



Executive  
Perspectives

# The CEO's Roadmap on Generative AI

*March 2023*



# Introduction to this document


The release of ChatGPT in late 2022 is analogous to Mosaic's launch three decades prior. In 1993, it was clear that the internet would bring a major revolution across all businesses in less than a decade.

*The most focused of business models, and the strongest of brands can be blown to bits by new information technology*

– Philip Evans, in his book "Blown to Bits"

Similarly, it is clear that Generative AI will bring another major revolution across all businesses. Today companies are focused on productivity gains and technical limitations, but CEOs need to move the focus to business model innovation.

This is no small task, and CEOs—who are likely several steps removed from the technology itself—may feel they are at a crossroads. But from our perspective, the priority for CEOs is not to be fully immersed in the technology. It is to understand how Generative AI will impact their organization and their industry, and what strategic choices will enable them to exploit opportunities and manage challenges.



In this BCG Executive Perspectives edition, we explore how CEOs can take full advantage of the coming revolution with Generative AI

# Human-AI augmentation of the future

## Prior to Traditional ML

- Use cases focus around automation
- Humans as passive recipients of technology tools
- Humans as operators of processes



**Focus on standardization and routinization to reduce costs and replace human effort**

## With Traditional ML

- Use cases around making decisions with data
- Humans actively using technology with data
- Humans as operators of processes



**Focus on augmenting decision making to create most efficient systems and processes**

## With Generative AI/Foundation Models

- Use cases around augmenting human creativity
- Humans supervising AI on first drafts
- Humans as designers of content and auditors of AI
- Making decisions based on statistics and sequencing



**Focus on enabling greater productivity and creativity, to solve unsolved problems / Might augment decision making in some cases**

# CEOs don't need to understand the technology behind Generative AI to create business model innovation; instead, they need to understand its key features



## No Code / Low Code

With a convenient chatbot-like interface, Generative AI democratizes access for all including those not well versed in tech. "English is the hottest new programming language" according to Andrej Karpathy<sup>1</sup>



## "Infinite Memory"

Generative AI, trained on vast amounts of data, offers users access to an automated system that provides seemingly infinite memory and acts as a knowledgeable personal aide<sup>2</sup>



## Lack of Truth Function

As a probabilistic model, Generative AI generates the most likely output to a query. This can sometimes create hallucinations i.e., outputs completely separated from objective truth



Defining features that will drive **Business Model Innovation**

# Executive Summary | CEOs must make choices across three key pillars

## POTENTIAL

Which use cases will differentiate your organization?

1

**Discover your strategic advantage** through experimentation

- a. Generative AI is accelerating across every industry, **it is time to act now** or be left behind
- b. Use cases that rely on existing large language model (LLM) applications will be important to stay competitive, but they won't offer differentiation – CEOs need to **discover the company's golden use case**
- c. When use cases are identified plan the right implementation approach: **fine-tune or train**
- d. **Plan for long-term advantage** through investment in talent and infrastructure

## PEOPLE

How should CEOs adapt org structures and prepare employees for deployment?

2

**Prepare your workforce** with strategic workforce planning and transforming op models

- a. CEOs will need to **address key org questions** for change management, talent and operating models
- b. Generative AI will **redefine roles and responsibilities** across the organization
- c. As AI adoption accelerates, CEOs need to **develop a strategic workforce plan**
- d. CEOs will need to **consider new operating models**, however we expect that agile (or bionic) models will remain the most effective and scalable in the long term

## POLICIES

How will the company ensure ethical guardrails and legal protections are in place?

3

**Protect your business** with clear policies that address the limitations of Generative AI

- a. **Generative AI presents critical risks** for which companies will need to be prepared
- b. **Prepare for risk** through clear policies and training that define roles and responsibilities on how to use Generative AI with a measure of confidence
- c. CEOs should ensure the organization **adapts responsible AI norms** for long term risk mitigation

# BCG Executive Perspectives

## AGENDA

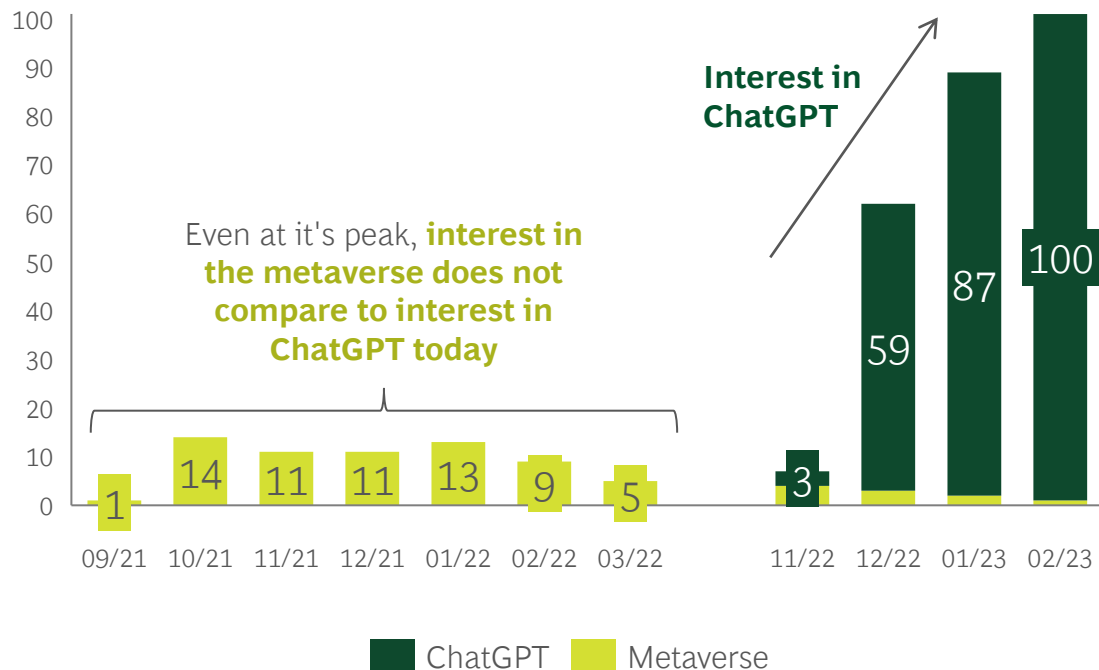
- ✓ **Potential: Discover your strategic advantage**
- ✓ People: Prepare your workforce
- ✓ Policies: Protect your business

# Interest in Generative AI is exploding, fueled by the launch of ChatGPT

1a | It is time to act now

## Interest in Generative AI has grown exponentially since Q4 2022

Google Search Interest (100 = max interest)



## This is driven by the release of ChatGPT, which has taken the world by storm

INSIDE VIEW

### Opinion: Can ChatGPT Write This Column?

Not yet, which points to the big question about any technology: Can it scale?

By Andy Kessler January 22, 2023 03:32 pm ET

Appeared in the Jan 23, 2023, print edition as 'Can ChatGPT Write This Column?'

Wall Street Journal

Fortune

TECH - CHATGPT

### ChatGPT passed a Wharton MBA exam and it's still in its infancy. One professor is sounding the alarm

By STEVE NOLLMAN  
January 21, 2023 at 4:44 PM PST

Robotics & AI

### OpenAI begins piloting ChatGPT Professional, a premium version of its viral chatbot

Kyle Wiggers  
2:09 AM PST • January 11, 2023

OpenAI this week signaled it'll soon begin charging for ChatGPT, its viral AI-powered chatbot that can write essays, emails, poems and even computer code. In an announcement on the company's...

