



## **Generative AI – Revolutionizing the Creative Design and Development Process** April 2023



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## Introduction and overview

- Key information on the report



## Our research methodology is based on four pillars of strength to produce actionable and insightful research for the industry



Year-round tracking of 35+ IT service providers and design agencies Large repository of existing research in Interactive Experience (IX) services Over 30 years of experience advising clients on strategic IT, business services, engineering services, and sourcing Executive-level relationships with buyers, providers, technology providers, and industry associations

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## **Background of the research**

- Generative AI (GAI) as a technology has been around for the last five decades; however, recent developments in the maturity of AI models, faster computation power of systems, and the availability of high-quality training data for the models have redefined the technology in 2023
- There is a huge surge of use cases served by custom-built applications on top of the foundational models of GAI and the market is being flooded by a plethora of start-ups in the space
- While big giants such as Microsoft, Google, and Meta fight hard to dominate the GAI landscape, the market is experiencing huge investments from leading experience providers such as Adobe, Salesforce, and Oracle as well
- Enterprises in the financial services space such as Morgan Stanley and retailers such as Levi Strauss have already begun to operationalize multiple innovative use cases of GAI for business
- In this research, Everest Group has taken the opportunity to highlight the potential of GAI for streamlining marketer's content supply chain and optimizing their UI/UX value chain. We also emphasize on the future implications of the technology for both enterprises and service providers
- As the technology still has several limitations when it comes to its full-fledged commercial adoption, both service providers and technology vendors are working relentlessly to mitigate the risks associated with GAI technology

#### Scope of this report





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## GAI definition, use cases, and adoption

- Technology architecture for implementing GAI
- Use case of GAI
- Start-up ecosystem and unicorns in the GAI space
- Adoption of GAI across tech vendors
- Adoption of GAI across enterprises

# Though GAI has been around for the past five decades, mature AI models, faster computation, and high-quality training data is redefining the technology in 2023

### **Defining GAI**

Everest Group defines Generative AI as a variant of AI technology based on deep learning Generative Adversarial Networks (GANs) and Transformer models, having the ability to provide convincingly unique content in the form of text, imagery, video, audio, and synthetic data

#### Evolution of GAI by the extent of investment and perceived market impact

2014-2022

Horizon 2

• Development of GANs

Large Language Models

• Text-to-image generation

Conceptualization of

(LLMs) by Google

Launch of ChatGPT

<sup>D</sup>erceived market impact<sup>1</sup>

- 1966-2014 Horizon 1
- Language translation
- First chatbot Eliza
- Image recognition
- Visual object recognition
- Apple's launch of Siri

- Horizon 3
- Microsoft integrates ChatGPT in its search engine
- Google to add GAI to Gmail, Docs, Slides etc.
- Launch of GPT4 by OpenAl
- Amazon partners with AI start-up Hugging Face to compete with ChatGPT
- Meta shifted its focus from metaverse to GAI
- Alibaba is testing a ChatGPT rival
- Baidu to embed chatbot Ernie in its search engine

## Factors responsible for exponential GAI growth in Horizon 3



Faster computation with TPU by Google for 275 Tera operations per second



Mature AI models with more than 175 billion parameters (GPT4) by Open AI

| $\subset$ | $\supset$ |
|-----------|-----------|
| C         |           |
| C         |           |
|           | 5         |
| E         | F         |

Growth in high-quality large classified training data sets such as the 800GB dataset, The Pile by Eleuther Al

#### Extent of investment

1 Impact is measured in terms of the ability to drive efficiency (in operations/processes to extract productivity gains), effectiveness (direct impact on top/bottom-line growth), and experience (enhanced stakeholder experience). Source: Everest Group (2023)



# **GAI** is built on a three-layered architecture comprising infrastructure, AI models, and the end-user application interface





## The evolution in GAI technology has flooded the market with a plethora of applications built on the intelligent model layer and serving multiple impactful use cases

