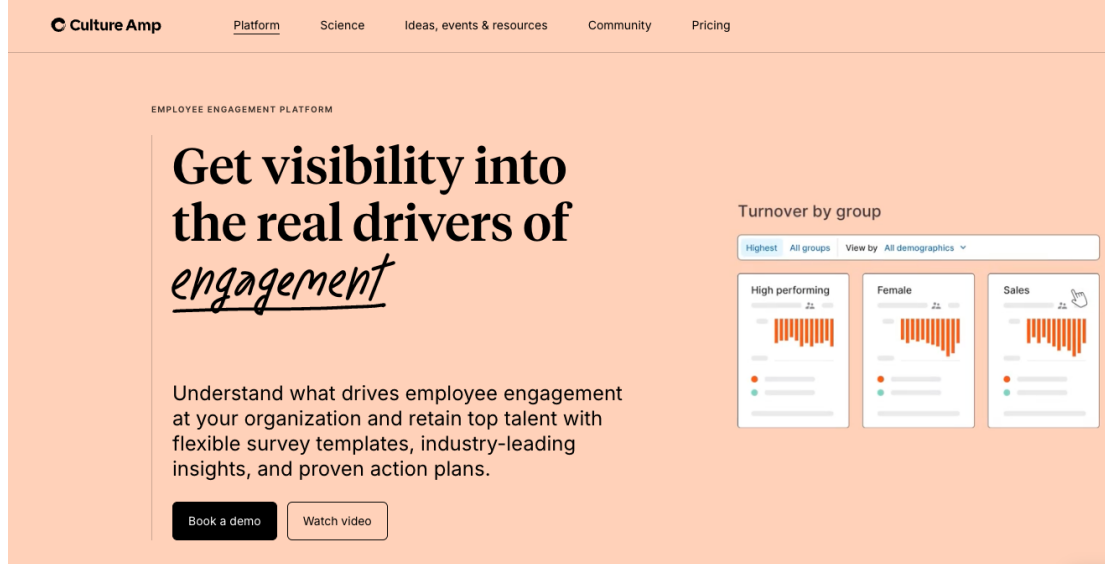


HR Analytics Prediction: Why do People Resign?

- predict which employees are more likely to leave the company.
- <https://www.kaggle.com/code/soylevbeytullah/human-resources-department#Employee-Attrition-Prediction-Using-Machine-Learning>
- <https://www.kaggle.com/code/paramarthasengupta/hr-analytics-prediction-why-do-people-resign#Prediction--Considering-all-the-inputs!>

AI-Powered Employee Engagement Tools

- AI chatbots for 24/7 employee support (e.g., CoPILOT, **Leena AI**)
- AI platforms for collecting and analyzing employee feedback (e.g., **Qualtrics**, **CultureAmp**)
- Personalization of employee experiences using AI-driven insights



Sentiment Analysis in HR

- Using natural language processing (NLP) to gauge employee sentiment from surveys, emails, and feedback
- Tools like for sentiment analysis <https://www.medallia.com/customers/>
- Impact: Enhancing organizational culture and satisfaction

AI in Learning & Development

- Adaptive learning platforms that personalize employee training paths
- Examples: **Coursera for Business, LinkedIn Learning**
- AI-driven insights into skills gaps and future training needs

Workforce Planning and Analytics

- Predictive modeling for workforce demand and supply
- Tools for talent forecasting (e.g., **Workday Adaptive Planning, Visier**)
- AI's role in identifying future workforce needs

Chatbots and Virtual Assistants in HR

- • Role of AI chatbots in handling HR inquiries and streamlining HR services
- • Tools like **Olivia by Paradox**, **Workday Assistant**
- • Impact: 24/7 employee assistance and improved HR service efficiency

AI-Driven Employee Onboarding

- Automating the onboarding process using AI platforms
- Benefits: Faster onboarding, enhanced new hire experience
- Example: AI onboarding platforms like **Enboarder, Appical**

Data-Driven HR Decisions

- How AI helps HR professionals make better, data-driven decisions
- Real-time HR dashboards (e.g., **Microsoft Power BI, Tableau**) to track performance metrics Machine learning to predict such as Azure Machine Learning , IBM Watson or SaaS

Case Study 1: IA in Recruitment

- • Example of a government department using Intelligent automation to automate the hiring process
- • Impact: Faster recruitment cycles and reduced bias

Slide 17: Case Study 2: Employee Engagement

- AI-driven platforms improving employee engagement in a large government organization
- Results: Increased employee satisfaction and retention

Data Mining and AI Algorithms



4

Prescriptive

التوجيهية

- تحدد الإجراءات المستقبلية – أي، “ماذا يجب أن يحدث التالي؟”
- تستند إلى تحليلات بيانات حالية، خطط مستقبلية محددة مسبقًا، أهداف وموضوعات
- خوارزميات متقدمة لاختبار النتائج المحتملة لكل قرار وتوصي بأفضل مسار للعمل

3

Predictive

التنبؤية

- تستند إلى بيانات تاريخية وتفترض خطط أعمال ثابتة
- تساعد قرارات الأعمال على أن تكون مؤتمتة باستخدام الخوارزميات



2

Diagnostic

التشخيصية

- RCA آلي - تحليل الأسباب الجذرية
- يشرح “لماذا” تحدث الأمور
- يساعد في تحديد مشكلات وحلها

1

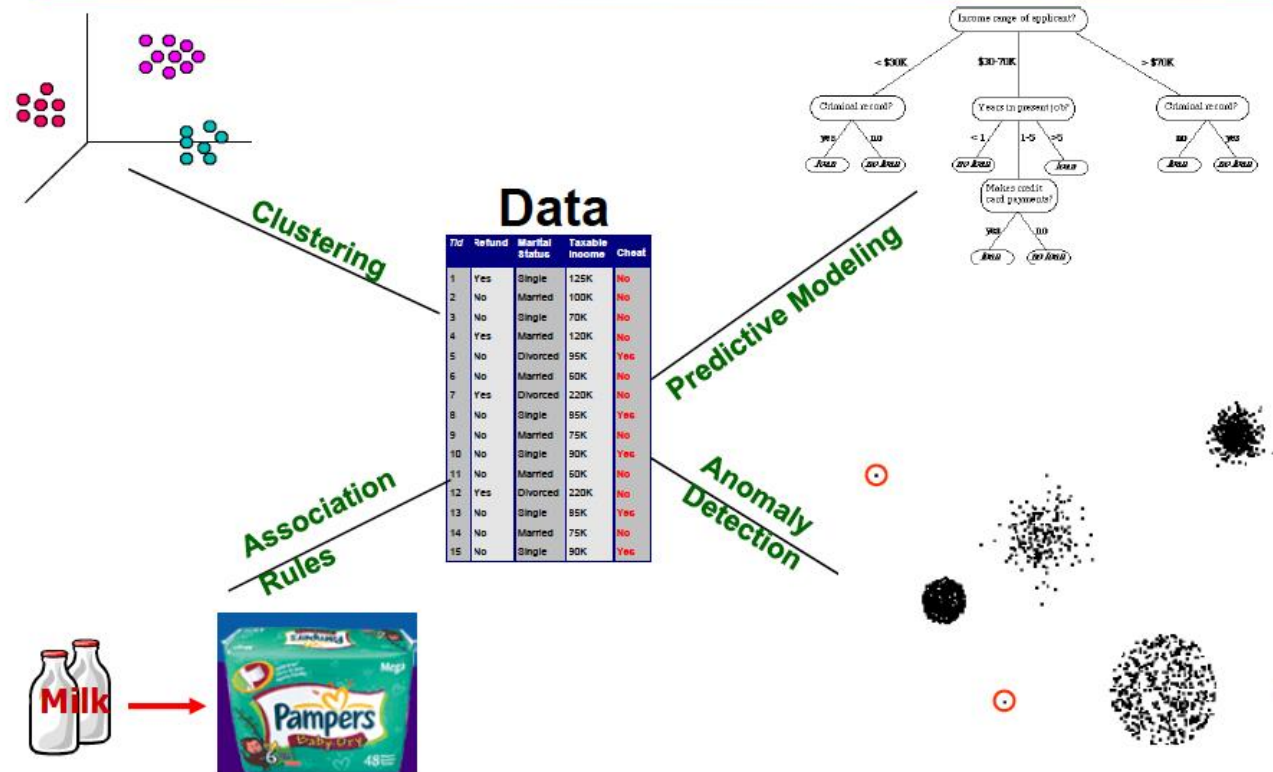


الوصفية

- تستند إلى بيانات مباشرة
- تخبر بما يحدث في الوقت الحقيقي
- دقيقة ومفيدة لإدارة العمليات
- سهولة التصور

التعقيد

Data Mining Tasks ...



01/17/2018

Introduction to Data Mining, 2nd Edition

14

Classification: Application 1

- Fraud Detection
 - **Goal:** Predict fraudulent cases in credit card transactions.
 - **Approach:**
 - ◆ Use credit card transactions and the information on its account-holder as attributes.
 - When does a customer buy, what does he buy, how often he pays on time, etc
 - ◆ Label past transactions as fraud or fair transactions. This forms the class attribute.
 - ◆ Learn a model for the class of the transactions.
 - ◆ Use this model to detect fraud by observing credit card transactions on an account.

Classification: Application 2

- Churn prediction for telephone customers
 - **Goal:** To predict whether a customer is likely to be lost to a competitor.
 - **Approach:**
 - ◆ Use detailed record of transactions with each of the past and present customers, to find attributes.
 - How often the customer calls, where he calls, what time-of-the day he calls most, his financial status, marital status, etc.
 - ◆ Label the customers as loyal or disloyal.
 - ◆ Find a model for loyalty.

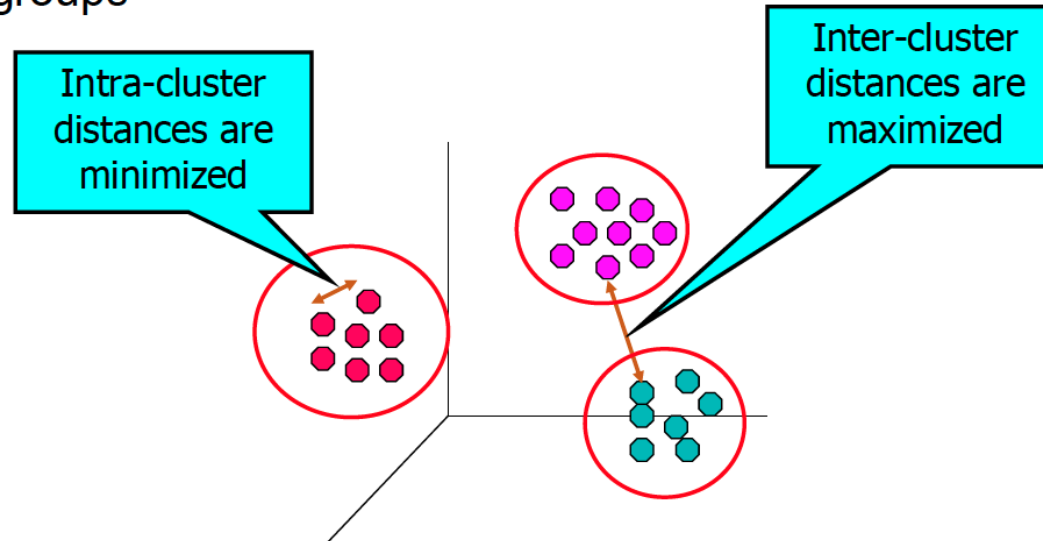
From [Berry & Linoff] Data Mining Techniques, 1997

Regression

- Predict a value of a given continuous valued variable based on the values of other variables, assuming a linear or nonlinear model of dependency.
- Extensively studied in statistics, neural network fields.
- Examples:
 - Predicting sales amounts of new product based on advertising expenditure.
 - Predicting wind velocities as a function of temperature, humidity, air pressure, etc.
 - Time series prediction of stock market indices.

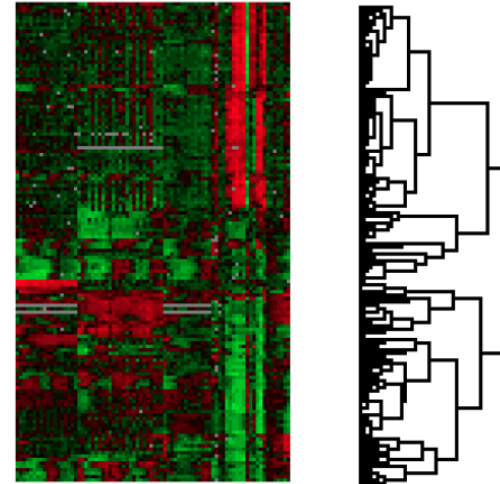
Clustering

- Finding groups of objects such that the objects in a group will be similar (or related) to one another and different from (or unrelated to) the objects in other groups

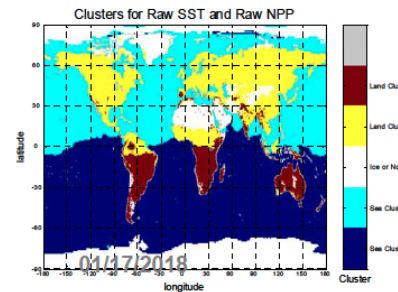


Applications of Cluster Analysis

- **Understanding**
 - Custom profiling for targeted marketing
 - Group related documents for browsing
 - Group genes and proteins that have similar functionality
 - Group stocks with similar price fluctuations
- **Summarization**
 - Reduce the size of large data sets



Courtesy: Michael Eisen



Use of K-means to partition Sea Surface Temperature (SST) and Net Primary Production (NPP) into clusters that reflect the Northern and Southern Hemispheres.

Introduction to Data Mining, 2nd Edition



Clustering: Application 1

- Market Segmentation:
 - **Goal:** subdivide a market into distinct subsets of customers where any subset may conceivably be selected as a market target to be reached with a distinct marketing mix.
 - **Approach:**
 - ◆ Collect different attributes of customers based on their geographical and lifestyle related information.
 - ◆ Find clusters of similar customers.
 - ◆ Measure the clustering quality by observing buying patterns of customers in same cluster vs. those from different clusters.

Association Rule Discovery: Definition

- Given a set of records each of which contain some number of items from a given collection
 - Produce dependency rules which will predict occurrence of an item based on occurrences of other items.

<i>TID</i>	<i>Items</i>
1	Bread, Coke, Milk
2	Beer, Bread
3	Beer, Coke, Diaper, Milk
4	Beer, Bread, Diaper, Milk
5	Coke, Diaper, Milk

Rules Discovered:

{Milk} --> {Coke}

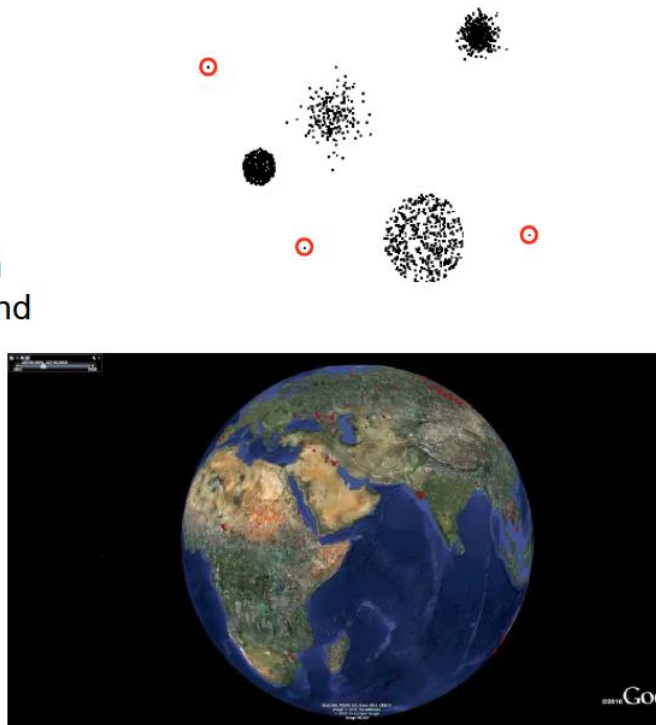
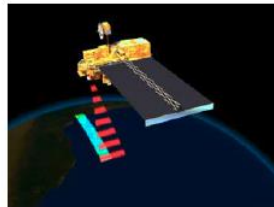
{Diaper, Milk} --> {Beer}

Association Analysis: Applications

- Market-basket analysis
 - Rules are used for sales promotion, shelf management, and inventory management
- Telecommunication alarm diagnosis
 - Rules are used to find combination of alarms that occur together frequently in the same time period
- Medical Informatics
 - Rules are used to find combination of patient symptoms and test results associated with certain diseases

Deviation/Anomaly/Change Detection

- Detect significant deviations from normal behavior
- Applications:
 - Credit Card Fraud Detection
 - Network Intrusion Detection
 - Identify anomalous behavior from sensor networks for monitoring and surveillance.
 - Detecting changes in the global forest cover.

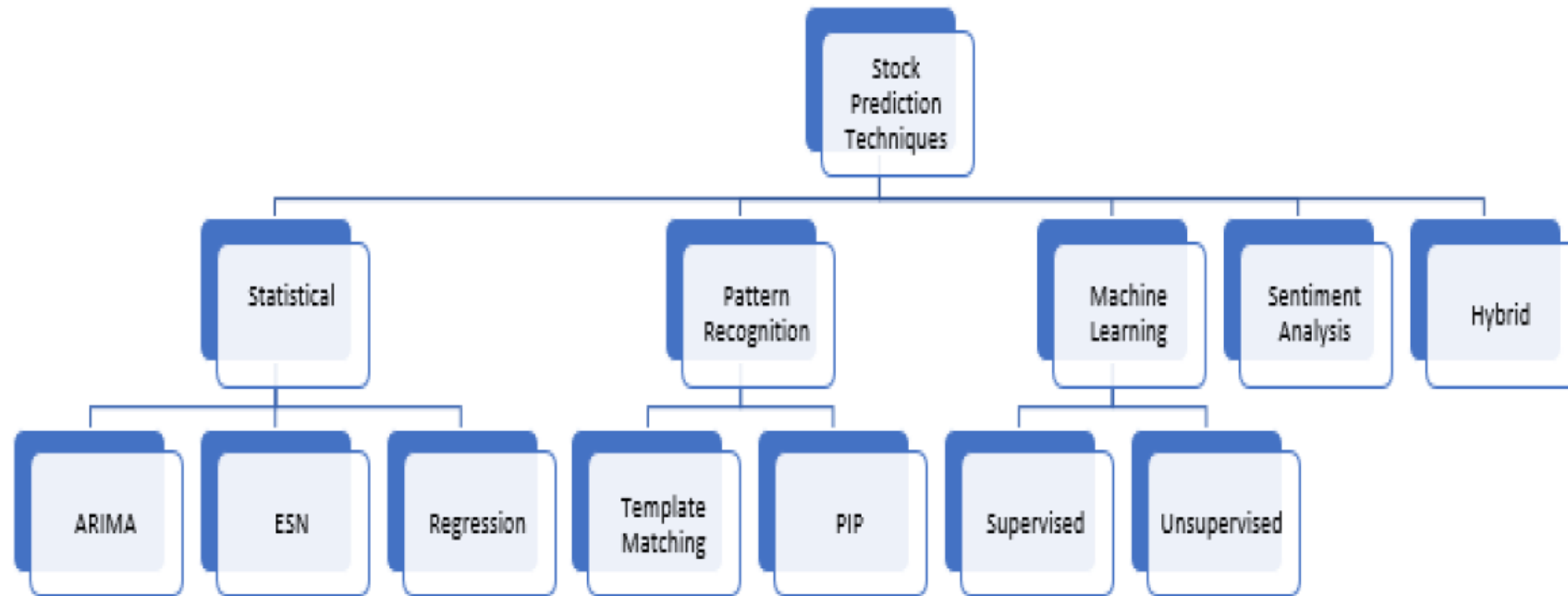


Top 8 Time Series Algorithms

(And their strengths / weaknesses)

Algorithm Name	Description	Pros	Cons	Local vs Global
ARIMA (AutoRegressive Integrated Moving Average)	A statistical model for analyzing and forecasting time series data, focusing on finding patterns in the data.	Flexible, handles a wide range of time series patterns.	Complex to understand and implement, requires stationary data. AutoARIMA has helped improve several of these drawbacks.	Local only. Cannot be used globally.
Prophet	Developed by Facebook, tailored for business forecasting with daily observations and strong seasonal patterns.	Easy to use, handles outliers well, good for daily data with seasonal patterns.	Less effective for non-daily data or data without strong seasonality. Has received a lot of scrutiny following the Zillow collapse.	Local only. Cannot be used globally.
LSTM (Long Short-Term Memory)	A type of neural network algorithm, effective for predictions based on time series data.	Excellent at capturing long-term dependencies in data.	Requires large amounts of data, computationally expensive.	Can be used locally or globally.
Holt-Winters Method	Captures trend and seasonality for forecasting, useful for seasonal data.	Good for data with trend and seasonal patterns, straightforward implementation.	May not handle non-seasonal data well, can be sensitive to parameter choices.	Local only. Cannot be used globally.
SARIMA (Seasonal ARIMA)	An extension of ARIMA that incorporates seasonality.	Handles both trend and seasonality, flexible model structure.	Can be complex to configure, requires stationary data. AutoARIMA has helped improve several of these drawbacks.	Local only. Cannot be used globally.
Exponential Smoothing	A time series forecasting method that applies weighted averages of past observations.	Simple to implement, good for data with no clear trend or seasonal pattern.	May not be as accurate for complex data, struggles with complex trend and seasonality.	Local only. Cannot be used globally.
Random Forest	An ensemble learning method using decision trees, applicable for various prediction tasks.	Handles a variety of data types, robust to outliers. Can detect complex seasonality and handles exogenous regressors well as features.	Can be slow to train on large datasets, may overfit if not tuned properly. Cannot predict above max or below min.	Can be used locally or globally.
XGBoost	A scalable implementation of gradient boosting, effective for a range of prediction problems.	High performance, handles various types of data, good for large datasets. Can detect complex seasonality and handles exogenous regressors well as features.	Can be complex to tune, prone to overfitting without proper regularization. Cannot predict above max or below min.	Can be used locally or globally.

Role of Analytics in Financial Markets



Shah, D., Isah, H., & Zulkernine, F. (2019). Stock market analysis: A review and taxonomy of prediction techniques. International Journal of Financial Studies, 7(2), 26.

Stock Market Charts

Market Summary > Apple Inc

125.12 USD

-2.67 (2.09%) ↓

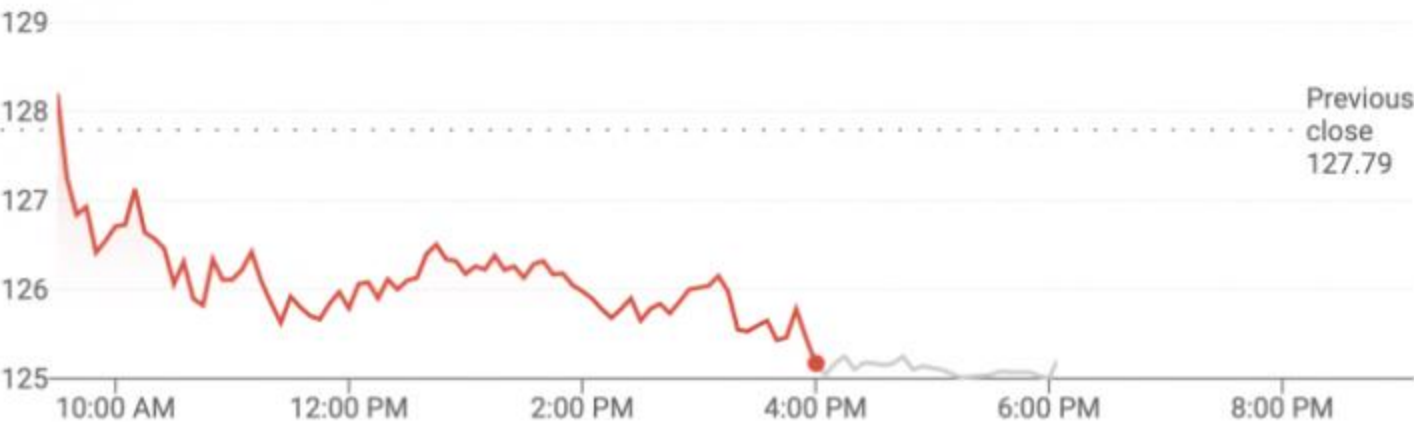
Closed: Mar 2, 6:06 PM EST · Disclaimer

After hours 125.15 +0.030 (0.024%)

NASDAQ: AAPL

+ Follow

1 day | 5 days | 1 month | 6 months | ytd | 1 year | 5 years | max



Open	128.41	Mkt cap	2.10T	Prev close	127.79
High	128.72	P/E ratio	33.82	52-wk high	145.09
Low	125.01	Div yield	0.66%	52-wk low	53.15

Role of Analytics in Financial Markets

Statistical approaches

- univariate analysis, due to their use of time series as input variables,
 - Auto-Regressive Moving Average (ARMA)
 - Auto-Regressive Integrated Moving Average (ARIMA)
 - Generalized Autoregressive Conditional Heteroskedastic (GARCH)
 - Smooth Transition Autoregressive (STAR) model
- Multivariate analysis, which utilize multiple input variables
 - Linear Discriminant Analysis (LDA),
 - Quadratic Discriminant Analysis (QDA),
 - Regression algorithms.

