



Higher Education & Research @ AWS

AWS Education & Research

AWS – May 2025

The education industry challenges



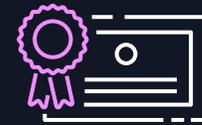
Technology diversity and unpredictable licensing costs



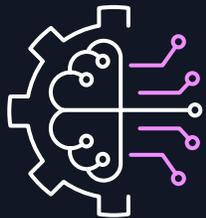
Student engagement, retention, wellbeing & employability



Blending traditional, hybrid, and flexible learning



Delivering new educational pathways, e.g., micro-credentials

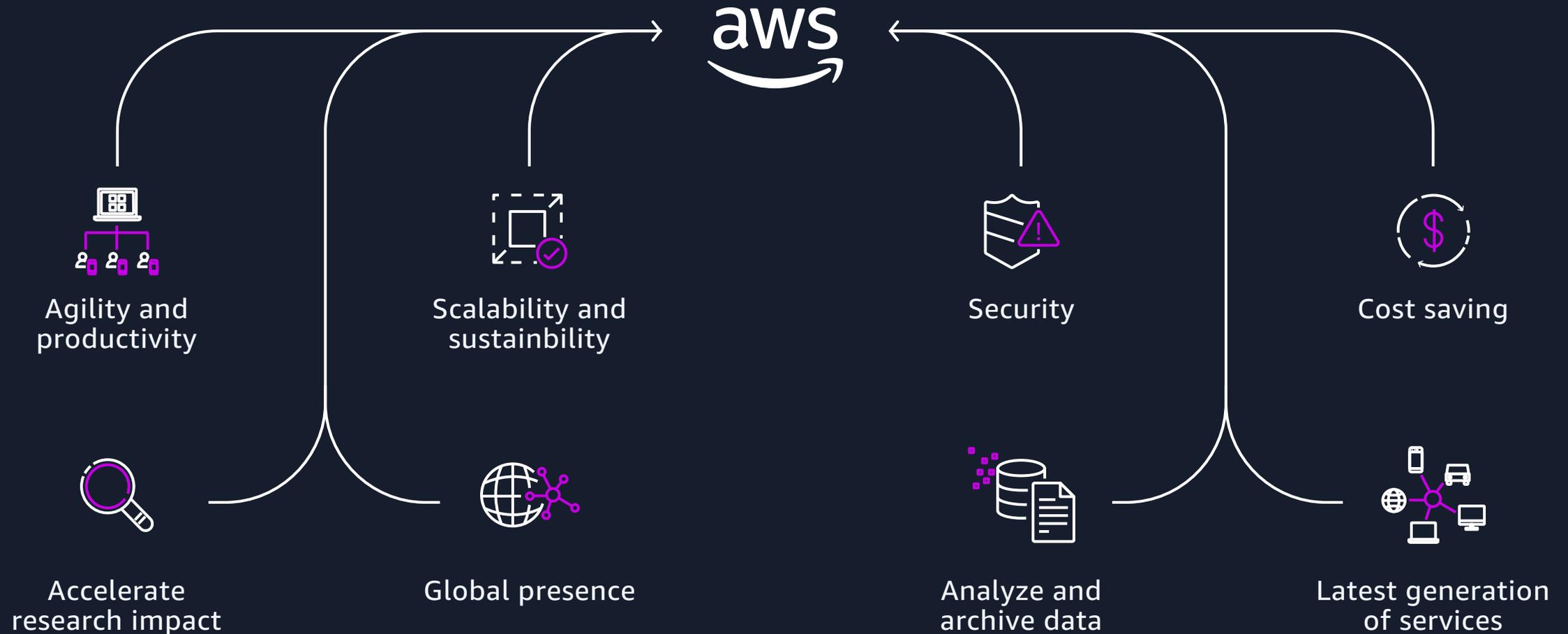


Embracing the GenAI revolution



Pressure to reduce costs and find new ways to improve efficiency

Empower education & scientific discovery with AWS



AWS focus topics in higher education



The next generation of campus— a student-centric approach

Empowering universities to modernize legacy systems and evolve into sector leading institutions tailored to students' needs



The future of AI in higher education

Helping universities better leverage their data and new AI technologies to transform their institutions



Research and innovation

Supporting academics throughout the research lifecycle, providing a comprehensive cloud capability

DATA | INSIGHTS | WISDOM

Academic performance trends
Engagement metrics
Learning behavior patterns
Retention predictors
Personalized support needs



Resource allocation efficiency
Space utilization
Energy consumption
Accelerate research
Sustainability measures

PARTNERSHIPS & FRAMEWORKS





Universidad
Francisco de Vitoria
UFV Madrid



UNIVERSITÀ
DEGLI STUDI
DI PADOVA



Enhancing governance and quality

Centralized access to university data like
UXXI, Canvas, Salesforce

Developed a unified security access strategy

Generated insights in near-real time that
create a better university experience



Institutional GenAI assistant

Moodle plug-in for course-specific chatbots
and an official university GenAI website

Solution supports institution chatbot,
document analysis, eLearning,
historical media assets

