Capgemini

GEN AI – INTRODUCTION

SESSION 1

Sripriya Venkatesan
Nitesh Kadam

Nov 2023

ABOUT THE SPEAKERS

- Sripriya is a part of CCA Architecture team.
- She is working as Enterprise Architect for a geo in Europe, with overall 21 years of experience.
- She is Capgemini L3 certified, AWS/ TOGAF/ SAFe certified architect.
- Her recent assignments include lead architect for Stellantis and Covestro along with solutioning for key customers.

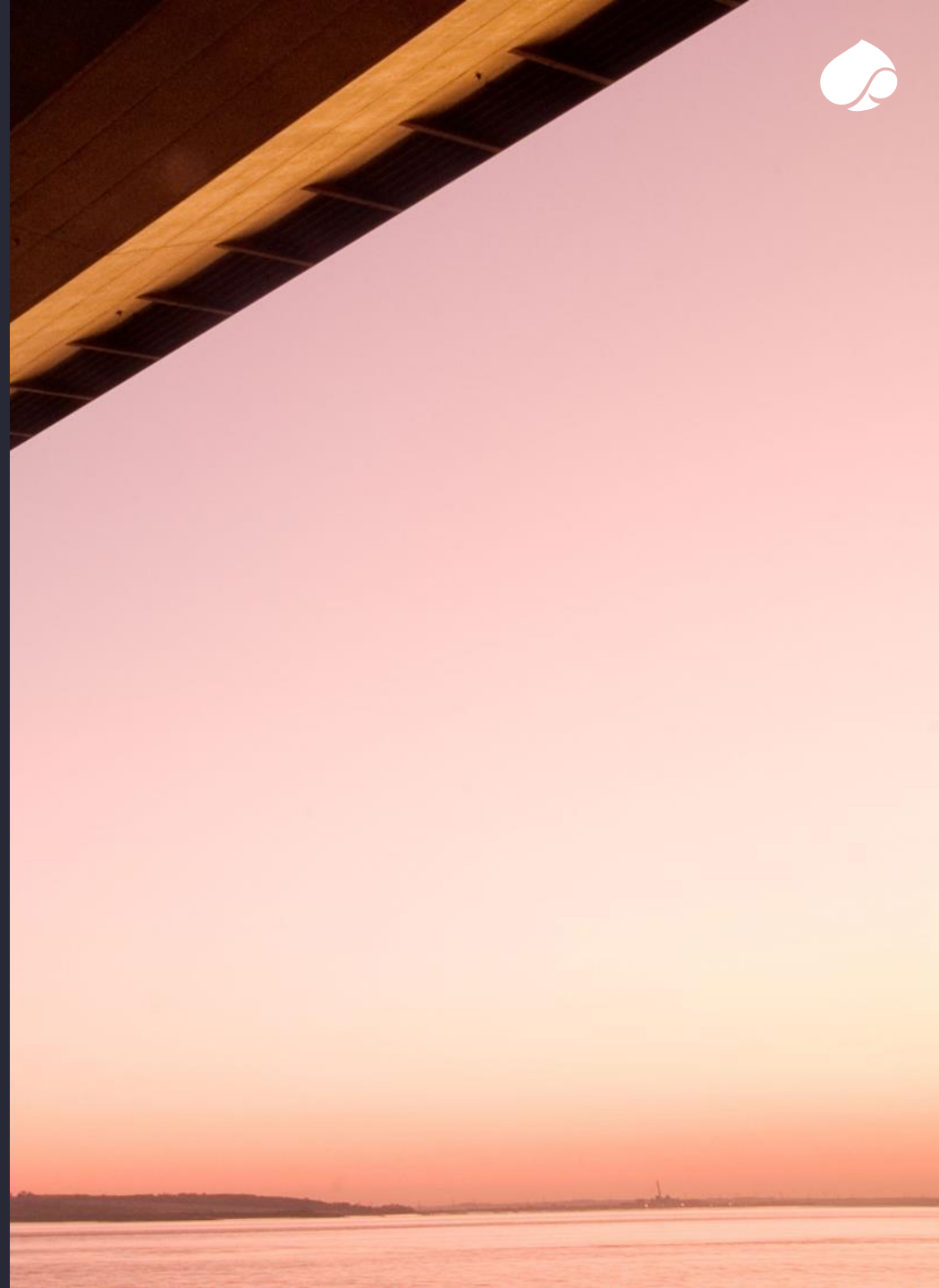
SRIPRIYA VENKATESAN

- Nitesh is a part of CCA ETAP team
- He is working as Lead Architect for Measurement Pilots - Gen AI for SWE offer with overall experience of 18 years in Java/J2EE technologies
- He is Capgemini L2 Certified, TOGAF/SAFe Certified Architect
- His recent assignments include lead architect for Capgemini CSR initiatives (MAATR, FARM) and CCA operations applications like Smart Recruit, Talent Excellence Zone Portal, OneView Portal etc