Role of Analytics in Financial Markets

Sentiment Analysis approaches

- It is the process of predicting stock trends via automatic analysis of text corpuses such as news feeds or tweets specific to stock markets and public companies.
- The sentiment classification techniques are mainly divided into machine learning approach and lexicon-based approach
- which is further divided into dictionary-based or corpus-based approaches
- There is potential for using sentiment signals from an unstructured text for improving the models for predicting volatility trends in the stock market.

Role of Analytics in Financial Markets

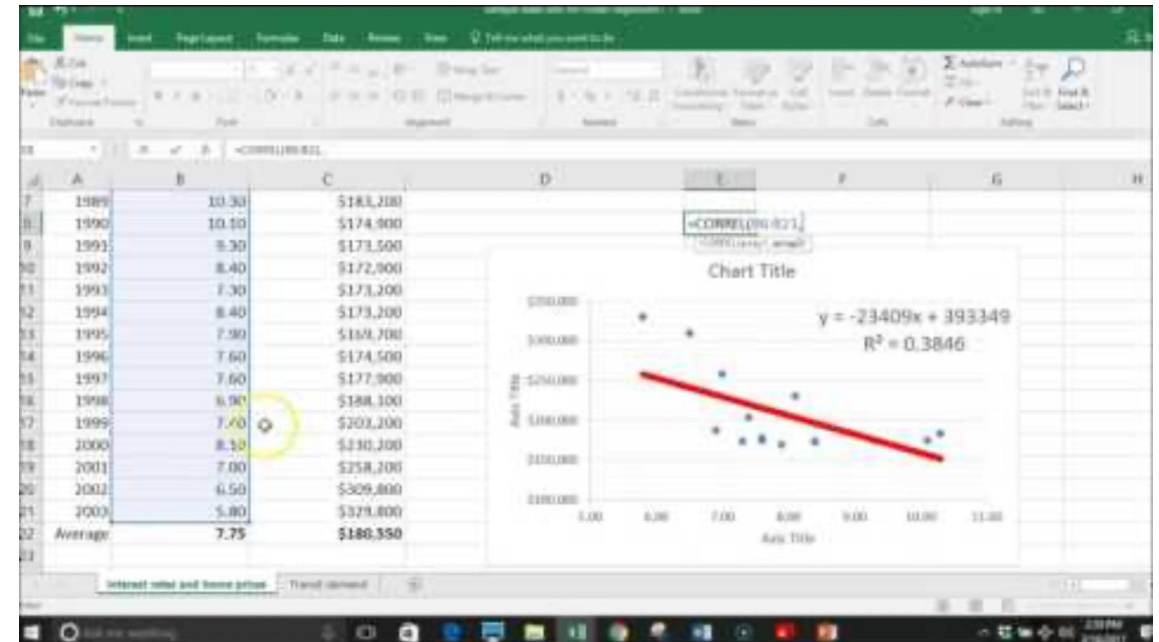
Trends approaches

- stock markets are recurring sequences found in Open-High-Low-Close (OHLC) candlestick charts which traders have historically used as buy and sell signals
- it involves the visual analysis of charts constructed over time to show variations in price, volume, or other derived indicators
- Perceptually Important Points (PIP), which involve reducing time-series dimensions (i.e., the number of data point) by preserving the salient points and template matching, a technique used to match a given stock trend with a pictographic image for object identification

Linear Regression

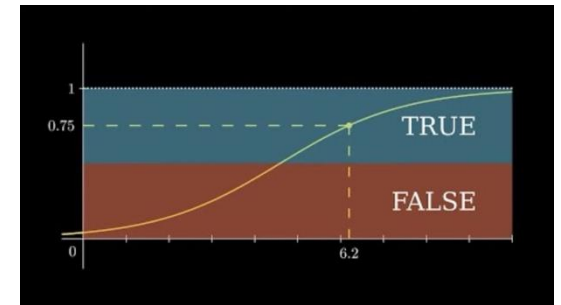
- Linear regression is a **supervised machine learning algorithm** used to predict the value of a dependent variable based on one or more independent variables. It assumes a linear relationship between the dependent and independent variables and fits a linear equation to the observed data

Linear Regression in
Excel →



Logistic regression

- is a supervised machine learning algorithm used for classification tasks where the goal is to predict the probability that an instance belongs to a given class or not¹. It is a statistical method that models the relationship between a dependent variable and one or more independent variables by using the logistic function, also known as the sigmoid function².



- ANOVA for Feature Selection in Machine Learning

-

Correlation

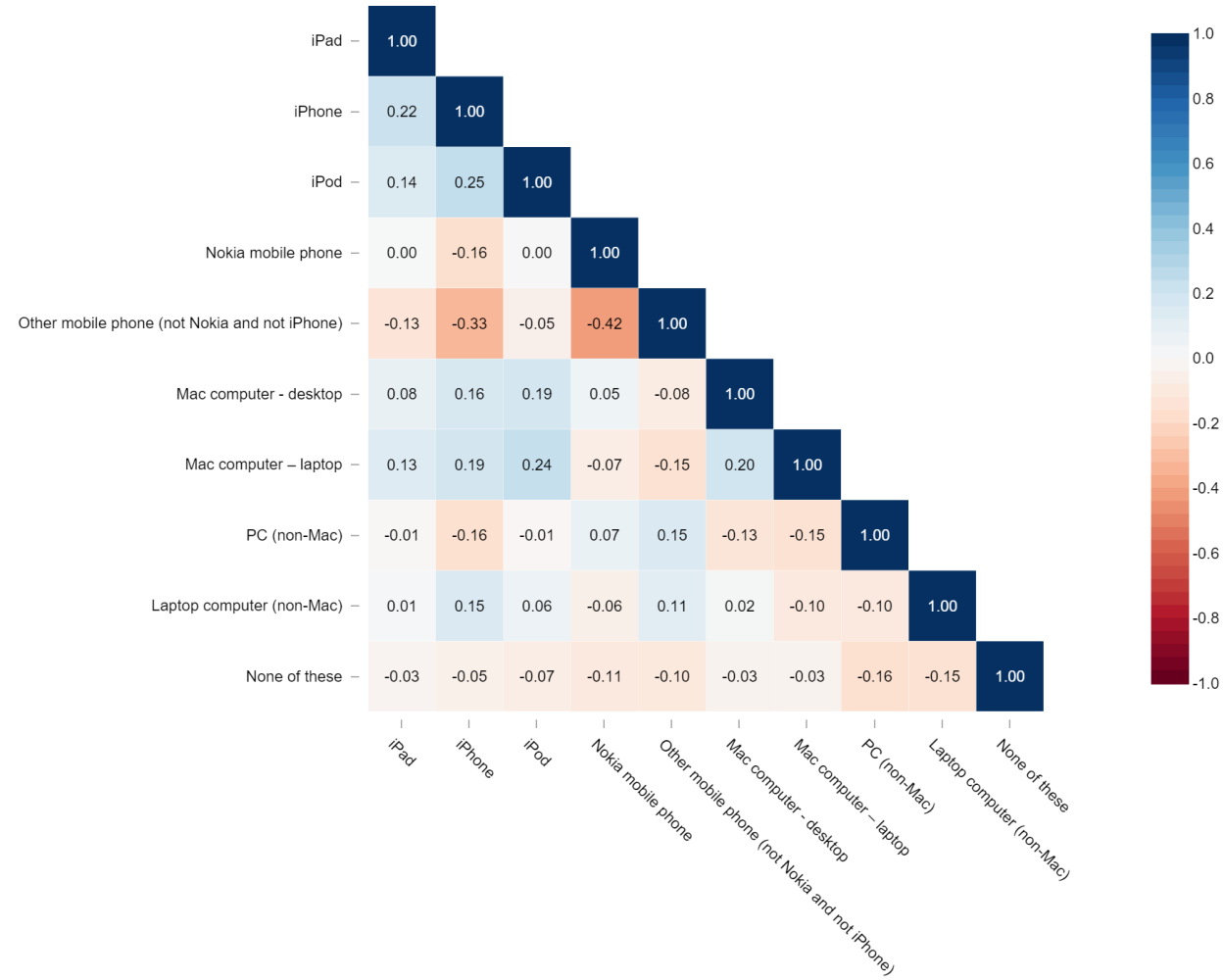
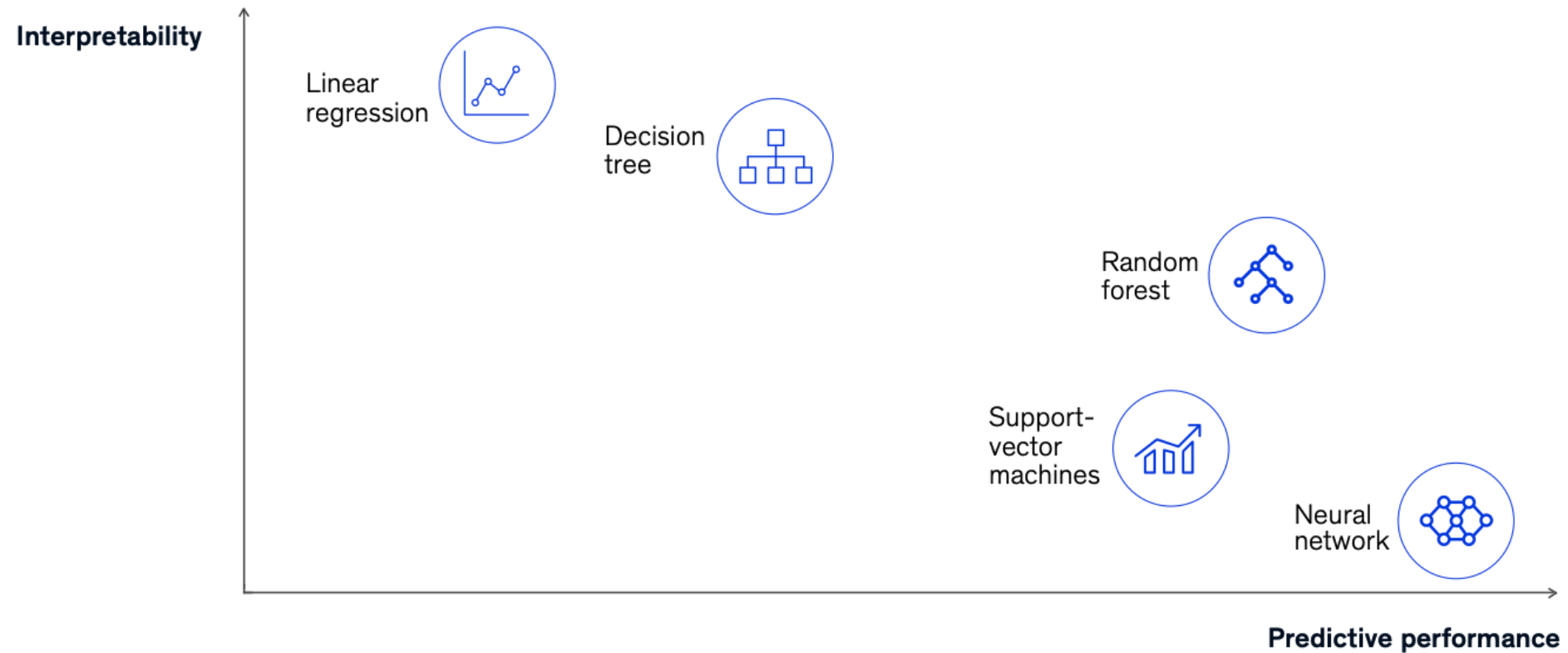


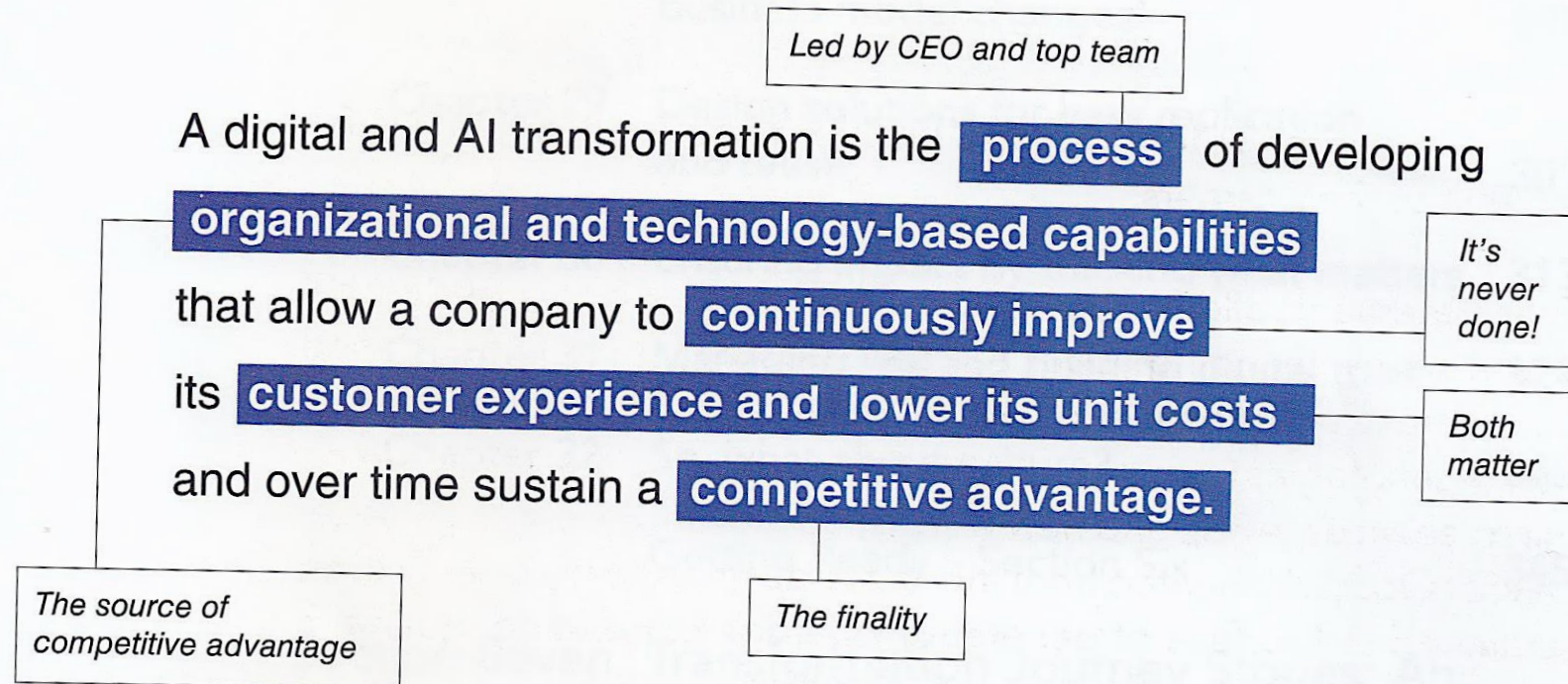
Exhibit 2

Models with more predictive power are often more opaque.



AI Strategy, Innovation and methodology

What we mean by digital and AI transformation



Why Digital & AI Transformation Now !

Digital disruption

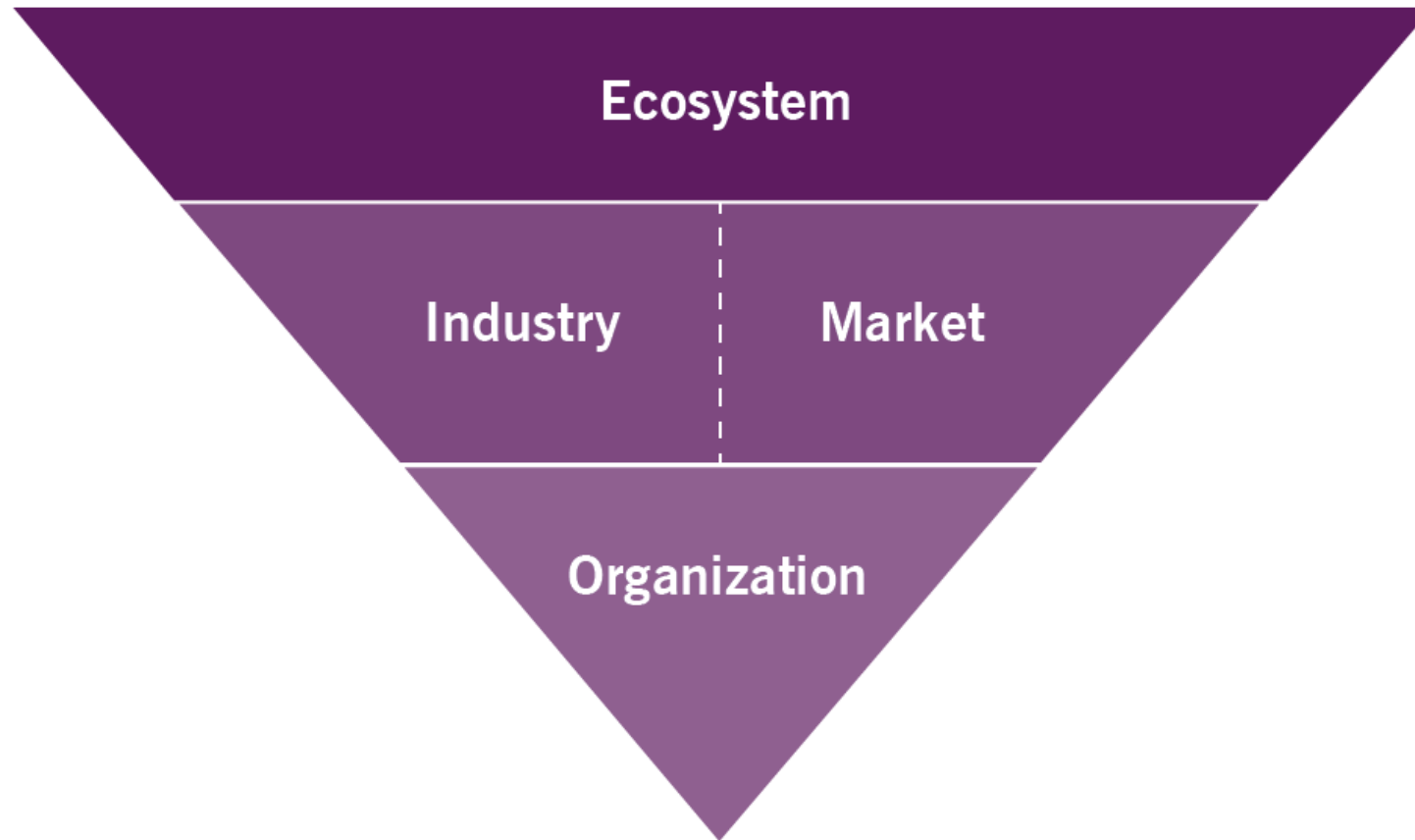


Figure 3.1 Levels of digital disruption

Being a disruptor or responding to disruption

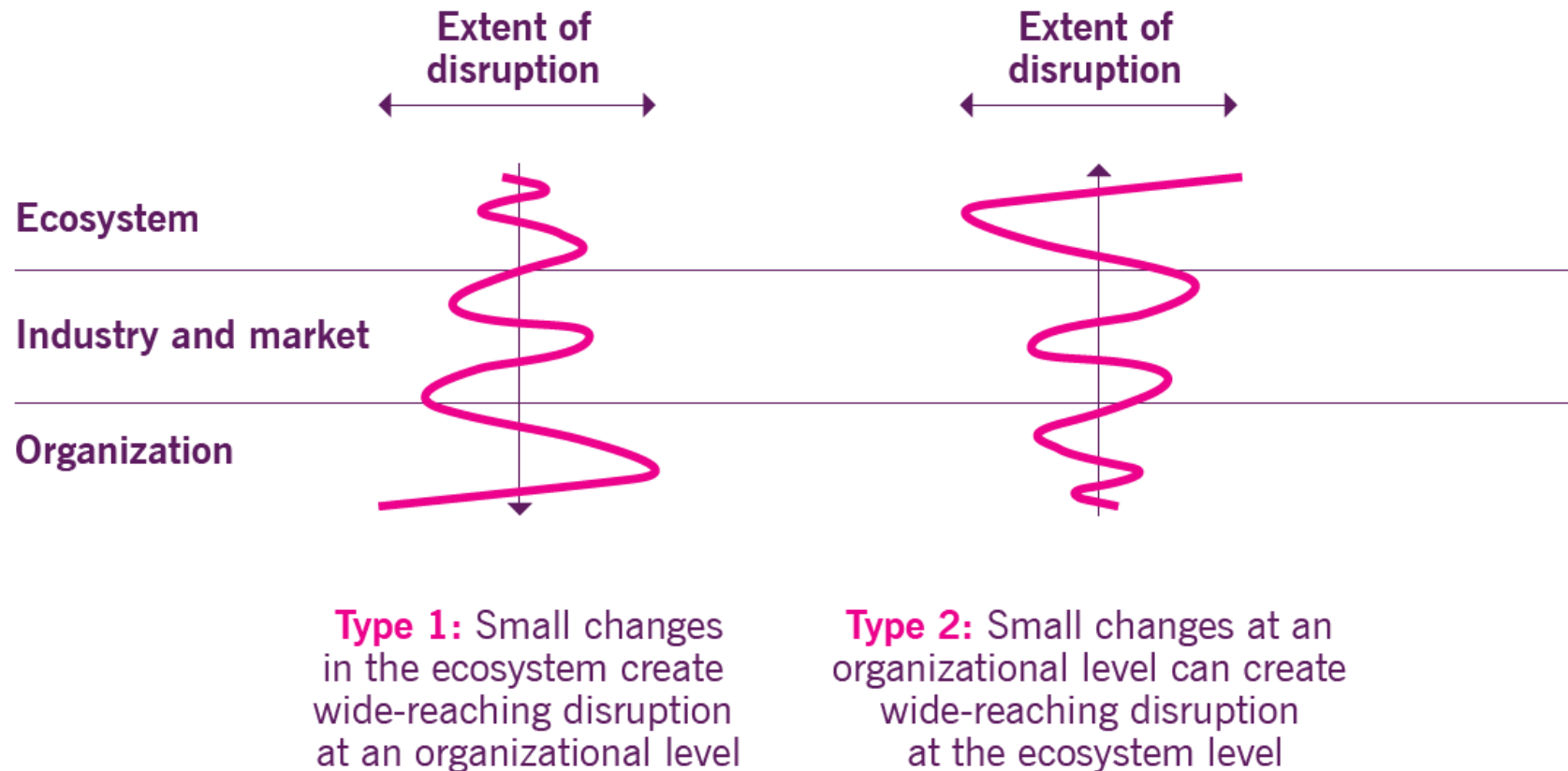
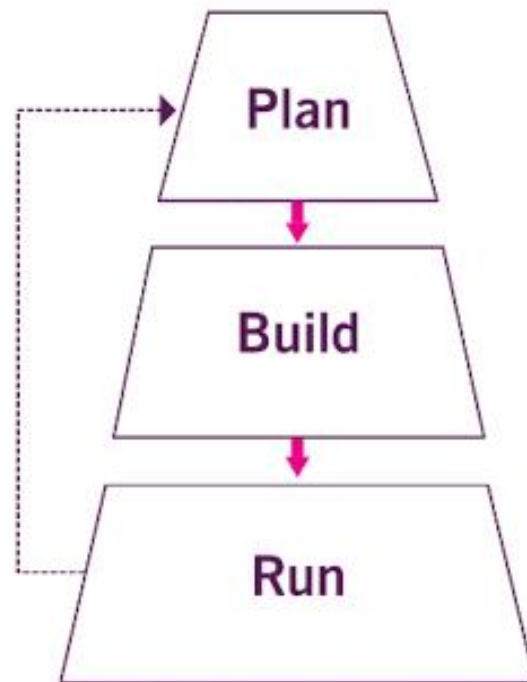


