

# Generating the Future: SAP AI and Foundation Model Roadmap

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Las Vegas

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**2024**

**SAP**insider



## In This Session

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Know what generative AI models are good at (and not)

How SAP Business AI delivers value and what the roadmap is



# What We'll Cover

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- A gentle introduction to the data science behind gen AI
- SAP Business AI strategy and value prop
- SAP Business AI offerings and roadmap



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## **Topic 1: A gentle introduction to the data science behind gen AI**

# Gen AI capabilities

Write a limerick that extols the virtues of enterprise architects for SAP products learning AI



In the world of SAP's intricate art,  
Enterprises play a crucial part.  
With AI they align,  
Their solutions refine,  
Crafting systems with ingenuity, smart!

Write a python function that generates Fibonacci numbers

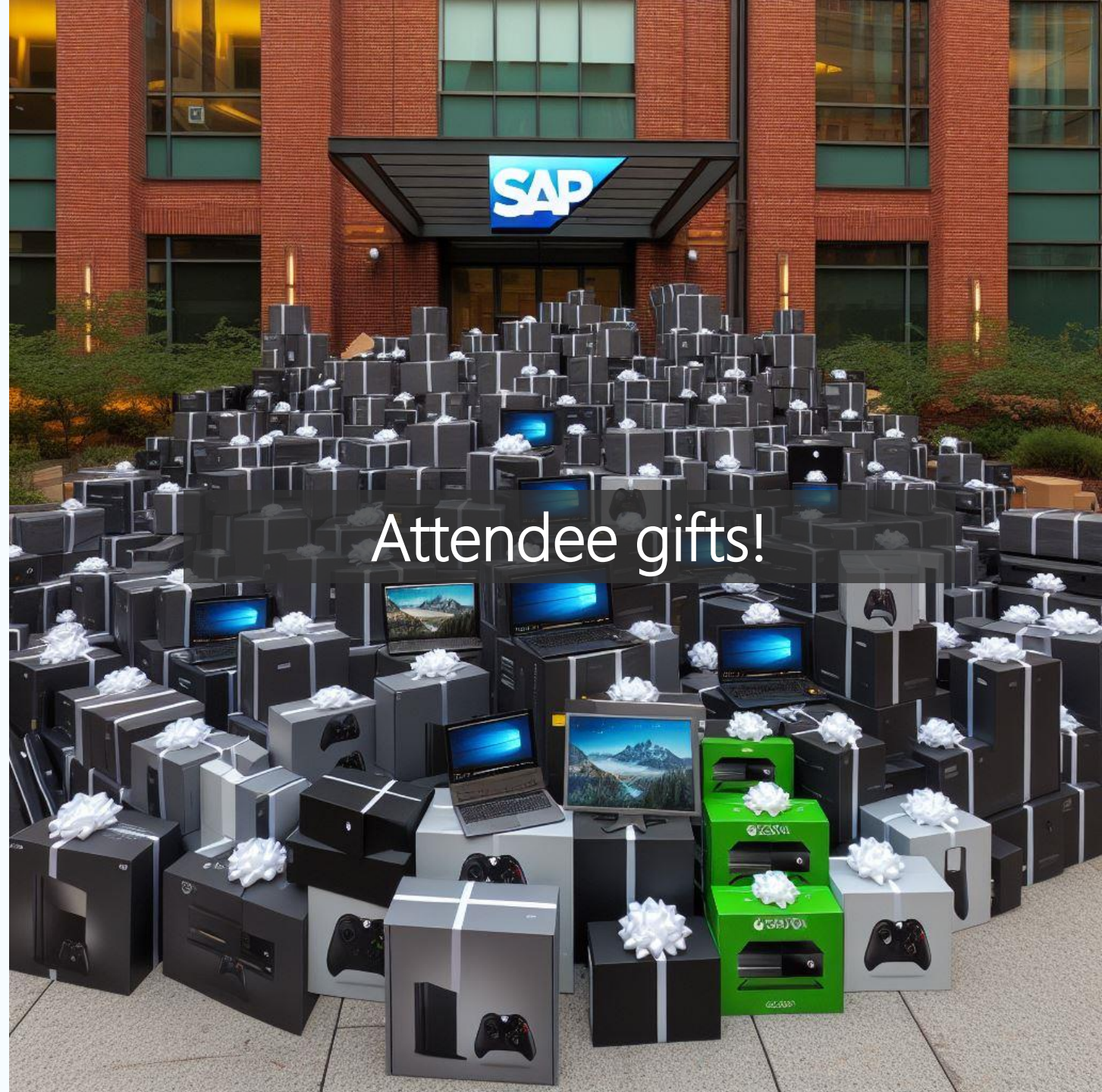


```
def fibonacci(n):  
    fib_sequence = [0, 1]  
    while len(fib_sequence) < n:  
        fib_sequence.append(fib_sequence[-1] + fib_sequence[-2])  
    return fib_sequence[:n]
```

# Example usage:  
print(fibonacci(10)) # Generates the first 10 Fibonacci numbers



**Prompt:** Photograph of a big pile of laptops, XBox game consoles, and iPhones outside SAP's North America headquarters at Newton Square, some wrapped in professional gift wrap



Prompt: A gorgeously rendered papercraft world of a coral reef, rife with colorful fish and sea creatures.



Prompt: A gorgeously rendered papercraft world of a coral reef, rife with colorful fish and sea creatures.  
Generated by OpenAI Sora

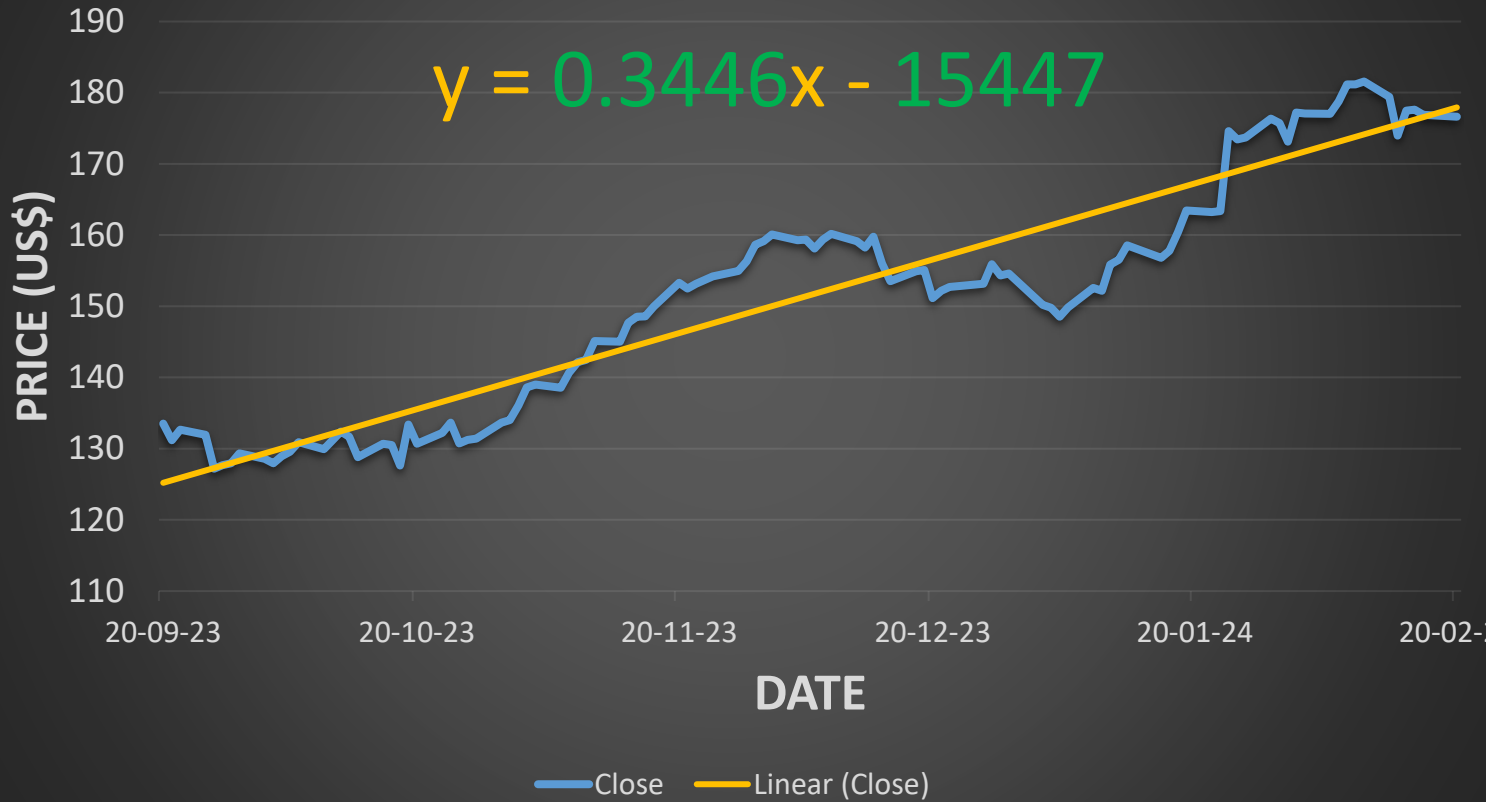




# Training ML models

Closing Price of SAP Stock (US\$)

$$y = 0.3446x - 15447$$



How do I predict the price of SAP stock on Feb 27, 2024?