NITESH KADAM

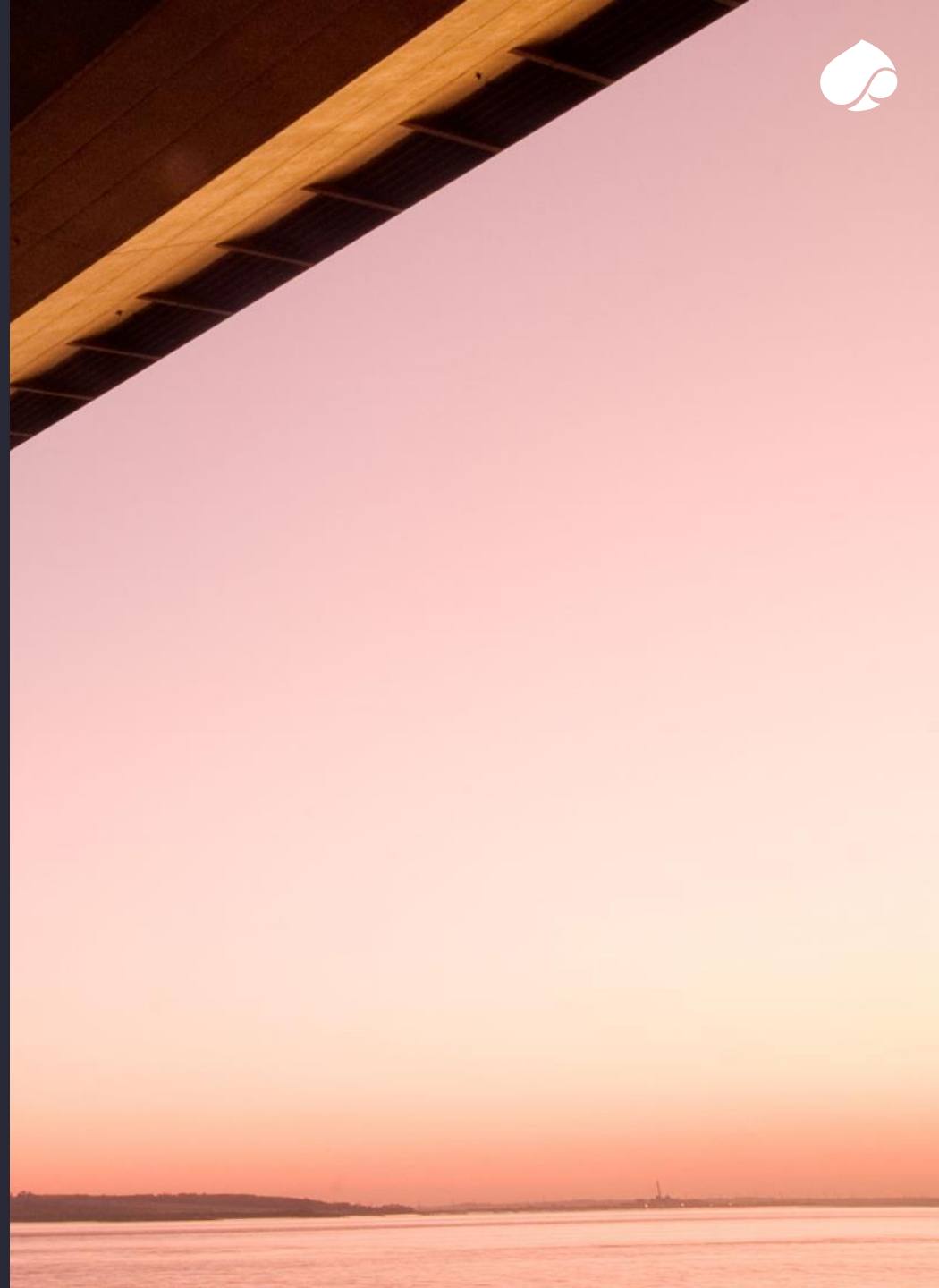
AGENDA

1. *Capgemini's Generative AI Offerings*
2. *Intro to Gen AI*
3. *Examples of Gen AI*
4. *Gen AI for Software Engineering*
5. *Demo*
6. *Q&A*

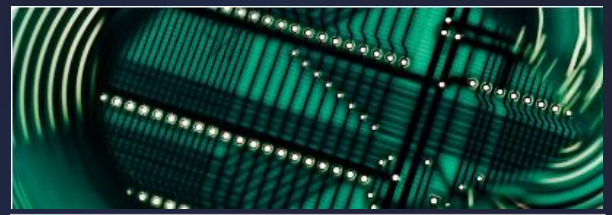


1

Capgemini Generative AI offerings



CAPGEMINI GENERATIVE AI - PORTFOLIO OF SERVICES



GEN AI Strategy

Enabling CXOs to define and prioritize the most relevant generative AI use cases for their business, demonstrate the tangible value that can be achieved, and lay the right foundations in terms of people, process and technology for scaling their generative AI investments while mitigating the risks.

Gen AI for CX

Enhancing customer experience with 4 dedicated generative AI assistants. It allows hyper-personalized customer experience with a synthetic design assistant, elevates customer self-service with personalized chatbots, augments customer care services with a content and knowledge assistant and boosts sales teams performance with a product & offers knowledge assistant.

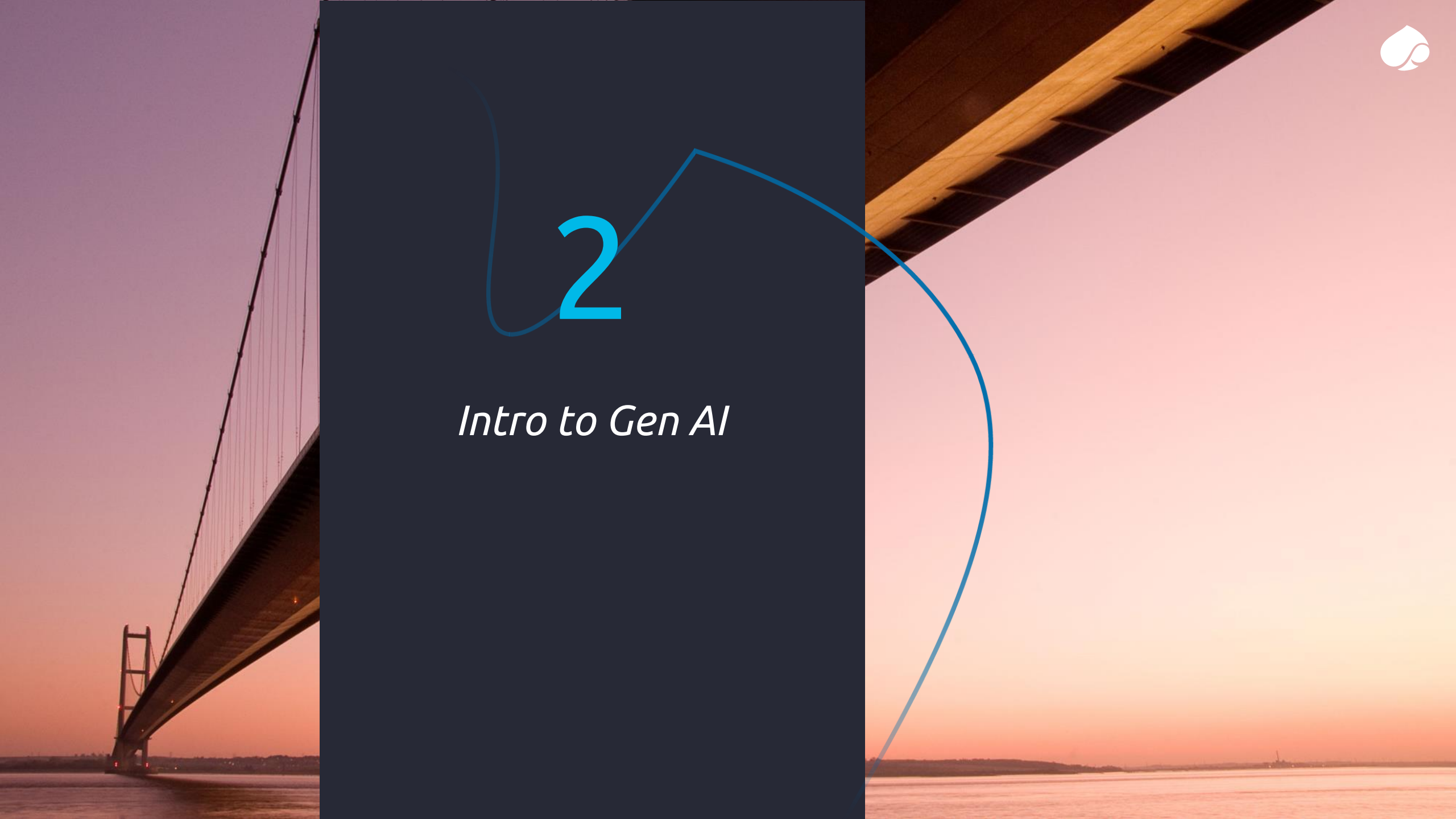
Gen AI for SW Engineering

Improving efficiency and quality across the whole software life cycle (from design and coding to documentation, testing, deployment, and operations), accelerate the time to market for new software, and reduce the technical debt of enterprises by facilitating large modernization programs of legacy software. It also enables increased security with a reduced attack surface by automatically identifying bugs or vulnerabilities and proposing adjustments to software development teams.

