



EMAKINA

AN EPAM COMPANY

The technology
trends that will
shape 2024

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Introduction

Navigating the AI and beyond

As we reflect on 2023, it's evident that artificial intelligence (AI) and digital innovation have done more than just grow – they have revolutionised the way we approach technology and business. The influence of AI is so extensive that it's impossible to discuss any tech trend in isolation. Although the report is organised into distinct sections, you'll notice AI's pervasive role in each one.

A staggering estimate from Statista highlights this transformation: in the last decade, global data volumes have soared by approximately 1233%, jumping from 9 to 120 zettabytes.¹ This explosion of data brings an annual challenge: sifting through the vast information to unearth genuine opportunities.

In this report, I will guide you through the significant events and advancements of 2023 across various domains – AI, marketing, social media, influencers, spatial computing, gaming, blockchain, and consumer behaviour.

At Emakina, an EPAM company, we have established an Innovation Hub. This Hub serves as a dedicated space for delving into the frontiers of AI and other advanced technologies. For this report, key participants and contributors from the Innovation Hub have been invited to share their expertise and insights on specific topics. Additionally, each topic is enriched with a timeline that highlights key events, providing a comprehensive overview of developments in these fields.



01

AI - A Catalyst for Innovation

Feb	<ul style="list-style-type: none">- Google launched Bard Chat.- Microsoft launched Bing Chat.
Mar	<ul style="list-style-type: none">- OpenAI launched GPT-4.- The fifth version of the Midjourney AI image tool was released.- Adobe launched the Firefly AI public beta.- OpenAI made the ChatGPT and Whisper API available.
Apr	<ul style="list-style-type: none">- Italy initially blocked, then unblocked, ChatGPT- Alibaba released the Tongyi Qianwen AI model.- Wonder Dynamics released the Wonder Studio AI video tool.
May	<ul style="list-style-type: none">- Adobe released AI generative fill in Photoshop.
Jun	<ul style="list-style-type: none">- Korea issued an AI ethics checklist.- China started reviewing the draft of its AI law.- Runway released the second generation of their AI video tool.- Google released virtual try-on powered by AI in US.
Jul	<ul style="list-style-type: none">- The AI lawsuit against Midjourney and other tools was dismissed.- Meta and Microsoft introduced Llama 2.- Stability AI released Stable Diffusion XL 1.0, an AI image tool.
Aug	<ul style="list-style-type: none">- EPAM launched DIAL, a unified AI platform.- Amazon released a new suite of AI technologies.- OpenAI integrated the DALL-E 3 AI image tool within ChatGPT and Bing Chat.
Sep	<ul style="list-style-type: none">- Getty and NVIDIA announced an AI image tool.
Oct	<ul style="list-style-type: none">- Fifteen US states passed AI laws or resolutions.- Apple quietly launched the open-source MLLM: Ferret.
Nov	<ul style="list-style-type: none">- Sam Altman was initially fired, then re-hired as the CEO of OpenAI.- Elon Musk unveiled Grok AI after advocating for a pause on AI development in March.- LumaAI released Genie, a 3D model AI tool.- YouTube announced an AI tool capable of imitating artists.- Microsoft rebranded Bing Chat to Copilot and began rolling out Microsoft 365 AI Copilot.
Dec	<ul style="list-style-type: none">- The first version of Pika, an AI video tool, was released.- The EU AI Act was passed.- A French startup confirmed a €385M Series A funding round for Mistral AI.- The sixth version of the Midjourney AI image tool was released.- Google made Gemini AI available within Bard.- YugoGPT outperformed Mistral and Llama 2.- Tesla unveiled Optimus Gen 2, a new AI humanoid robot.

The year 2023 was remarkable for AI innovations, unlocking a realm of seemingly endless possibilities. It was not only the industry giants like OpenAI, Google, and Amazon that made headlines with their ground-breaking AI models and announcements, but also significant advancements were seen in open-source AI solutions from Stability AI, Meta, Apple, and others.

The following section explores the latest AI breakthroughs and their profound impact on various industries.

1.1. Workplaces powered by AI

OpenAI 'ChatGPT' and 'DALLE3', Google 'Bard', Adobe 'Firefly' and Microsoft 'Copilot' are solutions most businesses have tested out or integrated in 2023. These solutions have gone multimodal, allowing multiple types of data inputs and outputs, such as text, images, audio, and video.

Microsoft Copilot AI and Google Duet AI are being rolled out within Microsoft Office 365 and Google Workspace. However, this rollout has been relatively slow, resulting in limited access for many, particularly in Europe due to regulatory restrictions.