Figure 3.2 Types of disruption

Traditional innovation cycle



Continual innovation cycle



Figure 1.3 Traditional vs continual innovation cycle

What happens when innovation accelerates

Innovation replaces or changes the current situation or creates a new capability or product, but it is expensive to introduce and often not very reliable. Innovation is introduced because it provides competitive advantage

As the use of the innovative product scales up, the organization uses standard processes and education to produce consistent, predictable results. Soon the innovation becomes a well-understood component of standard business operation

The more successful the innovation, and the more well understood it is, the more other organizations will use it or replicate it. No longer unique, it becomes a commodity that is essential to stay in business, but no longer a source of competitive advantage

Commoditized technology is inexpensive to produce and maintain, and the skills required to manage it are inexpensive and abundant. Organizations emerge that use economies of scale to supply and manage the commodity more cheaply and better than it can be done in-house

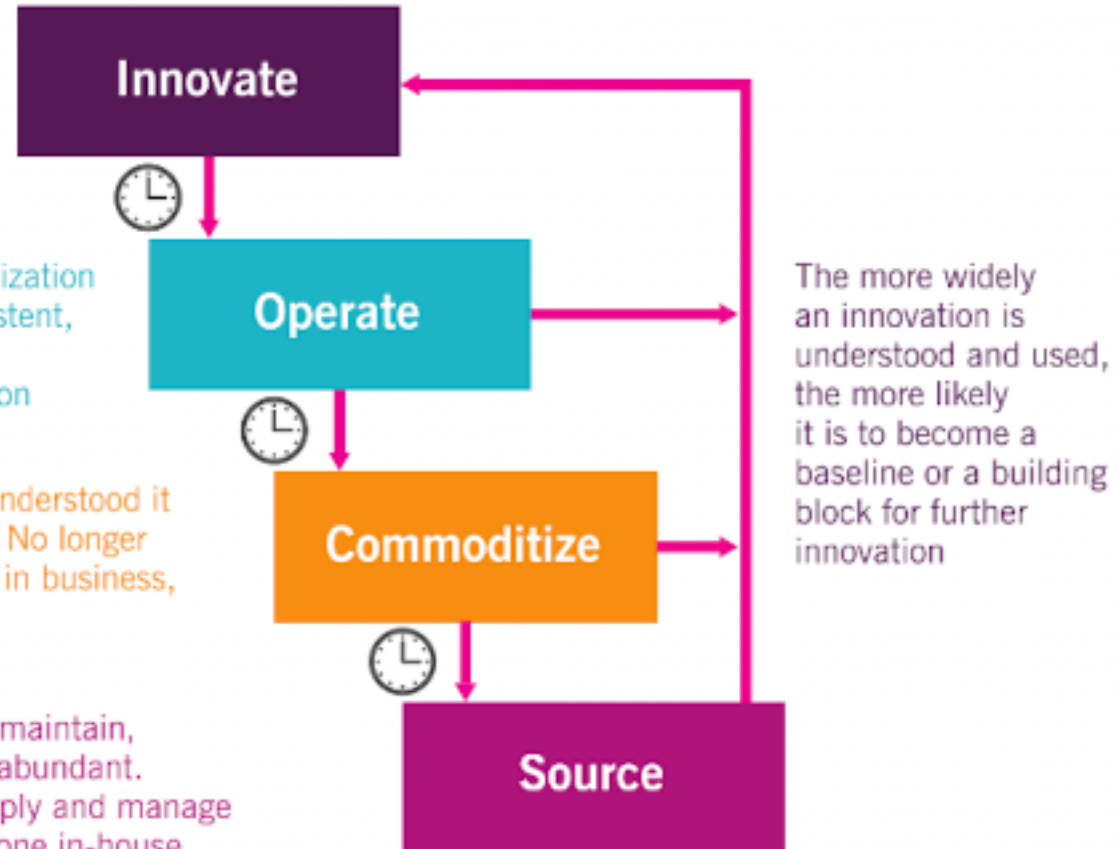


Figure 1.4 What happens when innovation accelerates

Accelerated Innovation!

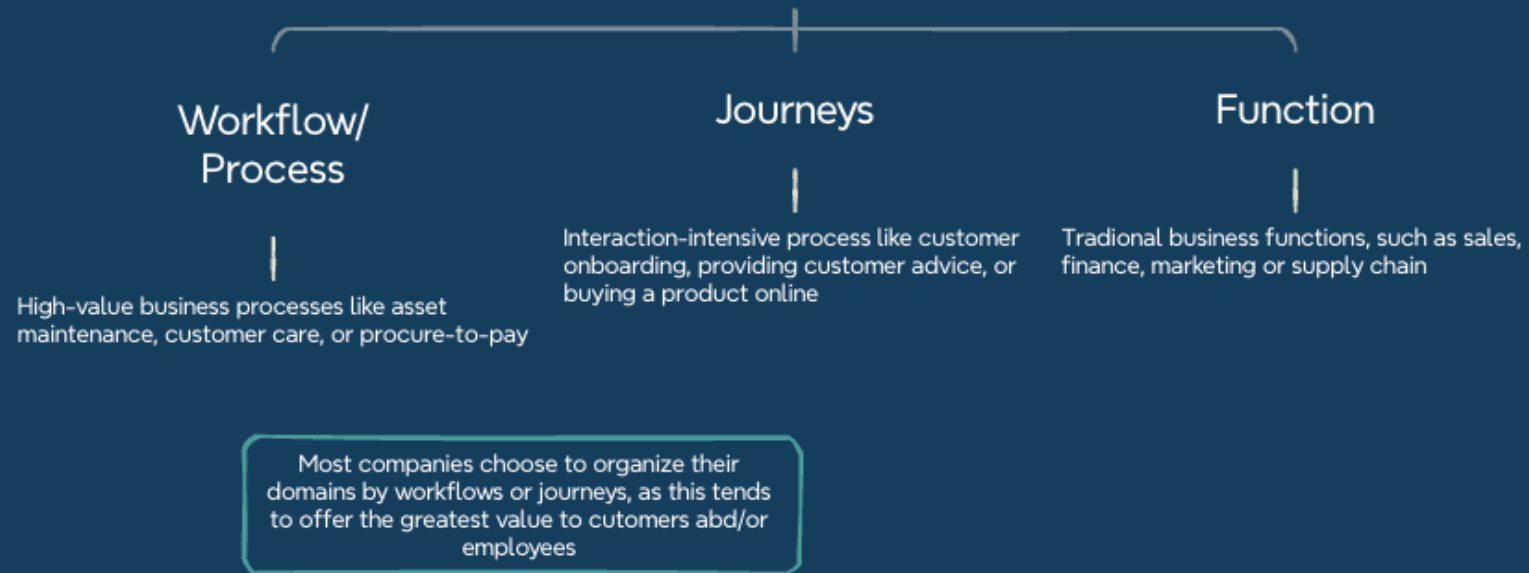
- Accelerated innovation demands that organizations change the way they adopt and use technology. They must move faster and be prepared to change direction midstream, as newer technologies or industry trends emerge.
- Also, in this model, the business operation evolves. It uses an iterative improvement cycle to cause or adapt to changes in the organization's environment. Tight links between planning and business operation result in a shorter strategic planning cycle, linking components in both the project and operational stages to strategic outcomes.
- Most organizations find themselves somewhere between their legacy business operations environment and an emerging digital environment. This requires a complex hybrid of management styles and cultures.



Figure 1.1 The continual improvement model

Alignment Value	1. Business-led Digital roadmap to align the senior leadership team on the transformation vision, value and roadmap and reimagining business domain deliver outstanding customer experiences and lower unit cost			
Delivery Capabilities	2. Talent To ensure you have the right skills and capabilities to execute and innovate	3. Operating Model To increase the metabolic rate of the organization by bringing business, operations and technology together	4. Technology to allow your organization to more easily use technology to innovate with pace	5. Data to continuously enrich data and make it easy to consume across the organization to improve customer experiences and business operations
Change Management	6. Adoption and Scaling To maximize value capture by ensuring the adoption and enterprise scaling of digital solutions and by tightly managing the transformation progress and risks			

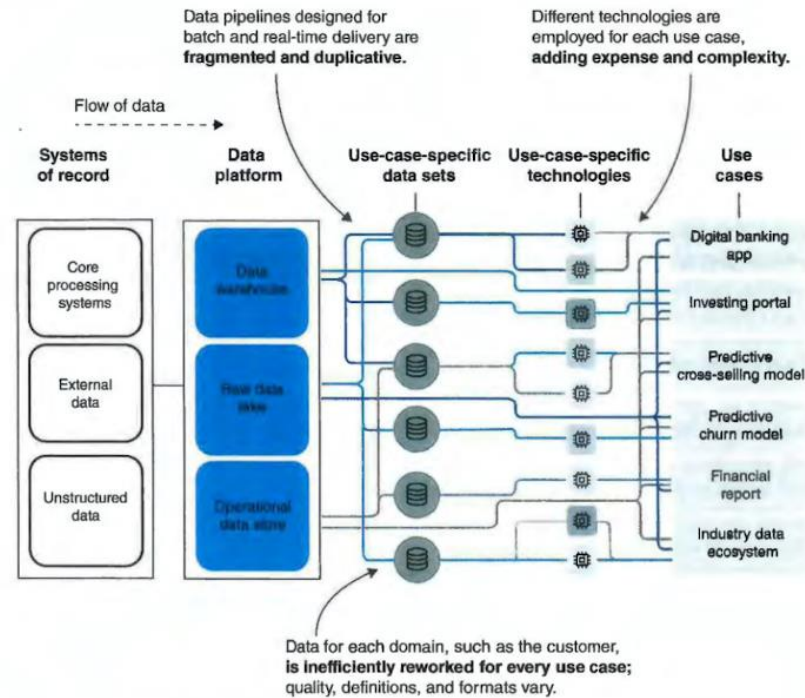
Three Ways to Define a Domain



What talent do you need in-house?

- Every company faces the same strategic question when it comes to digital and AI transformations:
- “Do we need to own this talent?”
- Executives will argue that technology is not their core business.
- The reality, however, is that if a company wants to competitively differentiate itself through digital solutions, **it needs to have the talent that will provide this differentiation in-house.**

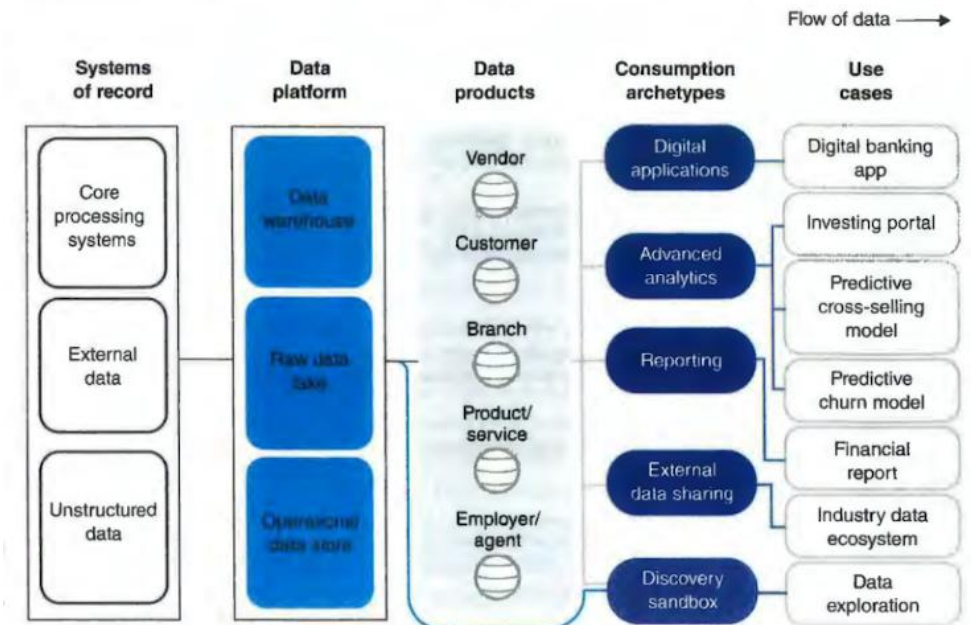
The legacy data setup in many organizations can be complex and inefficient



Source: Veeral Desai, Tim Fountaine, and Kayvaun Rowshankish, "A Better Way to Put Your Data to Work," *Harvard Business Review*, July–August 2022.

EXHIBIT 25.1

A data product approach results in standardization that saves time and money



Source: Veeral Desai, Tim Fountaine, and Kayvaun Rowshankish, "A Better Way to Put Your Data to Work," *Harvard Business Review*, July–August 2022.

EXHIBIT 25.2

Data architecture archetypes

CLOUD-NATIVE DATA LAKE

Centralized serverless architecture leveraging object storage and compute which can scale independently

Optimized for (very) large-scale data marts for SQL analytics and modern AI/ML applications

Flexible foundation to add capabilities (e.g., DWH, real-time) but beginning to be seen as "legacy" architecture

CLOUD-NATIVE DATA WAREHOUSE

Highly scalable and agile SQL-driven platform with independently scalable storage and compute

Implements modern data transformation driven by SQL or UI-centric ETL tools (e.g., dbt, Matillion)

Very good performance on vast majority of enterprise analytical workloads

Very well supported by tooling and required SQL skills are plentiful among data users, analysts, and data experts

LAKEHOUSE

Combines benefits of Data Lake and DWH into an integrated platform for analytics (e.g., BI, SQL) and AI/ML use cases

Leverages nextgen storage technologies (e.g., Delta Lake or Iceberg) supporting ACID transactions on top of object storage

Handles the most complex batch data jobs and high-volume streaming data (e.g., IoT)

Less mature tooling but rapid pace of technical innovation

DATA MESH

Emerging archetype; fundamental departure from centralized IT and data functions

Decentralized architecture approach focused on data products fully owned by business domains

Data products are curated for quality, cataloged, and accessed via well-defined data services

Data products are built leveraging any of the data architecture archetypes defined above

DATA FABRIC

Emerging strategy for creating a unified data environment across the Enterprise's data landscape

The Fabric is stitched together through metadata into a secure, unified data management layer

Meant to solve multicloud scenarios for heterogeneous data sources and infrastructure

No existing tooling currently enables a true Data Fabric, it must rather be built in-house

The ETL Process Explained



Extract

Retrieves and verifies data
from various sources



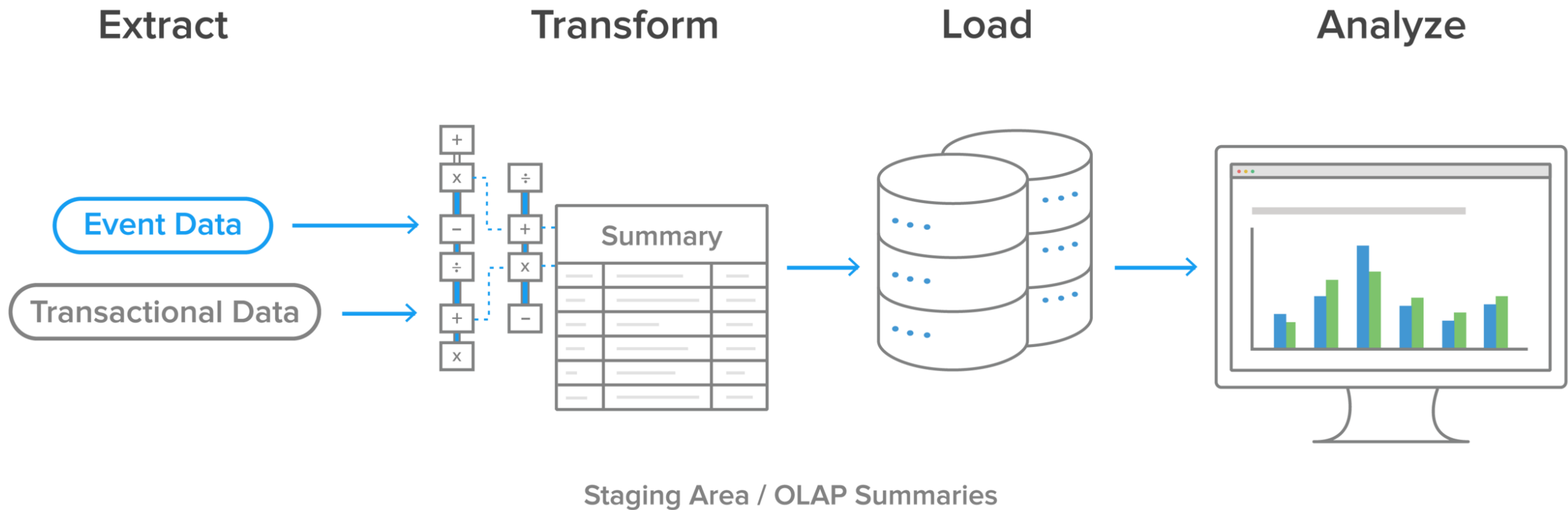
Transform

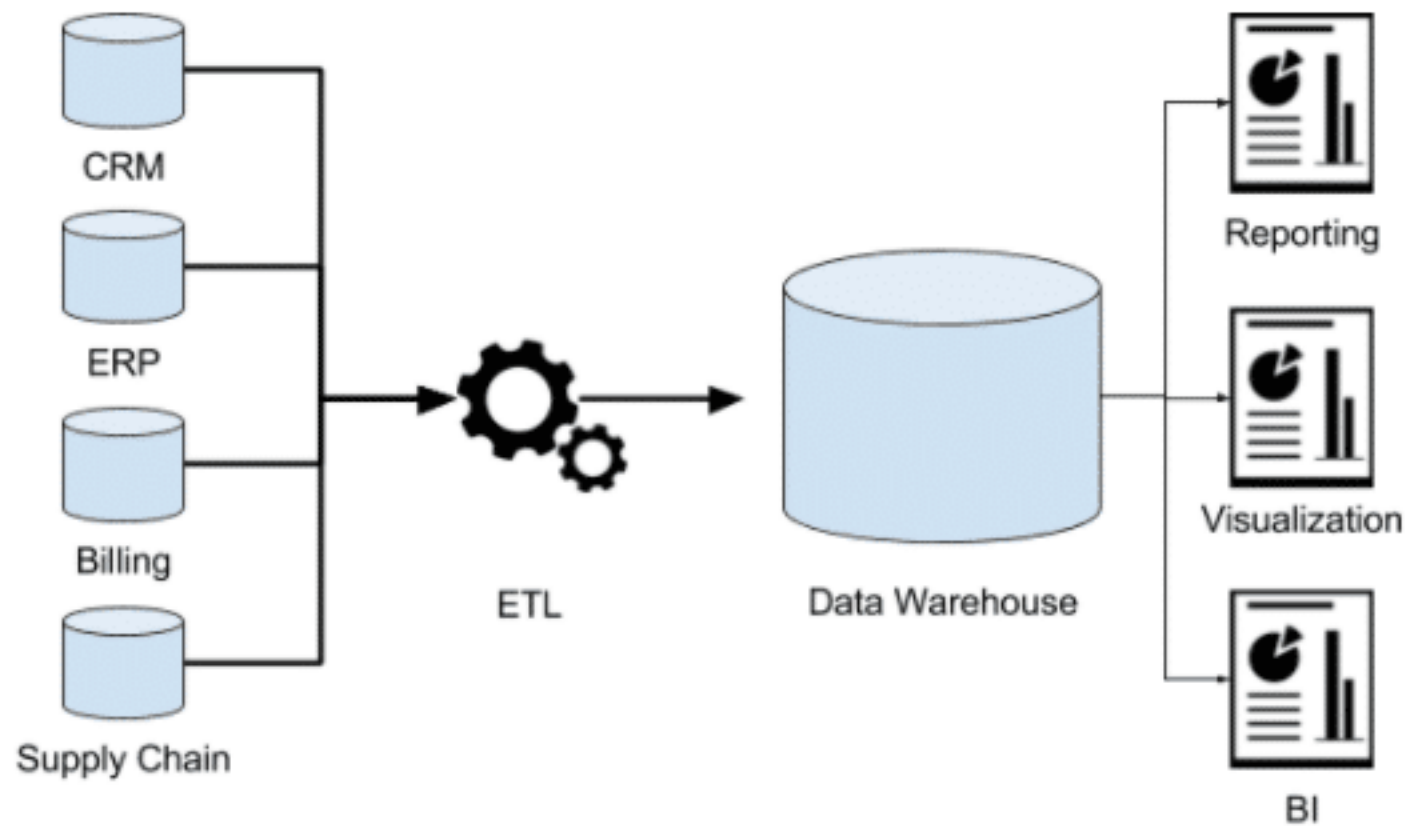
Processes and organizes
extracted data so it is usable



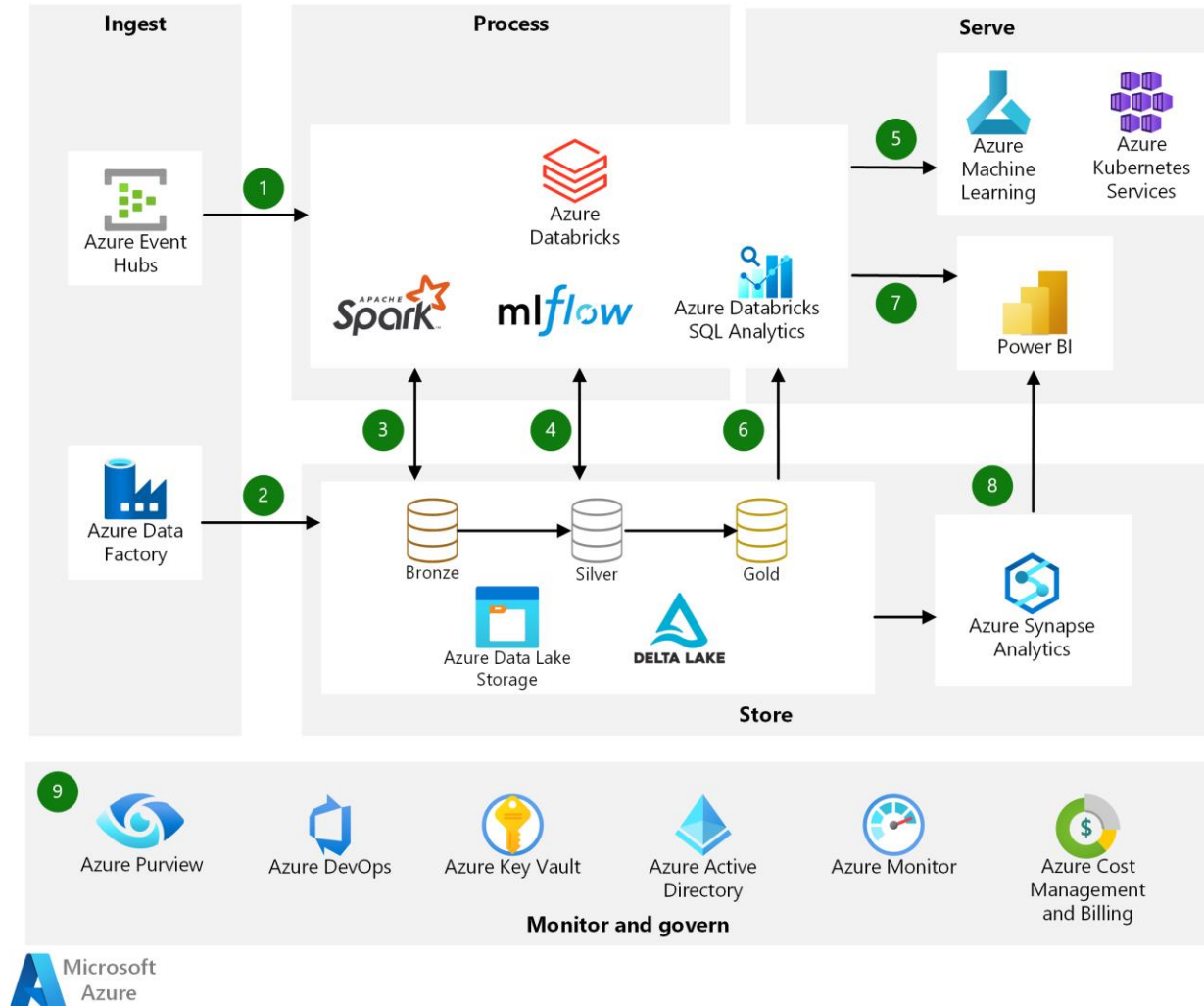
Load

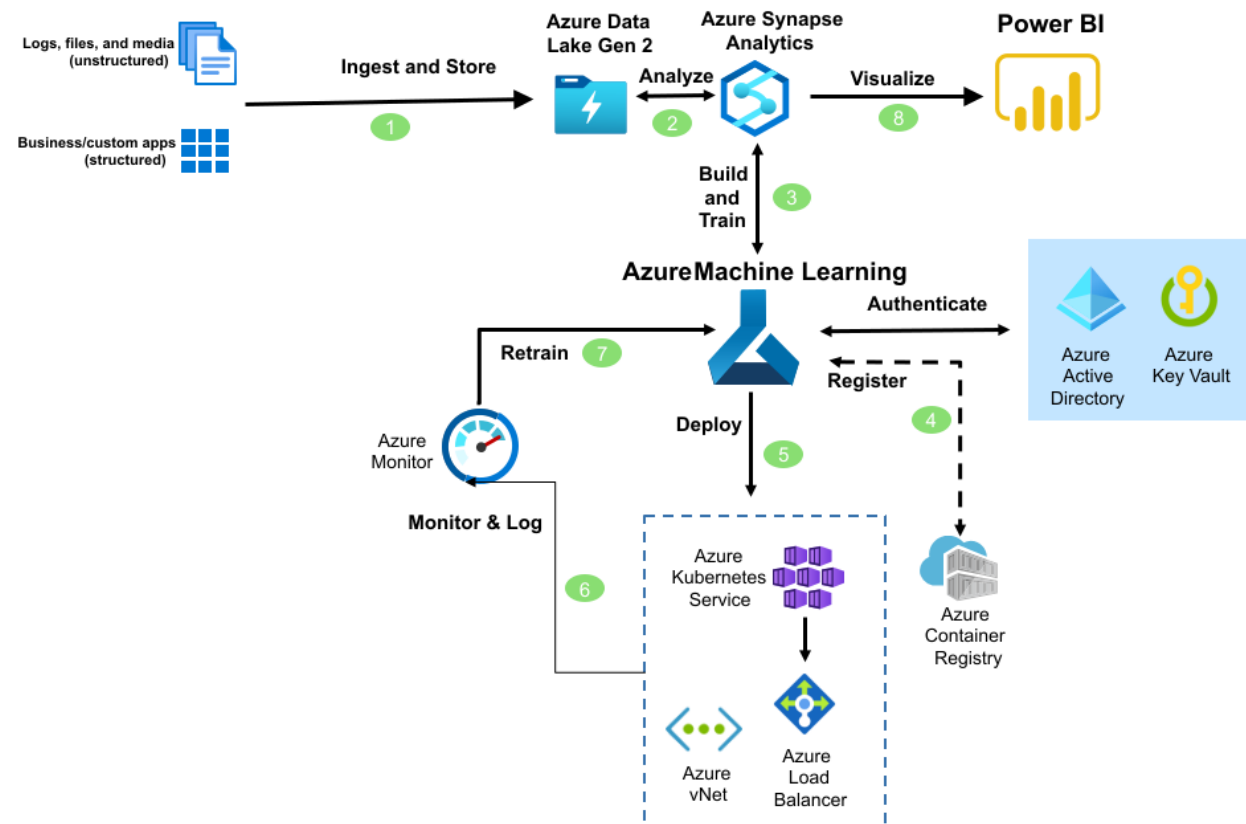
Moves transformed data
to a data repository