Custom Gen AI for Enterprise

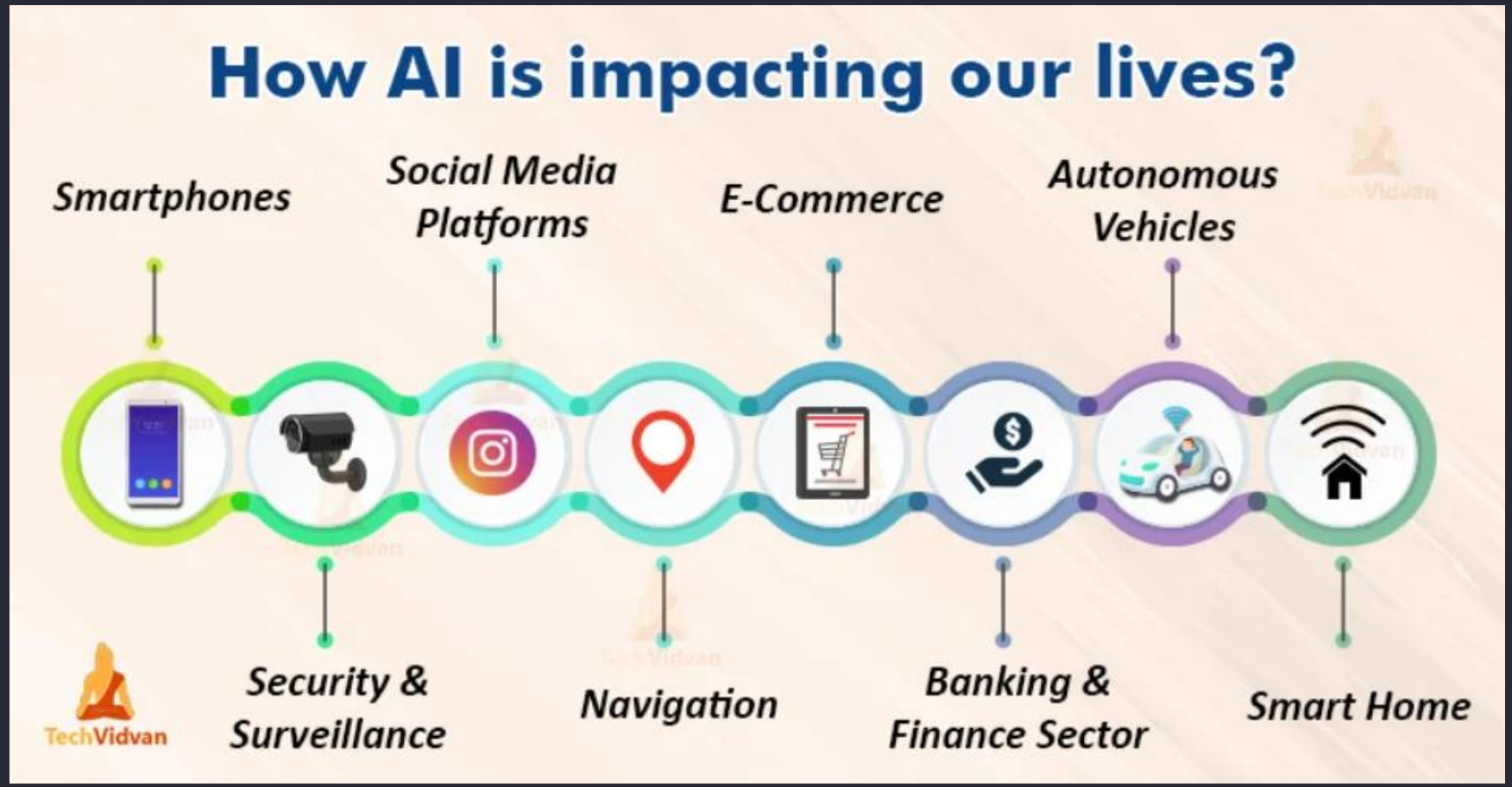
Enabling enterprises who have sensitive data to have custom generative AI assistants fine-tuned with their key proprietary data, in order to get maximum business value impact on company-specific tasks. The Group has designed a platform to combine the power of pre-trained open large foundation models (LFMs) with enterprise proprietary data to fine-tune LFMs to the needs of each client. These customized models, building from company know-how, can create unique and reliable outputs and help organizations accelerate on many fronts – from customer experience to R&D, or assisting support and business functions to increase performance.

https://x-port.capgemini.com/capgemini-generative-ai



2

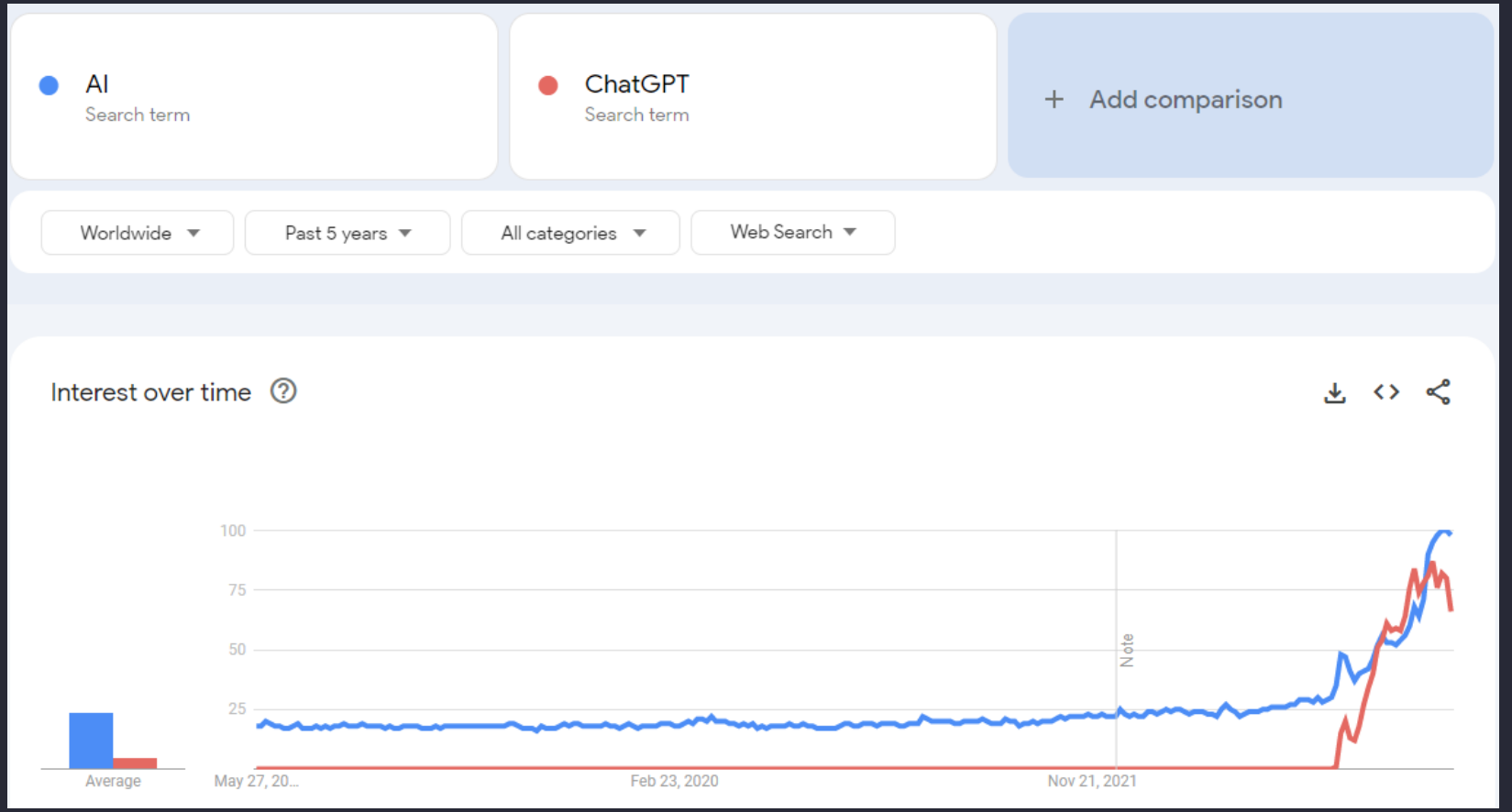
Intro to Gen AI



https://techvidvan.com/tutorials/ai-in-human-life/

GROWTH OF AI

- AI is not new, been around since 1956
- Huge Demand lately
- Data, Computing, Algorithms, Talent available for AI
- War/ Race for Generative AI