$$y = mx + b$$

Substitute the date in x:

$$y = 0.3466 * (45349) - 15477$$

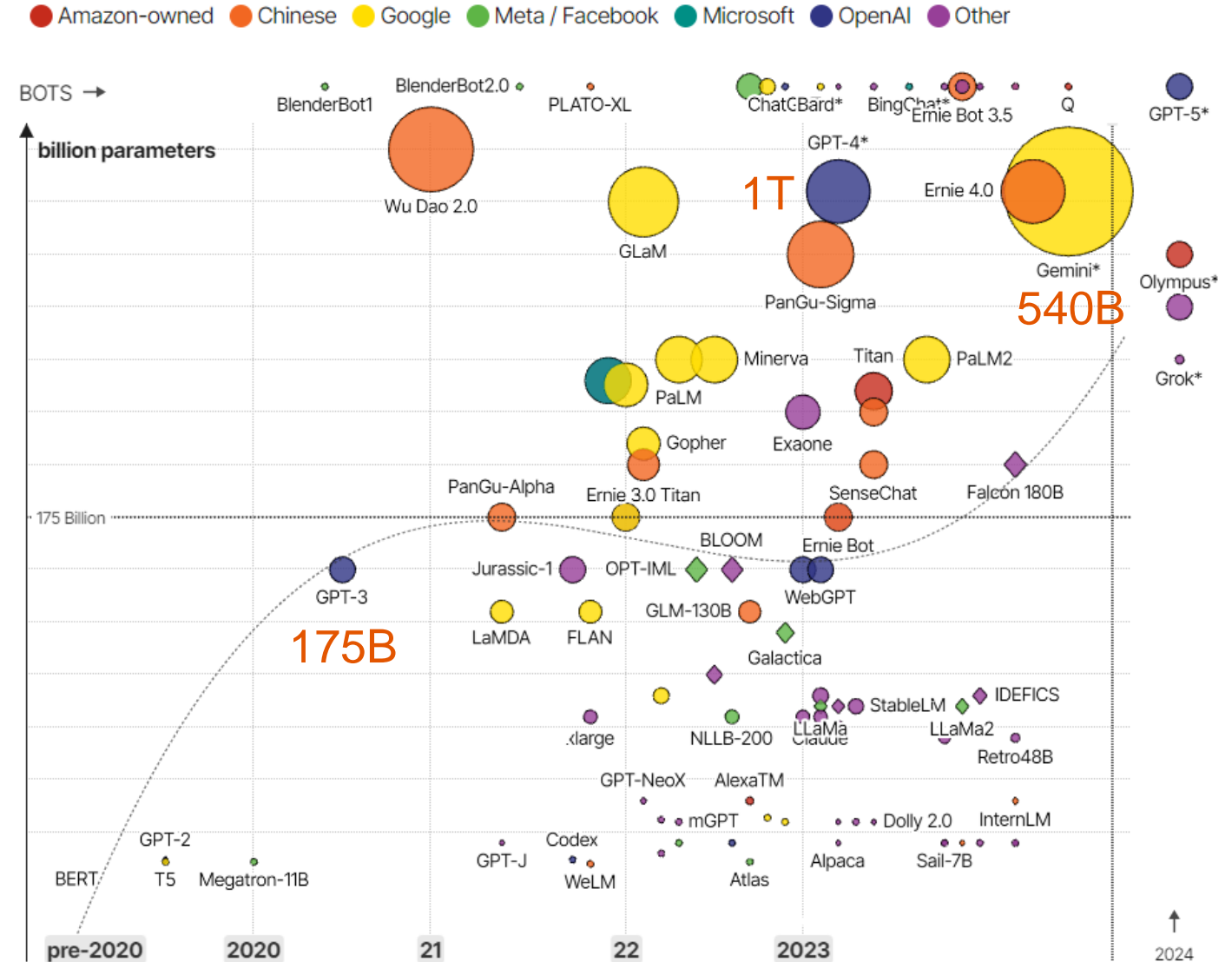
$$y = \$180.26$$

# Parameters

$$y = mx + b$$

has 2 parameters

# The Rise and Rise of A.I. Large Language Models (LLMs) & their associated bots like ChatGPT



David McCandless, Tom Evans, Paul Barton

Information is Beautiful // UPDATED 6th Dec 23

source: news reports, [LifeArchitect.ai](https://life-architect.ai)

\* = parameters undisclosed // see [the data](https://the-data.com)

# How foundation models (LLMs) are trained

## Playing fill-in-the blanks with the Internet

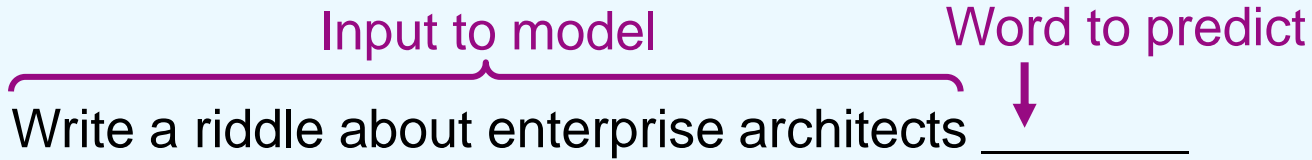
LLMs such as GPT, Claude, Llama, etc. are trained by guessing the blanks and updating their parameters.

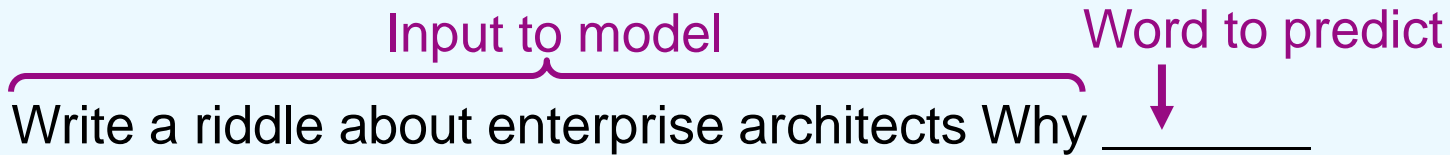
The firefighter sprayed \_\_\_\_\_ on the \_\_\_\_\_.

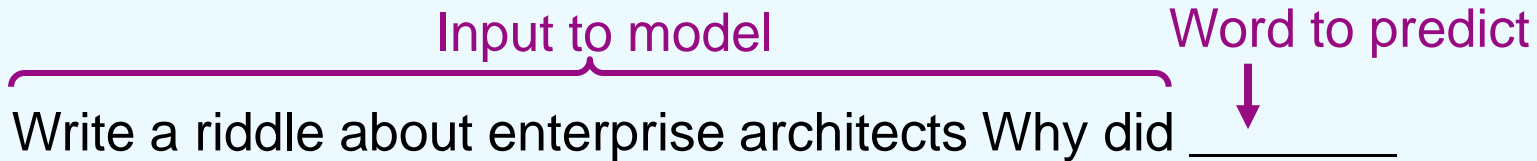




# How are predictions generated?

  
Write a riddle about enterprise architects \_\_\_\_\_

  
Write a riddle about enterprise architects Why \_\_\_\_\_

  
Write a riddle about enterprise architects Why did \_\_\_\_\_

Write a riddle about enterprise architects Why did the \_\_\_\_\_

Write a riddle about enterprise architects Why did the enterprise \_\_\_\_\_

Write a riddle about enterprise architects Why did the enterprise architect \_\_\_\_\_

Write a riddle about enterprise architects Why did the enterprise architect cross \_\_\_\_\_

# Attention is all you need

Write a riddle about enterprise architects Why did the

Write a riddle about enterprise architects Why did the

Input to model

Word to predict

Write-riddle-ent-arch a riddle-why-ent-arch about  
enterprise-about architects-about Why-riddle-ent-arch did the-ent-arch \_\_\_\_\_

cross-rd-str? → cross  
hit-fist-computer?  
draft-arch-diag?