TechCrunch  
..and many more

# Companies are already seeing a transformative effect from using Generative AI

## 1a | It is time to act now



### Technology

~88%

Of **software developers** reported higher productivity when using a generative AI code assistant<sup>1</sup>



### Consumer

Automated on-model **fashion image generation** resulted in

1.5X

Increase in retailer conversion rate<sup>2</sup>



### Biopharma

Generative AI Identified a **novel drug candidate** for the treatment of Idiopathic Pulmonary Fibrosis in

21 days

(vs. years with traditional methods)<sup>3</sup>



### Financial Institutions

Synthetic GAN-enhance training set for fraud detection achieved a

~98%

accuracy rate  
(vs. 97% with unprocessed original data)<sup>4</sup>



### Entertainment

Generate novel animated motions from a single training motion sequence with

~97.2%

quality score on natural movements  
(vs. 84.6% with traditional methods)<sup>5</sup>



### Insurance

InsureTech platforms leveraging generative AI to reduce up to

~30%

of customer service costs<sup>6</sup>

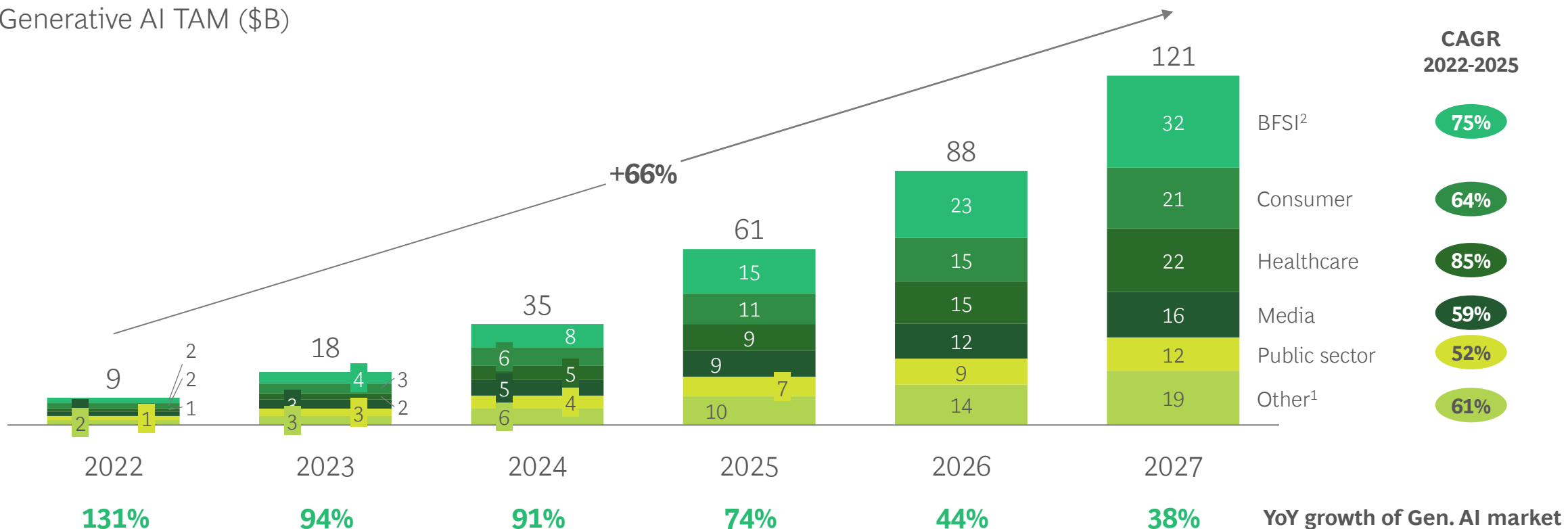
1. [Quantifying GitHub Copilot's impact on developer productivity and happiness](#) 2. [Vue.ai helps fashion retailers create high-quality on-model product photos](#) 3. [Deep learning enables rapid identification of potent DDR1 kinase inhibitors](#) 4. [Using generative adversarial networks for improving classification effectiveness in credit card fraud detection](#) 5. [GANimator: Neural Motion Synthesis from a Single Sequence](#) 6. [Insurtech COVU Leverages OpenAI to Streamline Insurance Agency Operations](#)



# Total addressable market is expected to reach ~\$120B by 2027

## 1a | It is time to act now

Generative AI TAM (\$B)

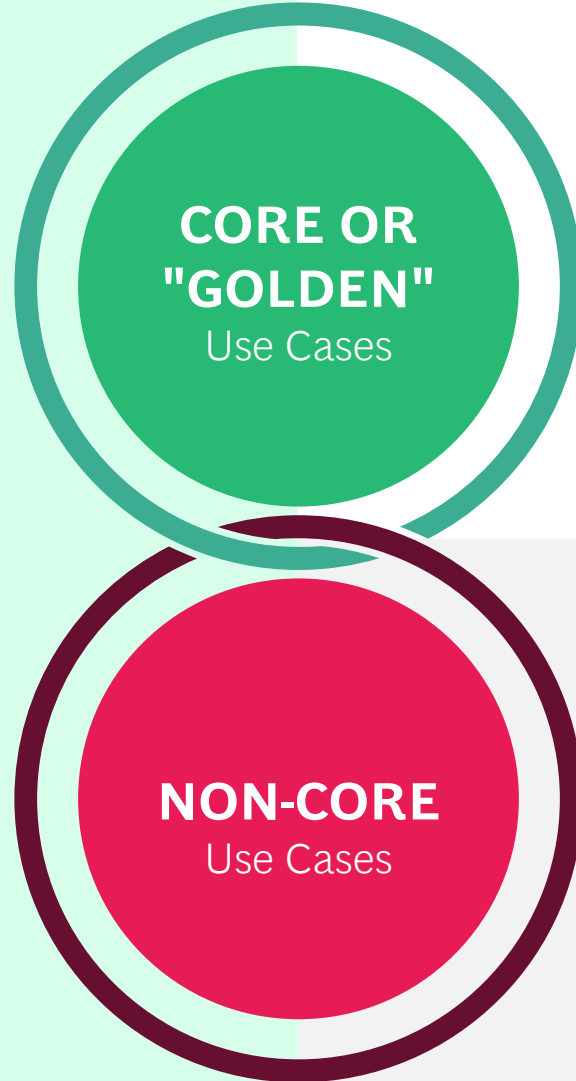


NOTE: 1. Other includes Industrial Goods, Energy, and Telecom markets; 2. BFSI includes Insurance (~\$2B 2025) and Financial Institutions (~\$13B 2025) including retail and wholesale banking, asset and wealth management, and private equity  
 Source: AI TAM research; Expert interviews; BCG analysis

### 1b | Discover the company's golden use case

**For the CEO, the key is to identify the company's so-called golden use cases that drive competitive advantage**

**Non-core use cases are table stakes, everyone will adopt them**



Strengthen competitive positioning with truly unique use cases that both drive value and are challenging to adopt (i.e., have a barrier to entry for competitors)

- For example, in pharmaceuticals companies, Generative AI can drive core R&D to produce new drugs/molecules at record pace

There is low barrier to adopting use cases that rely on existing LLM applications, but they will be important to keep pace with other organizations

- For example, purchasing Generative AI tools that create automatic summaries of meeting notes

**Table-Stakes to use cases will improve efficiency**

# Golden use cases will add to a company's unique competitive advantage in the marketplace, while non-core use cases are readily adopted by all

## 1b | Discover the company's golden use case



### Productivity Gains

First drafts  
with Jasper AI

#### What is Jasper Doing?

Web-based application for businesses powered by Generative AI that helps teams create tailored content up to 10x faster

#### How is Jasper Doing it?

Built a model on top of OpenAI's GPT-3, fine-tuned on 50+ use-cases such as writing, copyediting, advertising, and content creation

#### Why is generative AI better vs traditional ML?

Traditional ML incapable for such a task. It does not have any "generative" capabilities for new text adapted to use-case

### Non-core use case

*Productivity improvement will be table stakes since all businesses will adopt*



### Efficiency Gains

Predictive maintenance  
with an Equipment Manufacturer

#### What is the Equipment Manufacturer Doing?

Building proof-of-concept for global end-to-end predictive maintenance of fleet with IoT sensors powered by Generative AI

#### How is the Equipment Manufacturer Doing it?

IoT sensors constantly monitor key indications of performance through signals from parts, and relay that information back to a Generative AI powered back-end software