At EPAM, we have our own AI tools and that is certainly the way to go. It has allowed us to test and play in a safe environment while learning together. My team now uses a selection of AI tools almost daily, so I can really recommend the same approach to other businesses setting out on their AI Journey!"

Sarah Claeys, *Director of Content Design*

Due to the slow rollout of enterprise solutions, EPAM has ensured all employees have access to an EPAM AI Chat built on top of EPAM DIAL – a unified AI orchestration platform powered by proprietary and other AI models.² This solution allows us to switch between multiple models within a single interface, all while boasting an additional layer of security. Beyond internal solutions like the AI Chat, there were tools widely explored within the Innovation Hub. Some of those tools and insights are shared below.

01. Midjourney, Adobe Firefly, DALLE3 and Stable Diffusion XL

Description: AI tools for image generation.

Insight: It comes as no surprise that these tools are integrated into our daily work. A key takeaway from exploring these tools is the varying learning curves and legal implications associated with each. Therefore, each project may benefit from a different combination of AI tools. While tools like Stable Diffusion XL require lengthy research and take longer to learn, their cost-effectiveness and open-source design are making them increasingly important in creative processes. This open-source aspect helps us navigate around the restrictions associated with some tools.



For Halloween 2023, our client requested a campaign for which we assessed specific needs and formulated a strategy, leading us to experiment with AI tools. We quickly found that Adobe Firefly wasn't suited for creating certain complex effects, such as simulating artificial blood, prompting us to look for workarounds and alternative solutions. Findings like these offer valuable lessons about the strengths and weaknesses of these tools, enhancing our efficiency in future projects."

Sébastien Henry, *Senior Art Director*



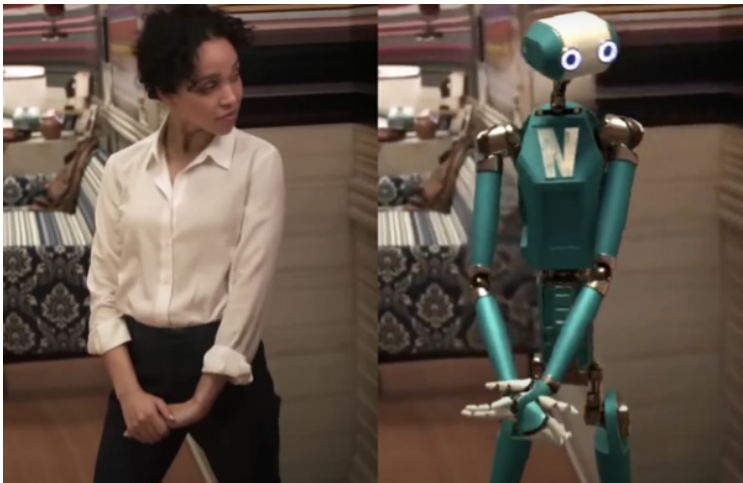
The last year in the AI tool landscape has been exhilarating and unpredictable. New tools have been emerging rapidly, with some stepping into the limelight and others remaining in obscurity. ChatGPT and Midjourney seem to continue to lead the pack, despite the emergence of tools that can match or even offer better quality outputs. This dominance might be due to friendly interfaces. Either way, we continue to explore and embrace what the mysterious AI tool landscape brings us."

Claire Maeter, Design Strategist

02. Wonder Studio

Description: An AI-driven platform specialising in visual effects and CGI. It is best known for a feature allowing the user to replace any person in the video with a 3D character.

Insight: Wonder Studio offers the capability to create stunning visual effects, which is particularly advantageous for clients aiming to elevate their video content and campaigns. Tools like these could be instrumental in bringing brand mascots to life, ensuring they resonate with audiences through a series of captivating campaigns. While the tool shows promise, it's important to note that it's still evolving, and therefore requiring adjustments during post-production for optimal results.



A screenshot from a video showing comparison between an Apple commercial video and a video where the subject was replaced with a character.

Source: [Youtube](#).



03. Runway, Pika AI, Leonardo Motion

Description: AI tools for video content generation and editing.

Insight: When it comes to rapidly producing and refining video content, AI video tools have the potential to be game changers. This is a crucial factor for agencies striving to deliver timely and cost-effective solutions, especially for clients who require quick turnarounds on high-quality video projects. Just like many other tools, they haven't reached the final-project readiness stage. However, they've already proven useful for making storyboards come to life and getting concept approval.