Expand to 100,000 users to serve the entire
university community



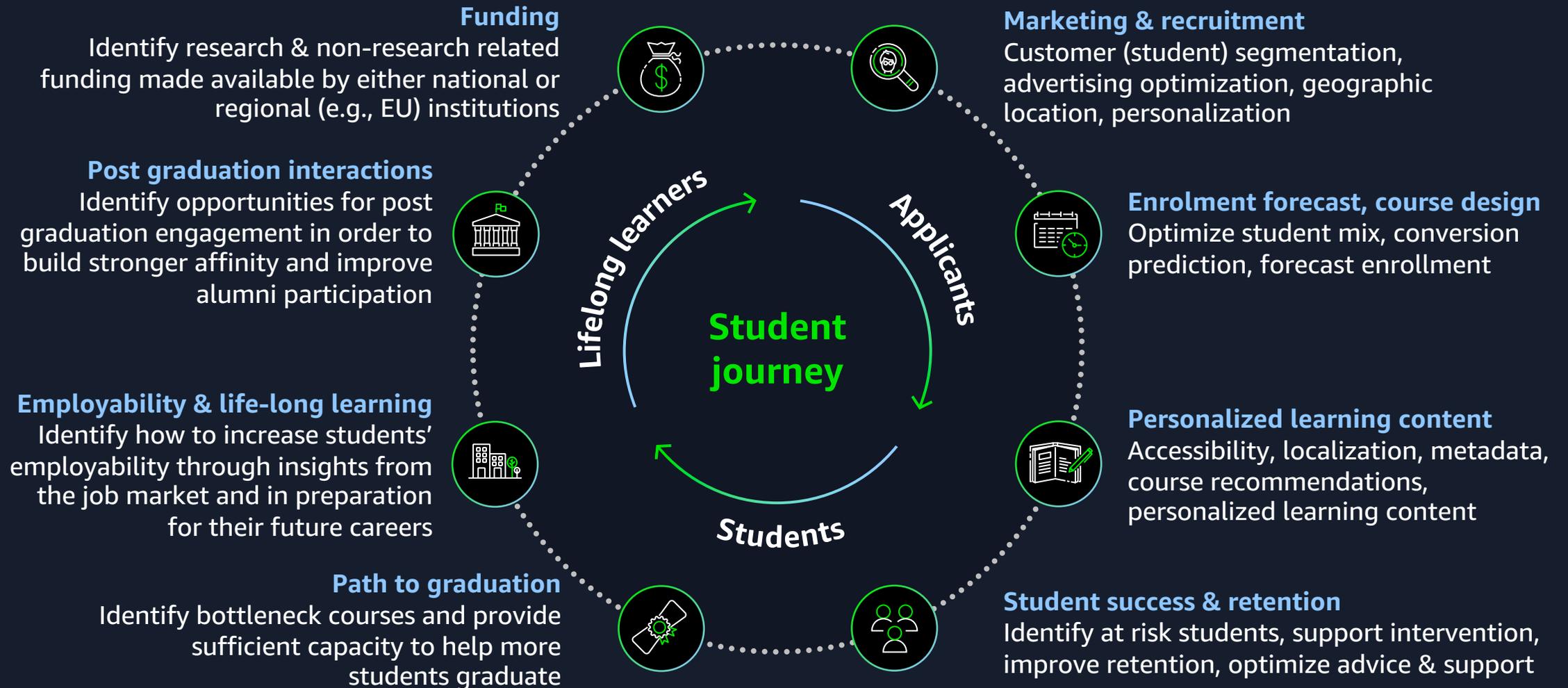
RACE Hub—RMIT AWS Cloud Supercomputing Hub

RMIT opens Australia's first university cloud
supercomputing facility to industry partners

The facility can test solutions up to 80 times
faster than existing servers, allowing rapid
product development



Digital campus—student-centric approach



The future of higher education with AI

Research & innovation

Increase research impact, inclusive of revenue growth, scholarship output and faculty recognition

AI transforms fields by analyzing data, processing language, and computer vision, predicting drug interactions, enabling lab automation, and accelerating physics modeling simulations.

(Management, HR, Finance, Legal, IT):

To maximize operational efficiency and mitigate enterprise risk across the institution, inclusive of technology and process modernization

AI transforms management with decision support and strategic planning; legal with document review and contract analysis; HR with recruitment, learning, and performance management; finance with predictive analysis, fraud detection, and automated reporting; and IT with data strategy, compliance, and security. This integration enhances efficiency, accuracy, and overall organizational effectiveness.

Academic tuition

Support student success and teaching and learning for traditional and extension/online programs

AI transforms education with personalized tutors, text summarization, question generation, automated grading, real-time feedback, and unique learning environments, enhancing student success.

Optimize the student lifecycle, inclusive of effective recruitment, retention

AI transforms the Student Services with intelligent document processing and chatbots, driving personalized marketing, accelerating admissions, aiding decisions, optimizing student journeys through analytics, and enhancing employee efficiency with faster processing and increased staff capacity.