Attention Is All You Need			
Ashish Vaswani* Google Brain avaswani@google.com	Noam Shazeer* Google Brain noam@google.com	Niki Parmar* Google Research nikip@google.com	Jakob Uszkoreit* Google Research usz@google.com
Llion Jones* Google Research llion@google.com	Aidan N. Gomez* <sup>‡</sup> University of Toronto aidan@cs.toronto.edu	Lukasz Kaiser* Google Brain lukaszkaiser@google.com	
Illia Polosukhin* <sup>‡</sup> illia.polosukhin@gmail.com			

# LLMs learn patterns in text (too well)

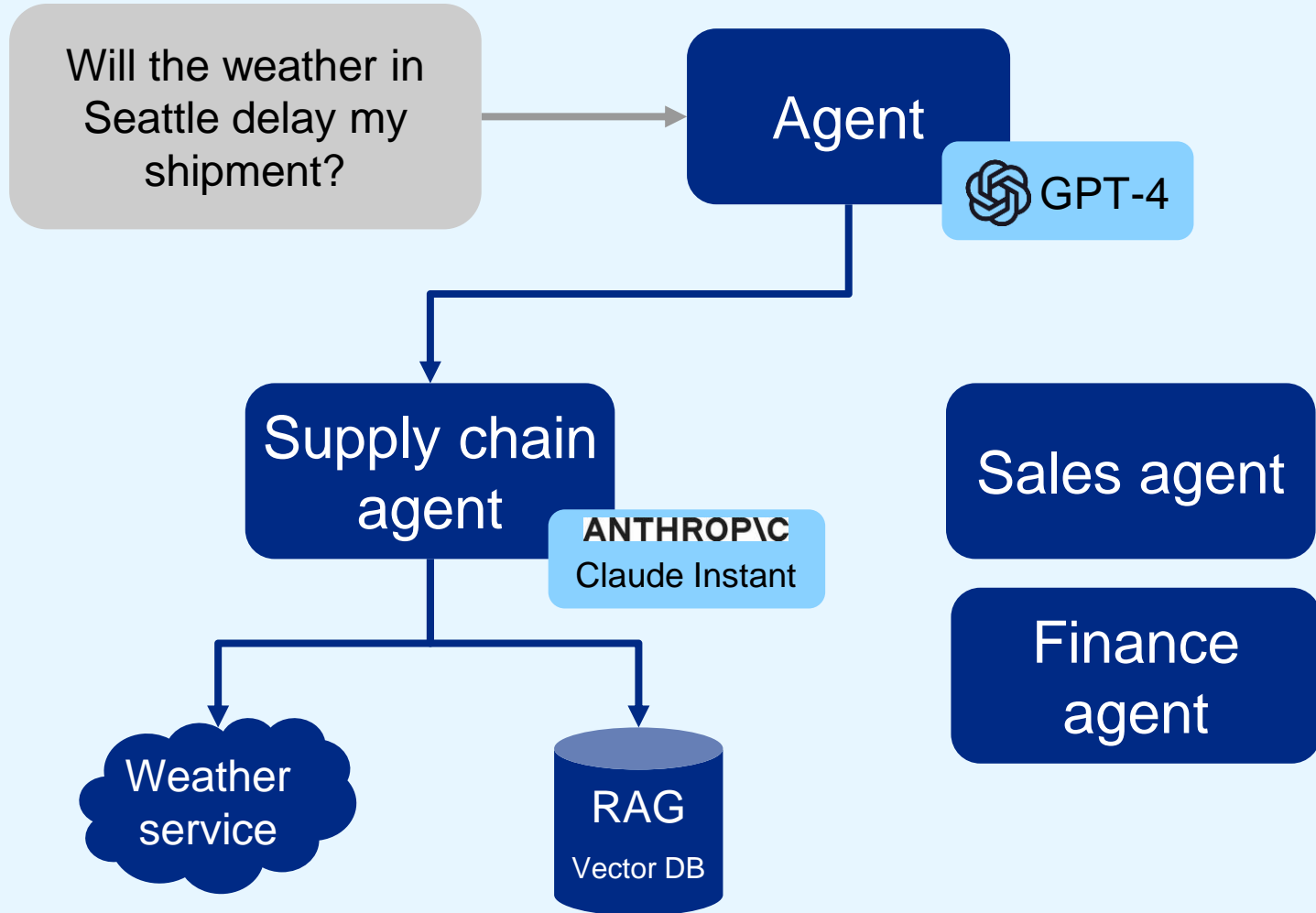
- Issues
  - Making things up (i.e. confabulation, ungroundedness)
  - Bias and discrimination
  - Outdated data

[Emmanuel Maggiori | LinkedIn](#)

[Reverse Psychology always works : r/Piracy \(reddit.com\)](#)



# Technical trends in generative AI



- **Multi-agent interaction:** Plan creation, reasoning and collaboration among agents
- **Task-specific LLMs:** Smaller models, faster response, fine-tuned for specific tasks
- **RAG (retrieval augmented generation) and data connections:** Connect to data stores and online services for latest data

# Glossary

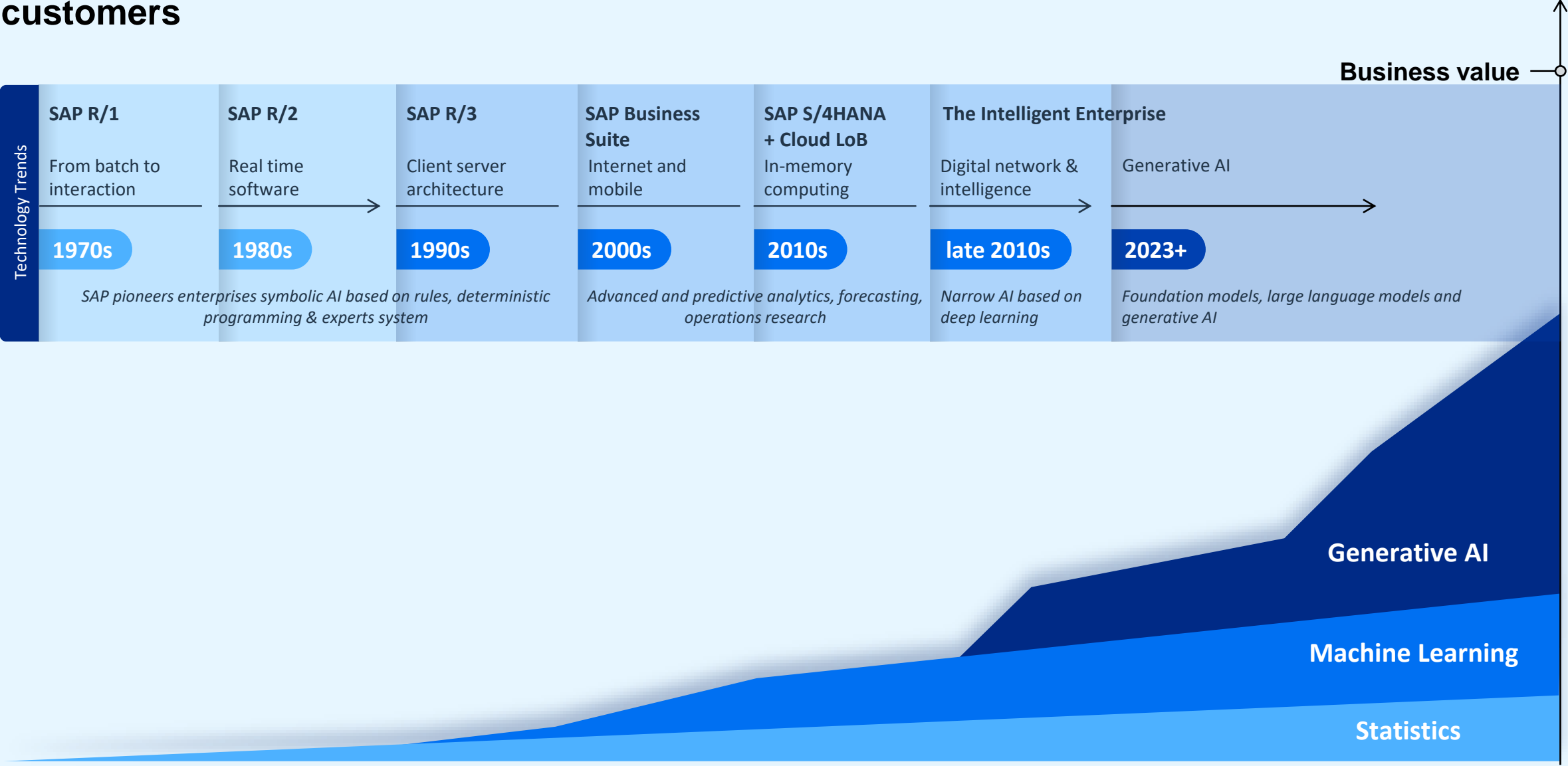
- **Foundation model:** A machine learning model that is trained on broad data such that it can be applied across a wide range of use cases
- **Token:** A “piece of a word” about 4 chars long
- **Context window (input token limit):** How many tokens an LLM can take as input
  - GPT-4: 32K tokens (49 pages of single-spaced text)
  - Gemini: 32K tokens
  - Claude 2: 100K tokens
- **Hallucination:** Generating text that is incorrect or nonsensical

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## Topic 2: SAP Business AI vision, strategy, and value prop



# Recent technology advancements mark a paradigm shift in how SAP will deliver value to customers



# We will fundamentally change the way in which companies operate



## Relevant

The most relevant AI delivered in the context of your business processes.



## Reliable

Uniquely reliable AI trained on the industry's broadest business data sets.