I closely follow generative AI tools with great interest, particularly Runway and Pika. While they are promising, these tools require significant improvements in terms of quality and the length of their outputs. Enhancing interactions, such as incorporating reference point images for content generation in user-friendly platforms like Midjourney, is also crucial."

Eric Falk, *Lead Conceptual Creative*



A screenshot from a video showing an example of what a video produced with Pika AI looks like compared to the original footage of an ad produced using live footage that was captured with high-speed cameras, a crew of over 30 people, and about a month of production.

Source: [LinkedIn](#).



04. HeyGen

Description: An AI-driven video platform allowing content glocalization and custom avatar creation.

Insight: HeyGen offers significant potential for enhancing video content localization, a vital service for agencies serving clients with a global presence, looking to tailor their marketing efforts across different markets and channels. All the global content that was visually suitable for other markets but previously had to be redone due to the language constraints of the models in the video can now be easily translated into any other language. The tool capabilities go beyond simply providing subtitles; they include modifying the model in the video to speak in a different language, with lip movements precisely synchronised to the translated speech.

05. Play HT, ElevenLabs

Description: AI-powered text-to-speech platforms.

Insight: These tools provide an efficient way to diversify content formats, converting text into natural audio for various applications – beneficial for clients exploring multimedia and multichannel marketing strategies.

06. In3D, Polycam, Luma AI, CSM AI, Genie AI

Description: AI-powered tools for 3D asset generation and animation.

Insight: Tools like In3D allow for the easy and fast creation of engaging, personalised, pre-rigged avatars. Meanwhile, tools such as Polycam, and LumaAI facilitate the effortless capture of objects for later integration into virtual spaces, including games and metaverses. CSM and Genie on the other hand allow 3D asset creation from images or prompts. These tools are great for quick prototyping. They're not yet ideal as standalone solutions, primarily because the topology and textures they produce often fail to meet our specific requirements.



Screen capture of a model using Genie AI and its topology. You can observe the model in 3D by visiting the source.

Source: [Luma Labs AI](#).



07. TLDRAW, Relume Library, Diagram AI

Description: AI tools for converting sketches or prompts into drawings, wireframes, and components.

Insight: These tools offer a glimpse into the future of UX design processes by providing an efficient method for transforming initial sketches into designs. Currently, while many plugins for Figma and Adobe facilitate the conversion of text or sketches into wireframes, Figma will likely integrate this functionality soon.



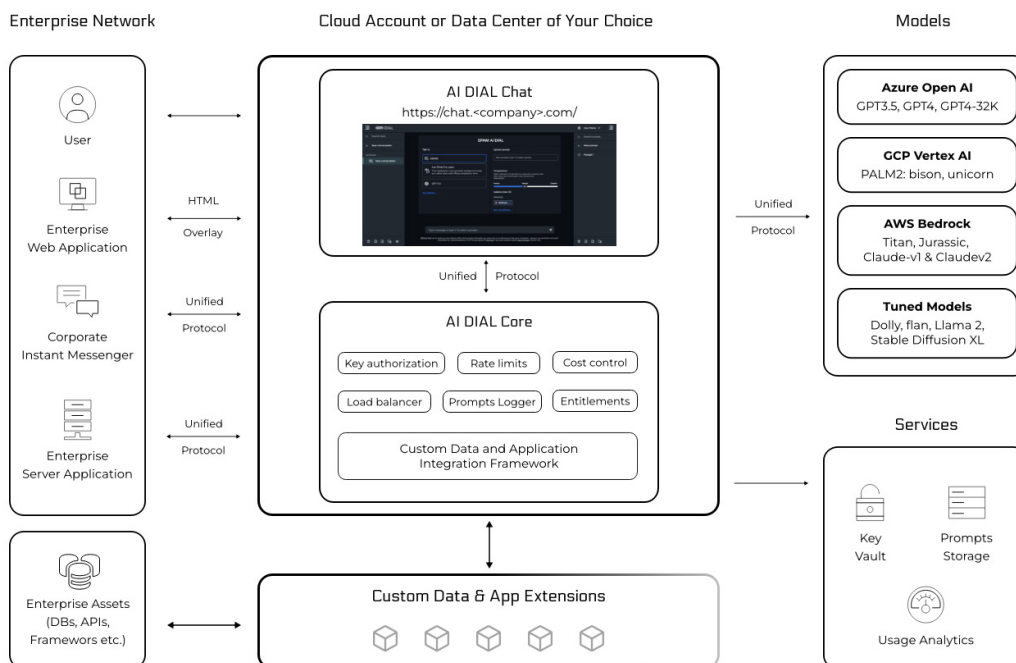
Exploring AI design resources like diagram.com and Figjam's AI plugin reveals they're in early stages, with untapped potential. While my experience was underwhelming, the promise of automated prototyping, wireframing, and content generation is exciting. As these tools mature, I foresee major advancements in UI design, personalised experiences, and dynamic content, driven by AI's ability to understand and anticipate user needs. We're heading towards more intuitive and efficient design processes."