Visual UI design Image generation Video generation 3D models media **General Writing** E-mail Al assistant Translation Marketing/Sales content Text = Relative demand Audio and Audio editing Audio generation Voice synthesis and dubbing Text-to-speech Speech-to-text speech Build and testing Maintenance Generation / Completion / Debugging / Refactoring / Functionality explanation Text-to-SQL Basic web-app builders Upgradation Code Simplification / Translation / Unit tests generation Synthetic data generation Productivity Others Synthetic data generation Collaboration tools Internal document search

Medium

Source: Everest Group (2023)

Use cases of GAI

Hiah



## With a plethora of use cases, the GAI ecosystem is experiencing a revolution with more than 300+ start-ups in the space

#### **UI design** Image generation **Video generation** 3D models **Ö**Fliki Colossyan Ď 🚫 synthesia 🙂 uizard 🕕 Diagram 🖇 Galileo Al Ø OpenArt R runway **O** mirage KREA A Midjourney Dübverse Common Sense Machines **General writing** Al assistants **Translation** Andi Quickchat Qngali 🔾 Jasper 🛞 OpenAI 🐻 Mulliny wordtune Google Translate DeepL 🖶 Typewise 🗟 Cohere 🍐 Rytr Relative demand Audio generation Audio editing Voice synthesis TTS/SST ာListnr 🕛 boomy Mores 💓 Amberscript liikrisp MAM RESEMBLE.AI Watson Google DeepMind 👐 WELLSAID supertone Code build and testing Code maintenance Text-to-SQL Web-app builders 💦 seek 🔁 GitHub Copilot 🜔 codiga 🛛 🖒 tabnine 🗑 GitGuardian C Enzyme 🗘 durable 📑 Debuild diffblue veezoo Al 2sql\* Synthetic data generation **Productivity** gretel O<sup>O</sup> Mirry.Al 🖬 hazy olean betterdata YOU mem 🔁

High Start-ups pioneering use cases of GAI

Medium



# Among the high-growth GAI start-ups, some have emerged as the unicorns of the space by operationalizing unique use cases and gaining the first-mover advantage

**Top start-ups in the GAI ecosystem as per disclosed valuations of** 2022 in billions

| 2022 in billions |         | Founded in | Last funding round         | Use case                      | Products             |
|------------------|---------|------------|----------------------------|-------------------------------|----------------------|
| ⑤ OpenAI         | \$20.00 | 2015       | US\$2 Billion, Jan 2023    | Chat and text to image        | ChatGPT and DALL-E   |
| 😕 Hugging Face   | \$2.00  | 2016       | US\$100 Million, May 2022  | Data science platform         | Hugging Face Hub     |
| 👌 Lightricks     | \$1.80  | 2013       | US\$130 Million, Sep 2021  | Visual editing                | Facetune, Image Leap |
| 🔾 Jasper         | \$1.50  | 2018       | US\$125 Million, Nov 2022  | Creative text                 | Jasper               |
| glean            |         | 2019       | US\$100 Million, May 2022  | Productivity                  | Workplace search     |
| stability.ai     | \$1.00  | 2019       | US\$101 Million, Oct 2022  | Text to image                 | Dream studio         |
| 📮 replit         | \$0.80  | 2013       | US\$350 Thousand, Mar 2022 | Code writing                  | Replit Ghostwriter   |
| Al21 labs        | \$0.66  | 2017       | US\$64 Million, Aug 2022   | Rephrasing                    | Wordtune             |
| 🚳 Milliny        | \$0.60  | 2018       | US\$50 Million, Mar 2022   | Sales conversion              | Mutiny               |
| 📴 descript       | \$0.55  | 2017       | US\$50 Million, Nov 2022   | Audio/Video editing           | Descript             |
| 🕞 runway         | \$0.50  | 2018       | US\$50 Million, Dec 2022   | Text to image, image to image | runway               |



## While the big giants fight hard to dominate the GAI landscape, the market is receiving significant investments from leading experience providers as well

### Microsoft

- Invested US\$1 billion in OpenAI in 2019 and again another US\$10 billion in 2023
- Embedded ChatGPT in its Bing search browser and workplace productivity tools