#### Why is generative AI better vs traditional ML?

Identification of anomalies in sensor data is difficult since failure data is rare in real-world. Generative AI can generate synthetic data, and better predict failures before occurrence

### Golden use cases

*For the equipment manufacturer, high quality of maintenance is a core part of their business model. Similarly for ProFluent, protein synthesis is at the heart of their business. Generative AI strengthens competitive positioning for both companies in their core business activities*



### Innovation

Building novel proteins  
with ProFluent

#### What is ProFluent Doing?

Creating novel proteins that do not exist in nature, aimed at advancing drug treatment. Proof-of-concept shown with creation of novel proteins with anti-microbial properties

#### How is ProFluent Doing it?

Using "inverse design", i.e., working backwards from desired properties to create proteins. Gartner believes that by 2030, 30% of new drugs will be discovered using this method

#### Why is generative AI better vs traditional ML?

Similar to Jasper, traditional ML does not have "generative" capabilities and thus is not great at creating never before seen protein structures by self-learning from training dataset

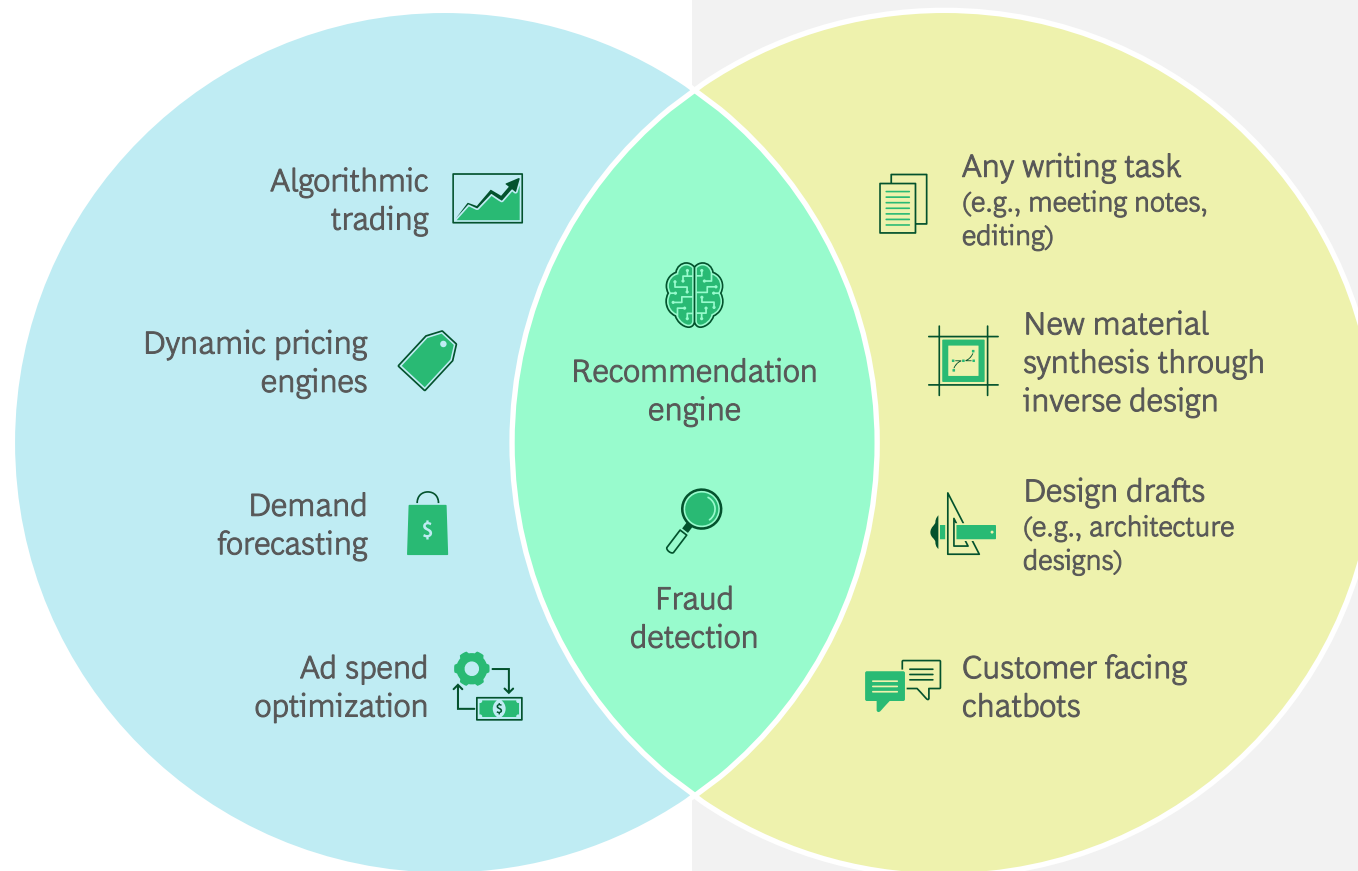
# While foundation models today are used for generative use cases, this may expand to include discriminative use cases as well in the future

## 1b | Discover the company's golden use case

*Not exhaustive*

### Discriminative uses of AI

*Currently in domain of Traditional ML*



### Generative uses of AI

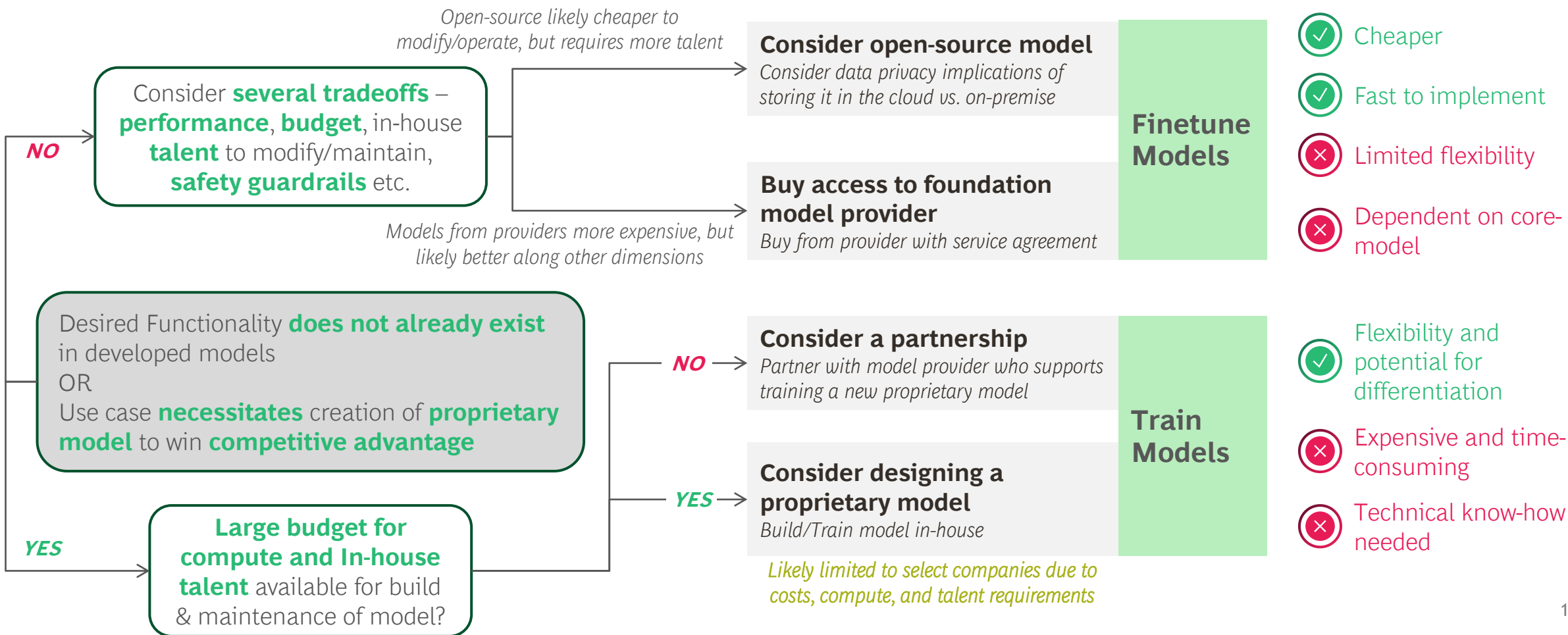
*Currently in domain of Foundation models*