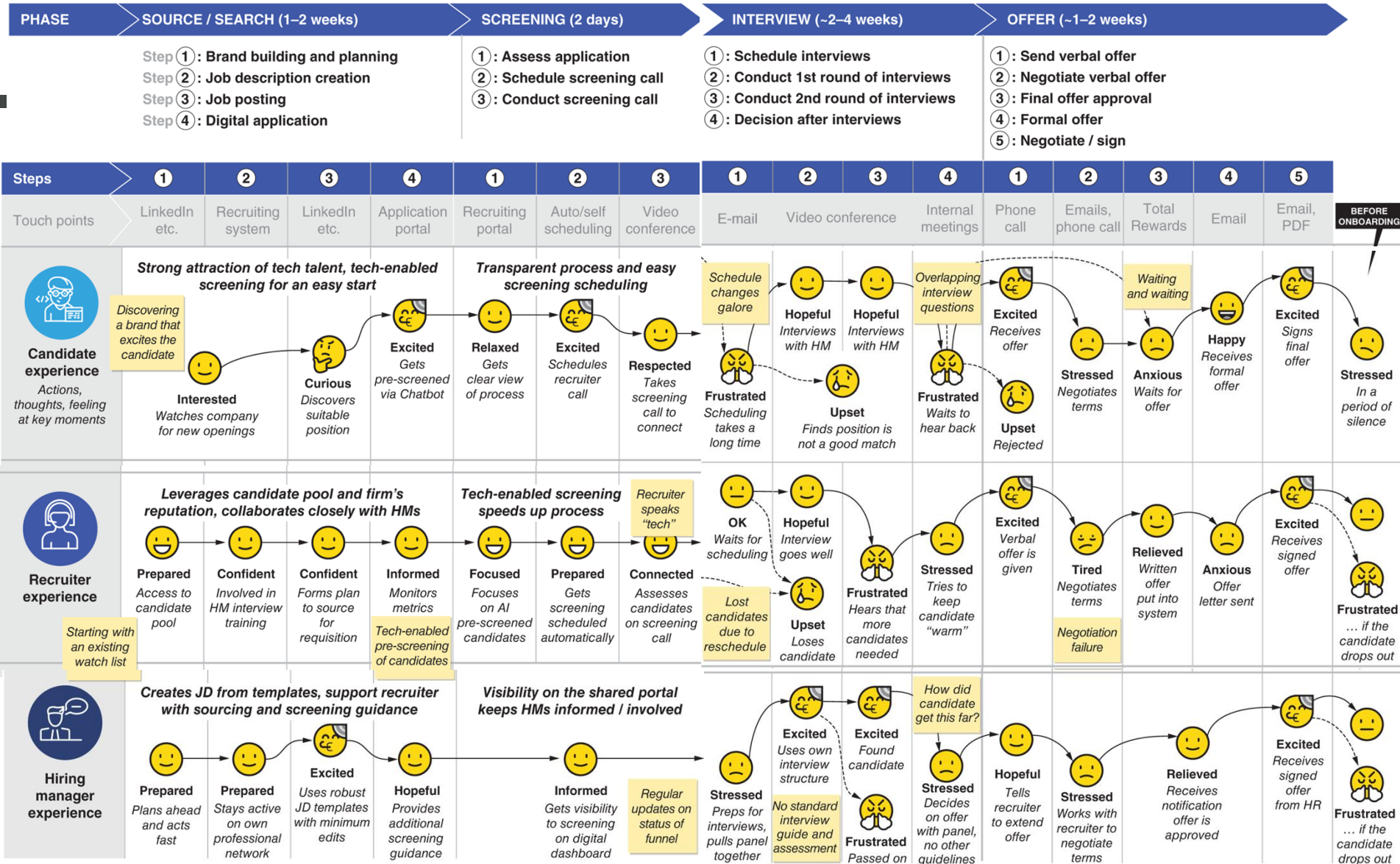
Modern analytics architecture with Azure Databricks





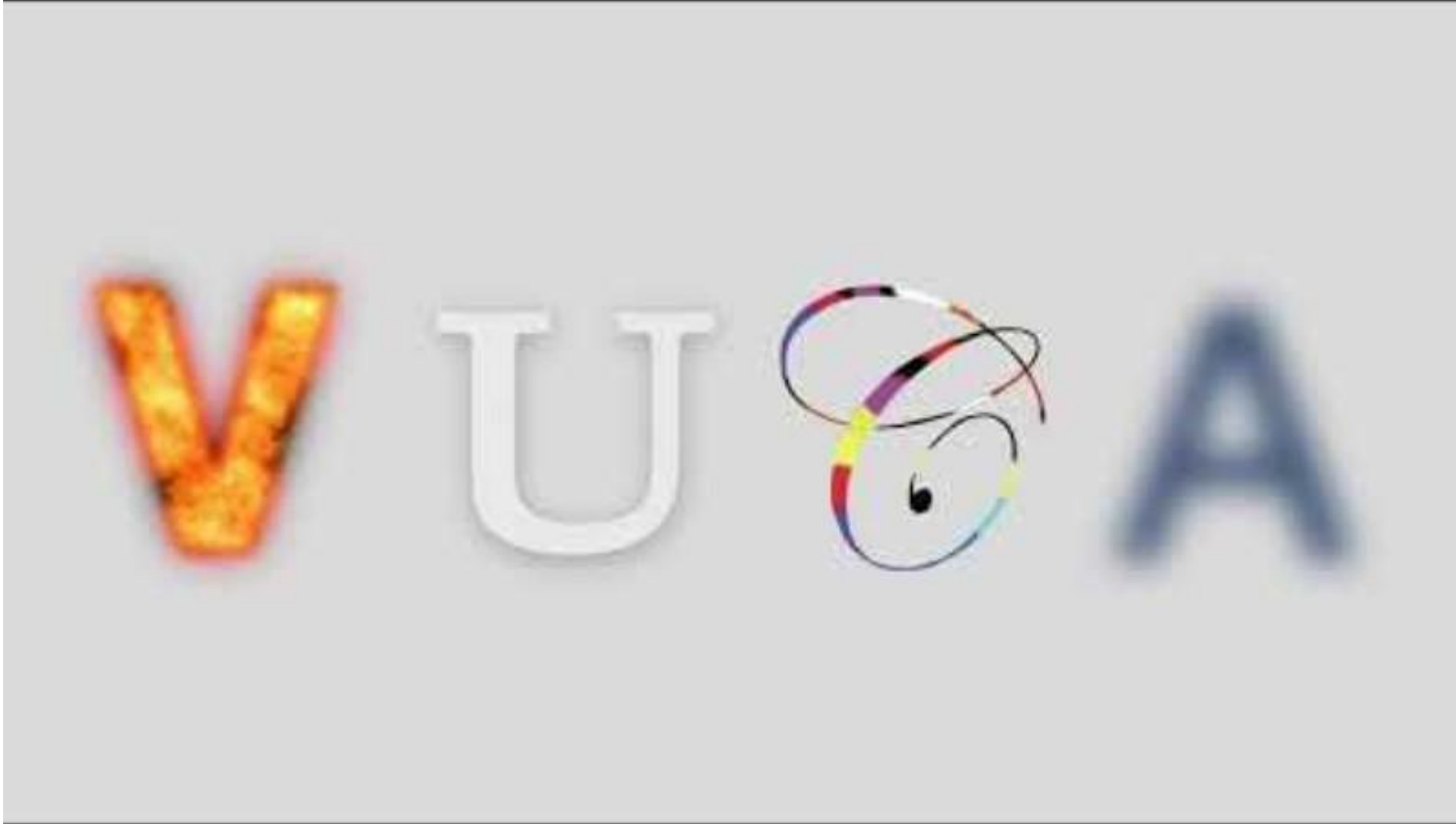
Future state recruiting journey

Financial services company



Accelerated Innovation has brought great urgency to business change

- The latest wave of innovation has led to terms such as '**digital transformation**' and '**organizational agility**'. But what does this mean in practice?
- Firstly, **emerging technology**, which builds on the capabilities of merged information and operations technologies, has introduced opportunities that have disrupted industries. Achieving and maintaining a position requires an organization to think differently about its business and operating models.
- Secondly, **the speed of innovation** has accelerated significantly. Technology is cheaper, faster, and easier to implement. Innovation adds greater functionality, making it faster and easier to enter new markets.
- **Organisations need to change quickly to harness** the power of rapidly evolving digital technology.



CORE EA Metamodel

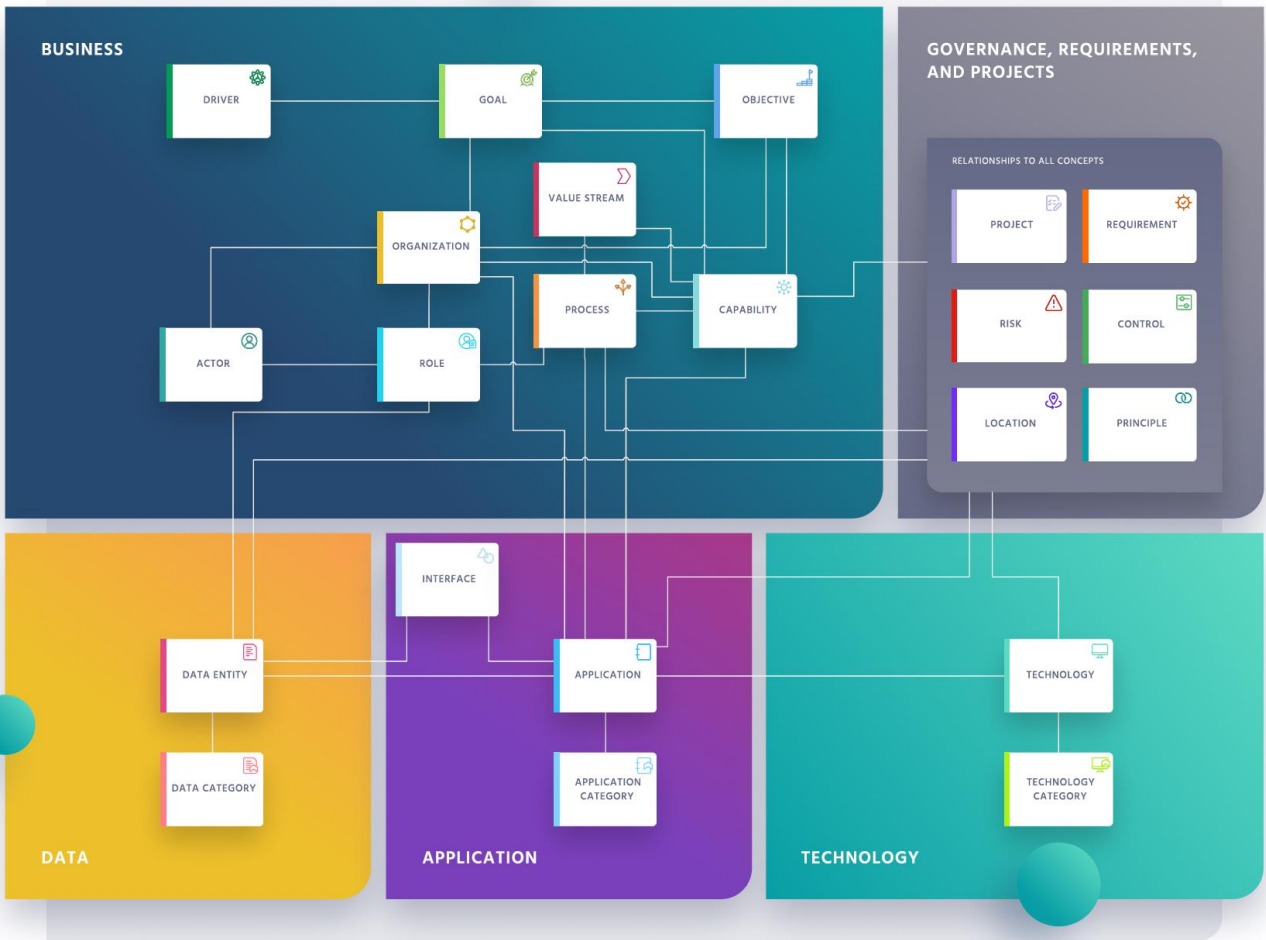


Business Architecture

- DRIVER.** An internal or external condition that motivates an organization to define its strategic goals and drive change.
Example: new regulation to conform to
- GOAL.** A statement of intent with respect to business strategy.
Example: Improve Customer Satisfaction
- OBJECTIVE.** A measurable outcome that contributes to the achievement of a goal. Objectives are normally SMART (Specific, Measurable, Achievable, Relevant and Timebound).
Example: Increase CSAT Score by 20% by 2025
- VALUE STREAM.** An end-to-end collection of activities that create an overall value-adding result for a customer, organization or entity.
Example: Onboard Customer
- CAPABILITY.** A business' ability to do something, often described within a hierarchical capability model.
Example: Customer Relationship Management
- ORGANIZATION.** A unit of a business organizational structure, usually described as part of a structure, covering region to department and team.
Example: Finance department
- ACTOR.** An individual or entity that takes on a role in the context of specific activities. An actor may have a number of roles.
Example: A user modelling solutions as part of a project
- ROLE.** The function assumed or part played by an actor in a particular action or event. An actor may have a number of roles.
Example: Accountant, Application Portfolio Manager
- PROCESS.** A sequence of activities that describe how a business outcome is achieved.
Example: Invoice Customer

Data Architecture

- DATA ENTITY.** A self-contained piece of information that has a clear meaning to the business and can be defined with attributes.
Example: Customer Account or Purchase Order
- DATA CATEGORY.** A classification element used to categorize data entities. It constitutes the data reference model taxonomy as a hierarchical structure.
Example: Customer



Governance, Requirements, & Projects

- PRINCIPLE.** A guiding statement intended to structure and constrain architectural decision making, processes and operations.
Example: Cloud first
- REQUIREMENT.** A statement describing a condition that should be met by a project, or aspect of an architecture.
Example: Conform to ISA 28001 Spec
- PROJECT.** A grouping of work items that is constrained by requirements and delivers or augments a capability.
Example: Project Great Man-Made River
- LOCATION.** A geographical place, or physical space, where activity happens or where an element of the architecture exists.
Example: London
- CONTROL.** A decision-making step with logic used to safeguard the security or ensure governance criteria of an architecture aspect.
Example: Data Anonymization
- RISK.** A statement describing a possible hazard that may effect an aspect of the enterprises architecture.
Example: Leak of sensitive data

Application Architecture

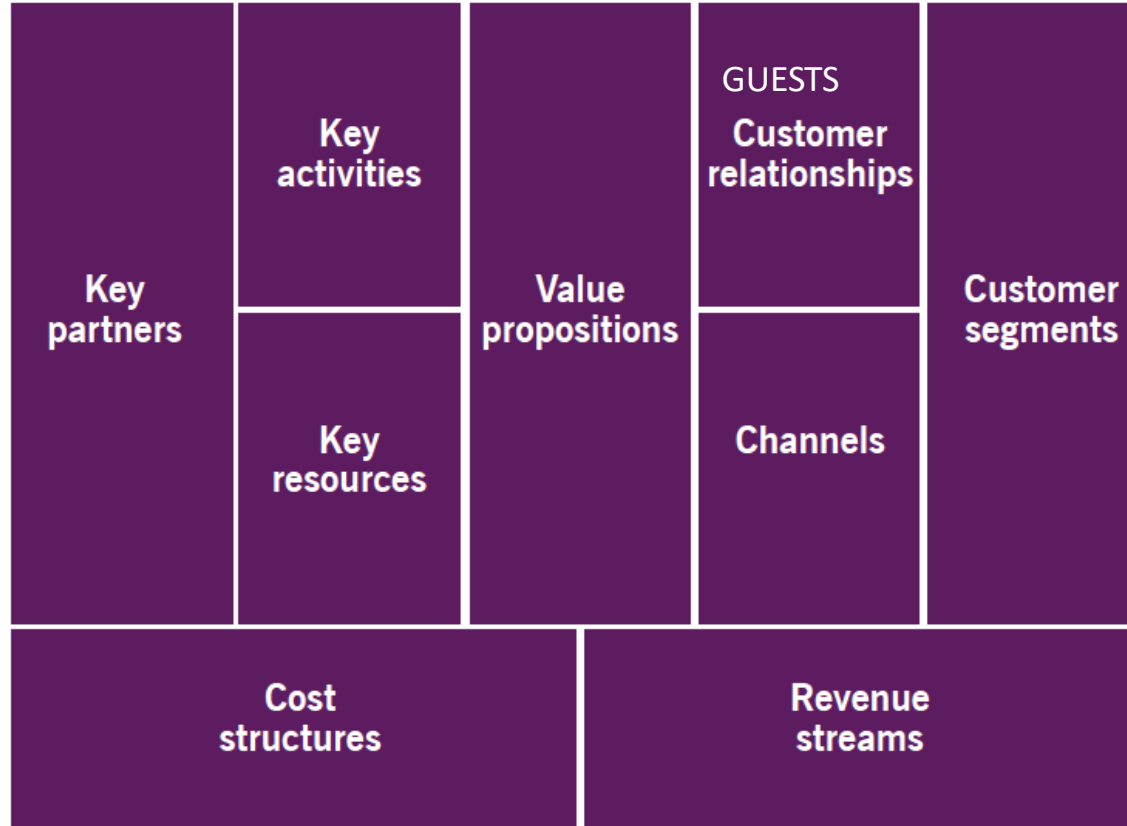
- APPLICATION.** A software solution, that can be deployed with its described components globally or locally, to provide a set of functionalities to business users.
Example: iServer365
- APPLICATION CATEGORY.** A classification element used to categorise Applications. It constitutes the application reference model taxonomy as a hierarchical structure.
Example: Enterprise Architecture Platform
- INTERFACE.** A point of access that an application makes available to other applications.
Example: Customer Claims API

Technology Architecture

- TECHNOLOGY.** A software or hardware solution on which application run or other components run.
Example: Microsoft SQL Server2022
- TECHNOLOGY CATEGORY.** A classification element used to categorise Technology. It constitutes the technology reference model taxonomy as a hierarchical structure.
Example: Enterprise Communication

BUSINESS MODEL CANVAS / نموذج الأعمال المؤسسية

- الإستراتيجية مسار العمل الذي من خلاله تحقق المنظمة أهدافها.
- نموذج الأعمال وصف رسمي لكيفية تكوين المؤسسة لخلق قيمة للعملاء بناءً على استراتيجيتها.