## Google

- Announced a host of new AI-powered features on its Workspace apps, including Google Docs, Gmail, Sheets, and Slides
- Opened its AI language model PaLM to challenge OpenAI and GPT-3

### amazon

- Partnered with ChatGPT's rival The Hugging Face in February 2023
- Has existing partnerships with Stability AI, the maker of image generation tool Stable Diffusion and the Israeli AI company AI21 Labs for its text capabilities

### IEM

IBM's launched its first Al-optimized, cloud-native supercomputer, Vela for training large-scale AI models

## 🔿 Meta

- Released the Meta Advantage+ suite of tools, which relies on AI to help marketers with creatives, placement, and targeting
- Shifting its focus from metaverse to GAI



ERNIE Bot is a new-generation Large Language Model (LLM) and GAI product developed by Baidu



Snapchat released its own chatbot called My AI powered by ChatGPT

## salesforc

Salesforce has announced the launch of Einstein GPT, a GAI tool for Customer Relationship Management (CRM)



Announced a set of cloud services that aid in building, refining, and operating custom LLM and GAI models that are trained with proprietary data and created for their unique domain-specific tasks

### Adobe

- Announced a family of GAI models, Firefly to be integrated with creative tools such as Photoshop, After Effects, and Premiere Pro
- Embedded tagging in Al-generated content to be used for commercial purposes

## 🚮 shopify

Launched Shopify Magic, an AI tool to help merchants generate product descriptions on their web pages without any external support

### ORACLE

Oracle has partnered with NVIDIA to enable the deployment of critical NVIDIA AI applications on the latest Oracle Cloud Infrastructure (OCI) Supercluster

## Enterprise pioneers have also begun to adopt GAI in multiple innovative ways



MORGAN STANLEY

Developed an internal-facing chatbot powered by GPT4 that searches the wealth management content repository, by unlocking the company's collective knowledge.

#### **INSILICO MEDICINE**

Insilico Medicine is using its GenAl platform called "Chemistry42" to generate novel chemical compounds for new medicines

#### LEVI STRAUSS

Levi Strauss has partnered with Lalaland.ai to design hyper-realistic Al-generated model avatars to promote diversity in body type, age, and skin color

SKIDMORE, OWINGS & MERRILL (SOM) SOM is an architecture firm that has created its own GenAI tool called "SOM Computational Design" to generate design options for buildings

#### GOVERNMENT OF ICELAND

The Government of Iceland has partnered with OpenAI to preserve the Icelandic language by using GPT4. The government aims to improve GPT-4's abilities for the Icelandic language and create resources for preserving other low-resource languages.



## Impact on the marketer's content strategy

- Definition of the marketer's content supply chain
- Challenges in the marketer's content supply chain
- Roadmap for the optimization of the marketer's content supply chain through GAI
- Importance of a human lens for customer-ready GAI content



# Being caught in the rat race for personalization at scale, brands are relentlessly trying to optimize their content supply chain for a continuous supply of real-time content at scale



### In the journey to manage the content supply chain at scale, marketers face several high-risk challenges



#### Complexity

As the content supply chain grows, there are high chances of it becoming more complex and difficult to manage between multiple stakeholders, teams, and departments being involved in the process, as well as an increased volume of content and channels for distribution.

#### Resource constraints

In order to effectively manage the content supply chain. there is a need for an increased number of resources, including time, money, and personnel. This can be a challenge for smaller organizations or those with limited budgets.

High-risk challenges faced by marketers

#### Quality control

It is challenging to control the quality of large-size content. It is important to establish clear guidelines and processes for content creation, review, and approval.



### Consistency

It can also become difficult to maintain consistency in messaging, tone, and branding in the content, especially if multiple teams are involved in the content creation process.

### Scalability

The content supply chain needs to be designed to scale as the organization grows by including agile processes, using flexible tools and technologies, and anticipating future needs and challenges.