**Foundation models** are currently being used for **generative use cases**; however, this may expand in the future to cover certain **discriminative use cases** as well

# Once use cases are selected, CEOs should make strategic choices about whether to fine-tune existing LLMs or to train a custom model

## 1c | Fine tune or train

### Decision Tree for Foundation Model Choice



# Training a custom LLM will offer greater flexibility, but that comes with high costs and capability requirements

## 1c | Fine tune or train

### 1 | Develop New, Cutting-edge foundation model

Create a new foundation model in-house from scratch. Costs scale with model complexity

**\$50 - \$90M+**

Estimated cost for complex models

#### Main drivers of cost:

- Hardware (i.e. GPUs or TPUs): \$30M<sup>1</sup>
- Training runs: \$10M<sup>2</sup>
- People and R&D costs: variable

### 2 | Enhance Existing foundation model

Partner with LLM provider to significantly enhance existing model (e.g., feeding complex company-proprietary data)

**\$1 - \$10M**

Estimated cost

#### Main drivers of cost:

- Training runs: \$1M - \$5M<sup>3</sup>
- Partnership costs: variable

### 3 | Fine-tune Existing foundation model

Fine-tune existing foundation model for related tasks (e.g., fine-tuning ChatGPT for legal memo writing)

**\$10 - \$100k+**

Estimated cost

#### Main drivers of cost:

- Data gathering and labelling: \$10k<sup>4</sup>
- Computational costs: minimal



**Usage Costs – \$7M to \$15M yearly (costs 30x to 50x lower if not using the most advanced model)**

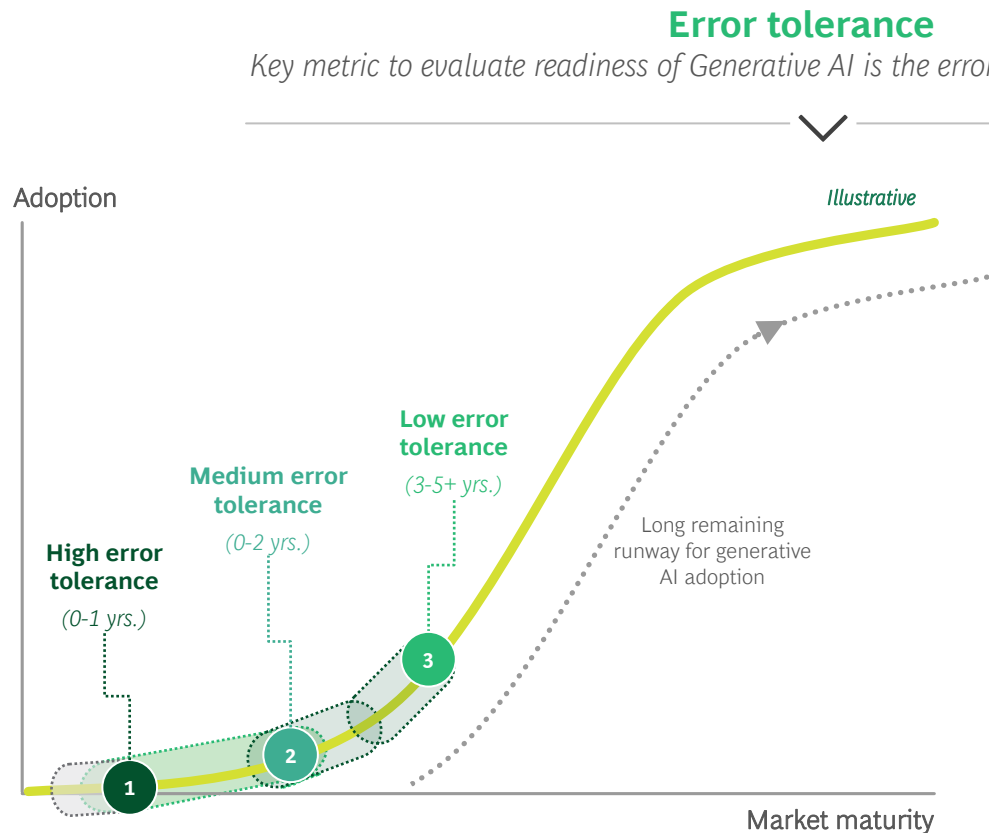
GPT4 costs \$0.06 for ~750 words. 5k to 10k employees each using the technology 100 times a day costs ~\$7M to \$15M

1. Meta's LLaMA used 2048 A100 GPUs for training, each of which can cost ~\$20k. See [https://wandb.ai/vincenttu/blog\\_posts/reports/Meta-AI-Released-LLaMA-VmldzozNjM5MTAz?galleryTag=ml-news](https://wandb.ai/vincenttu/blog_posts/reports/Meta-AI-Released-LLaMA-VmldzozNjM5MTAz?galleryTag=ml-news). 2. A single training run for GPT-3 is projected to cost \$12M. See <https://venturebeat.com/ai/ai-machine-learning-openai-gpt-3-size-isnt-everything/>. 3. Training runs here likely less intensive than full-scale model training, leading to lower costs.

# Carefully assess the timing of Generative AI investments considering tech and talent; move too soon and risk wasting money, too slow and risk falling behind

## 1d | Plan for long-term advantage

It could take 5+ years for low error tolerance use cases to be feasible<sup>1</sup> ...



### 1 Near-term | **HIGH error tolerance**

Use cases where errors are OK

- e.g., drug development since scientists review every molecule suggested by AI for safety and efficacy

### 3 Longer-term | **LOW error tolerance**

Use cases with low room for error

- e.g., doctors using chatbots to retrieve and query a patient's medical history for easy access

...but research is becoming proprietary

**Open-source:**  
OpenAI's GPT-2

**Research is also moving very quickly:**

Meta's LLaMA released 2/24/23, outperforming GPT-3 on many tasks

**Proprietary:**  
OpenAI's GPT-3;  
Meta's LLaMA

GPT-4 released on 3/14/23

Waiting too long to invest into Generative AI today may mean that businesses risk falling behind. Research into high-performing foundation models is increasingly proprietary and guarded as a source of competitive advantage.

1. Sequoia expects first drafts produced by Generative AI in certain domains to be better than human professionals by 2030  
See <https://www.sequoiacap.com/article/generative-ai-a-creative-new-world/>

# BCG Executive Perspectives

## AGENDA

- ✓ Potential: Discover your strategic advantage
- ✓ **People: Prepare your workforce**
- ✓ Policies: Protect your business



# To achieve the Human-AI augmentation of the future, CEOs should answer questions for change management, workforce planning, and op model design

## 2a | Address key organizational questions

### Key considerations to craft a Generative AI adoption plan

	Managing Culture and Change in Company	Strategic Workforce Plan	Organization and Operating Model Design
<i>Overarching Goal</i>	<i>Cultivate a culture that embraces AI like another coworker</i>	<i>Build a workforce that will be competitive 10 years from now</i>	<i>Create an efficient operating model that balances scale and agility</i>
<i>Key Questions Addressed:</i>	<ul style="list-style-type: none"><li>• How can professional identity concerns be managed to encourage AI adoption?</li><li>• How can a culture of human and AI collaboration be fostered?</li><li>• How can management communication create positive momentum</li></ul>	<ul style="list-style-type: none"><li>• What new skills and talent will be crucial for long-term advantage?</li><li>• What new competencies will managers need to lead an AI-augmented workforce?</li><li>• How should training/recruiting be adjusted to build a high-performing workforce?</li></ul>	<ul style="list-style-type: none"><li>• What existing roles and responsibilities will change because of Generative AI?</li><li>• How should I organize my departments for efficient collaboration with AI</li><li>• Where should LLMs and data scientists sit within the organization?</li></ul>

A successful Generative AI adoption plan is **customized to each organization**, driven by the **industry** the company operates in, its current **AI readiness**, and the **golden use cases** it selects

# While traditional AI has augmented the capabilities of managers and decision makers, Generative AI will augment the capabilities of individual contributors

## 2b | Redefine roles and responsibilities



**Traditional AI/ML empowers individuals to make decisions, changing the role of managers**

### Traditional AI and ML algorithms augments decision making

Lower-level individuals can now make data-driven decisions without management support

This changes the role of the manager from decision maker to a manager of teaming and relationship dynamics

- For e.g., at ExxonMobil, geoscientists use ML algorithms to decide where and how to extract oil at maximum efficiency with limited guidance of managers

VS.