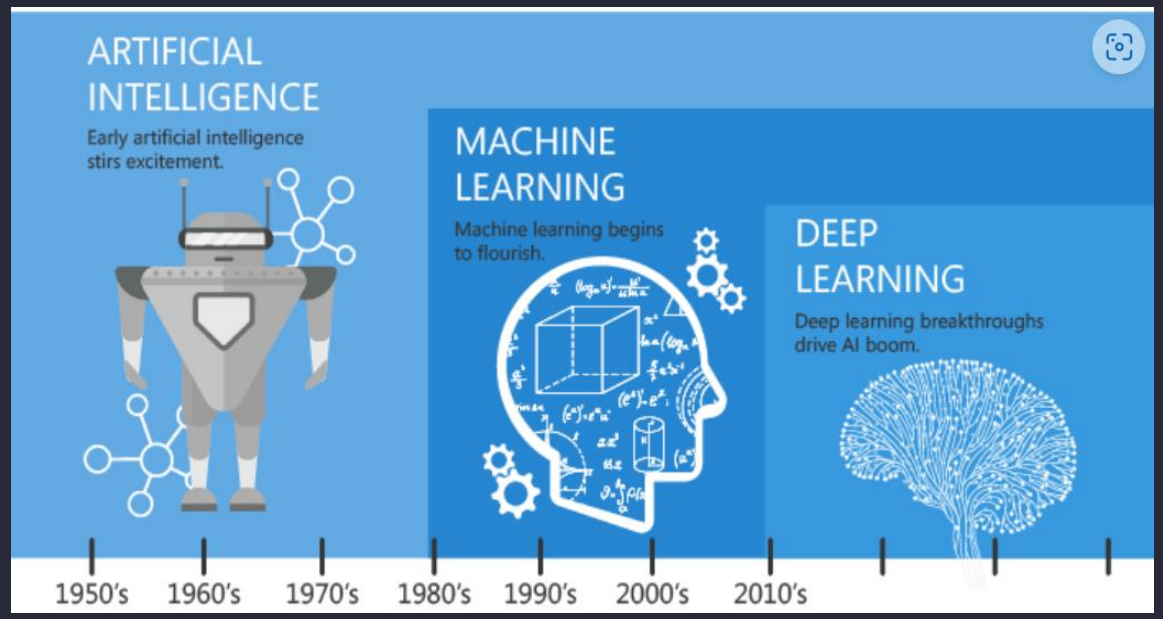


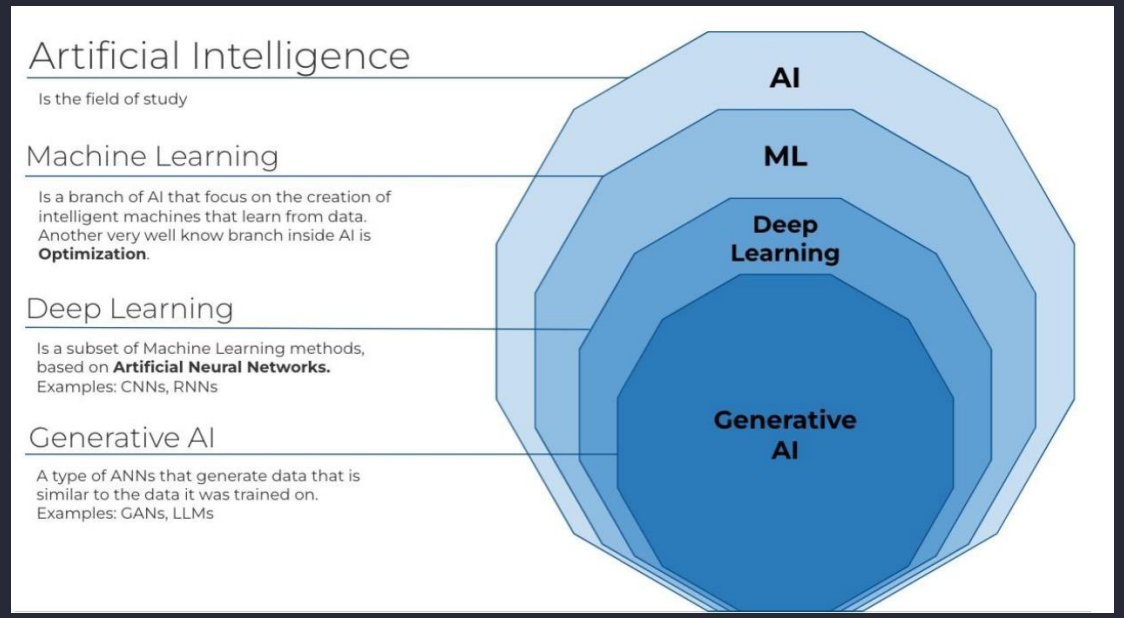
Google trends around AI

AI AT A GLANCE

AI - Applying advanced analysis and logic-based techniques, including machine learning (ML), to interpret events, support and automate decisions and to take actions

- Gartner





https://www.linkedin.com/pulse/biggest-confusion-cleared-ai-vs-ml-dl-ashwin-kumar/

https://gcloud.devoteam.com/blog/unlimited-creativity-how-generative-ai-is-transforming-the-world-of-innovation/

INTRODUCTION TO GEN AI

What is Gen AI

- Generative AI (Gen AI) is a type of AI that can create new content, such as text, images, and music

Impact

- Gen AI is changing the way software professionals work by automating many of the tasks that were previously done manually.
- Still in its early stages of development but slated to have one of the most revolutionary impact in software development industry.

Opportunities

- Emergence of new roles, such as Gen AI engineer and Prompt engineer that are focused on designing and using Gen AI tools.
- This technology will empower software professionals to focus on higher-level, strategic & creative tasks

Challenges

- It requires significant investment in technology and training, as well as a shift in mindset and approach towards development
- Governance, Legal

GEN AI QUOTES

- *"Generative AI is the key to solving some of the world's biggest problems, such as climate change, poverty, and disease. It has the potential to make the world a better place for everyone." ~**Mark Zuckerberg***

- *"Generative AI models surprise, impress and scare us, all at the same time" – **Gonzalo Gortazar***

JOURNEY OF GEN AI

2010 - Near Perfect Translation of Natural Language

AI researchers working on natural language translation discovered that models exposed to vast amount of text produced much better results than models using top-down grammatical rules

2014 – Mastering the meaning of words

Language models started to make sense of the meaning of words in a natural language by analysing the context in which the word appeared

2017-2022 – Large Language Foundation Models

Started customization of language models which are initially a cost-prohibitive however, once they have created it is easy to customize it

2022 – Conversational Large Language Models

With the introduction of ChatGPT which is easy to access a large language foundation models.

HOW IT WORKS

Generative AI is a type of artificial intelligence (AI) that uses machine learning algorithms to create new and original content like images, videos, text, and audio.

1 Forming a Database
A neural network, consisting of various information or media files like images, text, data, sounds, etc., forms the basis of artificial intelligence.