Gitte Weijs, Principal UX Designer



Companies like EPAM are developing their own AI solutions. EPAM DIAL is EPAM RAIL's (Reliable AI Lab) open source, multi-modal, model-agnostic solution enabling developers to build and create custom applications – like the EPAM AI Chat created for EPAM employees.

Interested in DIAL? Schedule a demo via epam-rail.com.



1.2. AI and emerging solutions

Given the diverse array of AI solutions, we've compiled a selection of use cases. Each one highlights a different industry and how they benefit from these advanced technologies.

AI analysis – Automotive

AI's potential involvement goes beyond integration of AI assistants within vehicles itself. The automotive industry often has complex supply chains and high product quality standards. AI algorithms can analyse production data to identify bottlenecks and inefficiencies, resulting in adjustments of the production schedule. AI, combined with computer vision can be used for product inspection, resulting in more defects identified.

AI-powered demand forecasting – Retail

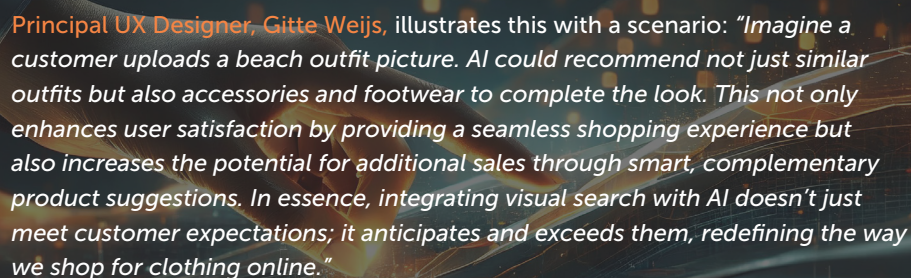
AI is proving to be particularly useful when it comes to retail company's logistics operations. It can analyse historical shipping data, weather patterns, and traffic information to optimise delivery routes. This reduces delivery times and costs and improves customer satisfaction. Additionally, AI-driven demand forecasting can predict inventory requirements, minimising stockouts or overstock situations. This ensures a more efficient, responsive supply chain, crucial in today's fast-paced retail environment.

AI-powered synthetic data – Healthcare

Healthcare is one of those industries where data privacy is paramount. Researchers developing new medical solutions can make use of synthetic data mimicking real patient data to refine those solutions. Synthetic data can retain the statistical properties of real patient data without the risk of exposing personal health data, ensuring compliance with privacy regulations whilst enabling research and development.

AI-powered visual search – Retail

Today's customer constantly takes screenshots of clothing pieces they see on various channels in hopes of finding exact clothing piece or a worthy alternative. Your website, equipped with AI visual search, allows this customer to upload this image to your website and get exact matches, or suggestions closely resembling the item from the image. This enhances the shopping experience by making it easier for customers to find what they're looking for, as it's based on visual cues rather than text-based searches.



Principal UX Designer, Gitte Weijs, illustrates this with a scenario: "Imagine a customer uploads a beach outfit picture. AI could recommend not just similar outfits but also accessories and footwear to complete the look. This not only enhances user satisfaction by providing a seamless shopping experience but also increases the potential for additional sales through smart, complementary product suggestions. In essence, integrating visual search with AI doesn't just meet customer expectations; it anticipates and exceeds them, redefining the way we shop for clothing online."



"AI-powered visual search UX-wise transcends mere pattern matching; it comprehends styles, anticipates needs, and personalises shopping, transforming casual browsers into loyal customers and redefining online retail experiences."

Gitte Weijts, Principal UX Designer

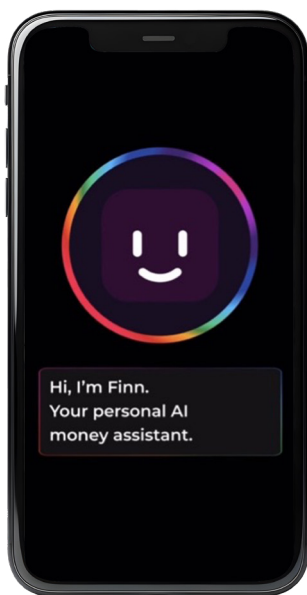
AI-powered customer support – Travel

AI-powered chatbots can interact with customers in a human-like manner, providing automated responses to common queries, such as flight booking options, hotel reservations, travel advice or even itinerary crafting. These chatbots can handle a high volume of simultaneous queries, reducing wait time for customers and freeing up customer service representatives to handle more complex issues.