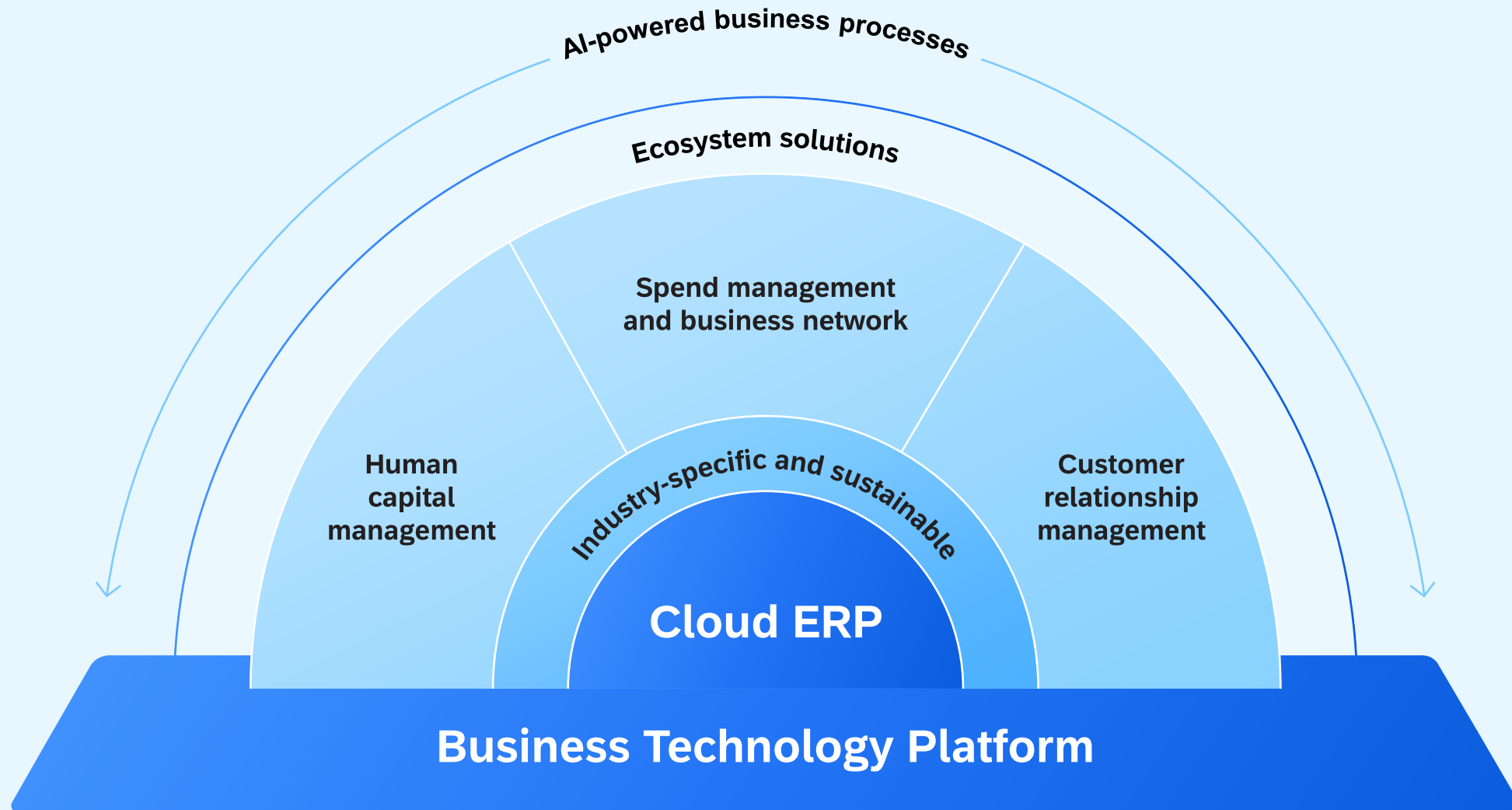
## Responsible

AI built on leading ethics and data privacy standards.

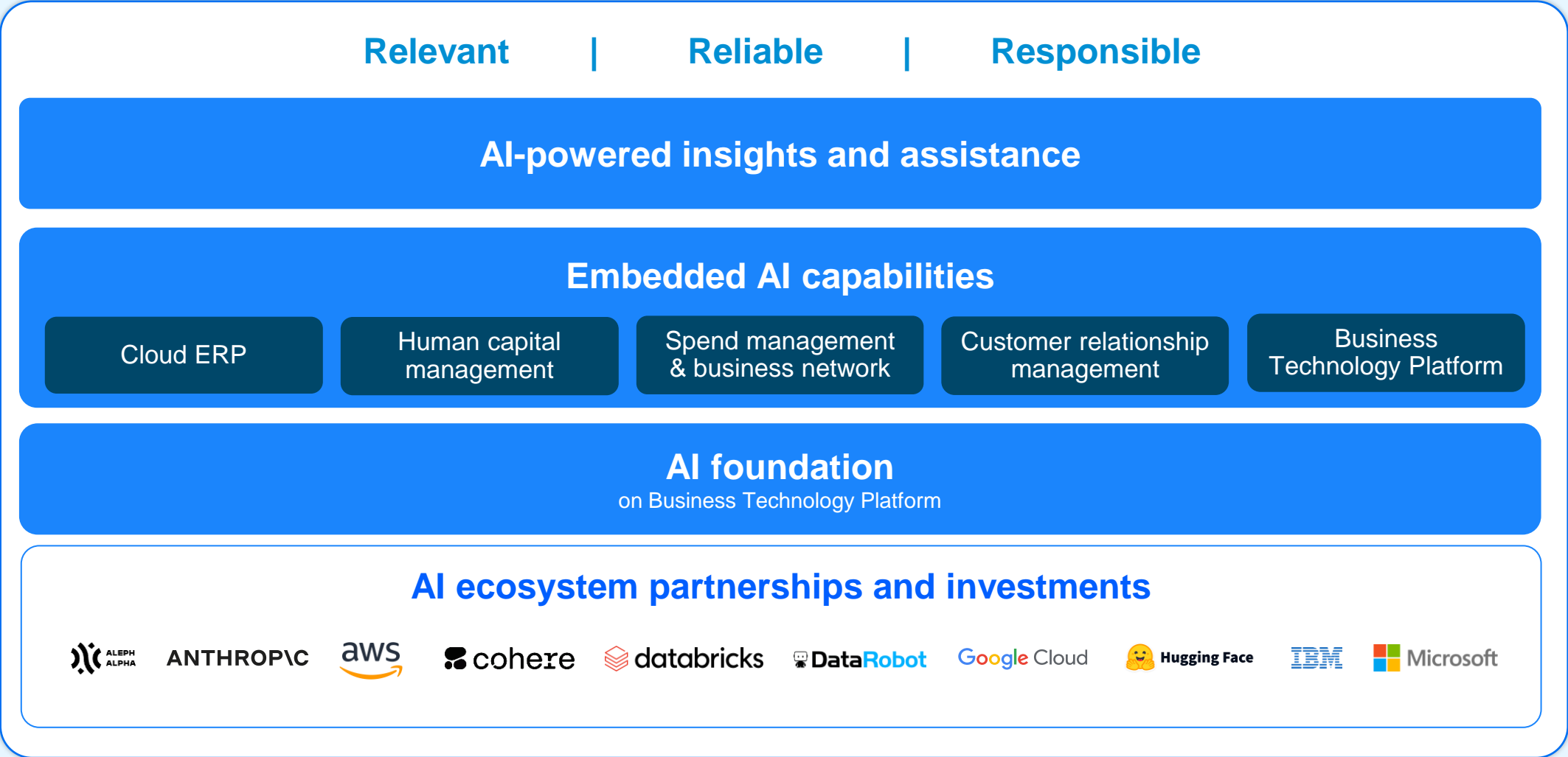


# Real business results

# SAP Portfolio



We believe in providing AI built for business. That is, AI that enriches all your business processes and empowers you to steer your business with agility.





# Relevant AI capabilities delivered through 50 years of deep understanding of business and processes



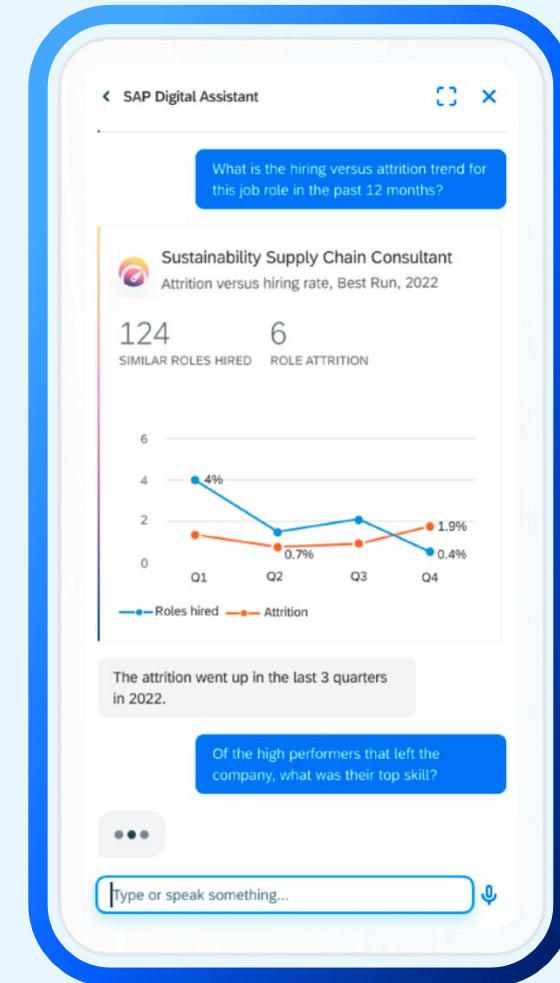
## RELEVANT

**Empower every employee** to interact with SAP application in the most natural way possible

**Benefit from AI embedded** in your applications that improves and optimize your desired business outcomes

**AI trained from real data** that learns and adapts from your utilization

**Accelerate your cloud journey** with automated code generation and migration tools



**Integrating the business and process data that resides within SAP applications with the power of AI to deliver unmatched reliability of output**