## GAI has the potential to continuously mitigate major challenges to optimize the content at scale for the increased efficiency of the marketing teams



**Relative efficiency** 

1 Impact is measured in terms of the ability to drive efficiency (in operations/processes to extract productivity gains), effectiveness (direct impact on top/bottom-line growth), and experience (enhanced stakeholder experience). Source: Everest Group (2023)

# Though GAI can replace certain repetitive marketing jobs, customer-ready content will continue to require a human's creative lens

| Source | Step 1:<br>Content planning<br>ChatGPT  |
|--------|---|
| Input  | Suggest ideas for a toothpaste Ad?  |
| Output | <ul> <li>"Steer clear of cavities and keep your smile sweet."</li> <li>"Fight cavities and brighten your smile all at once."</li> <li>"Affordable, fast-acting toothpaste with mint flavor."</li> <li>"It's paste! It's white!"</li> <li>"Micro-fine abrasive polishing formula."</li> <li>"Cavity protection that tastes great."</li> <li>"New formula, new taste."</li> <li>"Kiss your dentist goodbye."</li> </ul> |

Step 2: Content creation Stable Diffusion

Create a cavity protection toothpaste ad



Step 3: Content scaling



Create a cavity protection toothpaste ad for Chinese customers



There is still a lot of human-led fine-tuning and enhancement that is required in the content before it goes to the customer; however, technology has a drastic impact on the time to the customer. The quality of output from the technology would now depend on the skill to generate targeted prompts, which translates to the closest desired output.

Note: Images are generated by using the publicly available website version of the Stable Diffusion application Source: Everest Group (2023)



- Leveraging GAI for mitigating UI/UX development challenges

## In order to pacify the effects of the persistent talent shortage in the area of UI/UX design, enterprises need to identify and mitigate the challenges faced by the internal teams





## GAI can be a significant blessing for optimizing the UI/UX development value chain; brands need to make significant strides in incorporating the technology in their current workflows

Increasing the efficiency of the front-end team





## Risk and the future roadmap of GAI

- Current risks associated with GAI
- Efforts being taken to mitigate GAI adoption risks
- Highlight on the emerging human-machine creative loop
- Future potential of the GAI technology



## While leaders are proliferating strong positive messaging around GAI, the technology currently has a significant amount of risk associated with its commercial adoption

Relative degree of complexity Low

### Cost

Technology cost - building and deploying GAI models can be expensive, particularly if large amounts of data or specialized hardware are required. Environmental cost - complex and huge AI models running behind the GAI engines require a humungous computation and storage capacity, which leads to a multifold increase in the carbon footprint from these technologies

#### Legal and ethical

Accountability – a lack of source attribution and degree of confidence has led to several lawsuits against the technology because of copyright issues and accuracy concerns

Bias - while training on large sets of data, the model tends to replicate biases in its source. While ChatGPT has content moderation guardrails in place to prevent sexual, hateful, or violent content, these filters can be easily bypassed by rephrasing the prompts. On the user's side, since GAI is programmed for being overly confident about its output, it can cause a hallucination bias in the user's mind where he tends to completely trust the information provided by these systems without checking its credibility. This can further lead to the Eliza effect where users start personifying the GAI system and thus over-estimating its overall capabilities

**Privacy** – the technology it feeds on is publicly available, which can cause the following privacy concerns:

- No consent is being taken from individuals for the scraped data
- Individuals do not have the right to ask if their PII data is being used
- Individuals do not have the right to delete their data
- Individuals are not being compensated for the usage of their data (even if it is not copyrighted)
- Prompts contain sensitive information which can be further used to train the model
- · Sharing of PII data with third-party vendors
- Products using the technology are not compliant with most privacy standards such as GDPR

### Skill gap

There is a shortage of skilled AI professionals who are capable of building and deploying GAI models, which can make it difficult for organizations to adopt these technologies.