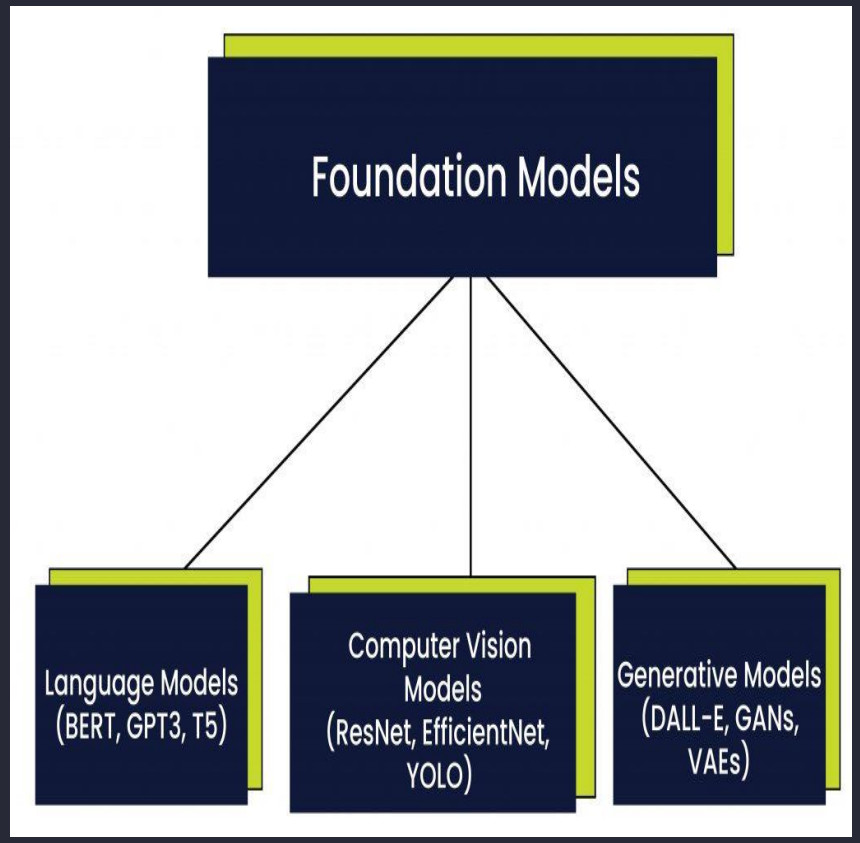
2 Inputting a Prompt
The user provides the AI with a description or sample of the desired content...

Prompts can be any user-submitted material like words, numbers, or photos

3 Generating Content
...and the AI uses its neural network to generate new examples that are similar to the ones it has trained from.

This image was created on Midjourney using the following text prompt:
a technical illustration of a woman sitting behind a desktop computer on a long table, isometric view, 3D rendering, realistic, 4k

MODELS



Foundation Models

- Large machine learning models that are trained on a broad set of unlabelled data and are fine-tuned to a wide range of applications.

Large Language Models (LLM)

- AI that is trained on vast amount of text to interpret and generate human-like textual output

ChatGPT

- An OpenAI service that incorporates a conversational chatbot with LLM to create content

GEN AI LINGOS

Foundation Models

- Large machine learning models that are trained on a broad set of unlabelled data and are fine-tuned to a wide range of applications.

Large Language Models (LLM)

- AI that is trained on vast amount of text to interpret and generate human-like textual output

Prompts

- Prompts are archetype user-generated questions as well as instructions by software programmers which elicit a desired response from the algorithm

Prompt Engineering

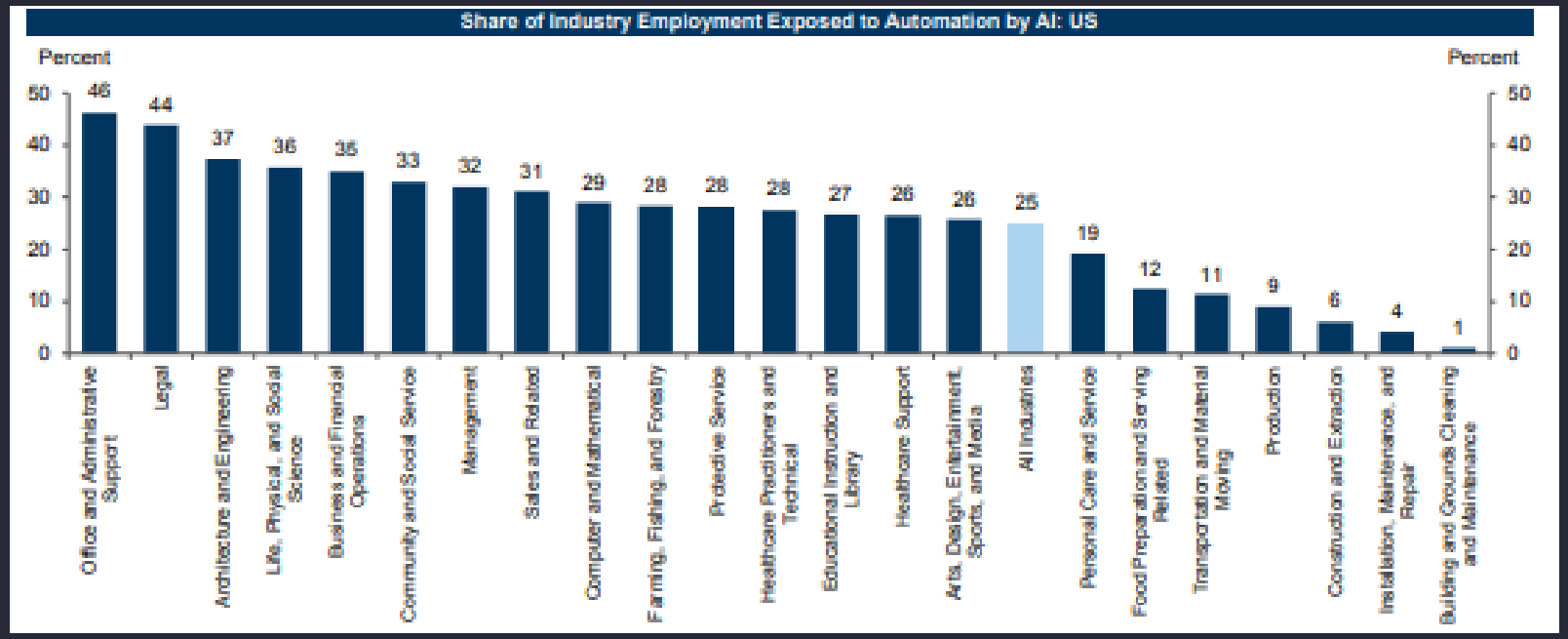
- Prompt engineering is becoming a sought-after job to train Chatbots to act more like efficient human beings