**Generative AI creates first draft content, changing the role of individual contributors**

### Generative AI augments content creation

Individuals will spend less time creating first-drafts and more time revising or supervising AI generated content

This changes job tasks of individual contributors to include auditor or supervisor of Generative AI

- For e.g., Andrej Karpathy, a founding member of OpenAI, said "Copilot has dramatically accelerated my coding... I don't even really code [anymore], I prompt & edit"

“

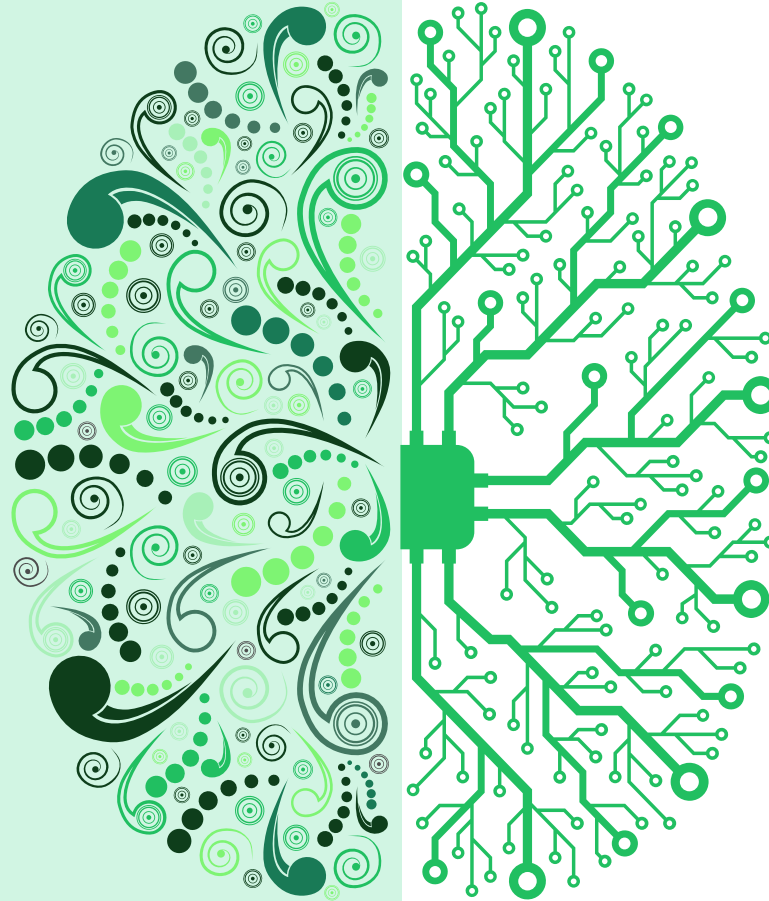
*This is the first time that a technology developed in Silicon Valley benefits the lives of everyday people so quickly and so tangibly*

– Satya Nadella,  
CEO of Microsoft

## FROM: Key roles today

*A role centered around creating marketing content and executing campaigns*

- Creating marketing content and ideas from scratch
- Managing social media accounts, scheduling and uploading posts
- Writing creative briefs to interface with advertisement agencies
- Tracking ad campaign performance metrics
- Creating brand guidelines to drive alignment across all stakeholders



## TO: New roles tomorrow

*A supervisor role with AI on content, with increased time devoted to strategic thinking*

- Supervising AI for first drafts of creative briefs and brand guidelines and overall better and faster marketing content
- Building deeper relationships with customers, suppliers, and brand ambassadors
- Increased focus on brand strategy, positioning, and target audience identification
- Increased focus on personalized marketing campaigns using Generative AI-powered tools

**Core role changes for a marketer**

## 2b | Redefine roles and responsibilities

# Generative AI will redefine roles across the organization

Carefully consider the professional identity of your employees when making changes to role definitions



### Marketing



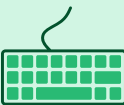
Sample roles	Tasks today that Generative AI can provide first drafts for	Future tasks <i>(in addition to verifying first drafts)</i>
<b>Social Media Specialist</b>	Creating social media content, scheduling and uploading posts	Building relationships with customers and followers
<b>Advertisers</b>	Developing creative material (e.g., videos)	Exploring new advertising channels and opportunities



### Finance



<b>Accountant</b>	Preparing and maintaining financial accounts	Identifying and implementing new accounting policies and programs
<b>Payroll Specialist</b>	Processing employee payroll and taxes	Ensuring compliance with labor laws and regulations, providing guidance and support to employees



### IT



<b>Software Engineers</b>	Low-value coding and debugging, code translation	Reviewing code safety, designing new complex algorithms (e.g., better recommendation engines)
<b>Help Desk Support</b>	Troubleshooting common issues	Resolving system-wide problems, supporting complex technical issues



### Sales



<b>Sales Rep</b>	Lead generation, follow-ups, logging customer interactions in CRM systems	Build relationships with customers, understand their needs and pain-points
<b>Deals Desk Support</b>	Log quotes, and request sales approvals	Develop complex pricing models, customized deals for customers

## 2b | Redefine roles and responsibilities

### Employees are expressing concern about the impact to their professional identity

IDEAS

#### How ChatGPT Will Destabilize White-Collar Work

No technology in modern memory has caused mass job loss among highly educated workers. Will generative AI be an exception?

By Annie Lowrey

*The Atlantic*

*TIME Magazine*

ARTIFICIAL INTELLIGENCE

#### How Generative AI Will Change All Knowledge Work

SUCCESS - CHATGPT

Some companies are already replacing workers with ChatGPT, despite warnings it shouldn't be relied on for 'anything important'

BY TREY WILLIAMS

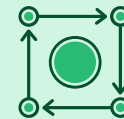
February 28, 2023 at 8:00 AM PST

*Fortune*

### To successfully adopt Generative AI, CEOs must alleviate these concerns



**Work with HR** to understand how roles will evolve and regularly pulse check employee sentiment as their AI initiatives roll out



**Develop a transparent change management initiative** that will both help employees embrace their new AI coworkers and ensure employees retain autonomy

*While some roles will be adversely impacted by Generative AI, overall Humans aren't going anywhere — and in fact are needed to deploy AI effectively and ethically*

# As Generative AI adoption accelerates, CEOs need to use their learnings to develop a strategic workforce plan

## 2c | Develop a strategic workforce plan

### DEVELOP

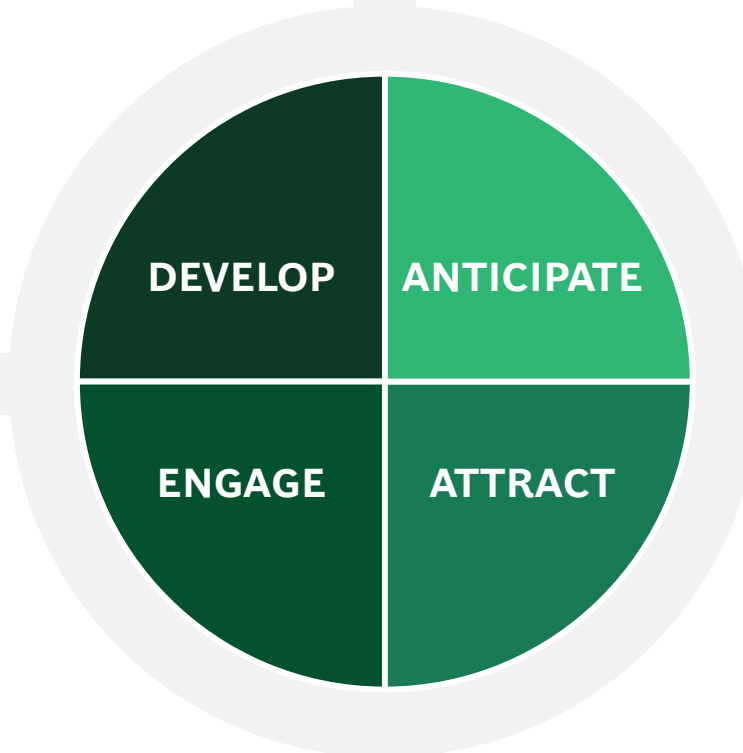
*Upskill and reskill talent at speed with high reach and high richness*

- What key skills will be needed to work effectively with Generative AI?
- What training programs can upskill the workforce at speed?