Campus management

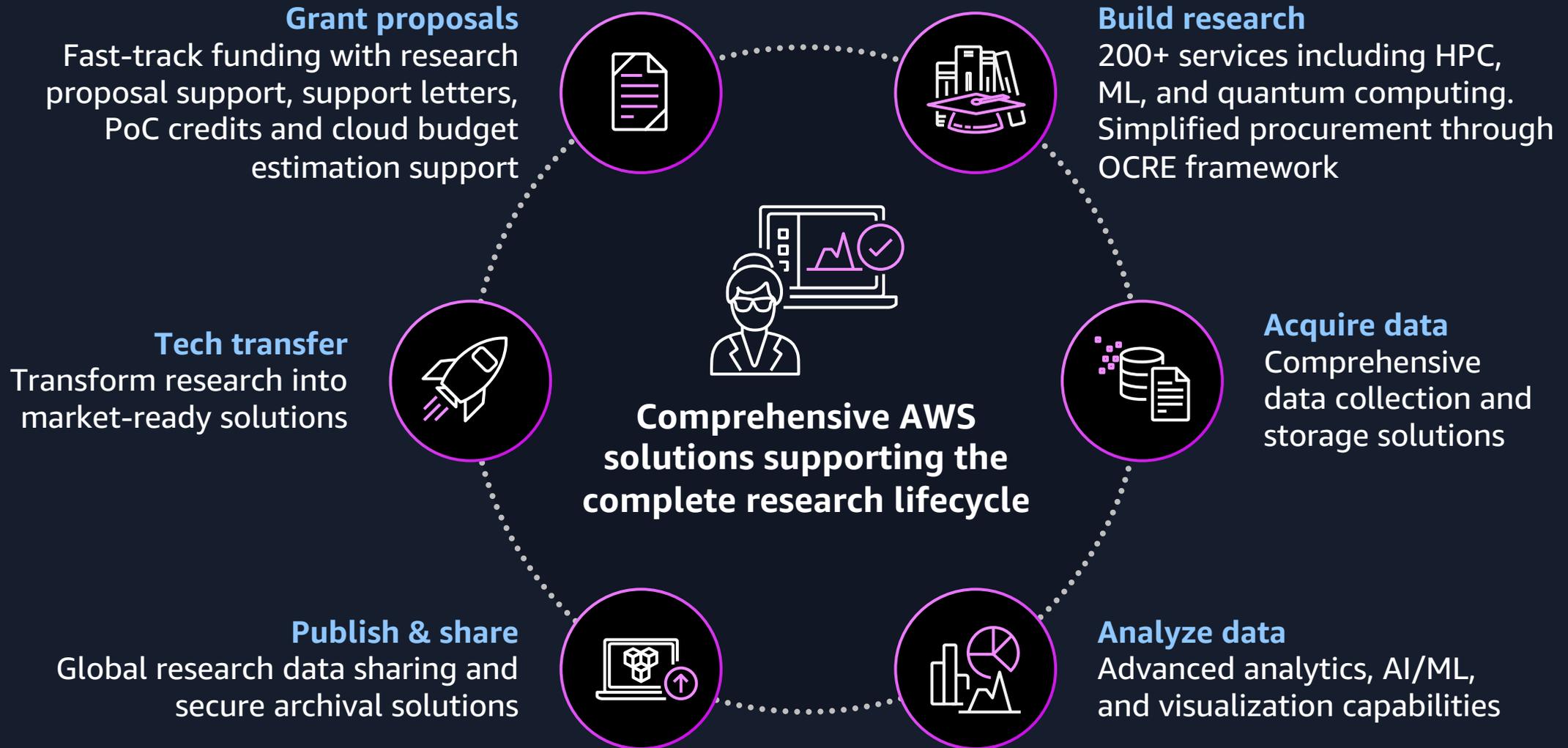
Maintenance and modernization of buildings and the entire campus

AI transforms campus management by enhancing operational efficiency, optimizing energy use, analyzing space utilization, and enabling predictive maintenance. This improves productivity, occupant satisfaction, and minimizes costs and downtime.

University administration

Student services

End-to-end research excellence



Transform through data & AI

Comprehensive solutions for research data lifecycle:
From management to analytics to AI-driven insights