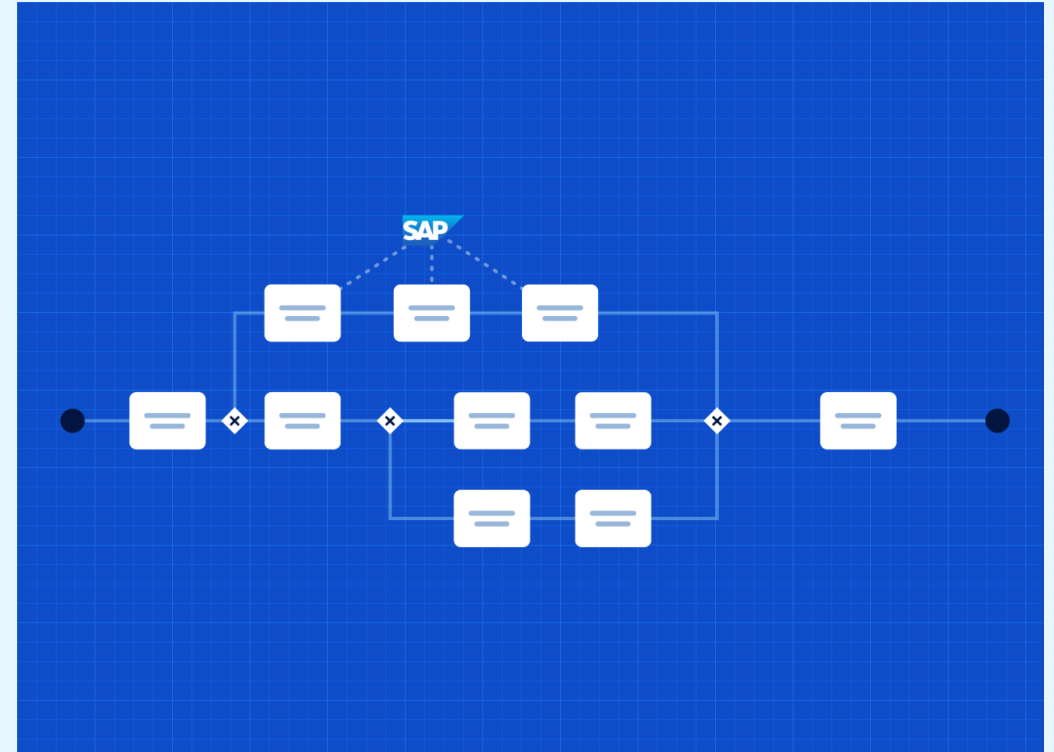


## RELIABLE

**Grounded in the truth** of customer business context and SAP's business and process data

**Data protection and privacy standards** that you can trust to run your business on

**World-class authorization concepts** protect employees and business partners from unwanted consequences



# Artificial intelligence built on leading ethics and privacy standards



## RESPONSIBLE

**Guiding principles and policies** that steer the development and avoid biases

**AI designed for people** to get their most valuable work done while keeping humans in the loop

**Governance model** with external AI ethics advisors and cross-functional operationalization

## The AI Ethics Policy.

The AI Ethics Policy clarifies how SAP's Guiding Principles for Artificial Intelligence relate to AI use cases. The policy applies to SAP and all its employees worldwide. It defines intent, expectations and obligations for employees involved in development, deployment and sale of AI systems.

### The Pillars of the Policy.



**“With SAP’s rich history and business process expertise, it is uniquely positioned to deliver AI that helps customers better leverage data to achieve measurable business outcomes.”**

*Ritu Jyoti, IDC, Group Vice President,  
Worldwide Artificial Intelligence and Automation  
Research Practice Global AI Research Lead*



Today, more than 24,000 customers are using SAP Business AI across multiple scenarios, and SAP is further committing to AI as a pillar for future innovation

**24,000+**  
**customers**

**>\$1B** investment via  
venture capital

**\$6.1B** in annual total  
R&D investment

**3** direct investments in  
Generative AI leaders

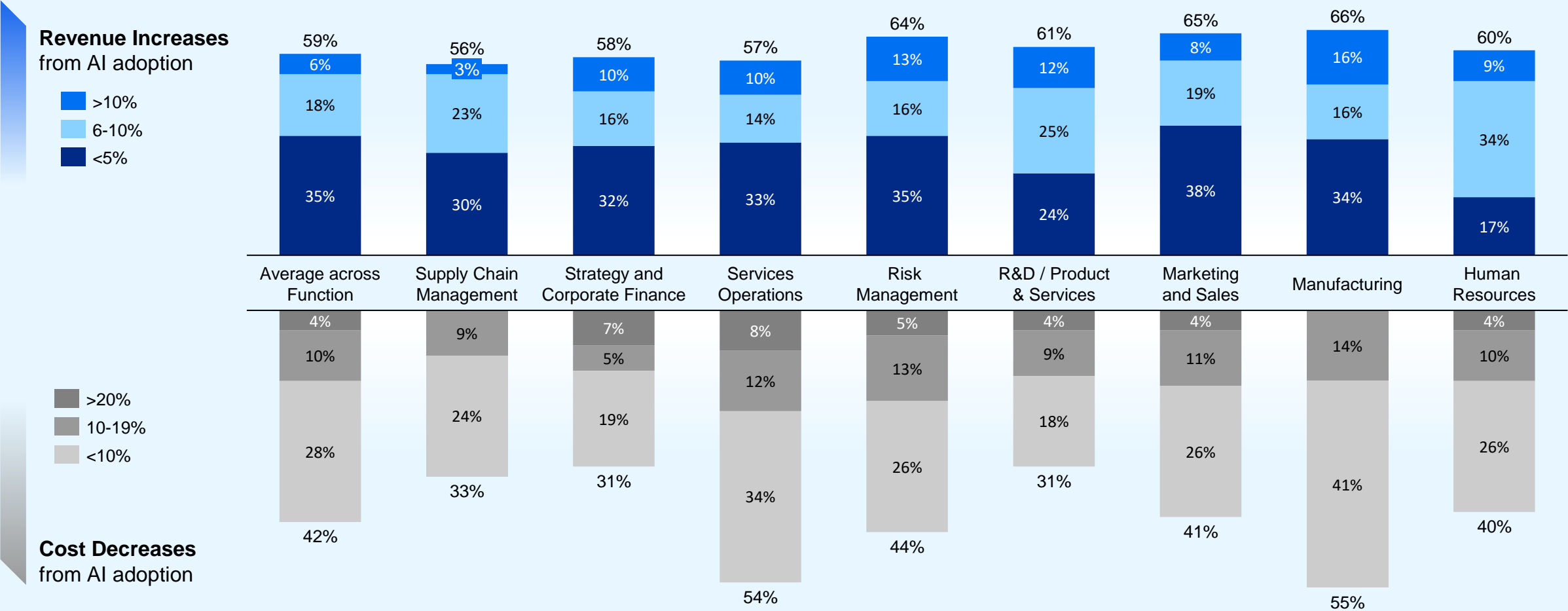


ANTHROPIC



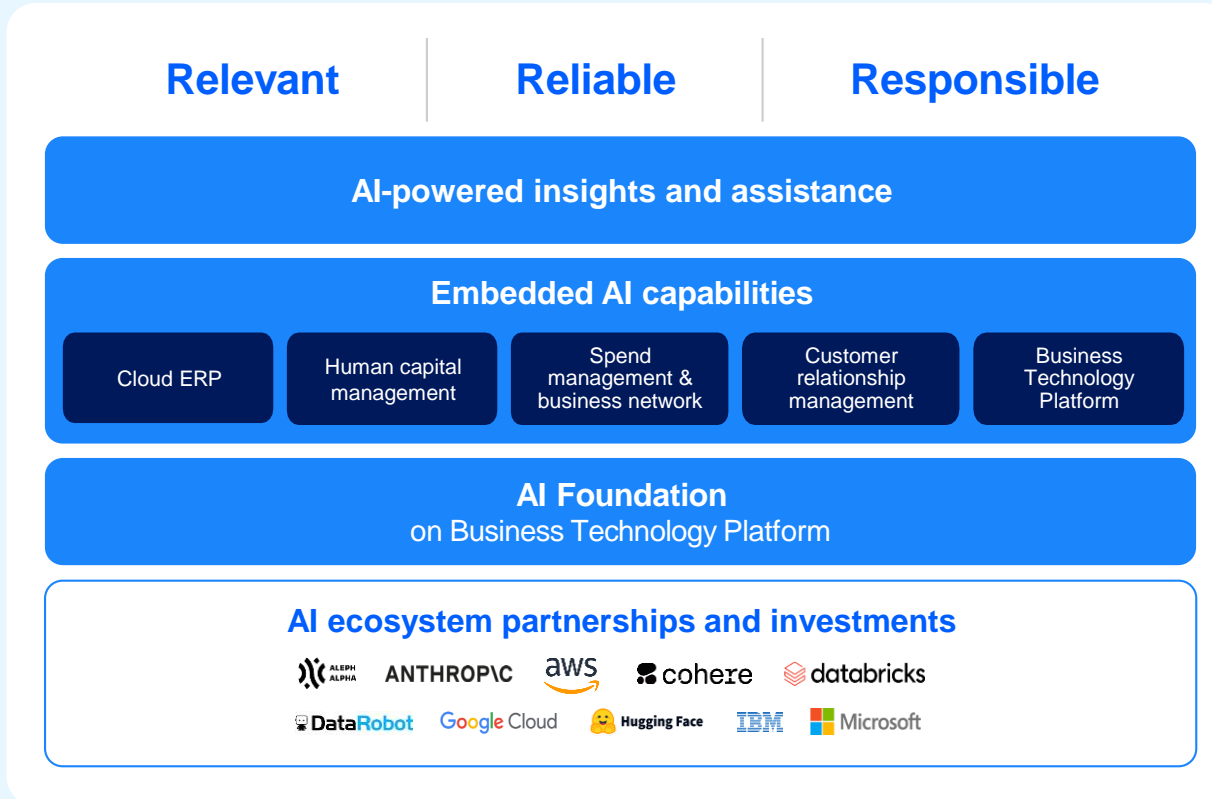
# Organizations are seeing both top and bottom line growth improvement by leveraging AI across functional areas