#### Training data

Data guality - the GAI models require high-quality training data for increasing the accuracy of output, which can be difficult to source Data quantity - the efficiency of the GAI models also depends on the breadth of training data, the labeling of which can be a very time-consuming and expensive affair

#### System integration

Integrating GAI into existing systems and workflows can be difficult, especially if those systems were not designed to work with AI.









# Researchers are relentlessly trying to mitigate challenges pertaining to the commercial adoption of the technology, but are unable to find the way forward with some

#### Plagiarism checkers and GAI content auto-tagging

The technology for checking the content created by GAI has already been developed by some of the major players such as Adobe and Salesforce for ensuring the commercial usability of the GAI content.

#### **Compensation structure for creatives**

Companies such as Adobe and Salesforce have already come up with robust compensation structures for creatives for mitigating copyright issues and increasing the continuous flow of authentic training data.

#### Addressing the skill gap in GAI

Companies such as IBM, Microsoft, and Google are investing heavily to upskill employees on GAI skills and aim to shorten the skill gap in GAI by 2030.

#### Training with customized data

Though the accuracy of open-source models such as GPT4 is still questionable, training the GAI models with custom data increases the reliability of output to a great extent.

#### Fair-representation learning models

Although not commercialized, Google has introduced the first fair-representation learning method called LASSI for GAI models to be able to segment similar data to mitigate bias.

#### Relying on cleaner energy sources

Though the adoption of green energy for GAI is the core strategy to mitigate the AI carbon footprint, efforts across enterprises still remain sluggish for the same.

## Questions that are still haunting the GAI pioneers

Does GAI require organizational restructuring?

How to reduce GAI carbon footprint?

Can GAI replace creatives?

Will GAI get cheaper?

Do I need to replace resources with GAI?

What about PII data?

Will GAI become GDPR compliant?

Is GAI 100% accurate?



C

solutions

of

Relative complexity



## Creating an ecosystem for authentic content is the way forward; pioneers in the industry are taking baby steps for enabling long-term commercial usability of GAI content

## Human-machine collaboration for authentic and customized GAI content supply

Adobe has taken significant efforts in creating this ecosystem with its recently launched Firefly product, which is going to be a backbone GAI technology for the Adobe Creative suite of products.



## Key takeaways from the GAI content ecosystem

#### Human-machine collaboration is the future

GAI models need a constant supply of authentic content created by a human lens to ensure the uniqueness and quality of the output.

#### Contextualized content is the need of the hour

GAI models need to create content that resonates with the brand messaging, style, and goals, which require inputs from humans for generating customized outputs.

#### Compensating the creatives

Creating an ecosystem of creatives along with the GAI infrastructure is essential, and therefore establishing robust compensation models for the creatives would be essential to incentivize them to continue their contribution.

## As the GAI technology matures, the industry will see a paradigm shift in organizational structures, use cases, and governance models

|  |                          | Today  | What the future ho   |
|--|--------------------------|--|--|
|  | Technology stack         | <ul> <li>Computation on GPUs/CPUs hardware</li> <li>Deployment on servers/cloud</li> <li>Limited interoperability</li> </ul> | <ul> <li>Computation on TPUs</li> <li>Seamless integration with</li> <li>Edge-based deployment of</li> </ul>   |
|  | Organizational structure | <ul><li>Hierarchical structure</li><li>Siloed teams</li><li>Maximum focus on technical expertise</li></ul>                   | <ul><li>Flat structure</li><li>Collaborative teams</li><li>Equivalent focus on techie</li></ul>  |
|  | Use cases                | <ul><li>Content creation</li><li>Product design</li><li>Chatbots</li></ul>   | <ul> <li>Personalized recommendation</li> <li>Autonomous driving</li> <li>Medical diagnosis and treation</li> <li>Cybersecurity threat prevention</li> </ul> |
|  | Governance               | <ul> <li>Multiple scattered governance initiatives</li> <li>No universally agreed-upon governance framework</li> </ul>       | Collaboration between gove<br>the development and implen   |
|  |                          |  |  |

olds…

- h NLP, computer vision, and other AI tech
- on IoT devices/smartphones
- ies, creatives, and domain experts
- dations
- eatment suggestion
- vention

ernments, organizations, and other stakeholders on ementation of global standards for GAI

Source: Everest Group (2023)

h stacks,



# Implications for service providers and enterprises Implications for service providers

- Implications for enterprises

## **GAI** has taken the industry by storm and enterprises need to act quick to respond to this revolutionary technology disruption

## 01

### Embrace

Understand the opportunities and risks associated with GAI. Educate and engage internal stakeholders on the benefits and pitfalls as they will soon seek advisory services around the potential of GAI.