أنواع الضيوف

The business model template

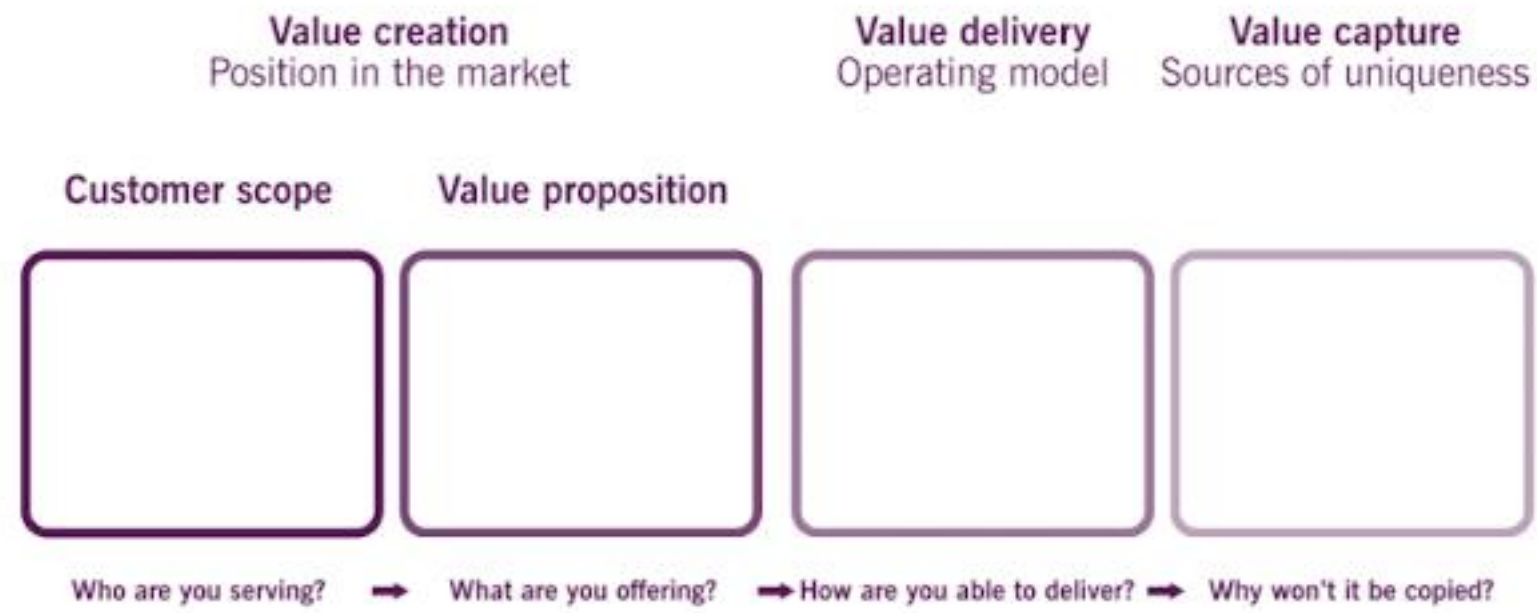
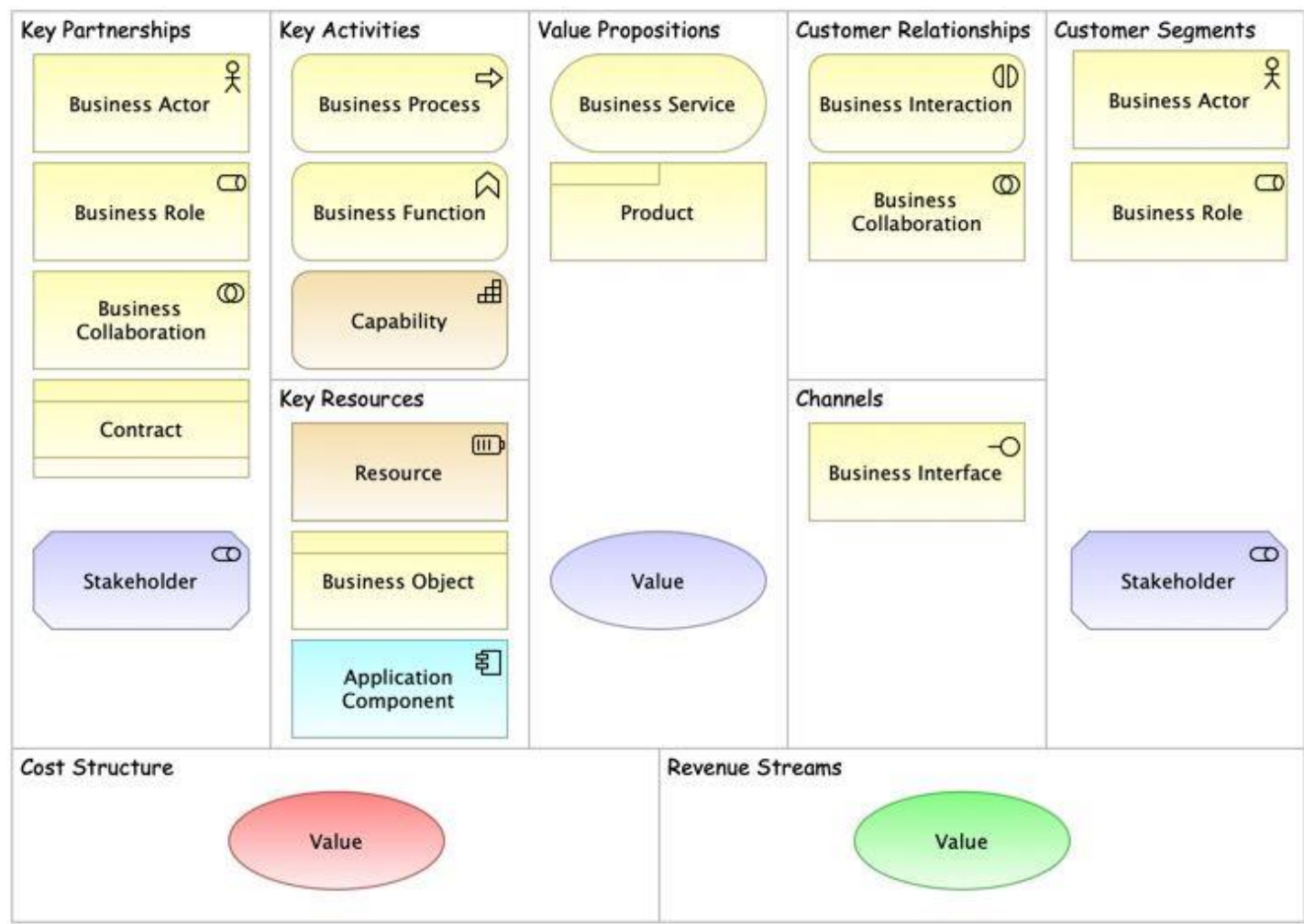
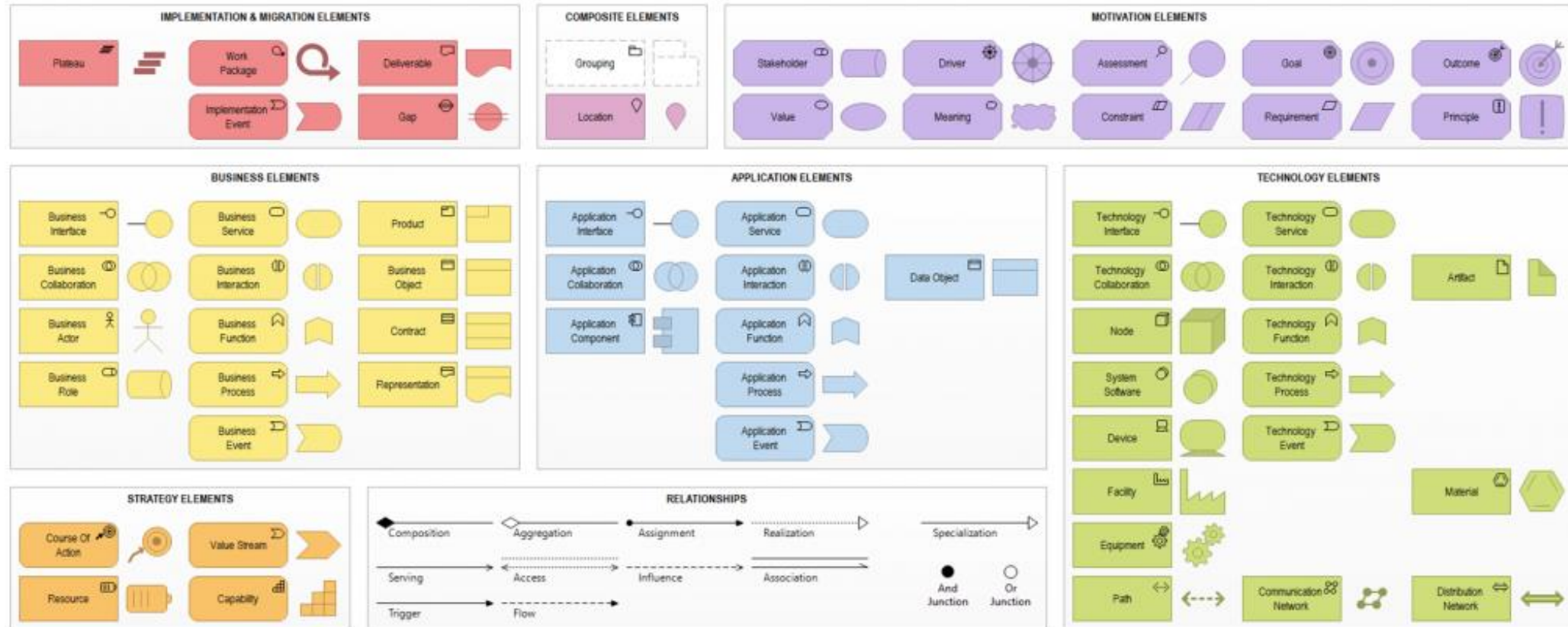


Figure 2.8 Adapted company design template
Reproduced from Boudreau (2018)





أدوات لتحليل البيئة / المؤثرات الخارجية

أداة	الوصف	الاستخدام
بيستل PESTEL	إطار عمل لتحليل العوامل البيئية الكبرى التي تؤثر على المنظمة	مراقبة التأثير والتغيرات المحتملة للمنظمة بحيث يمكنها تعديل موقفها أو استراتيجيتها لتظل ذات صلة
تحليل سوات SWOT	أداة لتحليل نقاط القوة والضعف والفرص والتهديدات التي تواجه المنظمة	تحديد الإجراءات التي يجب أن تتخذها المنظمة بالنسبة لفرصة معينة أو موقف محدد
طريقة دلفي أو تقدير/محادثة/تقدير	إطار عمل للتنبؤ حيث يتم إرسال عدة جولات من الاستبيانات إلى مجموعة من الخبراء وتشارك مع المجموعة بعد كل جولة	التنبؤ بنتائج إجراء أو سيناريو مقترح، وتحديد أفضل مسار للعمل أو الاستجابة
تحليل دورة الحياة	طريقة تستخدم لتقييم التأثير البيئي لمنتج طوال دورة حياته	تحديد المعايير التي يجب أن تُستوفى للتنافس في سوق حساسة بيئيًا، وكيفية الامتثال لها
التخطيط السيناريوي	طريقة تصف المتغيرات في سوق أو موقف ويتم التنبؤ بالنتائج لتغيرات كل متغير	فهم مجموعة النتائج التي قد تنتج في وضع معين في بيئة المنظمة، وفهم الأسباب التي تسببها، وتطوير خطة لكل نتيجة محتملة تتم معالجتها مع تعلم المزيد عن المتغيرات
تحليل نظام القيمة	طريقة تستخدم لرسم أجزاء مختلفة من نظام بيئي تجاري والقيمة التي تساهم بها وتستفيد منها الأجزاء المختلفة	إنشاء نماذج تجارية أو تشغيلية مفصلة، وتقييم تأثير التغيرات في البيئة على قيمة العلاقات بين مكونات النظام البيئي
قوى بورتر الخمس	إطار لتقييم القوى التنافسية التي تعمل في بيئة؛ وهي: المنافسة، الداخلون الجدد، قوة الموردين، قوة العملاء، تهديد المنتجات البديلة	تحليل قيمة المنظمة وكيفية تعزيز موقعها التنافسي في المواقف التي تؤثر عليها أنواع مختلفة من المنافسين
مصفوفة السياسة الاتجاهية	أداة لتحديد شرائح السوق المفضلة بناءً على مدى جاذبية الشريحة وما إذا كانت المنظمة لديها القدرات لدعمها	التجزئة السوقية، خاصةً عند تحديد الأسواق للقدرات الحالية؛ كما تساعد أيضًا في تحديد القدرات التي يجب تطويرها في سعي الشريحة السوقية
تحليل المنافسين	طريقة لتحليل منتجات منافس معين وأساليب المبيعات وطرق التوريد والتصنيع واستراتيجيات التسويق	إنشاء استراتيجيات مصممة لتحسين قدرات المنظمة لجعلها أفضل من منافس، للتفوق عليه في السوق

PESTEL

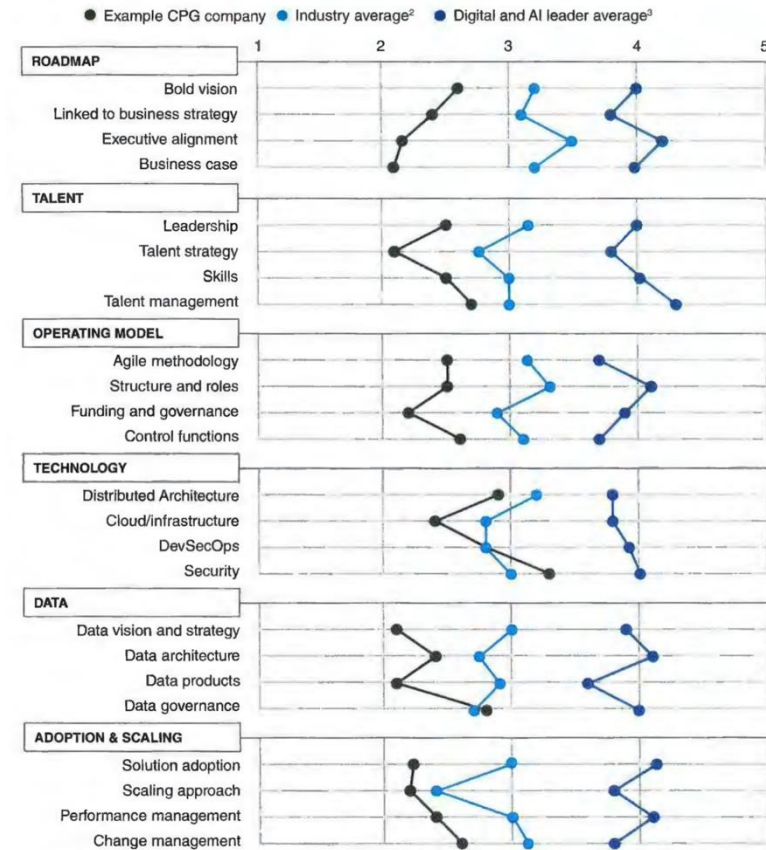
Political	Econmic	Social	Technology	Environmental	Legal

أدوات تحليل البيئة الداخلية

الأداة	الوصف	الاستخدام
SWOT تحليل	أداة لتحليل نقاط القوة والضعف والفرص والتهديدات التي تواجه المؤسسة	لمقارنة نقاط قوة وضعف المؤسسة بالقدرات المطلوبة لاستغلال الفرص وتقليل التهديدات ، وتحديد التدابير المضادة للتهديدات ، وتحديد القدرات التي يجب تطويرها
طريقة دلفي أو التقدير / التحدث / التقدير	إطار عمل لعملية التنبؤ حيث يتم إرسال عدة جولات من الاستبيانات إلى مجموعة من الخبراء ومشاركتها مع المجموعة بعد كل دورة	يمكن استخدامها داخلياً لتحديد مسار العمل الذي يجب اتخاذه لتحسين المؤسسة أو التعامل مع التحدي
تحليل دورة الحياة	طريقة تستخدم لتقييم الأثر البيئي للمنتج من خلال دورة حياته	لوضع سياسات حول كيفية إنتاج أكثر تصميم وتصنيع وتغليف وتوزيع مسؤولية للمنتج
تخطيط السيناريو	طريقة يتم فيها وصف المتغيرات في السوق أو الموقف ، ويتم عرض النتائج للتغيرات في كل متغير	لفهم مجموعة النتائج التي قد تنتج في حالة تغيير المؤسسة ، وفهم أسبابها ، ووضع خطة لكل نتيجة محتملة يتم تعديلها بعد تطوير قدر أكبر من اليقين بشأن المتغيرات
تحليل النظام البيئي للقيمة أو تحليل النظام البيئي للأعمال	طريقة تستخدم لرسم خريطة للأجزاء المختلفة للنظام البيئي للأعمال والقيمة التي تساهم بها وتستمد منها من بعضها البعض	تقييم النماذج التفصيلية للأعمال أو التشغيل ، وتقييم تأثير التغيرات في البيئة على قيمة العلاقات بين مكونات النظام البيئي
مصفوفة المهارات	تقنيات التقييم المستخدمة لتحديد نوع ومستوى المهارة والمعرفة في المؤسسة	تحديد ما إذا كان الملف الشخصي الحالي للمهارات والمعرفة كافياً للشروع في مسار عمل معين ؛ تحديد الاحتياجات لبرامج التدريب والتعليم
مصفوفة نضج القدرة	نموذج نضج ، يتم تطبيقه في العديد من السياقات ، يقيم نضج المؤسسة بالنسبة لنهج أو معيار الصناعة	لتحديد مدى كفاءة المؤسسة في مجال معين (مثل هندسة البرمجيات ، وإدارة الخدمات ، والأمن وإدارة المخاطر)
التقييمات الثقافية	التقييمات التي تحدد الطريقة التي يتم بها أداء العمل ، واتخاذ القرارات ، والمخاطر ، والابتكار ، وما إلى ذلك	يمكن أن تساعد التقييمات الثقافية في التحضير للتغييرات المطلوبة ، وتحديد أفضل السبل لتعزيزها داخل المؤسسة

Assessing digital capabilities

Capability ranking survey results by category, on scale of 1–5¹



1. 1 = lagging; 5 = best-in-class. 2. Average of top quintile of companies (from CPG industry) in the McKinsey Digital Quotient (DQ) database, across geographies. 3. Average of top quintile companies in the DQ database, across industries and geographies

EXHIBIT 5.1

Strategic roadmap for the entire transformation

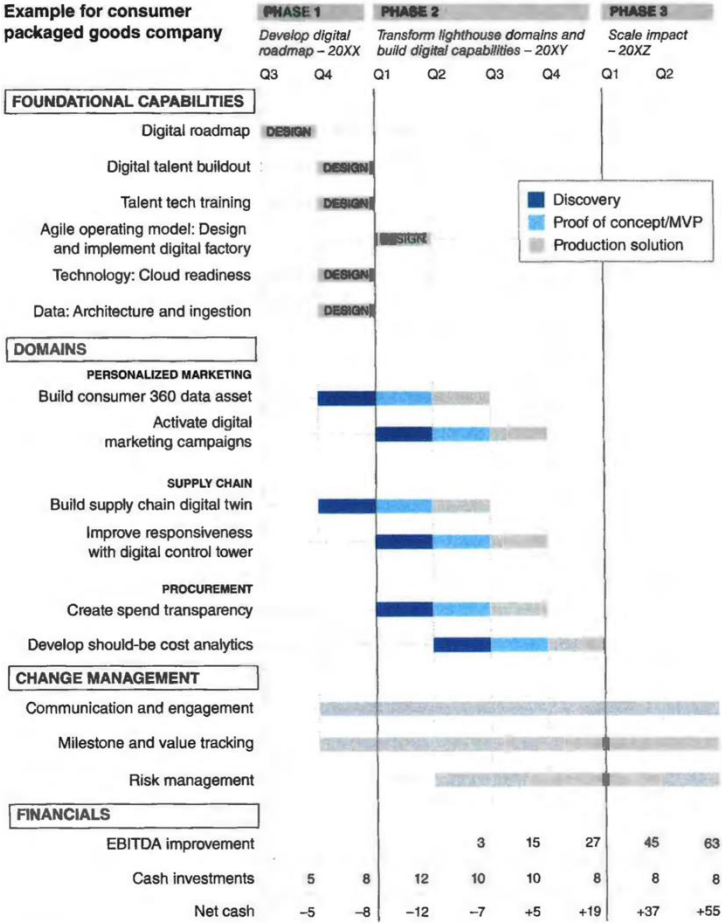


EXHIBIT 6.1

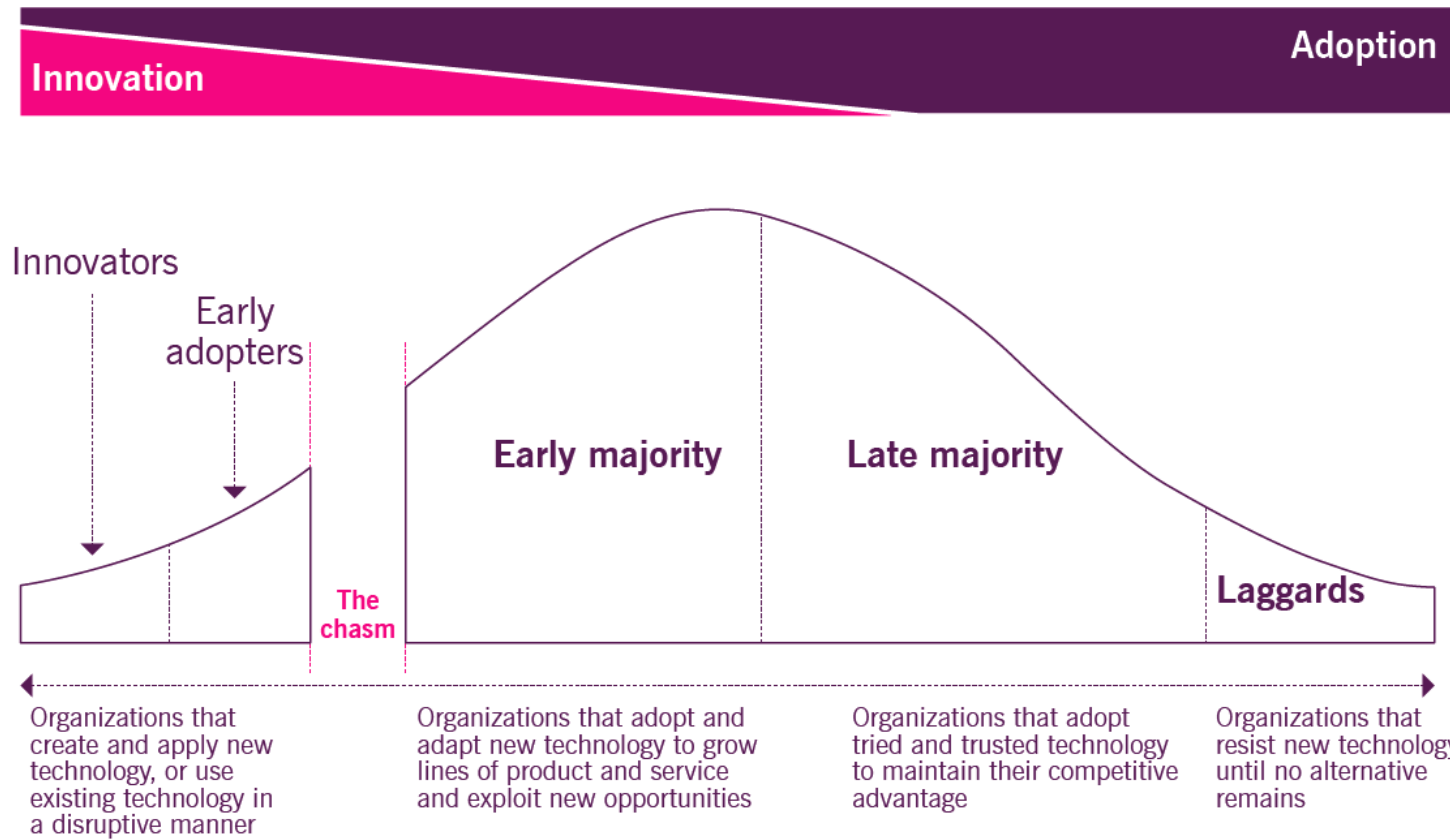
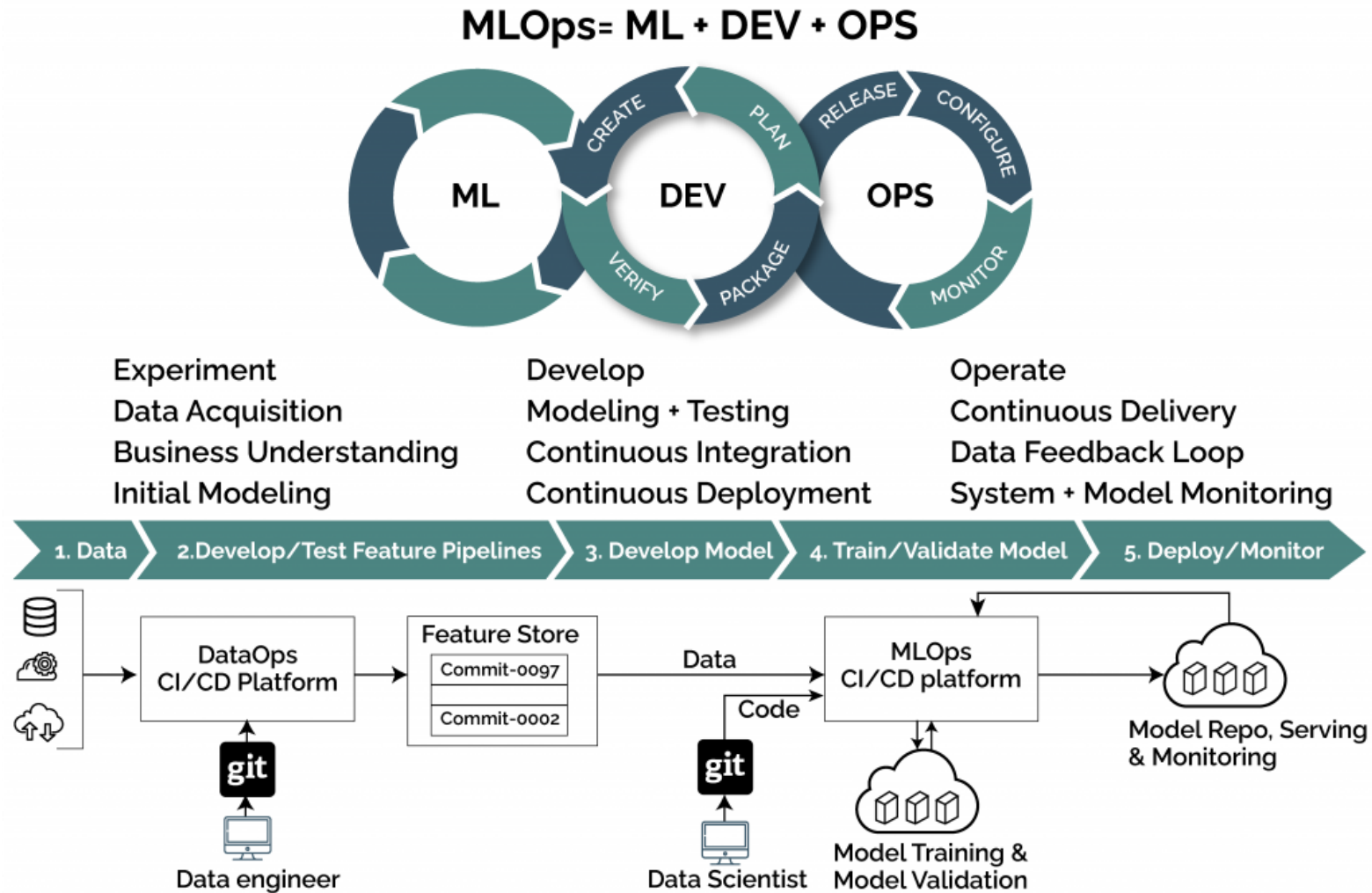