Revenue and/or Cost improvements from AI adoption in the function using AI capabilities<sup>1</sup>



<sup>1</sup> Source: McKinsey, State of AI in 2023, 1,684 participants globally. Answers shown above only respondents who stated seeing increase in revenue or decrease in costs

# Only SAP Business AI can help customers unlock three sources of value in relevant, reliable and responsible manner for better performance



## NATURAL USER EXPERIENCE

Facilitates human-machine interaction

## AUTOMATION

Enable machines to complete repetitive tasks like humans

## INSIGHTS, OPTIMIZATION, & PREDICTIONS

Augment human decisions and cognition

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## Topic 3: SAP Business AI offerings and roadmap



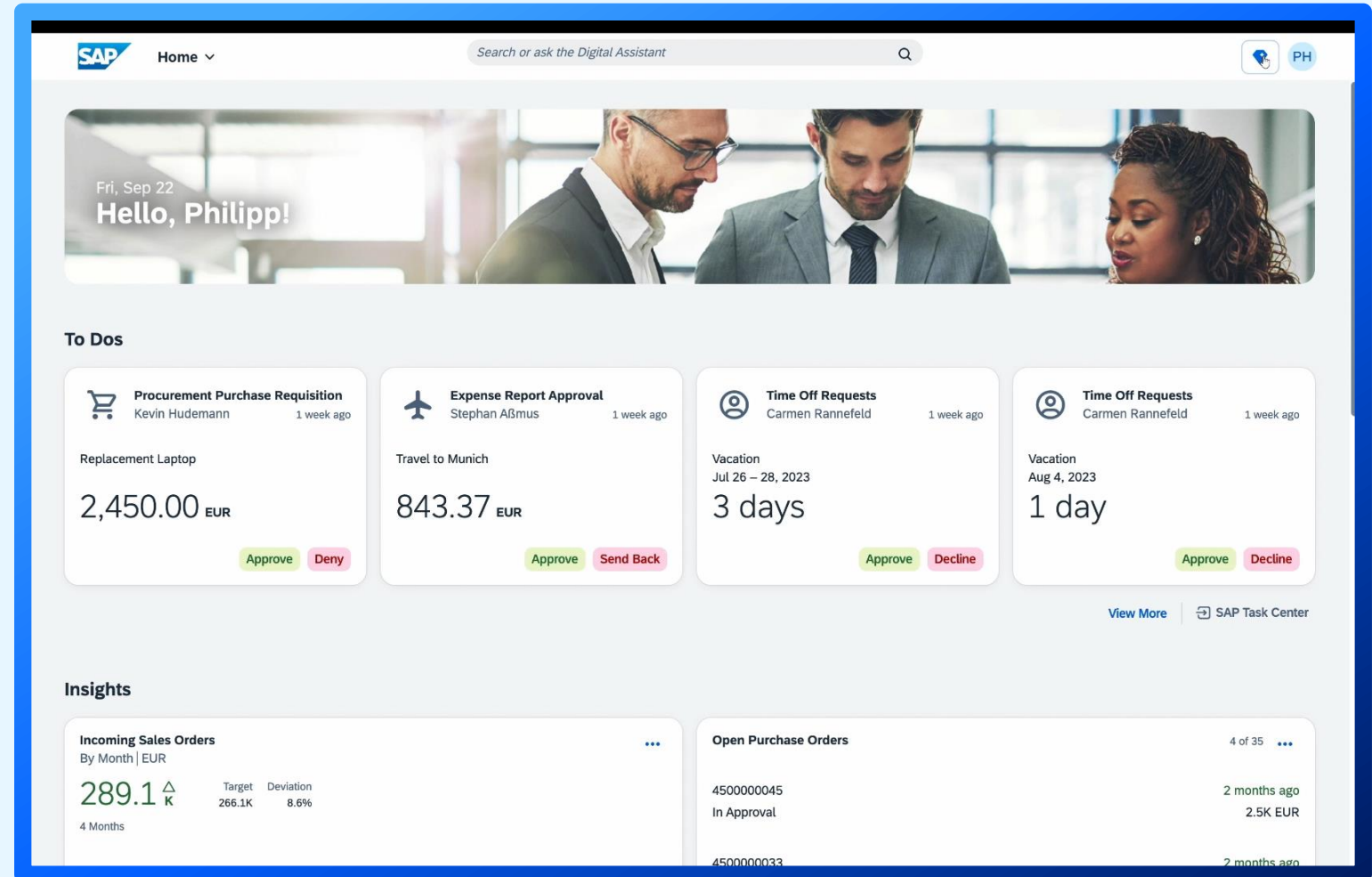
# Joule - the AI copilot that truly understands your business

**Work faster** with an AI copilot that truly understands your business

**Benefit from smarter insights** and quick answers on demand

**Achieve better outcomes** when creating content, code, and more

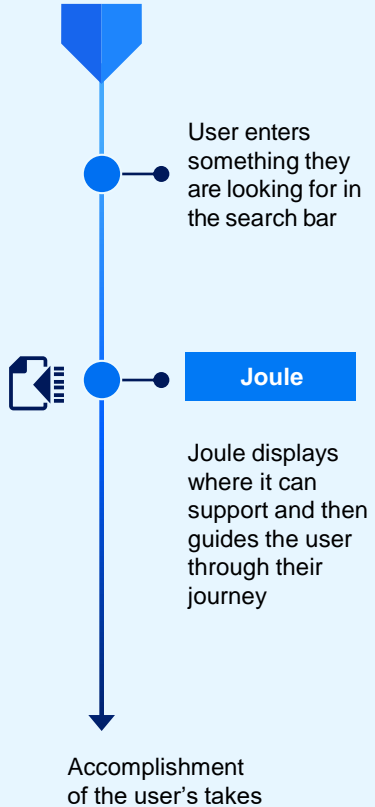
**Maintain full control** over decision-making and your data privacy



Joule

Note: Planned availability in SAP business applications at different times, starting with SuccessFactors and SAP Start in Q4 2023.

# Joule



## Challenge

- Delivering an intelligent user experience is challenging for today's Enterprise and stay competitive with intelligent user experience
- Users want to be guided through the SAP ecosystem to get relevant information or task to be done e.g., Get to the point from an entry page and retrieve the needed support

## Solution

### SAP Start

The central entry point for all SAP business applications – federating information and application into one place

### Joule embedded into SAP Start

- Offers unintrusive his services to the user from the search bar integration
- All Capabilities and content at your fingertips in one place
- Appears as a single line up to the full chat window
- Gives access to all SAP Business Software Systems connected to SAP Start

## Benefits

- Step-by-step augmented user journey gives the adequate help at the right point
- All defined Business Capabilities for Joule are available at the fingertips of the user
- Serves the full variety of the transactional, informational and navigational patterns of Joule
- Augments the SAP Start from a pure Launchpad to a Business Interaction center
- Everything inside the familiar user interface of Joule

## Average Business Value for Customers

Time gain for occasional SAP users

Up to 10mins<sup>\*\*</sup>  
time saved

per usage on transactional patterns

Up to 10mins<sup>\*</sup>  
time saved

on informational patterns

Up to 5mins<sup>\*\*</sup>  
time saved

per usage on navigational patterns

\* Processing time in interaction with Joule leveraging LLM support compared with « classical » approach, based on assumptions:

— Leave for the different help pages of SAP (SAP User Enablement content)

— Search for the policy documents (customer individual) – planned Q1/24

\*\* gained from SAP experiments based on semi experienced users

# Obtain optimal recommendations at all times to enhance decision making process

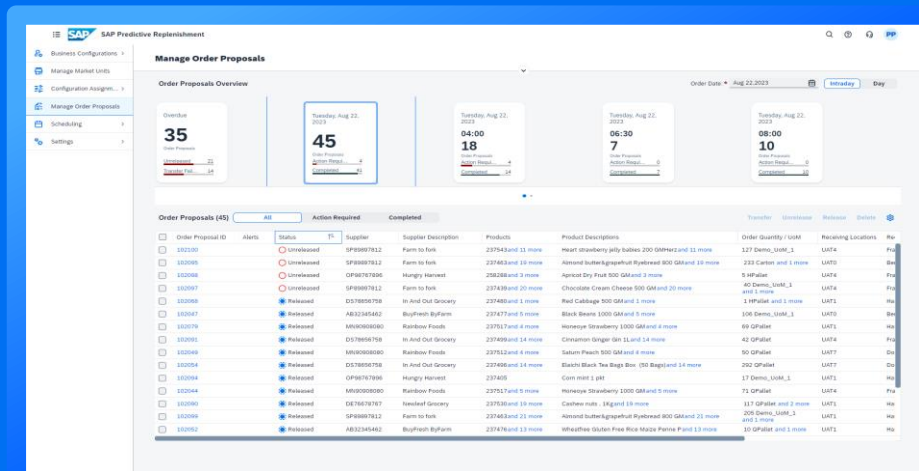
## Automate ordering for a more profitable future