Research data management

Storage and security

Integrity

Data transfer & sharing



Advanced analytics

Processing

Search and analysis

Visualization



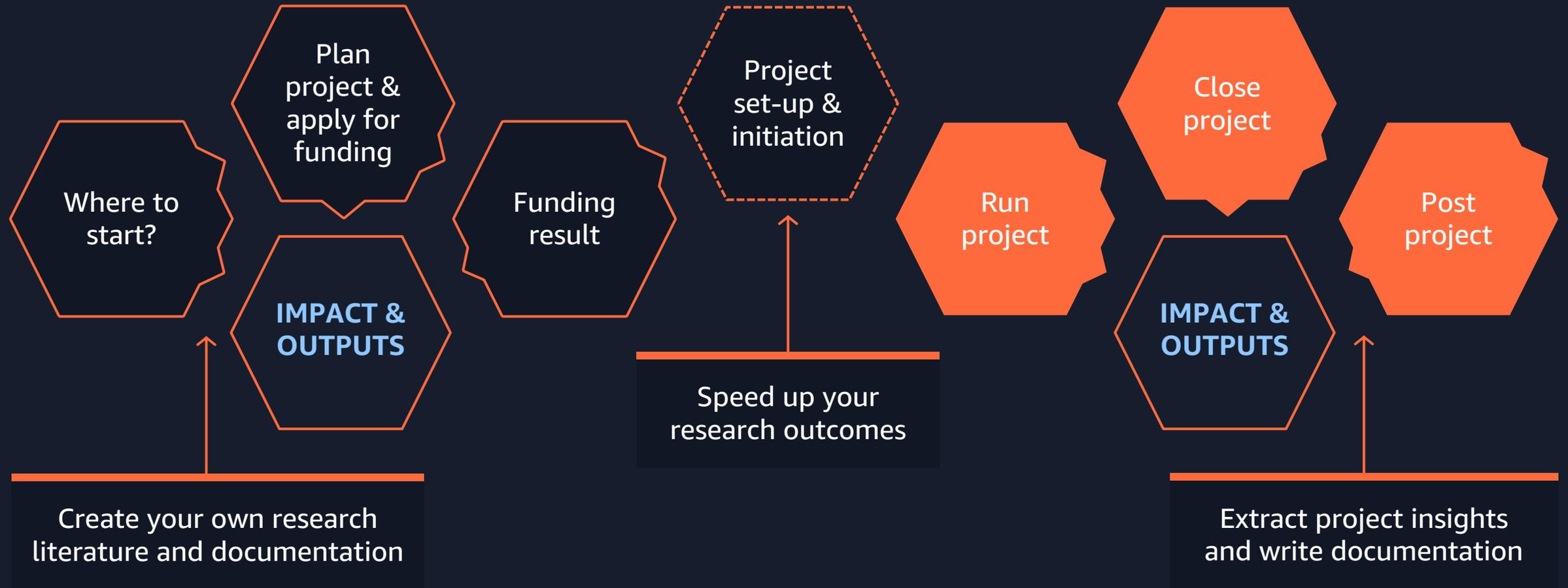
AI and ML solutions

Machine learning

GenAI development

AI Integration

AI and generative AI can help you at different steps in your research lifecycle



Collaborate and enable model training with long context length



GRNET/ATHENA

National Sovereign Greek LLM

Developed distributed training script with sequence parallelism and ZeRO-3 optimization enabling training the model with long context length.

CHALLENGE

GRNET and Athena Research Center wanted to train an open LLM for the Greek language, maintaining its English language capabilities while being extended to understand and generate fluent, culturally relevant, and accurate text in Modern Greek, which can be leveraged by the public & private sector to advance innovation & research.

SOLUTION

Collaborating with the GenAIIc, the team has developed distributed training scripts utilizing Fully Sharded Data Parallelism, ZeRO-3 and Sequence Parallelism. These training optimizations allow the team to continue pre-train the full Qwen2.5 32B parameter base model with 128000 context length with high efficiency.

OUTCOMES

- Enabled LLM training with 128000 context length
- Distributed LLM training across 16 P5 instances

FEATURES

- Amazon SageMaker HyperPod
- Amazon FSx for Lustre

Research

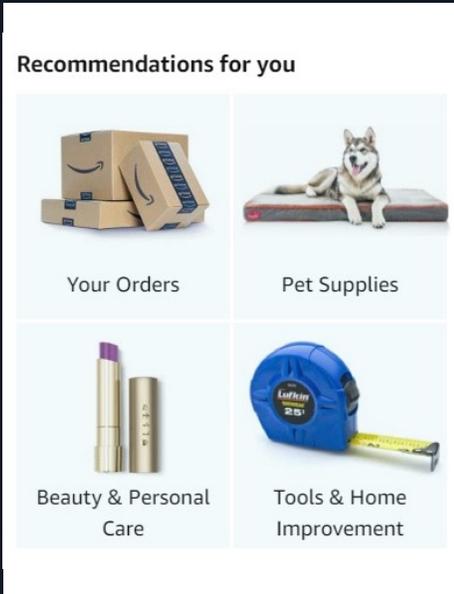
EMEA

Greece

Greek Language
LLM Development

Amazon SageMaker
HyperPod

AI innovation is in Amazon's DNA



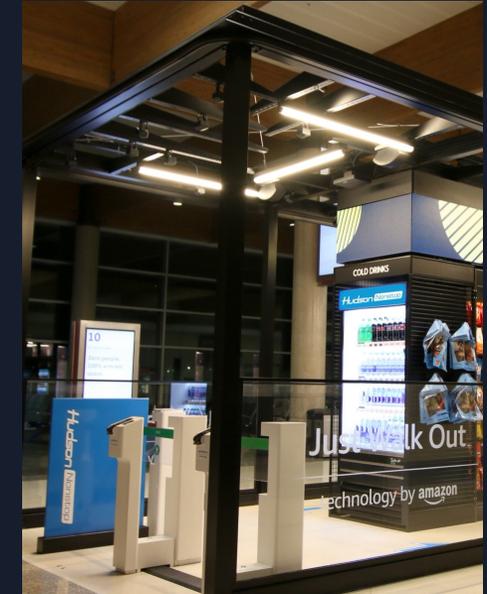
4,000 products per minute sold on Amazon.com