Figure 10.1 Technology adoption lifecycle

After Moore (2014)

MLOps = ML + DEV + OPS



AI/ML model lifecycle

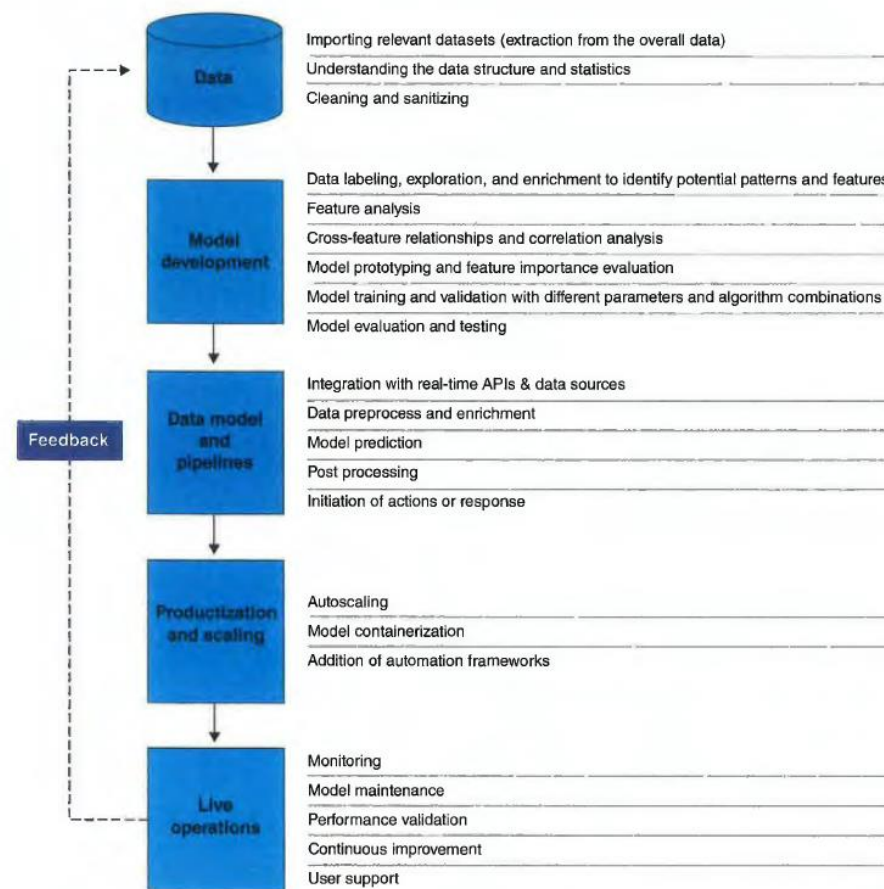
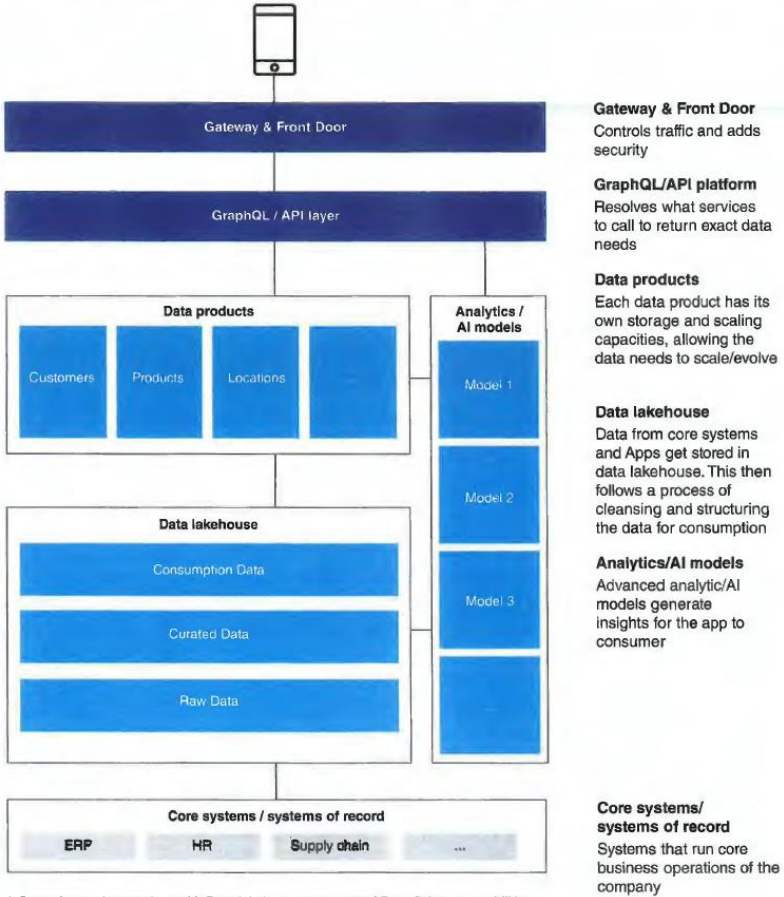


EXHIBIT 23.1

Modern application architecture¹ – overview

Example of consumer application architecture for a global medical device company



1. Serverless, microservices with Data lakehouse storage and Data Science capabilities

EXHIBIT 17.2

The family of xOps practices

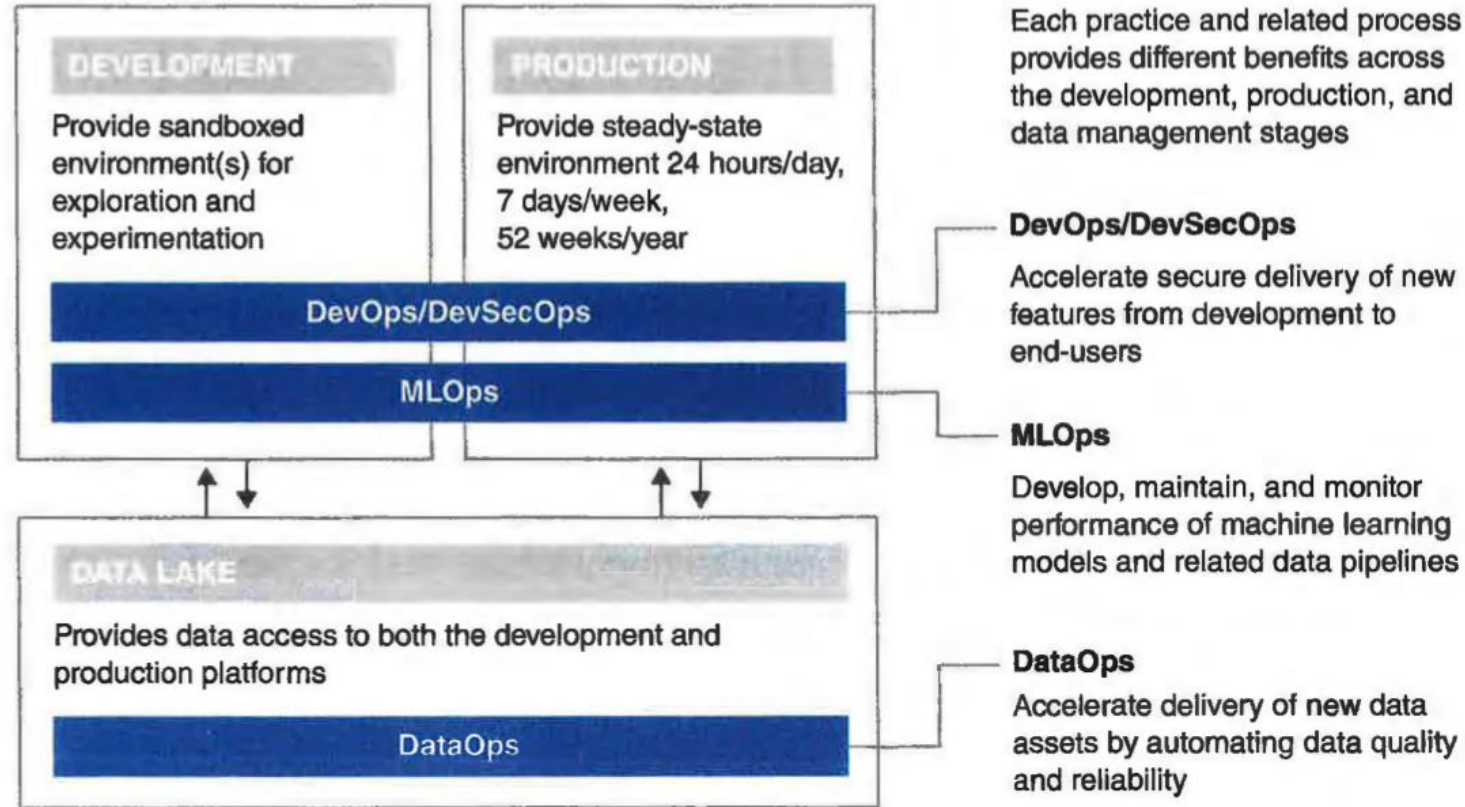


EXHIBIT 19.2

Data architecture archetypes

CLOUD-NATIVE DATA LAKE

Centralized serverless architecture leveraging object storage and compute which can scale independently	Optimized for (very) large-scale data marts for SQL analytics and modern AI/ML applications	Flexible foundation to add capabilities (e.g., DWH, real-time) but beginning to be seen as "legacy" architecture
---	---	--

CLOUD-NATIVE DATA WAREHOUSE

Highly scalable and agile SQL-driven platform with independently scalable storage and compute	Implements modern data transformation driven by SQL or UI-centric ETL tools (e.g., dbt, Matillion)	Very good performance on vast majority of enterprise analytical workloads	Very well supported by tooling and required SQL skills are plentiful among data users, analysts, and data experts
---	--	---	---

LAKEHOUSE

Combines benefits of Data Lake and DWH into an integrated platform for analytics (e.g., BI, SQL) and AI/ML use cases	Leverages nextgen storage technologies (e.g., Delta Lake or Iceberg) supporting ACID transactions on top of object storage	Handles the most complex batch data jobs and high-volume streaming data (e.g., IoT)	Less mature tooling but rapid pace of technical innovation
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DATA MESH

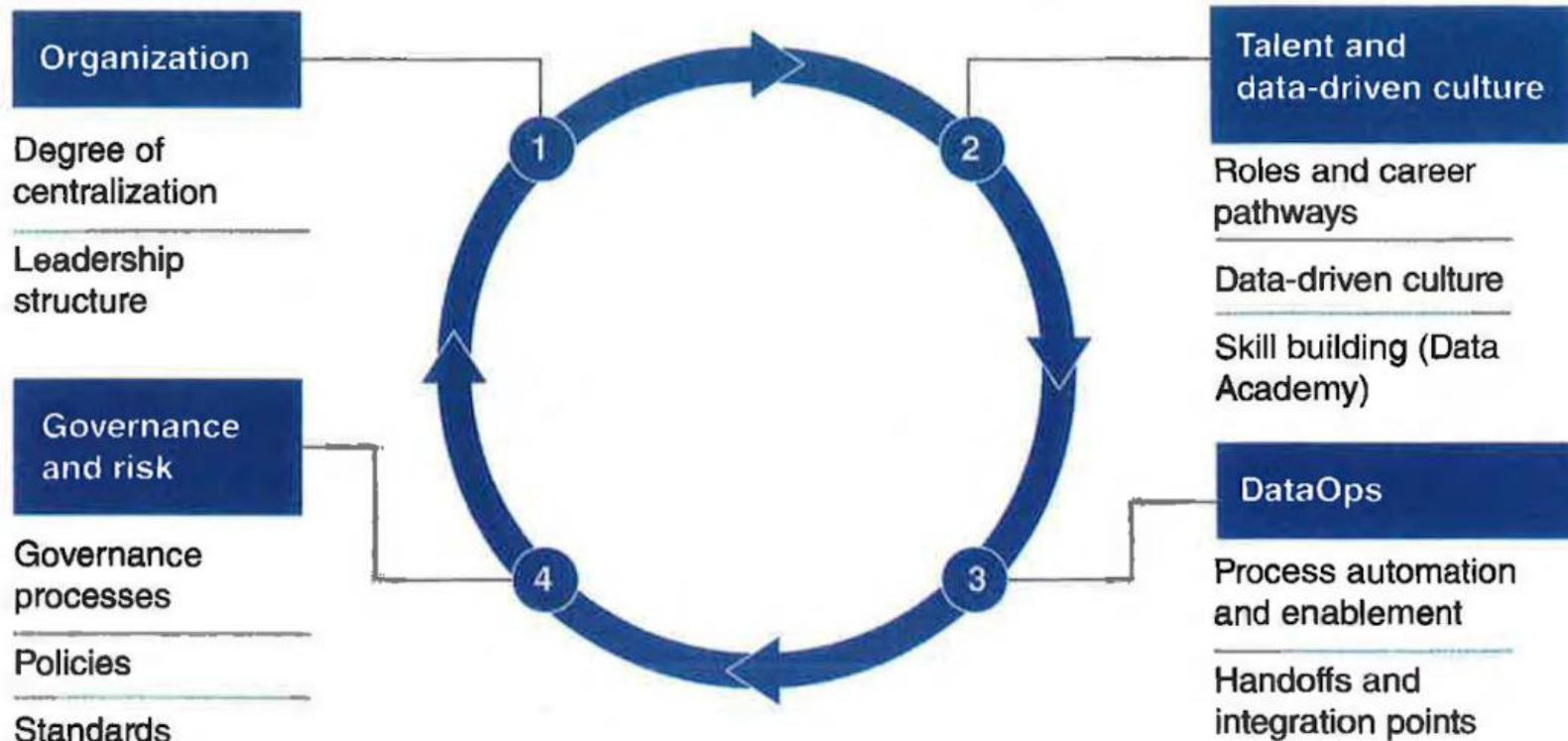
Emerging archetype; fundamental departure from centralized IT and data functions	Decentralized architecture approach focused on data products fully owned by business domains	Data products are curated for quality, cataloged, and accessed via well-defined data services	Data products are built leveraging any of the data architecture archetypes defined above
--	--	---	--

DATA FABRIC

Emerging strategy for creating a unified data environment across the Enterprise's data landscape	The Fabric is stitched together through metadata into a secure, unified data management layer	Meant to solve multicloud scenarios for heterogeneous data sources and infrastructure	No existing tooling currently enables a true Data Fabric, it must rather be built in-house
--	---	---	--

ORGANIZE TO GET THE MOST FROM YOUR DATA

Components of an effective data operating model



The data operating model is the overall approach for how the organization should manage data. It has four primary components: organisation, talent and culture, tooling and DataOps, and governance and risk

EXHIBIT 27.1

Typical setup across data capability areas in a best-practice federated model

	Degree of centralization ¹	Where capabilities report	What the center provides ²	What is delivered in federated manner
Data strategy		Chief Data Office	Enterprise data strategy, value assurance across BUs	Business unit-level data strategies, use cases, and opportunity and issue areas
Data product management		Chief Data Office	Data product standards, tooling, and playbook; management of some enterprise products	Management of the majority of data products, with cross-functional teams comprised of Business, Data, and Technology resources
Data architecture		Chief Data Office or IT	Enterprise data architecture, architectural guardrails and review	Ownership and management of source systems; identification of external data needs
Data engineering		Chief Data Office or IT	Deep expertise, pooled capacity for use case enablement	Data engineering teams aligned to business areas (in particular as data maturity increases)
Data governance		Chief Data Office	Data governance policy and standards, metrics and dashboards, governance of some enterprise domains	Day-to-day management of data domains (e.g., metadata definition, data quality measurement and improvement)
Data operations		Chief Data Office or IT	Data operations team that manages issues and data requests (e.g., for extracts, new datasets)	Remediation of issues unique to a business unit or requiring deep business expertise
Data risk (incl. data privacy)		Chief Data Office or Legal/Compliance	Data risk taxonomy; interpretation of regulations; and policies, standards, and controls to manage risk	Business unit-specific risks and regulatory concerns. Business guidance on acceptable risk tolerance.
Data talent and culture		Chief Data Office or HR	Data capability building, talent strategy and management, and change management	Role modeling of target culture and behaviors. Input on resource performance. Business unit-specific capability building.

1. Typical % of FTE in the center

2. Usually in an Enterprise Data Office, but with some areas commonly owned by IT, Legal, Risk, and others

EXHIBIT 27.2

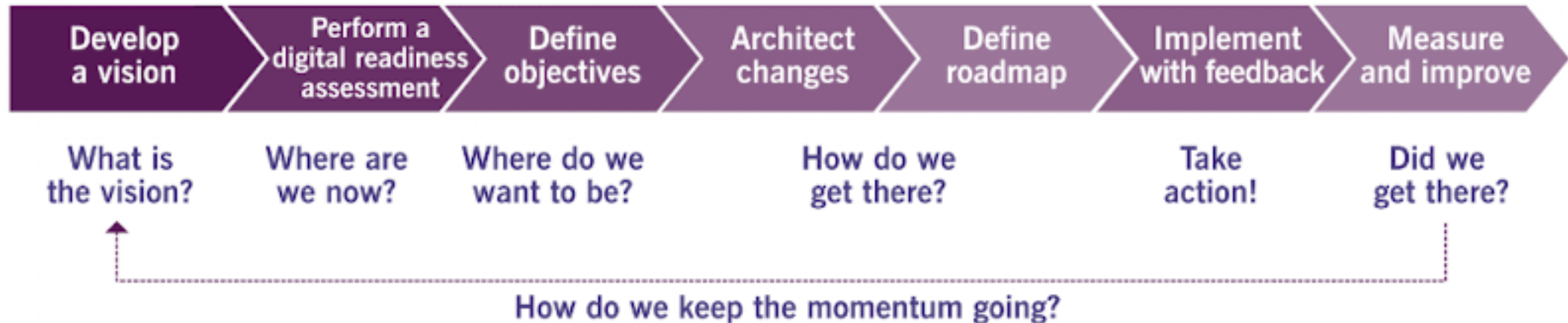
Example of data governance framework and executive level dashboard

Global bank example

● Issue ● At risk ● On target ● Completed

FRAMEWORK		SAMPLE TRACKING METRICS				
Name	Definition	Metric name	Metric Results	Trend	Data sponsor	Data leader
Data Program progress	Tracking progress of data governance program implementation	Percentage of Milestones Complete by accountable team (owner)	● 96% (47/49)	↑	John	Jason
		Percentage of Milestones at Past Due by accountable team (owner)	● 4% (2/49)	↓	John	Jason
Data policy and standard compliance	Measure of compliance for the data governance policies and standards	Launch data governance forums required for business-as-usual data governance	● 100% (10/10)	—	Kate	Kate
Data quality	Measure of data quality from business process and data provider perspective	Number of Open Data Defects	● Open Data Issues 243 of 27,671*	↑	Kate	Kevin
Data skills and talent	Measure of the state of skills and talent needed to deliver the data program	Priority hiring at leadership and one level down data roles filled	● 87% (94/108) 95% (103/108)	↑	Kate	Marvin
Data risk	Tracking risk reduction within data use cases	Percentage of VaR impacted by adjustments (rolling 3 months avg.)	● 69% 45% Target	↑	John	Susan
		Reduction of total expense variances within Use Case 1	● 21% (\$12.1B) Reduced 29% Target Reduction	↓	John	Susan

Typical Steps in a digital & AI transformation programme



POD

- كيف يمكن أن يكون لديك فريق كرة قدم إذا كان جميعهم حراس مرمى؟
 - كيف ستكون الأوركسترا إذا كانت جميعها أبواقاً فرنسية؟
 - - ديزموند توتو
-
- الوحدة التنظيمية في التحول الرقمي والتحول الآلي هي الكبسولة الرشيقية (تسمى أحياناً فرقة أو سكروم أو فريق رشيق أو فريق متعدد الوظائف).
 - الكبسولة عبارة عن فريق متعدد التخصصات يتكون من حوالي 5 إلى 10 أشخاص يمتلكون تصميم وتطوير وإنتاج منتج أو خدمة رقمية معينة لفترة طويلة من الزمن. يعد تسليم خارطة الطريق الرقمية في الأساس بمثابة تمرين لمعرفة عدد الكبسولات الرشيقية التي تحتاجها لإنجاز المهمة ونوعها.



تكوين حجيرات /كبسولة التطوير السريع POD

- تحتوي الكبسولات الرشيقة على مالك منتج (يُطلق عليه أحيانًا مدير المنتج أو مالك الكبسولة)، ومدير سكروم، ومجموعة من التقنيين الرقميين ذوي الصلة، وخبراء في موضوع الأعمال (انظر الشكل 4.1).
- معظم أعضاء المجموعة مخصصون بنسبة 100% للمجموعة لأن هذه هي الطريقة الأكثر فعالية لتحقيق سرعة تطوير عالية (على الرغم من وجود بعض الاستثناءات لبعض الموارد المشتركة، مثل مهندسي الحلول والمدربين الرشيقين).
- أظهرت الأبحاث الحديثة أن وجود الفريق يعمل معًا في موقع فعلي هو أمر مفضل ولكنه ليس بالضرورة محركًا حاسمًا لأداء الكبسولة الرشيقة، خاصة إذا كانت اختلافات المنطقة الزمنية معقولة.



AGILE POD نموذج بمحتوة الوظائف المطلوبة في بود السريع المثالي لتطوير

نموذج بود السريع المثالي لتطوير	الوظيفة	الوصف
		الأعمال BUSINESS توفير الخبرة الأعمال والوظيفية
	مالك المنتج	يملك رؤية المنتج ويدير تطوير المنتج
	خبير الموضوع	خبير في موضوع محدد ويجلب معرفة وظيفية وتجارية
	محلل الأعمال/العمليات	يحلل العمليات ويدعم تطوير وتحسين الأعمال
		التصميم DESIGN إنشاء تجربة المستخدم للمنظومة
	قائد التصميم	يقود التصميم المركز حول المستخدم
	مصمم UI/UX	يصمم تجارب مستخدم تلبي الحاجات المؤسسية واحتياجات العملاء
		التصميم ENGINEERING تصور مفهوم الحل بالهندسة المعمارية التقنية، تطوير الكود، وتشغيل الحل في الإنتاج
	المطور	يطور الكود ويشغل الحلول في الإنتاج
	مهندس الجودة	يبنى خطوط الأنابيب البيئاتية ويحلل الحلول من مصادر البيانات المتنوعة
		علوم البيانات/الذكاء الاصطناعي DATA SCIENCE / AI تحليل البيانات لتحديد الرؤى الرئيسية للحل
	عالم البيانات	يحلل البيانات ويستخرج الأفكار الرئيسية
	مهندس التعلم الآلي	يطبق تقنيات التعلم الآلي لتحسين الأداء والاستقرار
		الدعم SUPPORT تقديم إرشادات إضافية للفريق
	سكرم ماستر	يدعم عمليات سكرم ويساعد الفريق على تحقيق أهدافه
	مدرب أجايل	يدعم ويدرب الفريق على ممارسات الأجايل

Pod archetypes

هناك نوعان من الاعتبارات الهامة عند اتخاذ قرار بشأن تكوين طاقم العمل.

أولاً، ما هو نوع الحل الذي تريد تطويره؟

- على سبيل المثال، يتطلب الحل الذي يعتمد على التحليلات المكثفة خبرة عميقة في هندسة البيانات وعلوم البيانات. ومن ناحية أخرى، يتطلب الحل الذي يواجه العملاء المزيد من المهارات حول تصميم تجربة المستخدم وتطوير البرمجيات. بشكل عام، ستحدد معظم الشركات ثلاثة إلى ستة نماذج أولية مختلفة للقرون (انظر الشكل 4.2). بينما يقدم المعرض ثلاثة نماذج أصلية للبودات، يوجد نماذج أخرى، مثل حجرة التسويق الرقمي، أو حجرة متصلة (على سبيل المثال، IoT)، أو حجرة تكامل النظام الأساسية.