- **Optimize** inventory levels and costs while maximizing product availability and margins
- **Balance** inventory and calculate order proposals that minimize procurement costs
- **Reduce** waste and avoid lost revenue from stock-outs

## Visibility into skills & capabilities of your workforce

- **Find** and attract the best talent for new job postings equitably with gender bias detection
- **Help** your workforce reach its potential with personalized development paths
- **Identify** highly qualified talent in less time with intelligent resume analysis

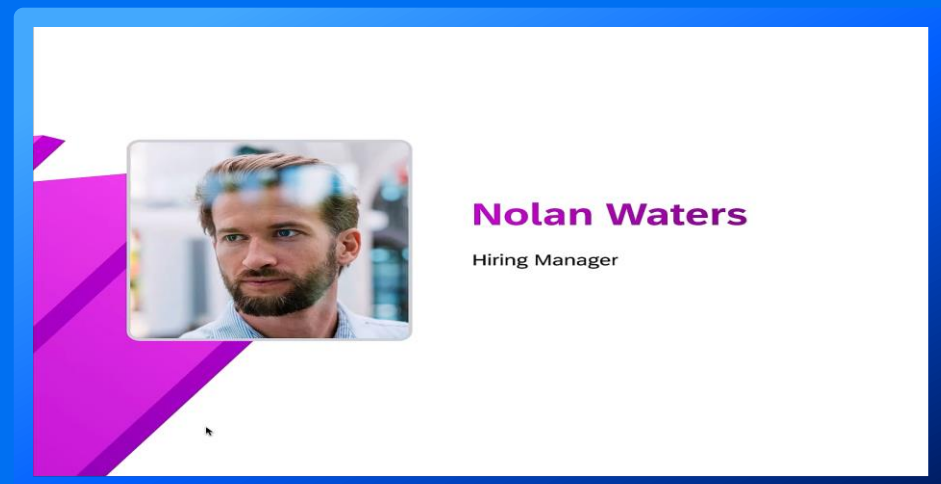
### SAP Predictive Replenishment



The screenshot displays the SAP Predictive Replenishment 'Manage Order Proposals' interface. It features a sidebar with navigation options like Business Configurations, Manage Master Data, Configuration Assistant, Manage Order Proposals, Scheduling, and Settings. The main area shows an 'Order Proposals Overview' with a date filter for Tuesday, Aug 22, 2023. Below this, there are five cards representing different time slots: 35 (00:00), 45 (04:00), 18 (06:30), 7 (08:00), and 10 (08:00). Each card shows a status (e.g., 'Unreleased') and a count. A table below lists individual order proposals with columns for Order Proposal ID, Status, Supplier, Supplier Description, Product, Product Description, Order Quantity, and Receiving Location. The table includes various products like 'Farm to fork', 'Hungry Harvest', 'Rainbow Foods', and 'In And Out Grocery'.

Order Proposal ID	Status	Supplier	Supplier Description	Product	Product Description	Order Quantity	Receiving Location
150100	Unreleased	SP98887812	Farm to fork	237453and 12 more	Heart strawberry 400 GM and 12 more	127 Dmml_LMT_3	LMT4
150095	Unreleased	SP98887812	Farm to fork	237463and 10 more	Almond butter&granola 400 GM and 10 more	233 Carton and 4 more	LMT4
150098	Unreleased	CP98767606	Hungry Harvest	238282and 3 more	Apricot Dry Fruit 500 GM and 3 more	5 4Pallet	LMT4
150097	Unreleased	SP98887812	Farm to fork	237438and 20 more	Chocolate Cream Cheese 500 GM and 20 more	42 Dmml_LMT_1 and 1 more	LMT4
150096	Unreleased	CP98767606	In And Out Grocery	237463and 1 more	Real Cabbage 500 GM and 1 more	1 4Pallet and 3 more	LMT1
150067	Released	AB23345452	Rainbow Foods	237477and 5 more	Black Beans 1000 GM and 5 more	100 Dmml_LMT_1	LMT1
150078	Released	MR00000000	Rainbow Foods	237571and 4 more	Monopole Strawberry 1000 GM and 4 more	66 4Pallet	LMT1
150091	Released	CP98767606	In And Out Grocery	237463and 14 more	Cinnamon Ginger 500 GM and 14 more	42 4Pallet	LMT4
150149	Released	MR00000000	Rainbow Foods	237512and 4 more	Sakura Peach 500 GM and 4 more	50 4Pallet	LMT7
150084	Released	CP98767606	In And Out Grocery	237463and 14 more	Black Beans 1000 GM and 14 more	260 4Pallet	LMT7
150084	Released	CP98767606	Hungry Harvest	237463	Corn and 1 4Pallet	17 Dmml_LMT_1	LMT1
150044	Released	MR00000000	Rainbow Foods	237571and 5 more	Monopole Strawberry 1000 GM and 5 more	72 4Pallet	LMT4
150090	Released	DE7676767	Real Food Grocery	237530and 10 more	Cashew nuts 1 4Pallet 10 more	117 4Pallet and 3 more	LMT1
150095	Released	SP98887812	Farm to fork	237463and 21 more	Almond butter&granola 400 GM and 21 more	200 Dmml_LMT_1 and 1 more	LMT1
150092	Released	AB23345452	Rainbow Foods	237477and 10 more	Weathered Golden Free Rice Mince Pasta 10 more	10 4Pallet and 1 more	LMT1

### SAP SuccessFactors Job Description & Interview Question Generation



# Extend capabilities by deploying and managing new AI models and natively integrate to your SAP systems with SAP Business Technology Platform

## Run AI models cost-efficiently at scale while preserving privacy and compliance

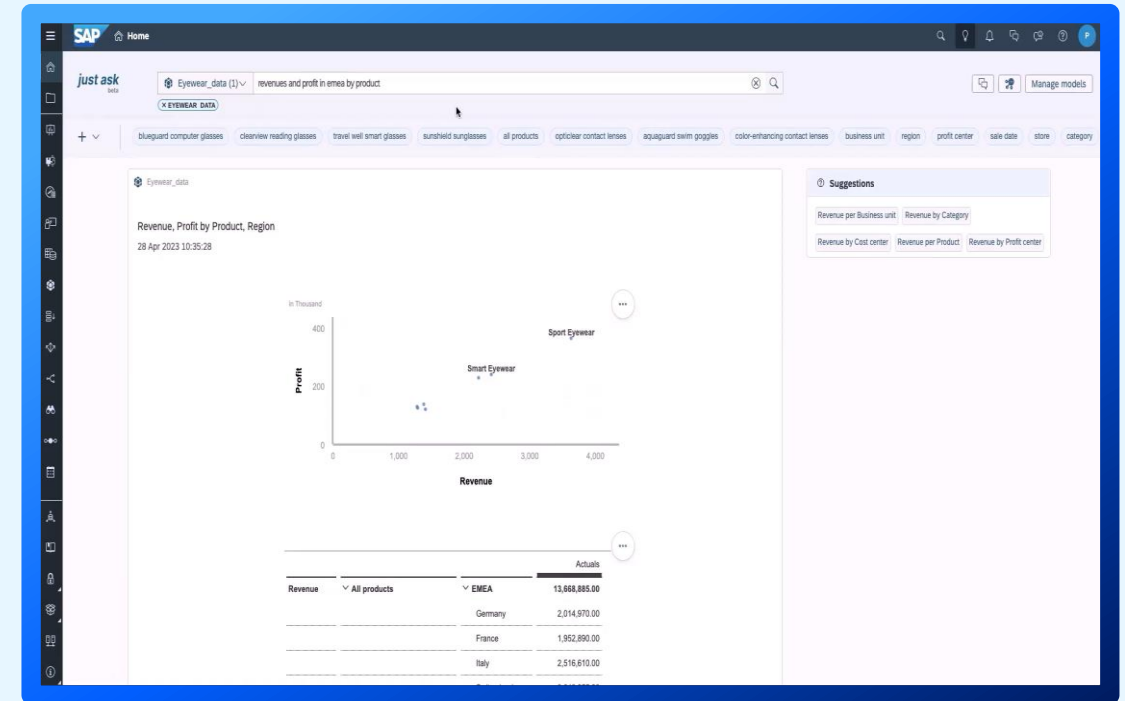
Strike the right balance between cost and performance while gaining peace of mind with fully SAP managed deployments

## Accelerate time to value with AI designed for SAP applications

Quickly embed AI in SAP applications and business processes while enforcing consistent authorization policies

## Ensure governance and compliance

Centralize ML lifecycle management across the enterprise and monitor and continuously improve model performance



**Quickly** access trusted insights via natural language

<sup>1</sup>Source: Vartak, M. (2022). How to Scale AI in Your Organization. In Harvard Business Review.