### ENGAGE

*Deliver unmatched talent value proposition and experience*

- How to create a culture of continuous learning and development that encourages employees to use Generative AI?
- What is the company's value proposition to employees in a Generative AI world?



### ANTICIPATE

*Understand talent and skills needed to deliver on business strategy*

- What workforce changes are needed as the company steadily adopts Generative AI?
- What are the risks associated with workforce changes, and how to mitigate them?

### ATTRACT

*Source creatively securing best-in-class candidate experience*

- How should the interviewing process change to surface the talents needed in a Generative AI dominated world?
- How should the sourcing process change to ensure candidates with new skillsets are attracted to the company?

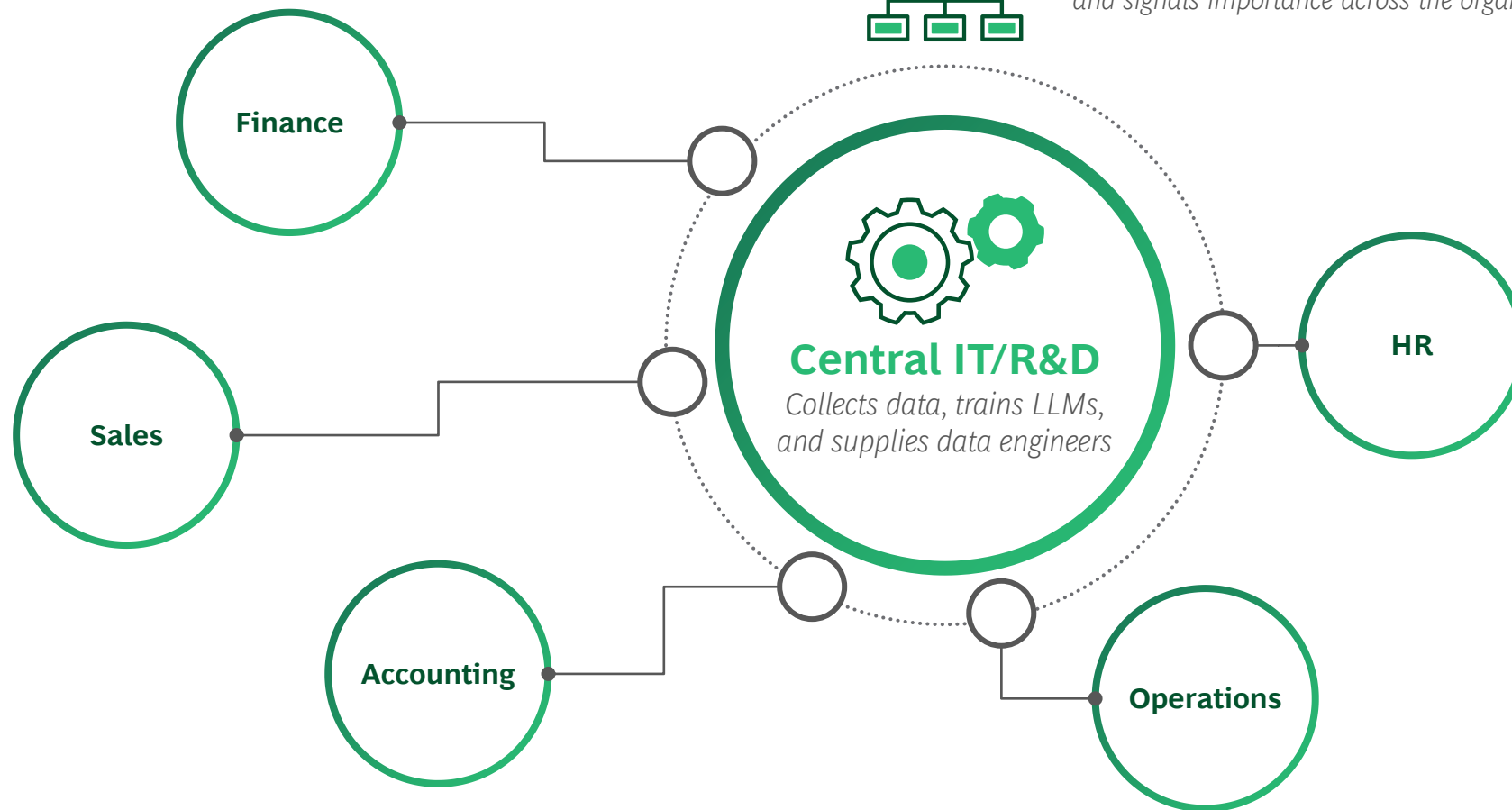
# Consider centralizing the IT/R&D function supplying LLMs and data engineers

## 2d | Consider new operating models



### Senior C-suite role (e.g., Chief AI Officer)

Elevates the importance of Generative AI to the C-suite and signals importance across the organization



Each functional department **interfaces with the Central IT/R&D** to:

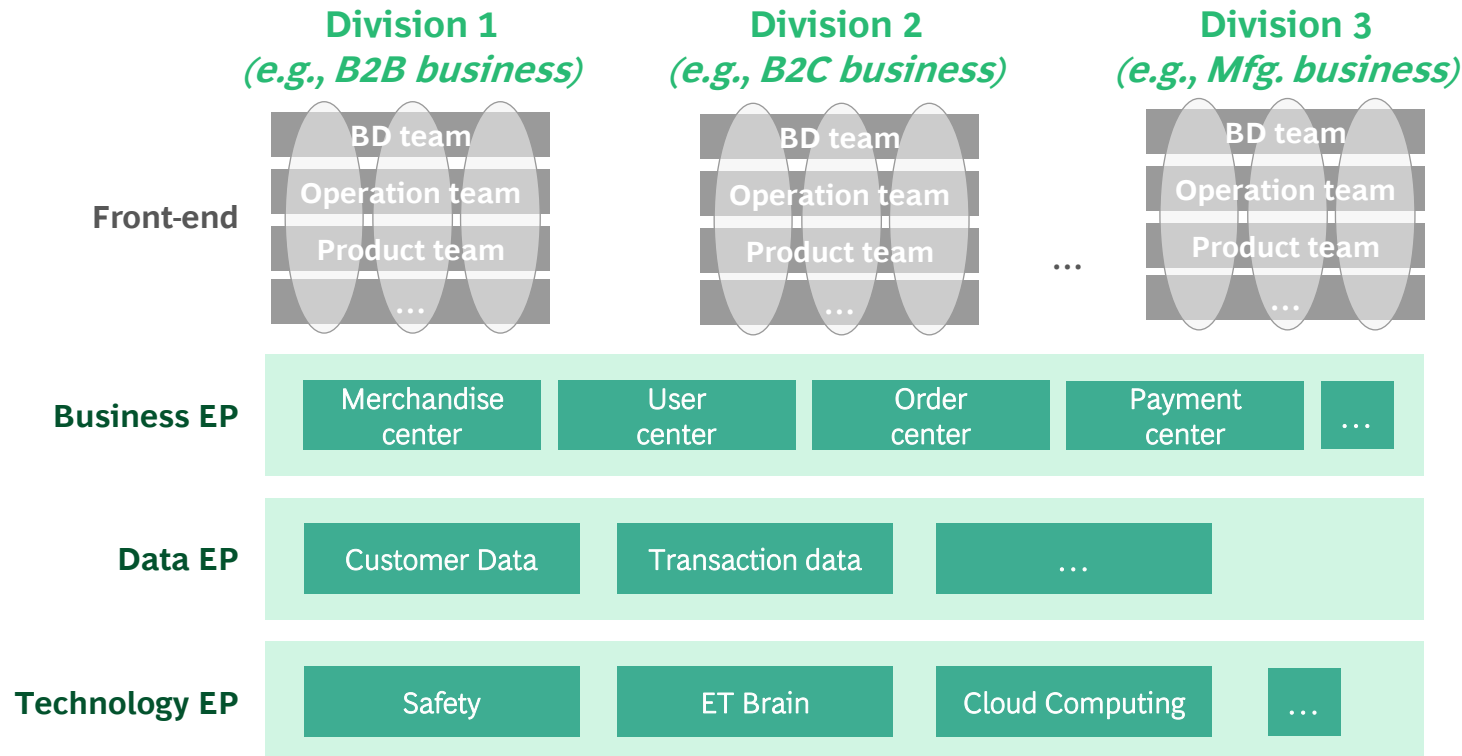
- **Supply** all collected **data** for model training
- **Embed data scientists** within their departments to build functional expertise
- **Request data engineers** to fine-tune LLMs for specific use-cases