الاعتبار الثاني هو مرحلة حياة جهود التطوير.

- في مرحلة الاكتشاف الأولية، تحتاج إلى الخبرة لتحديد نطاق العمل وتصميم الحل وتحديد أولويات حالات الاستخدام ووضع إطار لحالة العمل. في مرحلة إثبات المفهوم، تحتاج إلى المزيد من "المنشئين" (بما في ذلك المصممين ومهندسي البرمجيات) الذين يمكنهم التطوير والاختبار والتكرار بسرعة لتقديم الحد الأدنى من المنتجات القابلة للتطبيق. في مرحلة الإنتاج، تحتاج إلى قدرات هندسية لضمان أمان الحل وأدائه الفعال وقابليته للتوسع.
- بينما يتطور التوظيف في الحجرة خلال دورة حياة الحل، لا يوجد أبدًا عملية تسليم من حجرة إلى أخرى. في الواقع، يعد الحفاظ على استمرارية الأدوار الرئيسية، مثل مالك المنتج، أمرًا أساسيًا لضمان جهد تطوير متماسك.
- مع تحديد هذه النماذج الأولية، يصبح من الأسهل تقييم احتياجات الموارد الخاصة بالتحويل الرقمي والتحويل الآلي. كحد أدنى، يجب عليك تخطيط حجرة واحدة لكل حل على خريطة الطريق الرقمية الخاصة بك. إذا كان الحل معقدًا، فقد يكون لديك المزيد من القرون التي تركز على حالات الاستخدام المختلفة. يتطلب تعيين النماذج الأولية للحلول بعض الخبرة والممارسة، لكنه سيصبح قريبًا طبيعة ثانية.

أنواع الفرق والتوظيف النموذجي حسب دورة حياة الحلول

Pod archetypes and typical staffing by solution life cycle

Examples — will vary by industry and company

DIGITAL INTENSIVE SOLUTIONS			
Solution life stages			
Discovery	Proof-of-concept/MVP	Production	Change management
1 Product owner	1 Product owner	1 Product owner	1 Product owner
1 Design lead	1 Scrum master	1 Scrum master	1–2 Change agents ³
0.5 Software engineer ^{1,2}	1 Design lead	1 Design lead ¹	1 Business analyst ¹
1 Business/ process analyst	1 UI/UX designer	1 UI/UX designer	
1 SME	2–3 Software engineers ^{1,2}	2–3 Software engineers ²	
	1–2 SMEs	1–2 SMEs	
ANALYTICS INTENSIVE SOLUTIONS			
Discovery	Proof-of-concept/MVP	Production	Change management
1 Product owner	1 Product owner	1 Product owner	1 Product owner
0.5 Data scientist	1 Scrum master ¹	1 Scrum master ¹	1–2 Change agents ³
0.5 Data engineer	2 Data scientists	1 Change agent	1 Business analyst ¹
1 Business analyst	2 Data engineers	1 UI/UX designer ¹	
1 SME	1 Business analyst	1 Data engineer	
	1 SME	2 Machine learning engineers	
		1 Business analyst	
DATA INTENSIVE SOLUTIONS			
Discovery	Proof-of-concept/MVP	Production	Change management
1 Data product owner	1 Data product owner	1 Data product owner	1 Product owner
1 Data architect	1 Scrum master	1 Scrum master	1–2 Change agents ³
1 Data engineer	1 Data architect	1 Data architect	1 Business analyst ¹
1 Data SME	2–3 Data engineers	2–3 Data engineers	
1 Business analyst	1–2 Software engineers ²	1–2 Software engineers ²	
	1–2 Data SMEs		

1. Optional/as needed. 2. Software engineers cover full-stack developers, solution architects, cloud engineers, and DevOps engineers. 3. Pod members who are active promoters of change, working to embed new solutions and build organizational buy-in by embracing new processes, addressing questions and concerns, and resolving implementation challenges.

EXHIBIT 4.2

يقدم المعرض 4.2 نظرة شاملة على أنواع الفرق النموذجية والتوظيف المطلوب حسب دورة حياة الحلول. يتم تقسيم الفرق إلى مراحل مختلفة: الاكتشاف، النموذج الأولي/إثبات المفهوم، الإنتاج، وإدارة التغيير. لكل مرحلة، يتم تحديد الأدوار المطلوبة لضمان تنفيذ الحلول بكفاءة.

ثلاثة خيارات لتصميم نموذج التشغيل

في عالم الأعمال الرقمي المتسارع، يعتبر اختيار نموذج التشغيل المناسب أمرًا بالغ الأهمية لضمان استمرارية النجاح وقدرة المؤسسة على التكيف. يحدد نموذج التشغيل كيف تقدم المؤسسة القيمة لعملائها، ويشمل ذلك الأفراد والعمليات والتكنولوجيا. يوضح الجدول التالي ثلاثة خيارات مختلفة لتصميم نموذج التشغيل، ولكل منها مزاياها واعتباراتهما الخاصة:

الخيار	Digital Factory المصنع الرقمي	Product & Platform المنتج والمنصة	Enterprise-wide Agile الرشاقة على مستوى المؤسسة
الوصف	وحدة رقمية منفصلة تقوم ببناء حلول رقمية لوحدة الأعمال باستخدام طرق عمل رشيقة حديثة وفرق عمل متعددة التخصصات.	يجمع النموذج بين الأعمال والتكنولوجيا والعمليات في فرق عمل تركز على تحسين تجربة العميل/المستخدم (ما يسمى بفرق منتجات) وفرق عمل مخصصة لبناء الخدمات لإعادة استخدامها (ما يسمى بفرق منصات).	يوسع فوائد الرشاقة إلى ما هو أبعد من الرقمية/التكنولوجيا، حيث يمكن للعديد من العمليات والوظائف الأساسية الاستفادة من التعاون الرشيق.
التركيب النموذجي	50-10 فريق عمل. يمس أقل من 2٪ من المؤسسة.	50-1000 + فريق عمل. يمس 20-40٪ من المؤسسة.	1000+ فريق عمل. يمس 80٪ من المؤسسة.
الميزة الرئيسية	أبسط نموذج للتنفيذ.	يدمج الأعمال والتكنولوجيا والعمليات بشكل أوثق ويتناول تطور المنصات.	يخلق ثقافة رشاقة على مستوى المؤسسة.
المتطلبات الأساسية	مواءمة وحدات الأعمال في تمويل وتشغيل نموذج المصنع.	تحديث تكنولوجيا المعلومات مطلوب (مثل المواهب، والهندسة، و DevSecOps المعمارية، والسحابة، و	استعداد تنظيمي للتحويل الكامل للرشاقة.

الشراكة لتسريع بناء القدرات

لقد رأينا أربعة أنواع من الشراكات التي يمكن أن تتجح عندما يتم تحديد نطاقها وتنظيمها بشكل صحيح

المظلة

- مثل التعاقد مع مقاول عام لبناء منزل، يمكنك الشراكة مع شركة تساعد في تخطيط وتنظيم التحول، وربما توفر بعض المواهب، وتساعدك على فحص وتنظيم الموردين الآخرين للمواهب والتكنولوجيا والبيانات. ومن الأفضل العمل مع شريك شامل واحد لتجنب الاختلالات وتعقيد التنسيق.

الموهبة

- يمكن أن يؤدي استخدام الشركاء للحصول على المواهب إلى زيادة السرعة والمرونة بشكل كبير. يمكن للشريك المناسب إرسال فريق من الخبراء المهرة إلى عملك في غضون أيام، ثم المغادرة عندما لا تعود هناك حاجة إليه. ويمكنهم أيضاً تقديم خدمات التدريب والارتقاء بالمهارات. وقد تكون مثل هذه الشراكات ضرورية في البداية

التكنولوجيا:

- يمكن للشركاء المساعدة في تخزين التطبيقات والبيانات ومعالجتها وحمايتها. يقدم مقدمو الخدمات السحابية (CSPs) مجموعة متزايدة باستمرار من الخدمات والقدرات، خاصة فيما يتعلق بالبيانات والتحليلات (اقرأ المزيد في الفصل 18). قد يكون موفرو البرامج الآخرون أيضاً ذوي صلة اعتماداً على الحلول التي تقوم بإنشائها (على سبيل المثال، تقنيات مكدس تكنولوجيا التسويق للتسويق الرقمي). قد تحتاج أيضاً إلى شراكات تقنية محددة حول إمكانيات أكثر تخصصاً مثل تحديد الموقع الجغرافي أو اختبار الاختراق.

البيانات:

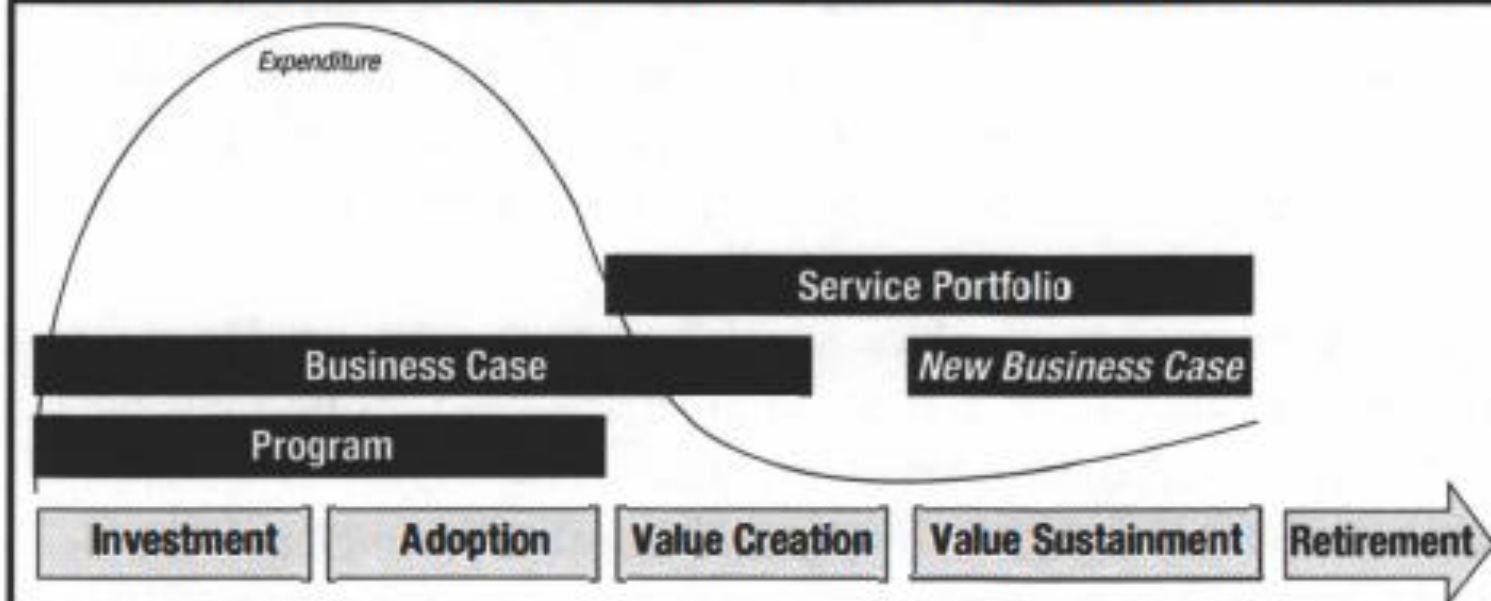
- يمكن للأطراف الثالثة تقديم بيانات تكميلية مهمة. تقدم مصادر البيانات العامة ووسطاء البيانات وأسواق البيانات مجموعة من البيانات والخدمات المتعلقة بالبيانات. يجب على الشركات أن تدرس بعناية بروتوكولات الوصول إلى البيانات، والملكية الفكرية، ومخاطر الأمن السيبراني.

يعتمد الاستخدام الفعال للشراكات في نهاية المطاف على مدى معرفة الشركة بالفجوات في قدراتها ومدى قدرتها على هيكلة الشراكات لسد تلك الفجوات على المدى القريب مع بناءها على المدى الطويل.

خمس علامات لخارطة طريق جيدة للتحول الرقمي والتحول الرقمي

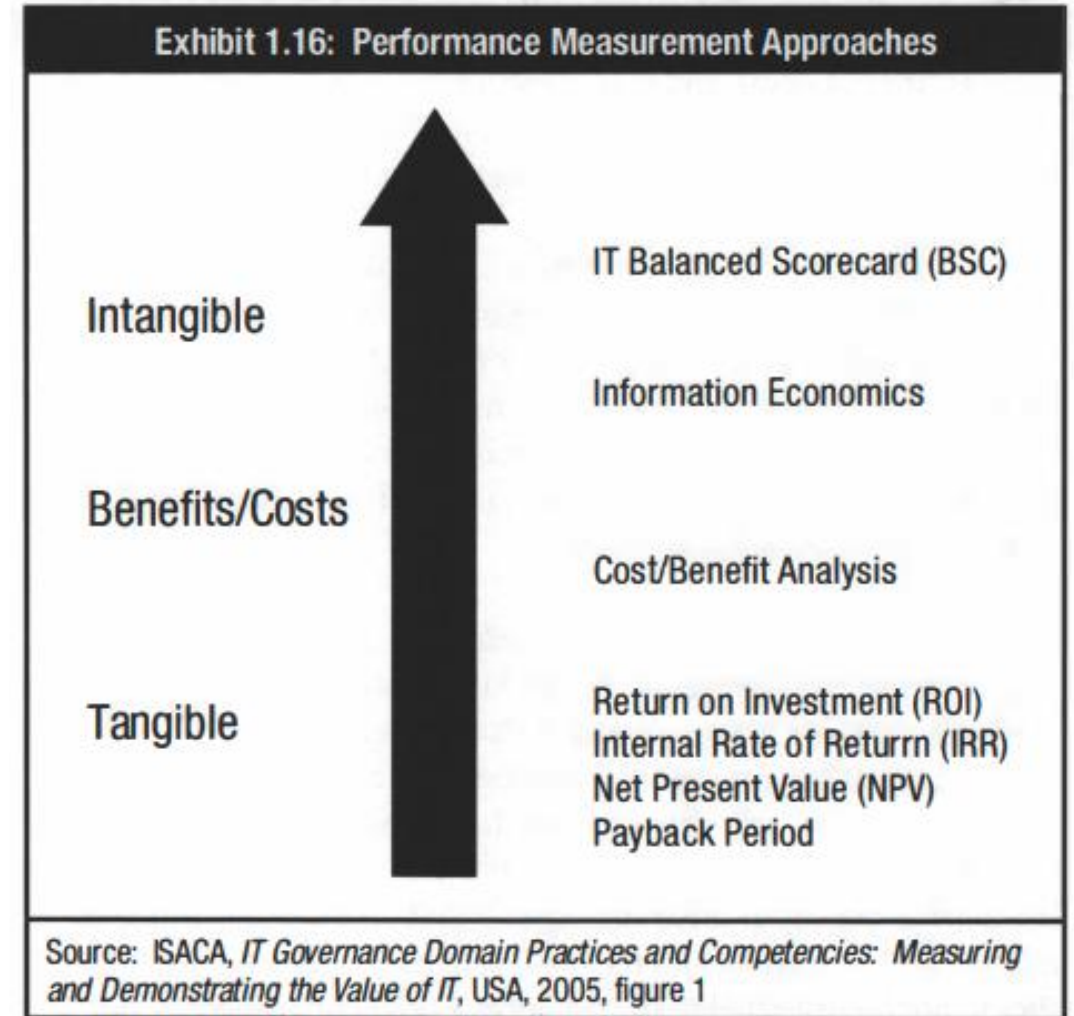
- إن خارطة الطريق الرقمية هي بمثابة عقد لمجموعة المديرين التنفيذيين لديك
- ليس من المفيد التخطيط لفترة أطول من عامين إلى ثلاثة أعوام. ستتغير الأمور دائمًا وستتعلم الكثير في السنة الأولى. كن واضحًا بشأن الجائزة التي تسعى للحصول عليها، وكن مرناً بشأن الرحلة للوصول إلى هناك.
- هناك خمس علامات لخارطة طريق جيدة للتحول الرقمي والتحول الرقمي:
 - يتم تسلسل المجالات والحلول الرقمية الأساسية بطريقة تنتج قيمة ذات معنى على المدى القصير والمتوسط.
 - ترتبط تحويلات النطاق بشكل واضح بالتحسينات في KPIs التشغيلية، والتي بدورها ترتبط بإنشاء القيمة. يلتزم قادة الأعمال بخريطة طريق المجال وقد تم إدراج الفوائد المتوقعة في أهداف أعمالهم وخطة الحوافز الخاصة بهم.
 - وتراعي الخطة الشاملة بشكل واضح بناء قدرات المؤسسة - المواهب، ونموذج التشغيل، والتكنولوجيا، والبيانات - وتتضمن الاستثمارات المطلوبة والوقت اللازم لتحقيق النضج.
 - إن الخطة المالية الشاملة واضحة وتعكس أفقًا زمنيًا واستثماريًا واقعيًا ولكنه قوي. ومن الضروري أن تكون هناك مقاييس مالية صارمة تمامًا كما لو كانت تتعلق بتحويل نموذجي للتكلفة أو الإيرادات، ويمكن قياس هذا التقدم خلال أشهر، وليس سنوات.
 - تم دمج إدارة التغيير للتحويل بأكمله وللحلول المحددة. لقد قام مكتب التحول بتطوير برنامج لإدارة التغيير ونموذج واضح للحوكمة، كما حدد معالم ربع سنوية قابلة للقياس (المزيد عن هذا في الفصل 30).
 - إن خارطة الطريق الرقمية هي لحظة القيادة "لتكديس الأيدي" للاتفاق. وتصبح خارطة الطريق في الأساس بمثابة عقد توقع عليه القيادة لتنفيذه.

Exhibit 3.15: Full Economic Life Cycle of an Investment



Source: ISACA, *The Business Case Guide: Using Val IT 2.0*, USA, 2010, figure 3

- Breakeven analysis
- Cost-benefit analysis (CBA)
- Information economics
- Internal rate of return (IRR)
- Net present value (NPV)
- Organizational flexibility
- Payback period
- Return on investment (ROI)
- Service life cycle



ROI for AI



To gain a good understanding of a planned AI project, you should map out both the hard and soft aspects of your investment. Once you've done such a two-by-two mapping, you can quantify some of the likely benefits.

	Hard	Soft
Returns	• Time savings • Cost savings • Productivity increases • Revenue increases	• Better experience • Skill retention • Agility
Investments	• Resources • Licenses	• Data • Compute and storage • Subject matter experts • Data science training

In the case of AI, the hard **ROI** you achieve can come from a number of different sources:

- **Time savings:** Automated intelligence that automates repetitive manual and cognitive tasks will reduce the time needed to process those tasks (e.g., invoice processing using AI).
- **Productivity increase:** Assisted intelligence enhances human decision-making, which can increase employee productivity. This productivity gain can come from effectiveness and efficiency (faster execution of tasks) or better decision-making (e.g., anti-money laundering compliance using AI).
- **Cost savings:** In some cases, time and productivity savings can reduce the number of employees required to perform the same amount of work, which can lower costs (e.g., reduced data entry operators as forms get digitized). However, this is not universal. A number of organizations directly transfer the number of hours saved into hiring fewer people and hope to see a reduction in labor costs. This may not always happen: If you reduce the time it takes an employee to perform a task by 20%, that person may find something else to do during that time. However, if you reduce the time by 80%, it will be easier to aggregate those savings into a reduction in headcount.
- **Revenue increase:** Assisted and augmented intelligence can provide new services that increase both the number of customers and their willingness to pay more for those services (e.g., customers buying digital subscriptions to curated and personalized music, videos and information).

In addition to these hard returns, AI can provide a number of soft returns. They include:

- **Better experience:** Assisted and augmented intelligence typically provide personalization that can result in a better customer experience. Even when companies cannot monetize their personalization efforts, they can provide a better experience, and over time that can become a cost of staying in business.
- **Skills retention:** Acquisition, retention and an increased need for data science and AI talent are major challenges for many organizations. Nevertheless, to ensure better utilization of fast-changing AI technology, it's becoming necessary to have data scientists who constantly explore new ideas and solutions.
- **Agility:** Even though some AI projects may not generate an adequate return, exploring a number of AI projects can help your data science team build new capabilities — and be agile when responding to new opportunities and challenges.

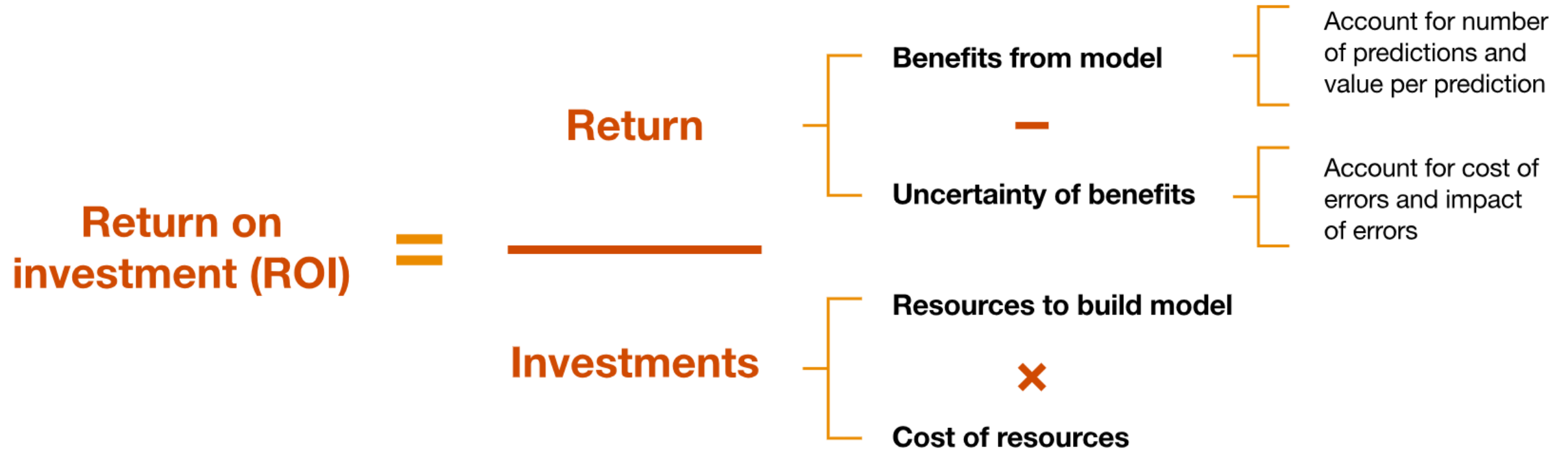


Figure 3.1—The Relationship Between Benefits Realization, Portfolio Management, Program Management and Project Management