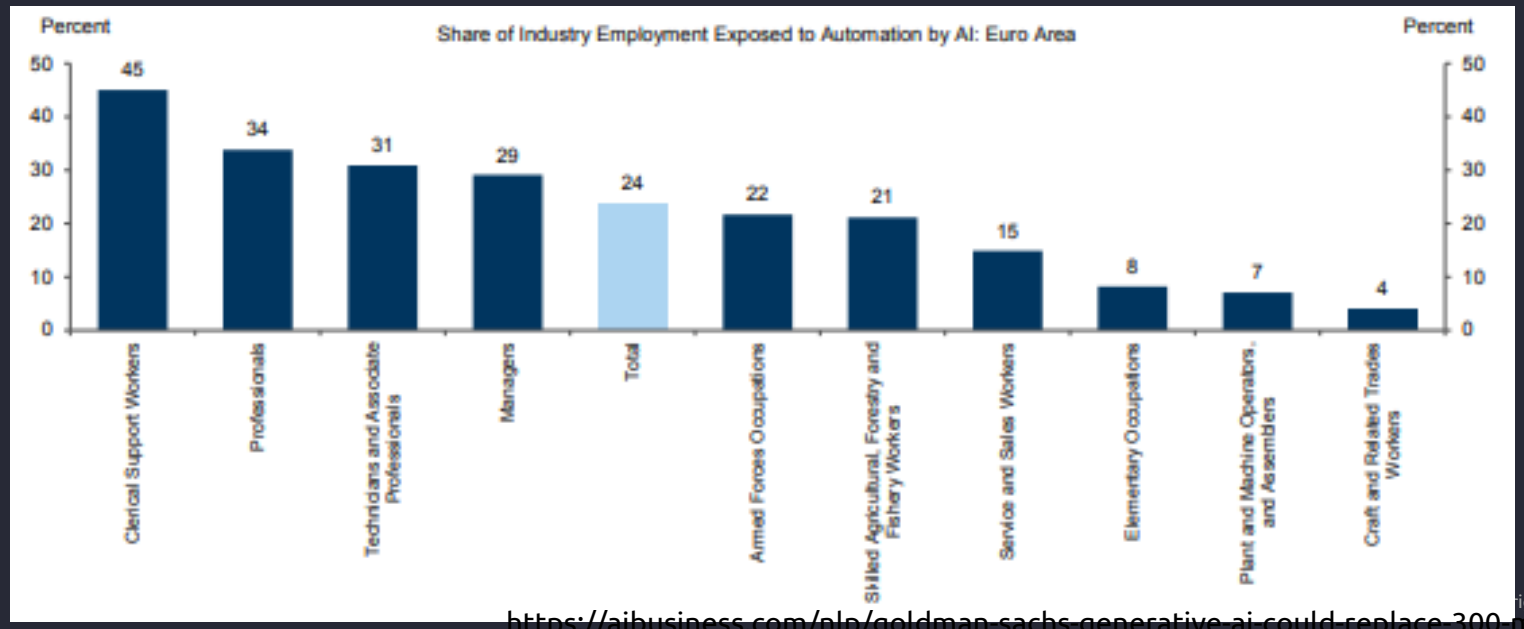
ChatGPT

- An OpenAI service that incorporates a conversational chatbot with LLM to create content

CURRENT STATE

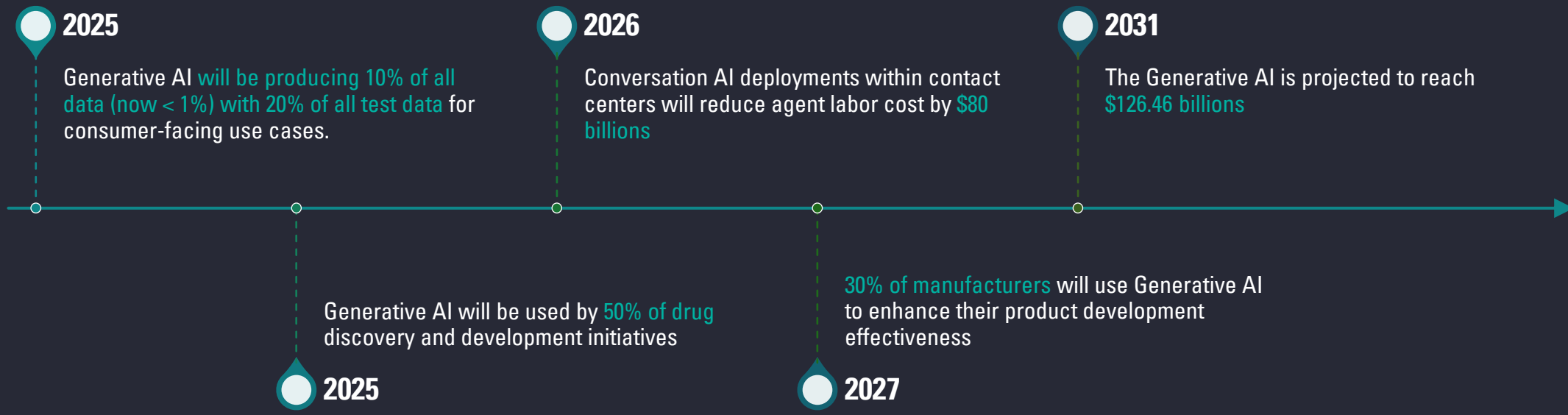
- Lot of excitement
- Fear of AI taking away jobs.

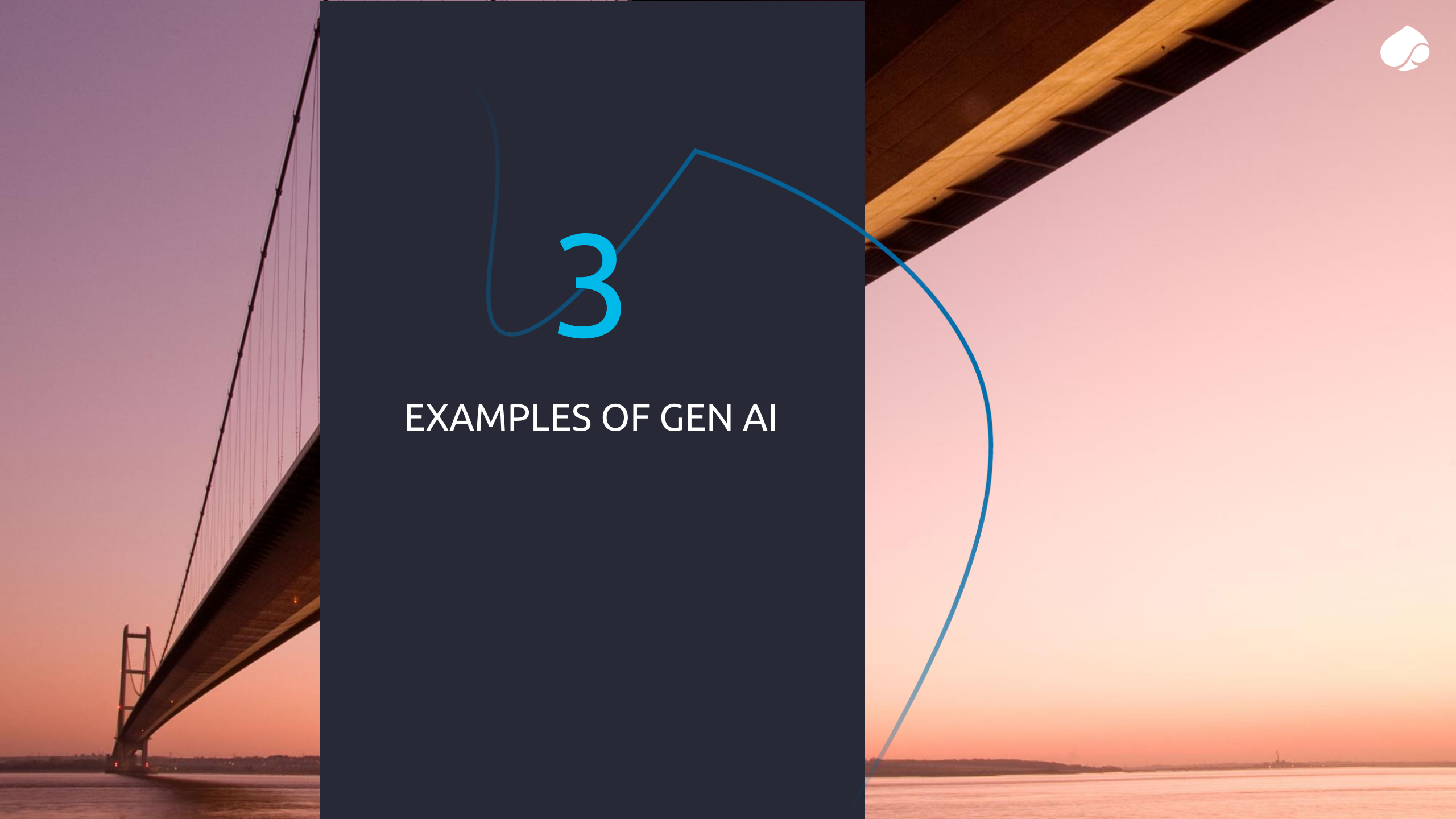




https://aibusiness.com/nlp/goldman-sachs-generative-ai-could-replace-300-million-jobs