1.6M packages every day

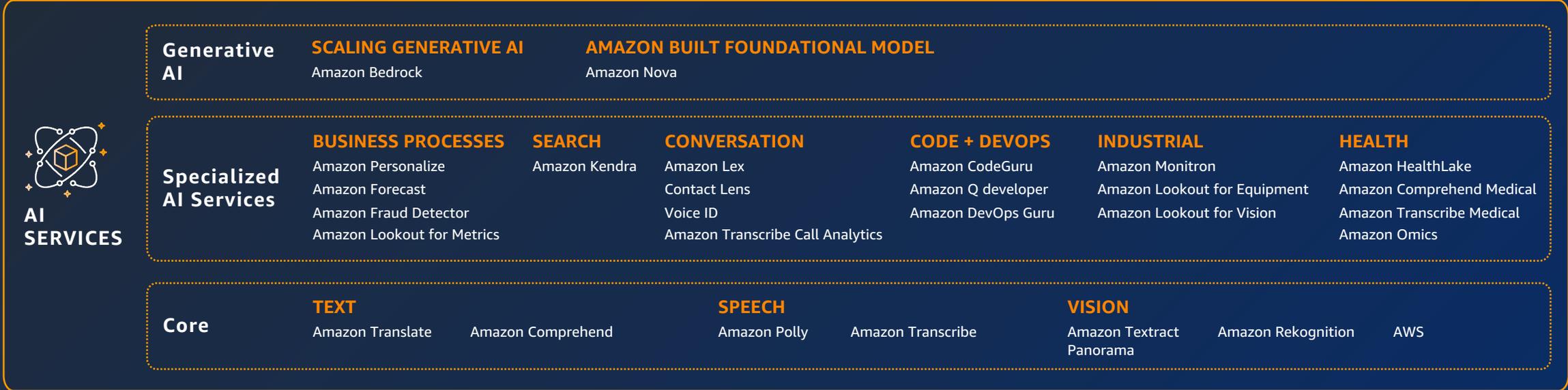


Billions of Alexa interactions each week



Just Walk Out technology in airports, stadiums and more

The AWS AI/ML Stack



Innovation can
transform industries



GENERATIVE AI



Enhance Customer Experiences

Boost employee productivity & creativity

Optimize business processes

Enhance Customer Experiences

CHATBOTS

VIRTUAL ASSISTANTS

CONVERSATION ANALYTICS

PERSONALIZATION

Boost employee productivity & creativity

CONVERSATIONAL SEARCH

SUMMARIZATION

CONTENT CREATION

CODE GENERATION

DATA TO INSIGHTS

Optimize business processes

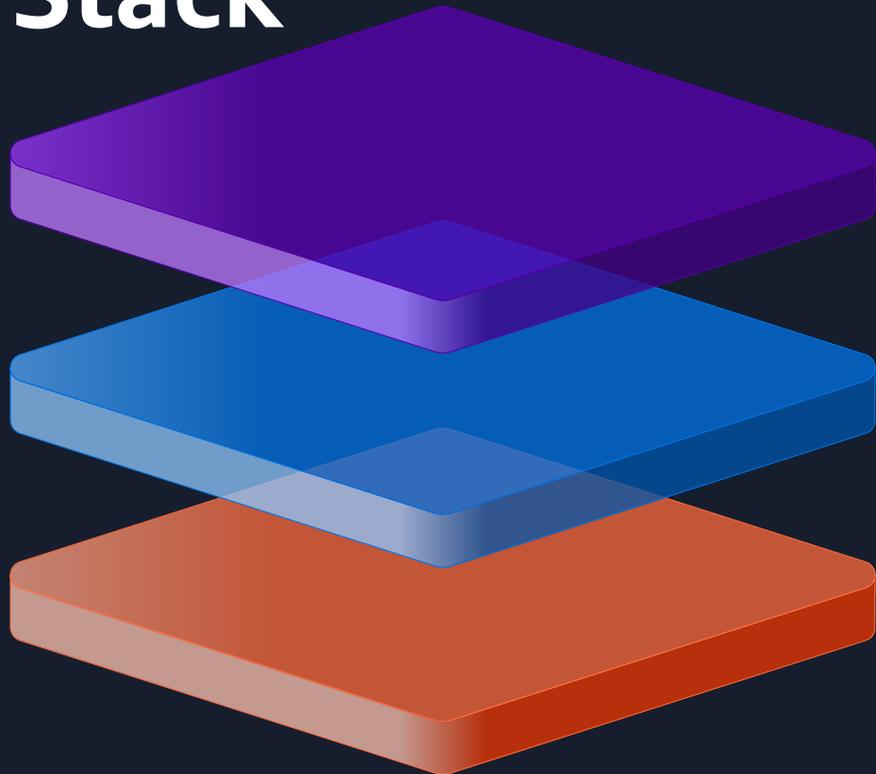
DOCUMENT PROCESSING

DATA AUGMENTATION

CYBERSECURITY

PROCESS OPTIMIZATION

AWS Generative AI Stack



APPLICATIONS TO BOOST PRODUCTIVITY



Amazon Q Business
INSIGHTS AND AUTOMATION



Amazon Q Developer
SOFTWARE DEVELOPMENT LIFECYCLE

MODELS AND TOOLS TO BUILD GENERATIVE AI APPS



Amazon Bedrock
AMAZON MODELS | PARTNER MODELS

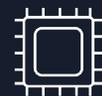
INFRASTRUCTURE TO BUILD AND TRAIN AI MODELS



Amazon SageMaker AI
MANAGED INFRASTRUCTURE



AWS Trainium
AWS Inferentia



GPUs

HIGH PERFORMANCE COMPUTE



Amazon SageMaker AI

Build, train, and deploy ML/FM models at scale

Access the latest and publicly available FMs

Manage and deploy models for inference

Classic ML and GenAI with Amazon SageMaker AI

Classic ML



Data Prep

Prepare data assets and pipelines,
Manage data quality and bias



Build

Experiment and automate the
execution of build pipelines



Train

Train ML models at scale
with automation



Deploy

Automate the execution of
deploy pipelines into production

GenAI



Data Prep



Pre-train or Select

Select from FM hub or
BYOFM, or Pre-train FM



Evaluate

Automated or human evaluation



Fine-tune

Fine-tune and/or optimize
models for deployment



Deploy

AUTOMATE WITH AI OPS AND GOVERNANCE



Amazon SageMaker JumpStart

MODEL HUB WITH FOUNDATION MODELS, BUILT-IN ALGORITHMS, AND PREBUILT AIML SOLUTIONS

Over 250+ publicly available foundation models and pretrained models from popular model hubs