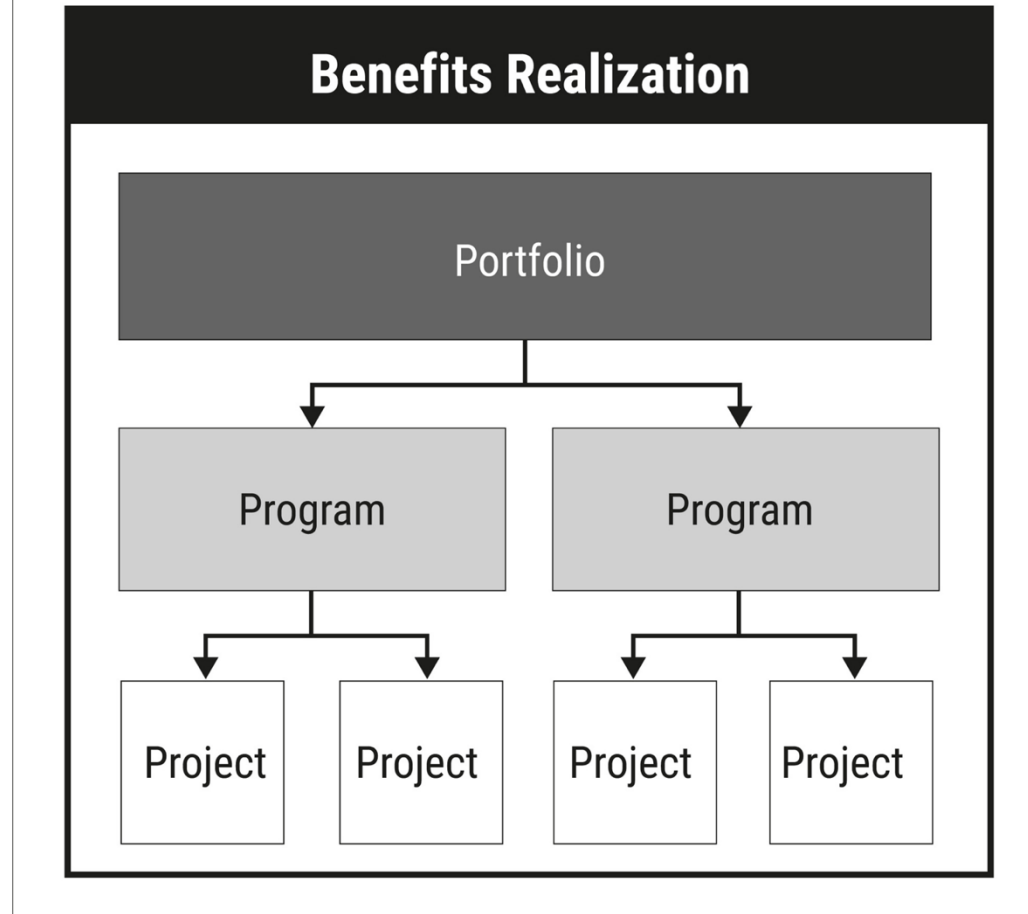
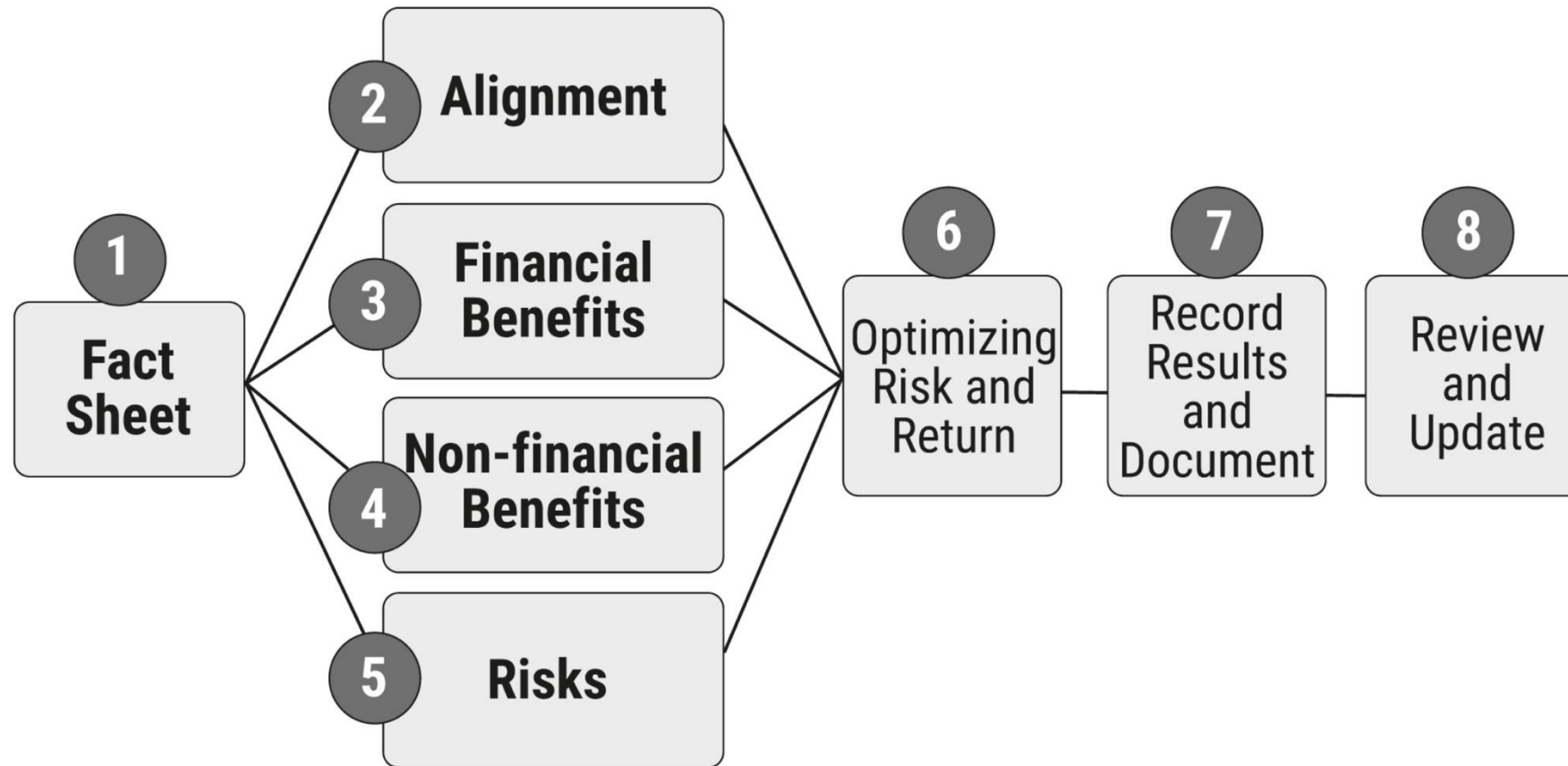


Figure 3.9—Business Case Development Steps



Business CASE (Details)

External & Internal
Analysis , Drivers

Challenges

Goals

Opportunity
Analysis

Current Project & Operations

Pipeline

Forecasted

Feasibility Study

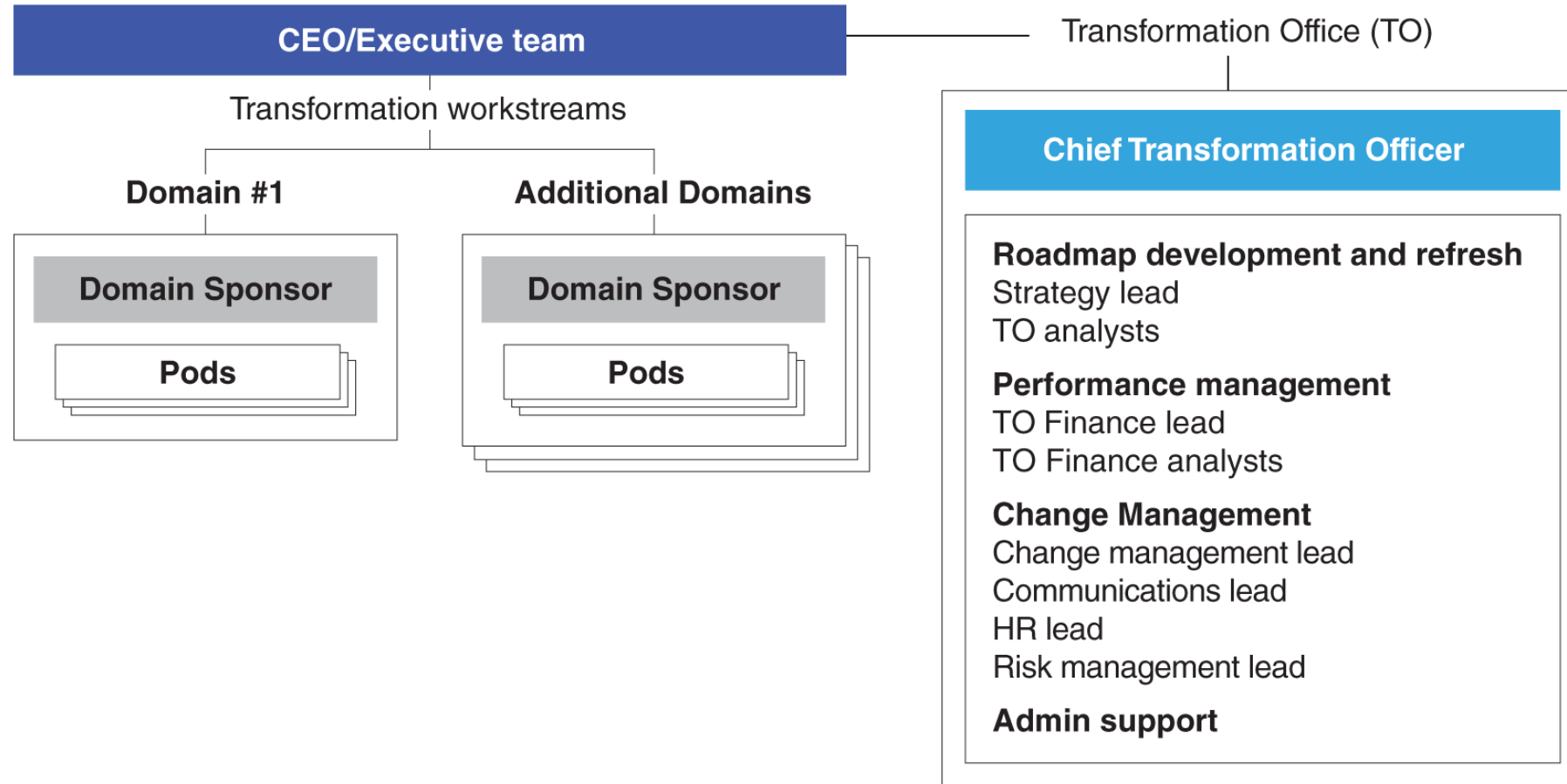
Make Or Buy Decision

ROI

Competitive Advantage

Risks

Transformation office setup



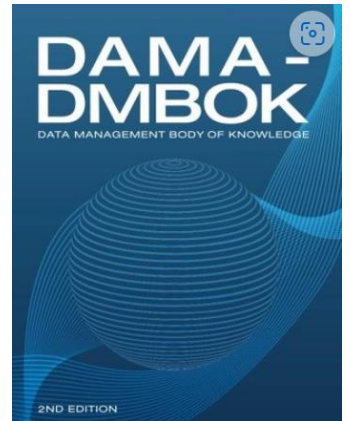
DAMA



DAMA International

- DAMA International is a **not-for-profit, vendor-independent, global association of technical and business professionals dedicated to advancing the concepts and practices of information and data management**¹²³⁴. It has a membership consisting of technical and business professionals³. DAMA International's vision is to be an essential resource to those who engage in information and data management

Data Management Body Of Knowledge



DAMA-DMBOK 2 DATA MANAGEMENT FRAMEWORK

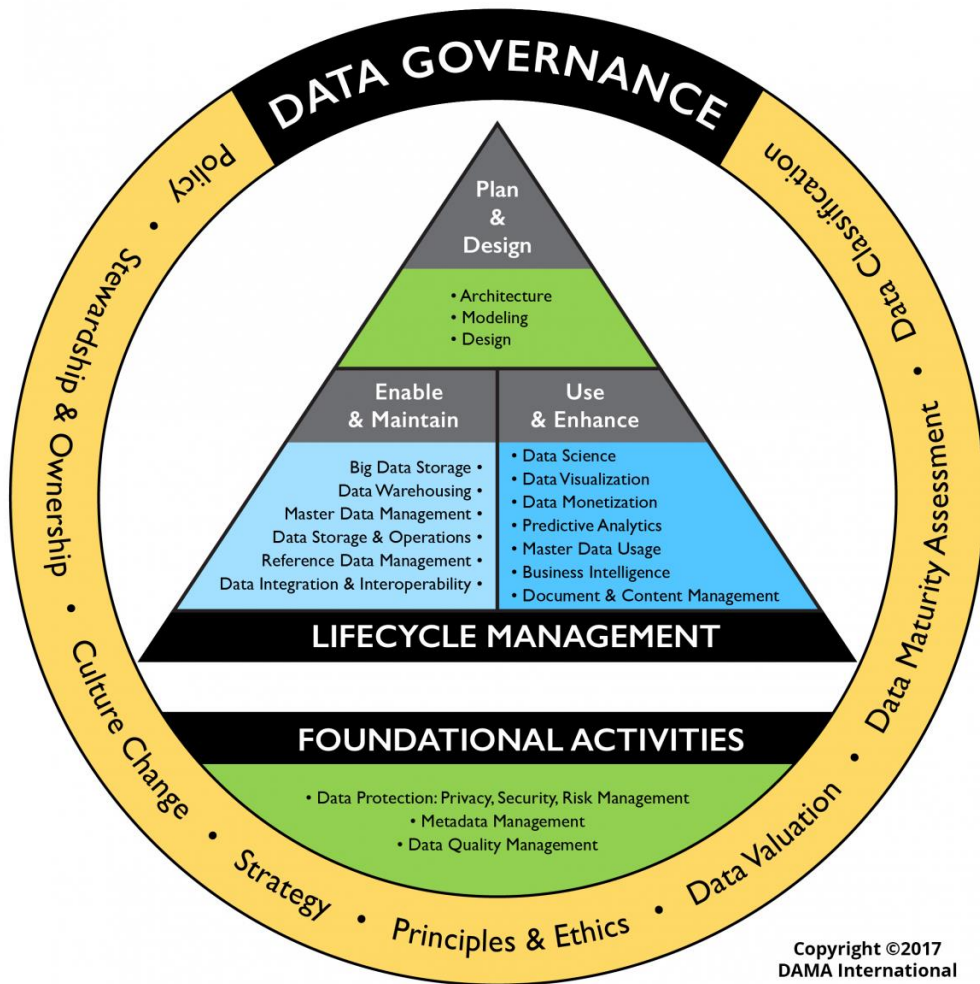


DATA GOVERNANCE

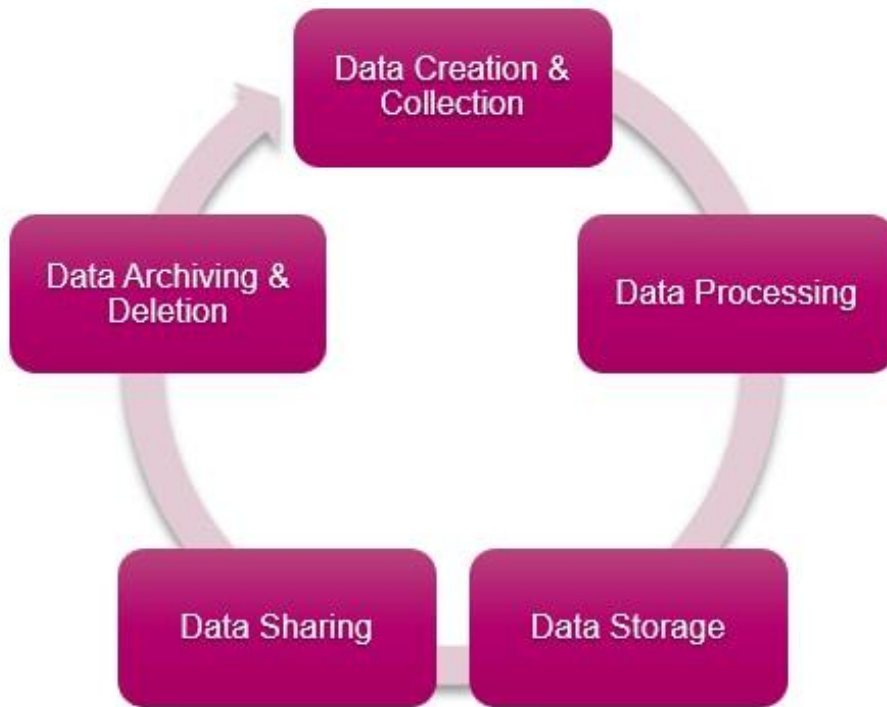
- **Strategy:** Defining, communicating, and driving execution of Data Strategy and Data Governance Strategy
- **Policy:** Setting and enforcing policies related to data and Metadata management, access, usage, security, and quality
- **Standards and quality:** Setting and enforcing Data Quality and Data Architecture standards
- **Oversight:** Providing hands-on observation, audit, and correction in key areas of quality, policy, and data management (often referred to as *stewardship*)
- **Compliance:** Ensuring the organization can meet data-related regulatory compliance requirements
- **Issue management:** Identifying, defining, escalating, and resolving issues related to data security, data access, data quality, regulatory compliance, data ownership, policy, standards, terminology, or data governance procedures
- **Data management projects:** Sponsoring efforts to improve data management practices
- **Data asset valuation:** Setting standards and processes to consistently define the business value of data assets

3.4 DMBOK Pyramid (Aiken)

If asked, many organizations would say that they want to get the most out of their data – they are striving for that golden pyramid of advanced practices (data mining, analytics, etc.). But that pyramid is only the top of a larger structure, a pinnacle on a foundation. Most organizations do not have the luxury of defining a data management strategy before they start having to manage data. Instead, they build toward that capability, most times under less than optimal conditions.



- Data governance is the **strategy of data**, setting the policies and rules that ensure data quality, compliance, and usage across the organization.
- Data Governance focuses on how decisions are made about data and how people and process are expected to behave in relation to data



- Data management is the **logistics of data**, implementing the policies and rules to collect, store, process, and analyze data for decision-making.

-
- **Data Governance and Data Management: A Primer**
 - Data is a **valuable asset** for any organization, but it needs to be organized, controlled, and used effectively.

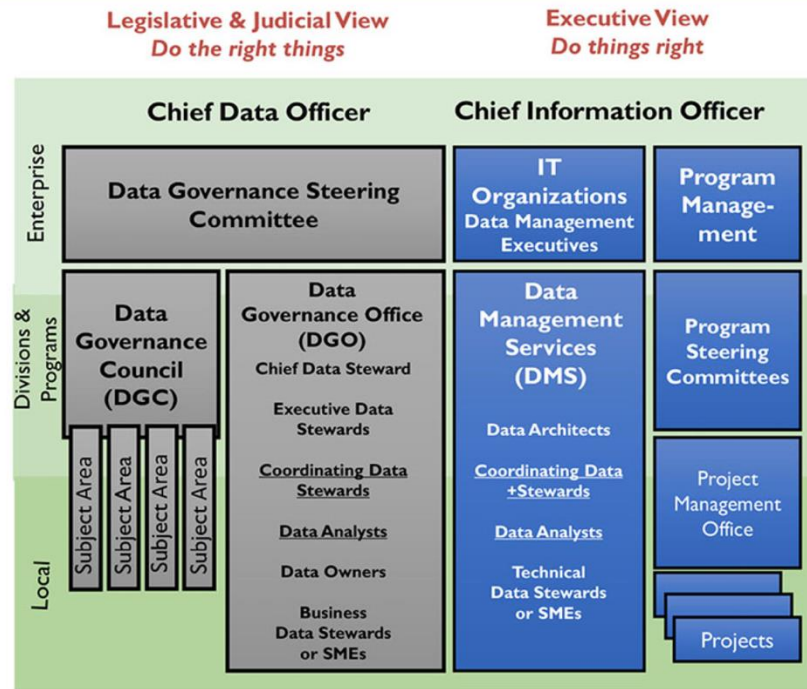


Figure 16 Data Governance Organization Parts

Table 4 Typical Data Governance Committees / Bodies

Data Governance Body	Description
Data Governance Steering Committee	The primary and highest authority organization for data governance in an organization, responsible for oversight, support, and funding of data governance activities. Consists of a cross-functional group of senior executives. Typically releases funding for data governance and data governance-sponsored activities as recommended by the DGC and CDO. This committee may in turn have oversight from higher-level funding or initiative-based steering committees.
Data Governance Council (DGC)	Manages data governance initiatives (e.g., development of policies or metrics), issues, and escalations. Consists of executive according to the operating model used. See Figure 17.
Data Governance Office (DGO)	Ongoing focus on enterprise-level data definitions and data management standards across all DAMA-DMBOK Knowledge Areas. Consists of coordinating roles that are labelled as <i>data stewards</i> or <i>custodians</i> , and <i>data owners</i> .
Data Stewardship Teams	Communities of interest focused on one or more specific subject-areas or projects, collaborating or consulting with project teams on data definitions and data management standards related to the focus. Consists of business and technical data stewards and data analysts.
Local Data Governance Committee	Large organizations may have divisional or departmental data governance councils working under the auspices of an Enterprise DGC. Smaller organizations should try to avoid such complexity.

Analytic Culture

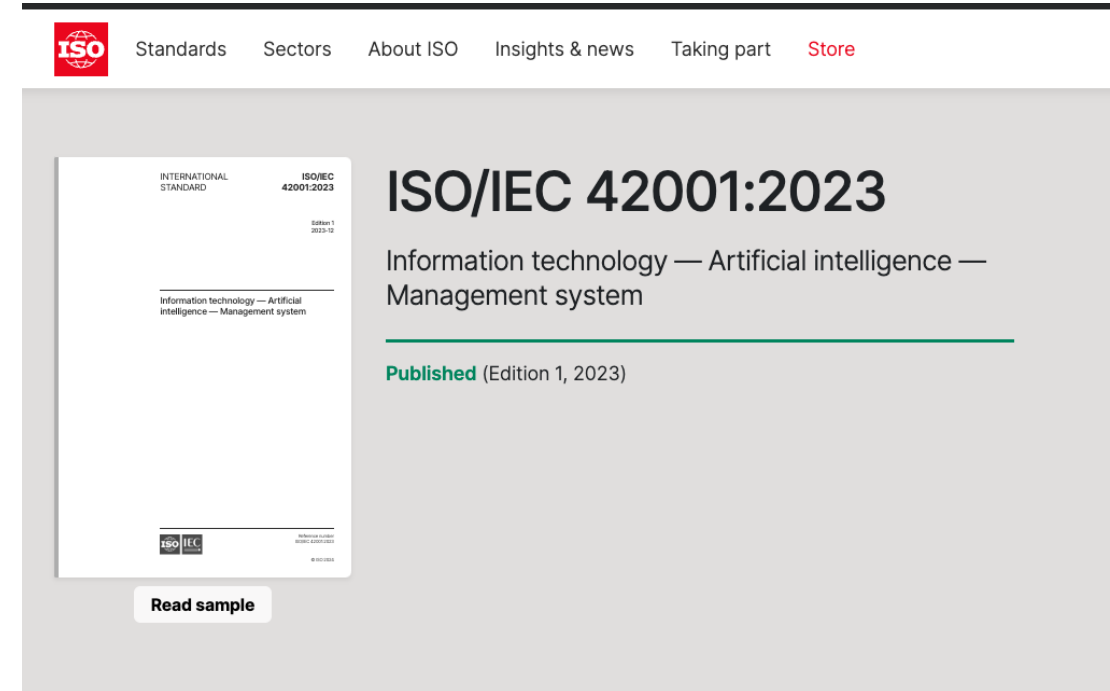
- Analytical culture is a soft element of an organization's makeup that encourages decision-making based on rational assumptions and robust, granular analysis
 1. When the 'culture of analytics' is present, employees use data and insights to support their decisions and improve business performance
 2. Teams look for data to test their assumptions and evaluate business outcomes

Responsible AI

- refers to the practice of designing, developing, and deploying artificial intelligence systems in a way that prioritizes ethical considerations, fairness, accountability, transparency, and respect for privacy. It aims to ensure that AI technologies are used for positive and constructive outcomes without causing harm to individuals, society, or the environment. Here are some key principles and areas associated with responsible AI:
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- 1. **Fairness and Bias Mitigation:** Ensuring AI systems treat all users fairly, without bias, and making conscious efforts to detect and minimize potential biases in data and algorithms.
- 2. **Transparency:** Making AI systems understandable and explainable, allowing users and stakeholders to know how and why decisions are made, especially in critical areas like healthcare, finance, and criminal justice.
- 3. **Accountability:** Assigning clear responsibility for the design, outputs, and consequences of AI systems, meaning there should be individuals or organizations responsible for the actions and impacts of AI systems.
- 4. **Privacy and Security:** Protecting users' personal data, ensuring it's used responsibly, and securing it against breaches. Compliance with data privacy regulations (like GDPR) is also a core part of this principle.
- 5. **Human-Centric Design:** Ensuring AI systems are designed with humans in mind, enhancing human decision-making rather than replacing it in critical situations.
- 6. **Sustainability:** Considering environmental impacts and resource efficiency in the development and deployment of AI, such as minimizing energy consumption or waste associated with large models.
- 7. **Social Good:** Aligning AI developments with broader societal goals, like public health, education, and well-being, to maximize positive impacts.
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- By focusing on these principles, responsible AI strives to create a framework where technology serves society's needs and values, empowering individuals and protecting their rights while fostering trust in AI systems.

ISO/IEC 42001:2023 Information technology, Artificial intelligence — Management system

- is a standard developed by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC).
- It provides a framework for organizations to establish, implement, maintain, and continually improve an AI management system.
- This standard is intended to guide organizations in responsibly managing AI-related activities by setting clear policies, procedures, and practices.
- It focuses on ensuring that AI systems are developed, deployed, and used in a way that is ethical, transparent, and aligned with organizational goals and regulatory requirements.
- ISO/IEC 42001:2023 aims to address the challenges associated with AI, including issues around data privacy, fairness, accountability, and risk management.



Course Assessment