#### Identify use cases Enterprises need to evaluate their current processes and identify relevant use cases for GAI and establish the scope of the use cases.



### ROI analysis Cost to benefit analysis of the

technology adoption is necessary for extracting maximum value out of the investment in GAI use cases.



## 04

### Capabilities

Enhance technical and operational capabilities in GAI technology to generate business value for operationalizing use cases.



## 05

### Governance

Create a governance framework across the organization to mitigate the risks associated with compliance, privacy, and legal aspects of GAI.

## 06

03

Partner

Partner with technology and IT service providers to leverage their skilled talent pool in GAI to achieve economies of scale.





## **Enterprises aiming to attain scalable GAI adoption would require consistent hand-holding from service providers**



Source: Everest Group (2023)

Build use case repositories for identifying and building the required technical skills and capabilities.

Evaluate the ecosystem and move beyond immediate tech partners to evaluate innovative partners and start-ups offering platforms and services around GAI.

Create multi-disciplinary teams in addition to those with core tech skills; hire creatives and domain experts.

Revamp internal business applications by integrating them with GAI technology to enhance team productivity

Create thought capital in collaboration with the ecosystem to educate the market on the long-term benefits of GAI adoption.

Build a GTM structure and devise a use case-specific, geography-driven, and advisory-led verticalized GTM strategy to target a wider spectrum of GAI demand themes.



## **Glossary of key terms used in this report**

| CRM | Customer relationship management is a technology used to manage all engagement activities with a company's existing and future customers to promote business growth |
|-----|---|
| GAI | Generative artificial intelligence is a disruptive technology that can create content through human-led prompts   |
| GPU | A graphics processing unit is a computing engine that helps in processing graphics, effects, and video  |
| GPT | Generative pretrained transformer is a language model developed by OpenAI, which is revolutionizing Natural Language Processing (NLP)                               |
| GTM | A go-to-market strategy is a well-developed action plan that specifies how a company will reach its target customers and move ahead of its competitors              |
| TPU | A tensor processing unit is a computing engine developed by Google for neural network machine learning using Google's in-house TensorFlow software.                 |



### **Research calendar** Interactive Experience (IX) Services

Planned Current release Published **Reports title Release date** Digital Experience Platform (DXP) Products PEAK Matrix<sup>®</sup> Assessment 2021 August 2021 Digital Marketing's Reckoning with Privacy October 2021 Digital Interactive Experience (IX) Services PEAK Matrix<sup>®</sup> Assessment 2022 February 2022 Digital Commerce Platform Trailblazers: Top 15 Start-ups Redefining Shoppable Experiences March 2022 Emergence of CDPs: Charting the Path to Data-driven Personalization July 2022 Adobe Services PEAK Matrix<sup>®</sup> Assessment 2022 September 2022 January 2023 An Enterprise Guide to Building Scalable Digital Product Experiences Metaverse: the New Gateway to Enhance Stakeholder Experience February 2023 Digital Commerce Platform PEAK Matrix<sup>®</sup> Assessment 2023 March 2023 Digital Commerce Platform – Provider Compendium 2023 April 2023 Generative AI – Revolutionizing the Creative Design and Development Process April 2023 Customer Data Platform PEAK Matrix<sup>®</sup> Assessment 2023 Q2 2023 Digital Experience Platform PEAK Matrix<sup>®</sup> Assessment 2023 Q3 2023 Marketing Cloud Vendors PEAK Matrix® Assessment 2023 Q4 2023

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