Fully customizable solutions for common use cases with reference architectures

Share AI and ML models and notebooks across your organization

 <p>HuggingFace Explore hundreds of popular and trending models from HuggingFace.</p> <p>View 368 models ></p>	 <p>Meta Explore popular and trending models from Meta including Llama, Code Llama, and more.</p> <p>View 44 models ></p>	 <p>AI21 Labs Explore popular and trending models from AI21 Labs including Jurassic and more.</p> <p>View 6 models ></p>	 <p>Stability AI Explore popular and trending models from Stability.ai including Stable Diffusion and more.</p> <p>View 11 models ></p>
 <p>Cohere Explore popular and trending models from Cohere including Command, Rerank, and more.</p> <p>View 12 models ></p>	 <p>TensorFlow Explore popular and trending models from TensorFlow for computer vision and NLP tasks.</p> <p>View 319 models ></p>	 <p>PyTorch Explore popular and trending models from PyTorch for computer vision and NLP tasks.</p> <p>View 34 models ></p>	 <p>Upstage Explore popular and trending models from Upstage including Solar mini chat model and more.</p> <p>View 4 models ></p>
 <p>LightOn Explore popular and trending models from LightOn including mini-instruct models.</p> <p>View 2 models ></p>	 <p>NCSOFT Explore popular and trending models from NCSOFT including VARCO LLM models.</p> <p>View 3 models ></p>	 <p>LG CNS Explore popular and trending models from LG CNS including EXAONE Atelier and more.</p> <p>View 1 models ></p>	 <p>Jina AI Explore popular and trending models from Jina AI including Jina Embeddings model and more.</p> <p>View 1 models ></p>
 <p>Voyage AI Explore popular and trending models from Voyage AI including Voyage-2 Embedding Model and more.</p> <p>View 3 models ></p>	 <p>Nomic Explore popular and trending models from Nomic including Nomic Embed Model and more.</p> <p>View 2 models ></p>	 <p>EvolutionaryScale, PBC Explore frontier, generative language models for biology from EvolutionaryScale, including ESM3.</p> <p>View 1 models ></p>	 <p>Amazon Explore popular and trending models from AWS for computer vision, NLP, and tabular tasks.</p> <p>View 36 models ></p>





Amazon Bedrock

Fastest way to add GenAI capabilities
to your applications

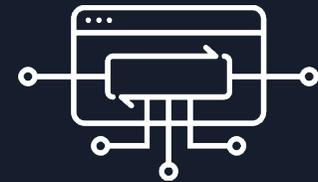
Amazon Bedrock **simplifies**



Choice



Customization



Integration

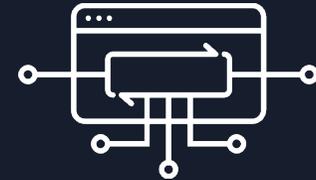
Amazon Bedrock **simplifies**



Choice



Customization



Integration



Choose the best model

Use high-performing FMs including 1P Amazon models and 3P partner models



Optimize for cost, latency, and accuracy

Scale with a selection of consumption modes to balance cost, latency and accuracy



Customize with your data

Use contextual information from your private data sources to deliver customized responses



Apply safety and responsible AI checks

Implement safeguards customized to your application requirements and responsible AI policies



Build and orchestrate Agents

Seamlessly connect with company systems, APIs, and data sources to drive automation

Amazon Bedrock

Base foundation models

AI21labs Effective reasoning & rapid analysis for long context windows JAMBA	amazon Frontier multimodal intelligence at low-latency, Agent & RAG Applications, high-quality image & video generation AMAZON NOVA New	ANTHROPIC Advanced reasoning & coding capabilities, including computer use skills CLAUDE	cohere Multimodal search & advanced retrieval powering multilingual knowledge agents COMMAND EMBED RERANK New	Luma High-quality video generation from text & images LUMA RAY 2 New	Meta Advanced image & language reasoning LLAMA	MISTRAL AI Knowledge summarization, expert agents, & code completion MISTRAL MIXTRAL	poolside Software engineering AI for large enterprises MALIBU POINT Coming soon	stability.ai High-quality AI image generation, easily deployable at scale STABLE DIFFUSION STABLE IMAGE
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Amazon Nova foundation models

State-of-the-art foundation models that deliver frontier intelligence and industry leading price performance.

Understanding models

Creative content generation models

Amazon Nova Micro

Our text only model that delivers the lowest latency responses at very low cost

GENERALLY AVAILABLE

Amazon Nova Lite

Our low-cost multimodal model that is lightning fast for processing image, video, and text inputs

GENERALLY AVAILABLE

Amazon Nova Pro

Our highly capable multimodal model with the best combination of accuracy, speed, and cost for a wide range of tasks

GENERALLY AVAILABLE

Amazon Nova Premier

Our most capable multimodal model for complex reasoning tasks and for use as the best teacher for distilling custom models

COMING SOON

Amazon Nova Canvas

State-of-the-art image generation model

GENERALLY AVAILABLE

Amazon Nova Reel

State-of-the-art video generation model

GENERALLY AVAILABLE

← Lower Cost & Latency

→ Increasing Intelligence



GenAI customization - why customize?