# Leverage Natural Language-driven Analytics Just Ask + SAP Analytics Cloud



## Challenge

- **Missing Skills:** Finding answers in data requires a deep understanding of technological concepts such as data-warehousing
- **Cognitive Overload:** Modern tools are designed for analysis. Dashboards have tried to solve the cognitive load, but they are too rigid to go after general use
- **Data Fragmentation:** Data is fragmented in silos in a way that makes data discovery slow and nearly impossible for non-technical users to enrich the simplest of the answers

## Solution

- **Just Ask:** Natural Language-driven access of your trusted insights with SAP Analytics Cloud enabling fact-based decision-making through natural language queries and conversational analytics.

## Benefits

- **Faster Insights:** Fast natural language querying with all the value of business semantics
- **Trusted Retrieval:** Proprietary LLMs ensure a secure information retrieval preserving data policies
- **Business Agility:** Offers multi-cloud workflow compatibility and integrates external data sources

## Average Business Value for Customers

Calculation Method / Assumption In Notes

**20%** Average time spent in information retrieval by knowledge workers.

**That's 1 resource on a team of 5 persons.**

Source: CB Insights knowledge worker's report

# It's time to realize your potential with Business AI from SAP



**99%**

of incoming payments  
automatically assigned



**15 minutes**

to run forecasts down  
from 3 hours



**350 hours**

saved each month  
by reducing repetitive tasks



**91.5%**

of employees use  
intelligent reskilling  
application



# Today, SAP offers a large catalogue of AI-powered scenarios across all business functions

Finance	Supply Chain	Customer Experience	Procurement	Human Resources	IT and Cross-Function
<ul style="list-style-type: none"> <li>▪ Tax Compliance</li> <li>▪ Cash Application</li> <li>▪ Intelligent accrual</li> <li>▪ Travel expense auditing</li> <li>▪ Travel expense verification</li> <li>▪ Invoice processing</li> <li>▪ Business Integrity screening</li> <li>▪ Goods and invoice receipt matching</li> <li>▪ Mobile expense entry</li> </ul>	<ul style="list-style-type: none"> <li>▪ Stock in transit</li> <li>▪ Visual Inspection</li> <li>▪ Demand forecasting &amp; sensing</li> <li>▪ Project-cost prediction</li> <li>▪ Predicted delivery processing</li> <li>▪ Demand-driven replenishment</li> <li>▪ Forward scheduling</li> <li>▪ Field service scheduling</li> <li>▪ Asset prediction &amp; optimization</li> <li>▪ Slow-moving materials prediction</li> </ul>	<ul style="list-style-type: none"> <li>▪ Predicted delivery processing</li> <li>▪ Discount recommendations</li> <li>▪ Intelligent sales execution</li> <li>▪ Relationship intelligence</li> <li>▪ Sales route optimization</li> <li>▪ Sales order automation</li> <li>▪ Opportunity scoring</li> <li>▪ Customer insights</li> <li>▪ Guided selling</li> <li>▪ Lead scoring</li> <li>▪ Product recommendations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Guided buying</li> <li>▪ Sourcing item and supply prediction</li> <li>▪ Material group recommendations</li> <li>▪ Invoice object recommendations</li> <li>▪ Job matching for contingent workforce</li> <li>▪ Resume ranking for contingent workforce</li> <li>▪ O'Net labelling</li> </ul>	<ul style="list-style-type: none"> <li>▪ Skill and career path recommendations</li> <li>▪ Learning recommendations</li> <li>▪ Job analyzer</li> </ul>	<ul style="list-style-type: none"> <li>▪ Joule</li> <li>▪ Process automation</li> <li>▪ Business rule mining</li> <li>▪ Intrusion detection</li> </ul>

...Find out more on [SAP Business AI](#)



# Wrap Up

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A gentle introduction to the data science behind gen AI

SAP Business AI strategy and value prop

SAP Business AI offerings and roadmap

## **SAP AI roadmap** **2023 & 2024**

THE BEST RUN **SAP**

### **AI roadmap:**

<https://dam.sap.com/mac/app/p/pdf/asset/preview/MVCpjyr?ltr=a&rc=68>



**Get the latest roadmap information**















**AI roadmap:**

<https://dam.sap.com/mac/app/p/pdf/asset/preview/MVCpjyr?ltr=a&rc=68>

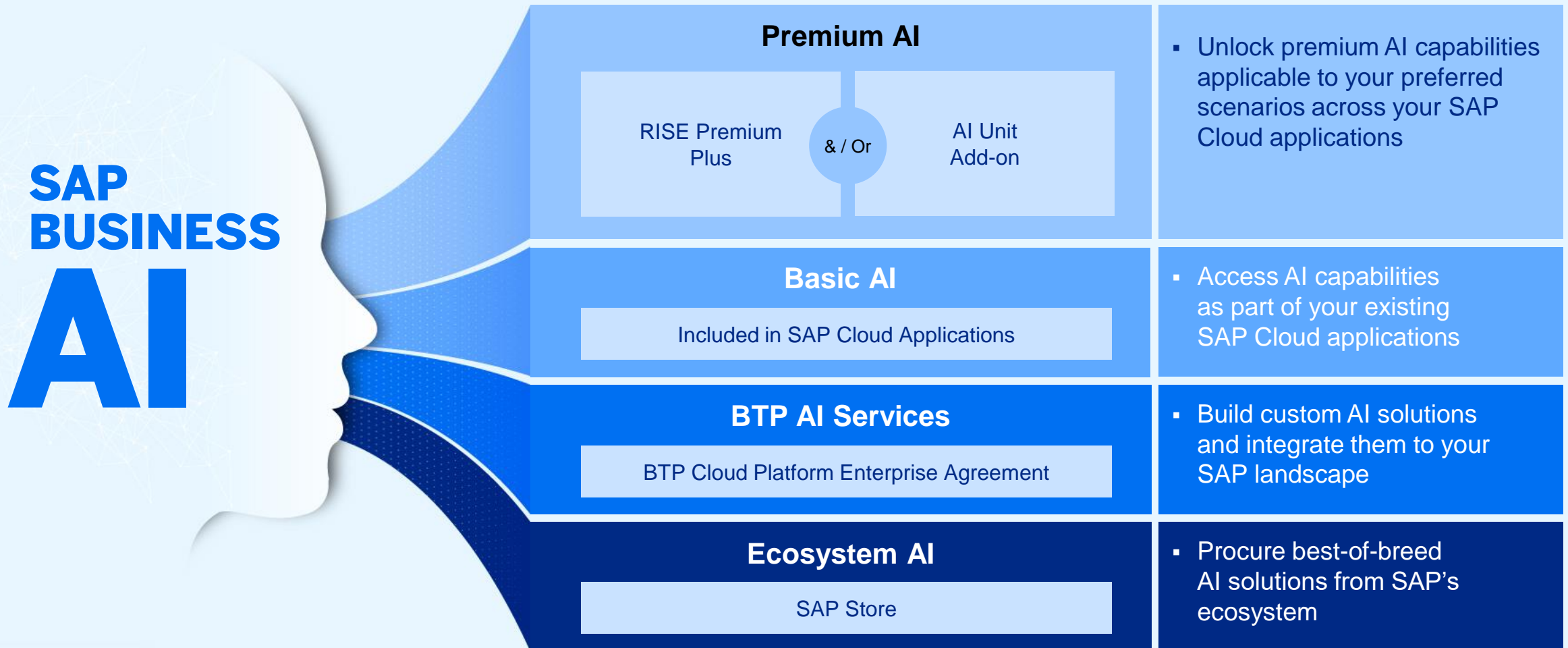




# SAP's ecosystem also supplies over 360 AI-based solutions readily available on SAP Store

Functional Area	Partner	Solution Description	Sample of AI-powered partner solutions available on SAP Store
IT & Cross-Function	 BigID	Machine learning tools and data insight to help enterprise better manage and <b>protect their customer, sensitive and regulated data</b>	
Customer Experience	 bloomreach	Generative AI-powered search, <b>content generation, product recommendations</b> and predictive analytics	
	 coveo™	<b>AI-enabled search and recommendation</b> platform integrated into SAP commerce cloud with Generative Answering Capabilities	
	 pricefx	AI-enabled and <b>Machine learning-enabled price optimization</b> capabilities	
	 yellow.ai	<b>Generative AI supported chatbots</b> and voice-bots	
Human Resources	 shyftplan	<b>AI-supported solution for shift scheduling</b> , scalable to thousands of employees, even for complex cases	
	 PARADOX	<b>Conversational AI recruiting</b> to automate candidate screening, text campaigns, 1:1 texting, interview scheduling, mobile-first	
	 degreed.	AI-powered tools to identify skill gaps across businesses and <b>deriving learning and talent development opportunities</b>	
	 eightfold.ai	Talent Intelligence Platform uses AI to radically increase the <b>efficiency and effectiveness of talent operations</b>	
Procurement	 scoutbee	AI-driven supplier search to <b>identify potential suppliers who meet specific sourcing requirements</b>	
	 SHIPPEO	<b>AI-powered real-time transportation visibility</b> of multimodal shipments globally, giving an end-to-end view of supply chain	
	 Icertis	Offers new suite of Apps that <b>applies AI to pool of digitized data incl. integration of new large language models</b>	

# Customers already benefit from artificial intelligence capabilities as part of SAP's Cloud applications and will soon be able to unlock new premium features





Explore more on  
[SAP.com/ai](https://www.sap.com/ai)