This creates a scalable model with a central authority for data ownership and model control

# We expect that agile (or platform) models will remain the most effective and scalable in the long term

## 2d | Consider new operating models

### Sample model for a platform organization



#### Decentralized

Front end teams have autonomy to serve customers



#### Scalable

Processes are identified and scaled to serve front end teams and to learn



#### Flexible

Technology allows for personalization and localization, to create the pull



#### Integrated

One source of all data and information



#### Responsive

Modular technology available to all



# BCG Executive Perspectives

## AGENDA

- ✓ Potential: Discover your strategic advantage
- ✓ People: Prepare your workforce
- ✓ **Policies: Protect your business**

# Risks associated with Generative AI are showing up in the real world rapidly

**WIRED** BACKCHANNEL BUSINESS CULTURE GEAR IDEAS SCIENCE SECURITY

SOFIA BARRETT | CULTURE | JAN 30, 2023 1:21 PM

## ChatGPT Is Making Universities Rethink Plagiarism

Students and professors can't decide whether the AI chatbot is a research tool—or a cheating engine.

The New York Times

Intelligence > | An Unsettling Chat With Bing | Read the Conversation | How Chatbots Work | Spotting A.I.-Generated Text

THE SHIFT

## A Conversation With Bing's Chatbot Left Me Deeply Unsettled

A very strange conversation with the chatbot built into Microsoft's search engine led to it declaring its love for me.



THE CONVERSATION

Academic rigour, journalistic flair

Podcasts COVID-19 Arts Business + Economy Culture + Society Education Environment + Energy Health Politics Science + Tech

Scams, deepfake porn and romance bots: advanced AI is exciting, but incredibly dangerous in criminals' hands

Published February 5, 2023 9:22pm EST

THE BYTE.

POWER UP

## URNS OUT USING CHATGPT IN SEARCH ENGINES WOULD HAVE A GRISLY ENVIRONMENTAL FOOTPRINT

EGREGIOUS.

ARTIFICIAL INTELLIGENCE / TECH / LAW

## Getty Images sues AI art generator Stable Diffusion in the US for copyright infringement

ARTIFICIAL INTELLIGENCE

## Amazon Warns Employees to Beware of ChatGPT

At the same time, OpenAI's Chat GPT gave correct answers to interview questions for a software coding position.

By Kevin Hurler | Published January 26, 2023 | Comments (28)

HACKADAY

HOME BLOG HACKADAY.IO TINDIE HACKADAY PRIZE SUBMIT ABOUT

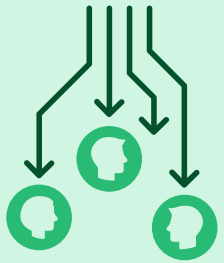
## CHATGPT, BING, AND THE UPCOMING SECURITY APOCALYPSE

by: Elliot Williams

40 Comments

March 4, 2023

# GenAI creates fundamental shifts impacting the Responsible AI (RAI) approach



Democratization

**Ease of use** is much higher now:

- Anybody (even non-technical staff) can use these capabilities with **very few technical resources** (e.g., data, compute, expertise)
- Smaller need for large teams and budgets **limiting visibility** for managers and governance mechanisms



**Shadow AI** will be on steroids:

- Capability overhang can **emerge in unexpected corners** of the organization (e.g., compared to only technical divisions before)
- Time to detect, resolve, and mitigate incidents is much higher **violating the principle of surprise aversion** in risk management



3PP Reliance

**Buying / renting**

from 3PP:

- Foundation models require a lot of compute, data, and expertise and are **overwhelmingly procured** rather than built in-house
- **Small set of entities** can provide these foundation models



**Latent and opaque** risks

outside of in-house scope:

- **Limited visibility** on data lineage (e.g., copyright infringement) and model training (e.g., using confidential information to upgrade models)
- **Limited control** on functionality changes on the technical roadmap



# Companies must be wary of critical risks of Generative AI today before adopting the technology

## 3a | Generative AI presents critical risks

Not Exhaustive



### Energy use and environmental harm

Generative AI uses more energy on compute, both during model training and usage than traditional ML. While more efficient computation techniques are being developed, mitigation today is limited to usage of more environmentally sustainable energy sources



### Capability Overhang

Due to its probabilistic nature, Generative AI can sometimes show unexpected capabilities upon deployment (e.g., several users tricked ChatGPT and bypassed its security to access kernel model). This risk is difficult to fully mitigate, but extensive pre-launch testing will help



### Biased Outputs

Real world data is often biased. Without oversight, the Generative AI models trained on this data also carry bias. Mitigation techniques include Reinforcement Learning with Human Feedback (RLHF) where the model is taught to be unbiased, yet this method is not perfect



### Copyright Infringement

Generative AI is trained on publicly available data, much of which is copyright protected. This can lead to lawsuits by IP holders. Mitigation strategies rely heavily on foundation model providers to obey copyright laws, and for governments to create new laws for Generative AI



### Lack of Truth Function

Generative AI can sometimes produce factually incorrect responses presented in a very convincing manner. To mitigate risks from using incorrect information, companies must mandate double checking all Generative AI outputs, and limiting its use to non-critical tasks today



### Sophisticated Phishing and Fraud

Generative AI makes cybercrime easier – generating convincing phishing emails or deepfakes instantly. To mitigate this risk, companies must strengthen cybersecurity protocols, train employees on new safety risks, and consider deploying Generative AI themselves to catch fraud



### Leaks of proprietary data

When training Generative AI models in the cloud, companies transmit proprietary data which the data may be leaked in a security breach. To mitigate this risk, companies can instead choose to train models on-prem vs. cloud, although this necessitates other tradeoffs