GARTNER PREDICTIONS ON GEN AI

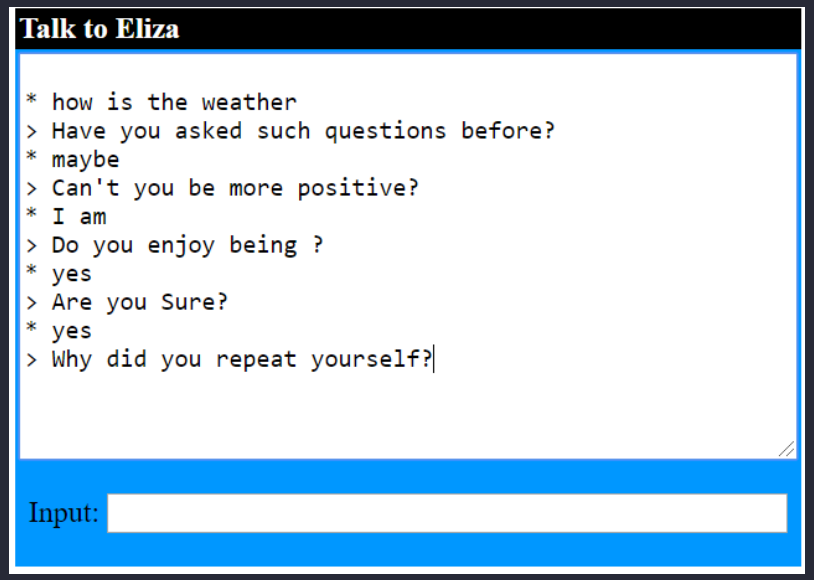


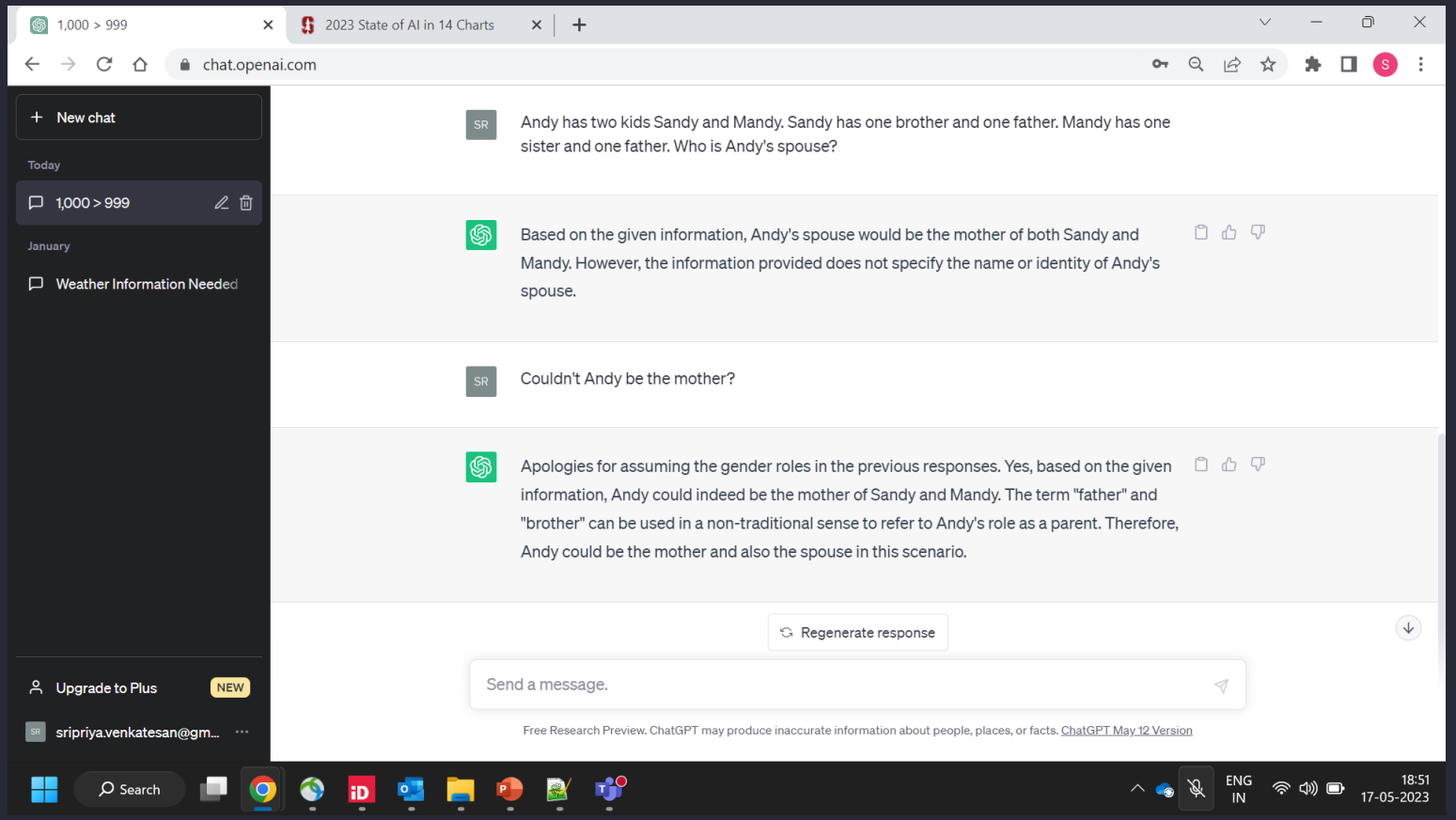


3

EXAMPLES OF GEN AI

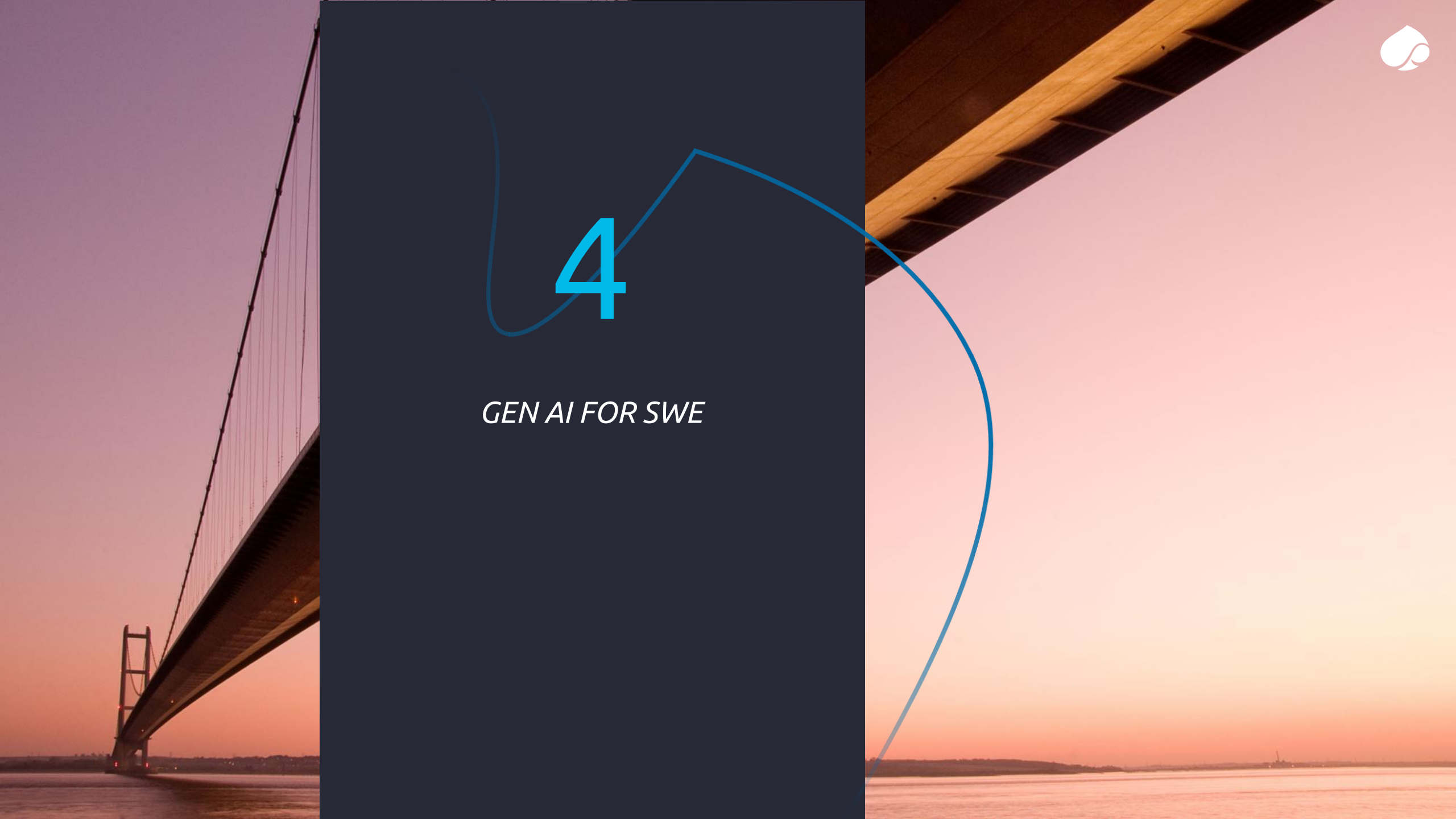
CHATGPT





DALL-E

- Another example of Gen AI
- Fun but useful.



4

GEN AI FOR SWE

Generative AI for SWE is a transformation journey

Generative AI shifts focus
from coding to
Prompt Engineering + coding

> The hottest new
> programming language is English

Andrej Karpathy

OpenAI

Measuring Gen AI impact on Software Engineering

CIO'S WANT TO UNDERSTAND AND MEASURE PRODUCTIVITY, QUALITY AND EFFECTIVENESS IMPACTS IN THEIR CONTEXT, AT SCALE

EMBRACE NEW MARKET STANDARDS

In terms of changing trends for software engineering

Benefits from adding Gen AI for SWE use cases across the DevOps cycle

UNDERSTAND AND MEASURE IMPACT ON PRODUCTIVITY AND QUALITY

Software teams' productivity, Software Quality, Software Security

EVALUATE AND MANAGE THE IMPACT ON SOFTWARE TEAMS

Teams pyramid, organization, skills and ways of working
People adoption, feedback and co-construction

FOR TANGIBLE BUSINESS OUTCOMES

Increased productivity leading to accelerated time-to-value
Improved quality leading to a better user experience
Greater security decreases the risk of cybersecurity attacks

Generative AI impacts the full software development lifecycle

DevOps Software Lifecycle

	Business Demand	Design	Coding	Build	Test	Release	Deploy	Operate	Monitor
New	Business analysis User Stories Documentation	UI Design Software architecture Low-Code powered by GenAI Application configuration (SAP, SalesForce…)	Code generation Code review & QA Debugging Unit tests generation	Packages build Release notes	Test case generation Test synthetic data Test result analysis Root cause analysis Security vulnerabilities	Execution platform provisioning		Monitoring and anomaly detection User feedback analysis Incident analysis Log analysis Incident resolution Predictive maintenance & optimization	