**Adapt to
domain-specific
language**

E.g. Finance – Teach financial & accounting terms to provide good analysis for earnings reports



**Enhance
performance
for specific tasks**

E.g. Customer Service – Improve ability to understand and respond to customer's inquires and complaints



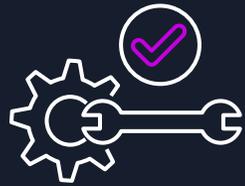
**Improve
context-awareness
in responses**

E.g. Legal Services – Better understand case facts and law to provide useful insights for attorneys

Customizing FMs in Amazon Bedrock



Fine-tuning FMs in Amazon Bedrock



Fine-tuning

PURPOSE

Maximizing accuracy for **specific tasks**

DATA NEED

Small number of labeled examples



Continued pretraining

PURPOSE

Maintaining model accuracy for **your domain**

DATA NEED

Large number of unlabeled datasets

Agents for Amazon Bedrock

ENABLE GENERATIVE AI APPLICATIONS TO EXECUTE MULTISTEP TASKS USING COMPANY SYSTEMS AND DATA SOURCES



1

**SELECT YOUR
FOUNDATION MODEL**



2

**PROVIDE BASIC
INSTRUCTIONS**



3

**SELECT RELEVANT
DATA SOURCES**



4

**SPECIFY AVAILABLE
ACTIONS**

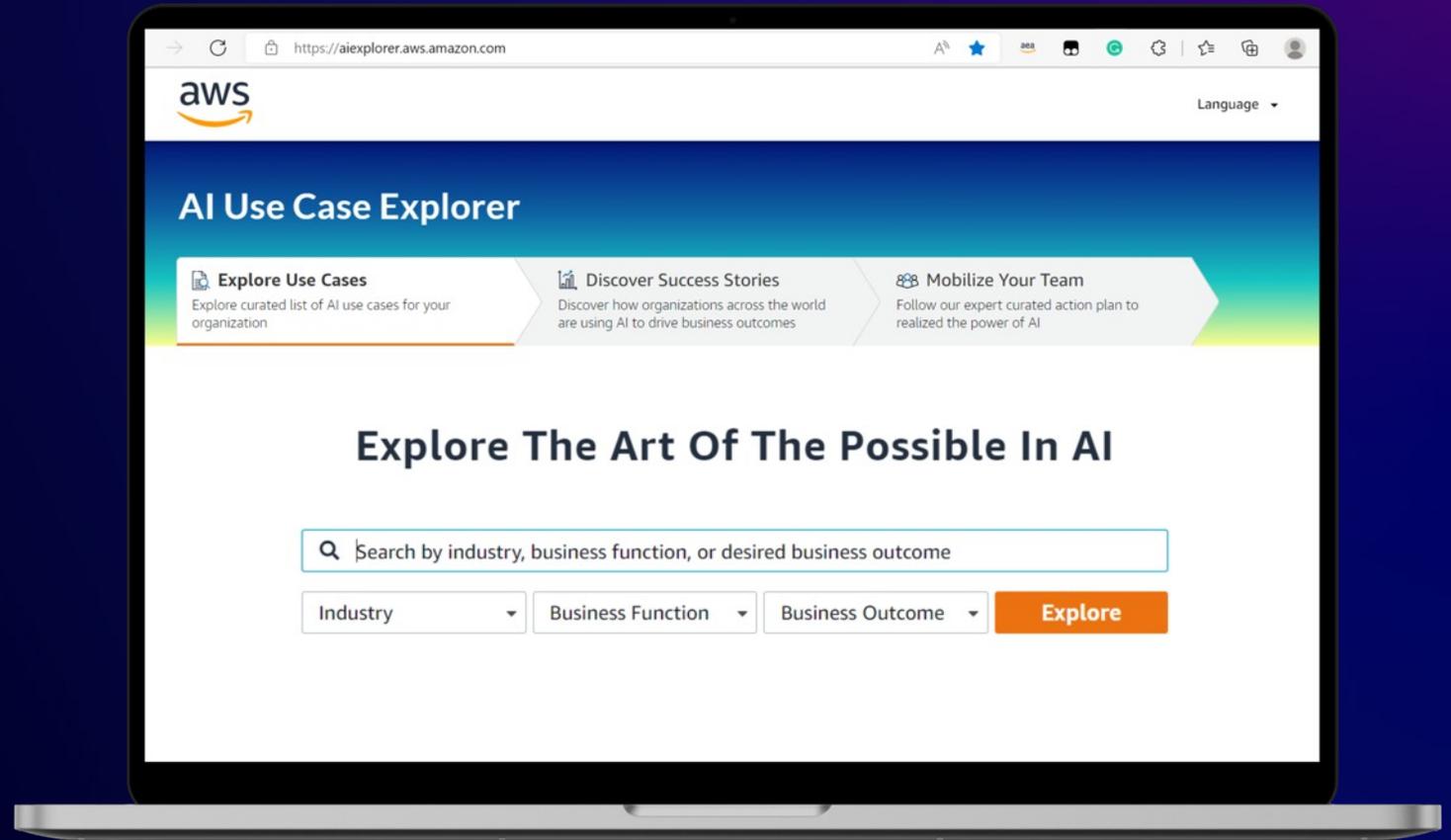
| Takes action by invoking API calls on your behalf |

| Chain-of-thought trace and ability to modify agent prompts |



AI Use Case Explorer

Easily find the most relevant AI use cases with related content and guidance to make them real



aiexplorer.aws.amazon.com

How to move from one use case to a strategic approach

The next generation of campus – a student-centric approach

The future of AI in higher education

Research & innovation

AWS can help you to create your education & research strategy



AWS can help you to build your data strategy

Research success

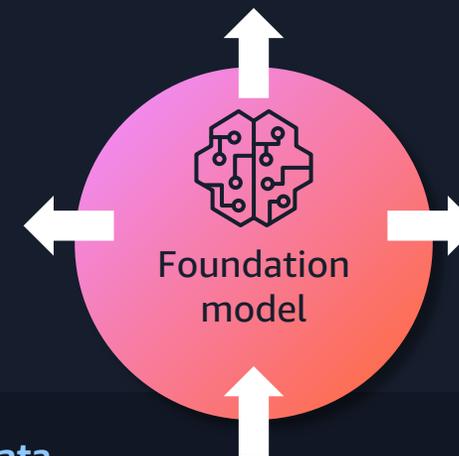
- Data transfer & sharing
- Search and analysis
- Documentation