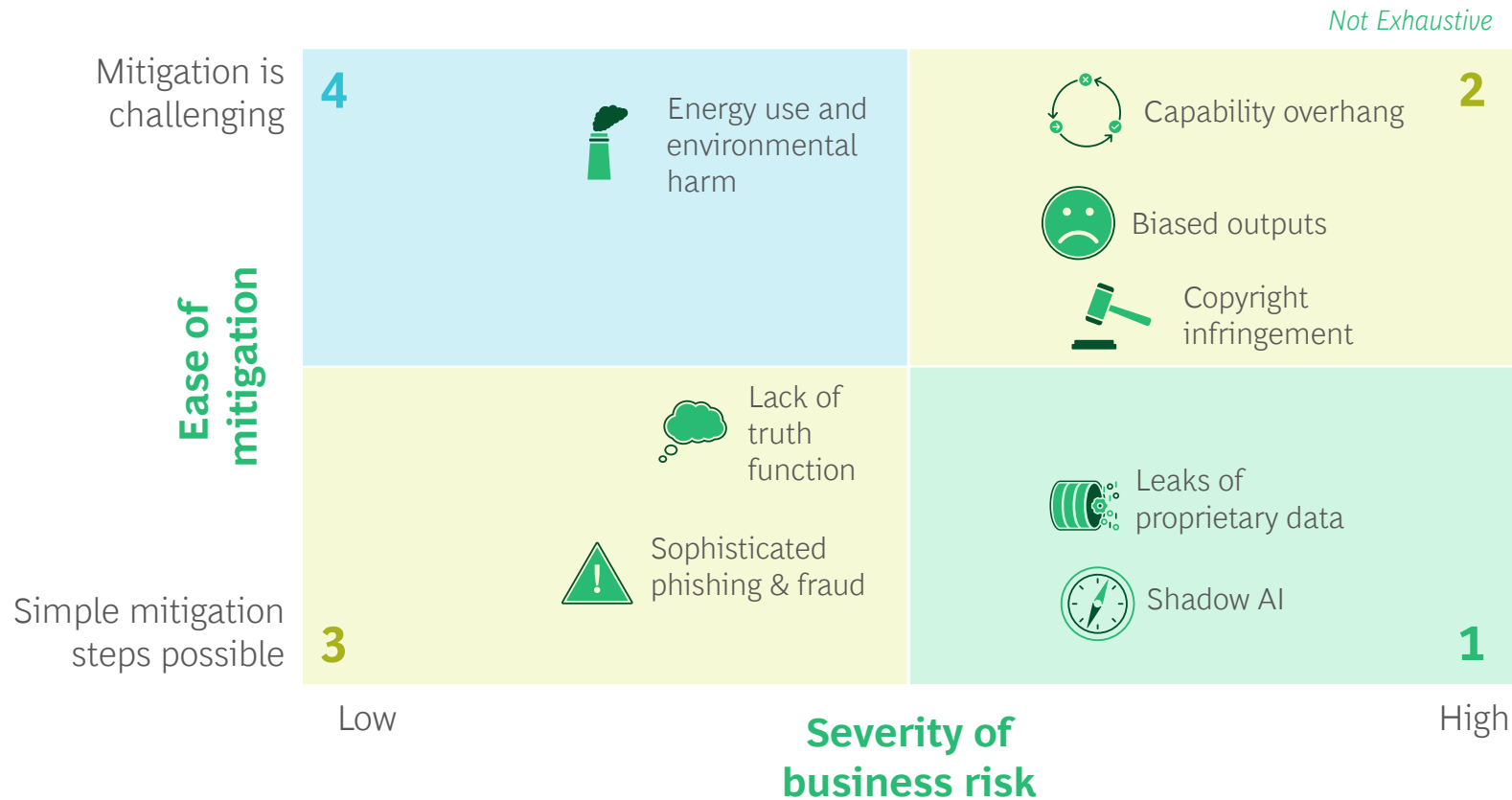


### Shadow AI

Employee application of external generative AI tools without adequate guidance or supervision creating risk and causing harm. To mitigate this risk, companies must create detailed and clear Generative AI use guidelines and policies

# Not all risks are created equal, with some posing a higher business risk while also being harder to mitigate

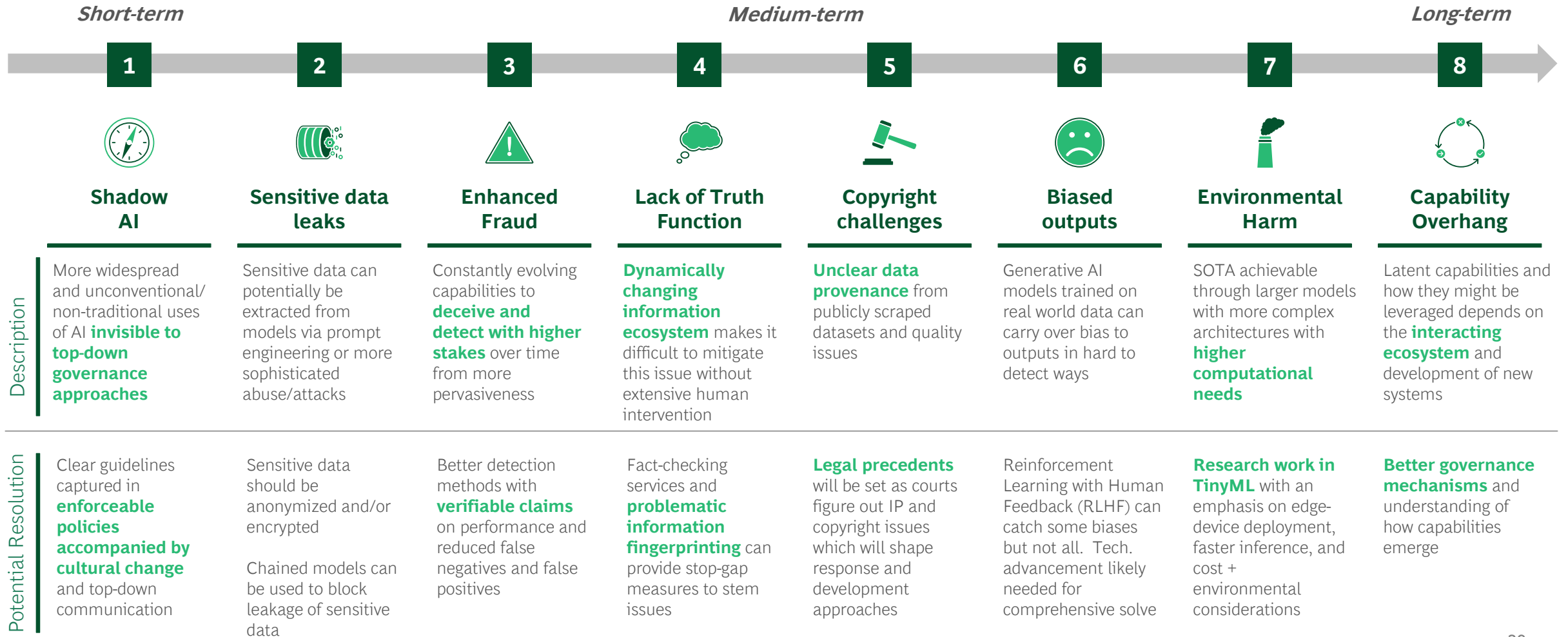
## 3a | Generative AI presents critical risks



- 1** Companies should focus on risks with high severity of business impact, that are easily **mitigated first**
- 2** Risks that are either difficult to mitigate, or that have low potential business impact can be **tackled second**
- 3**
- 4** Risks with low business impact are toughest to mitigate, but nonetheless important to **tackle after low hanging challenges are addressed**

# Timeline to potential resolution of issues varies based on complexity and urgency

## 3a | Generative AI presents critical risks



# Key Generative AI policies to adopt today

Companies are behind if they haven't already instituted such policies

## 3b | Adapt responsible AI norms

To manage risk with **Generative AI**, companies can adopt the following policies today:



### Enact Responsible Research/Release Norms

- Like academia, set up an institutional review board to a priori assess impact of any Generative AI use cases



### Set and Communicate Clear Generative AI Use Policies

- To manage IP and hallucination risks set clear guidelines on when Generative AI can and cannot be used



### Sanitize Sensitive Data Before Training Models

- To minimize losses during data breaches, sanitize sensitive data (such as names and addresses) before training foundation models



### Improve Generative AI Risk Assessment Capabilities

- Consider setting up a "red-team" to deliberately find failure models and vulnerabilities with Generative AI applications

*Leaders will need to revisit these policies continuously, as the pace of innovation with Generative AI is high and produces new capabilities (and correspondingly new risks)*

# Connect with our Generative AI leadership team with any questions

## Generative AI Team



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