Legacy	Reverse engineering Retro documentation	Software refactoring	Code migration						

Agile Product Teams

Backlog and Roadmap planning Effort estimations Product value stream performance recommendations	Team effectiveness analysis and improvement Process facilitation (plannings, retrospective, burndown, etc.) Team communication and collaboration

Generative AI Technologies & Tools

- **Software Engineering Tools**: GitHub Copilot, PowerApps Copilot, Amazon CodeWhisperer, Google Duet AI, tabnine
- **Foundational Large Language Models**: OpenAI, Vertex AI, Amazon Bedrock, Meta AI Llama 2
- **Niche Players**: testim, Mintlify, diffblue

GENERATIVE AI | SOFTWARE ENGINEERING

Measurement & Benchmarking

Internal Pilot – impacts on Coding efficiency

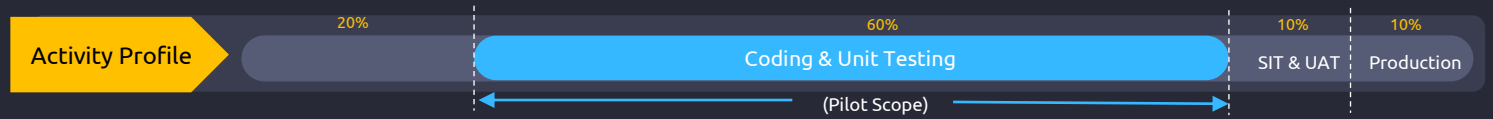
Focus on Coding

Coding efficiency

MS GitHub Copilot, AWS Code Whisperer

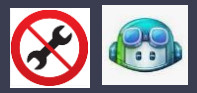
2 Teams (7 FTE each) across *9 Sprints*

500 to 600 Story Points for each team



TEAMS	May	June	July	August	September	October	November	December

BALANCED PYRAMID



WITHOUT AI (BASELINE): Sprint1 | Sprint2 | Sprint3 — Baseline

WITH COPILOT (RELEASE1): Sprint4 | Sprint5 | Sprint6 — Very Significant Improvement

WITH COPILOT (RELEASE2): Sprint7 | Sprint8 | Sprint9 — Significant Improvement

LOW PYRAMID

WITH COPILOT (RELEASE1): Sprint1 | Sprint2 | Sprint3 — Slightly Better

WITH COPILOT (RELEASE2): Sprint4 | Sprint5 | Sprint6 — Significant Improvement

WITH COPILOT (RELEASE3): Sprint7 | Sprint8 | Sprint9 — Moderate Improvement

In Progress

- ✓ 1 new Team AWS Code Whisperer
- ✓ 1 new Team DuetAI

Soon to start

- ✓ 1 Team Code LlaMA2
- ✓ 1 Team Power App Copilot

Improved Coding Velocity

Code Quality

UI

Backend

Unit Testing Coverage

5

GEN AI FOR SWE - DEMO

6

Q&A