Student success

- Student behavior & performance insights
- Improved student retention
- Identifying 'at risk' students
- Personalized learning & adaptive education

Organizational success

- Optimized course offerings
- Improved teacher effectiveness
- Predicting student success
- Enhancing overall institutional performance



Your data



- Learning management system
- Lectures video recordings
- University library content
- Research data

Start your journey today with AWS

1

Begin your AWS journey: explore possibilities, identify the right use case

2

Book a session with our experts to dive deeper into the topics of student-centric approach, GenAI, and research

3

Work with our experts to build a cloud and data foundation for your institution



Thank you!



Appendix—use cases





Accelerates student degree completion

Predict the best alignment for degree pathways

Alert students when they choose courses that deviate from their course

Assist in course capacity planning based on enrollment and student numbers

Enhancing governance and quality

Centralized access to university data like UXXI, Canvas, Salesforce

Developed a unified security access strategy

Generated insights in near-real time that create a better university experience

Single pane of glass for real-time view of the campus

Key focus areas—experience, campus operations, estate planning, and sustainability

Solution helps faculty and staff to effectively manage operations, costs, and utilization of space

Students—safe and comfortable place to learn and a platform to learn from





UNIVERSITÀ
DEGLI STUDI
DI PADOVA



Wolters Kluwer



Harvard
Business
School



Institutional GenAI assistant

Moodle plug-in for course-specific chatbots
and an official university GenAI website

Solution supports institution chatbot,
document analysis, eLearning,
historical media assets

Expand to 100,000 users to serve the entire
university community



Corporate performance management powered by AI

Generative AI supports decision-making for
CFO and management

Wolters Kluwer uses AWS Generative AI in
"CCH Tagetik expert solution"

Benefits include enhanced analytics,
financial planning, and
compliance-reporting



Data management with AI- powered unified platform

Unified Data Platform: Integrated previously
siload systems into a single platform

AI for curriculum and alumni insights
and created a collaborative data science
environment

The project included automated publication
mining and staff training in data analytics
and ML Ops





RACE Hub—RMIT AWS Cloud Supercomputing Hub

RMIT opens Australia's first university cloud supercomputing facility to industry partners

The facility can test solutions up to 80 times faster than existing servers, allowing rapid product development



Oxford's ML prototype revolutionizes numismatic digitization

Built and deployed 11 ML models
in 10 weeks

Saved up to 3 years of work cataloging a
collection of 300,000 coins

Coin analysis time cut drastically, from
minutes/hours to mere seconds



Global access for its user and scalability of compute

Development of an Open Blue Brain
Platform, a mouse brain simulation
research project

AWS expert teams (e.g., research, HPC) and
series of workshops on commercialization
and building of SaaS offerings

Results into a spinoff and global
business model

Generative AI Use Cases & Demos



Country: Canada **Use case:** Optimize business services and student experience | smart virtual assistant

Challenge: Customer needed efficient system to handle student inquiries, replacing slow manual processes.

Solution: AWS-powered AI chatbot for 24/7 automated student support with accurate answers. (Amazon Lex, Kendra and SageMaker)

Outcome: Students receive 24/7 access to consistent information & reduced manual answering needs freed up university resources



Country: Canada **Use case:** Improving Virtual Patient Interaction Tools in Pharmacy Education

Challenge: Pharmacy schools seek AI-powered patient simulators to enhance student training beyond current limitations

Solution: UBC created AI platform to simulate realistic pharmacist-patient interactions for student training.

Outcome: AI simulation provides safe, engaging environment for pharmacy students to practice patient interactions.



Country: USA **Use case:** Offer students unique digital learning tools and services (Study AiDE)

Challenge: Unlock educational value from UD's massive archive of 300,000 classroom recordings.

Solution: Generative AI study tools that enable UD students to take greater control over their learning and academic success.

Outcome: LMS that sets standards of how Generative AI will be used and creation of digital flashcards, study guides, practice quizzes and more.



Country: Singapore **Use case:** Help libraries to become immersive spaces that spark interest in reading.

Solution: StoryGen is a first-of-its-kind prototype that's helping local libraries to become immersive spaces that spark interest in reading.

Outcome: StoryGen immersive experience and ChatBook using Generative AI technology opens up new ways for library patrons of all ages to discover and learn more about Singapore's unique culture and history,

UCLA

Country: USA **Use case:** Fundraising with hyper-personalization powered by Amazon Bedrock

Challenge: Increase philanthropy to close short-term operational cost and improve long-term institutional financial sustainability

Solution: Anthropic's Claude 3 Sonnet LLM for email personalization and improved donor engagement through targeted, data-driven timing and content. **Outcome:** Donation conversion increased by 86% and donation size by 26%, improving dollars raised by a staggering 132%.

Demos - Use cases: Focus on Student Services

Student Advisor: AI helps prospective students explore programs and plan courses based on their interests.

Campus Assistant: Students receive instant answers about campus facilities, services, and daily university life.

Course Reviews: Universities use AI to analyze student feedback surveys for meaningful insights.