AI can also be used to analyse sentiment through social listening, giving an insight into customer satisfaction and brand perception. Ultimately, this can help companies make data-driven decisions when addressing concerns or making improvements. Besides travel, the banking industry can benefit from having such bots, too. Bunq is a good example of an app that uses AI to provide joint banking and travel suggestions.

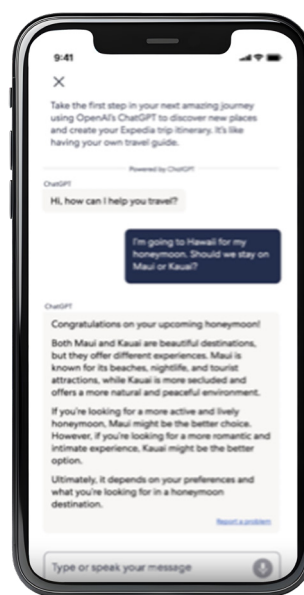
A screenshot from a video introducing the Bunq AI assistant.

Source: [LinkedIn](#).



A screenshot from a video of Expedia AI-powered conversational trip planning powered by ChatGPT.

Source: [Expedia](#).



Resource management – Real estate

EPAM's TelescopeAI was implemented at CoreLogic to enhance productivity and optimise project delivery³. CoreLogic manages hundreds of business programs and products, some developed in-house, and many others acquired in recent years. They used more than 20 tools to track, log and capture delivery metrics. To compile even routine reports, managers were forced to rely on manually aggregated information shared with static PowerPoint files that quickly became outdated. TelescopeAI tool helped CoreLogic manage numerous business programs and products, providing a unified and visual view of various data sources for real-time insights. It enabled efficient project management and decision-making by visualising key performance metrics and streamlining report generation.

Price and cost optimisation - Procurement

Svetlana Bolshakova, Director of Experience Consulting, reveals that "Conversations with numerous clients and account managers have revealed a significant opportunity and demand for leveraging AI in procurement. This domain presents substantial cost-saving potential for corporations through the adoption of AI-driven solutions. A prime illustration of this is price optimisation. In the volatile business landscape, where material costs are subject to frequent fluctuations, maintaining real-time price awareness poses a formidable challenge for large enterprises, exacerbated by the extensive array of contracts and procurement materials they manage. By perpetually monitoring global market trends and price variations of materials, including the raw materials constituting the procured items, AI can identify price reductions and initiate an alert, prompting the enterprise to engage in contract renegotiations, potentially yielding substantial financial savings."



Beyond price and cost optimisation, AI's application in procurement can extend to contract lifecycle management, suppliers optimisation, proactive management of confirmed and emerging risks across suppliers, spend categorisation and many more."

Svetlana Bolshakova, Director of Experience Consulting

A 2023 Forrester study, commissioned by Dataiku⁴ and based on responses from 220 leaders and AI decision-makers in North America, reveals the greatest barriers to implementing AI. This comes at a time when 60% of these leaders consider AI to be critically or highly important for their business strategy. They also plan to increase investments in AI initiatives by up to 10% in the next 12 months.



Following the advancement of Large Language Models (LLMs), we anticipate the emergence of decision intelligence as a critical development. This progression addresses the inherent limitations of LLMs, which can be further mitigated through the integration of a robust Business Intelligence (BI) framework.”

Polina Ilingina, *Product Manager and UX Consultant*



2023 was a year buzzing with AI experimentation and notable advancements in generative technologies, pushing AI towards practical applications across various industries. Thus, we should leverage Gen AI as a conversation starter, but focus our pitches on impactful AI projects. While there’s a strong focus on AI in retail, significant applications in healthcare and climate change are emerging, suggesting we might consider shifting more focus to these areas.”

Danuta Mikhailova, *Associate Director of Digital Engagement*

1.3. Is Europe falling behind?

Europe is often perceived as being somewhat behind the rest of the world in the field of artificial intelligence. In 2016, for instance, Europe’s investment in AI ranged between 2.4 and 3.2 billion euros. This figure pales in comparison to Asia’s investment, which was between 6.5 and 9.7 billion euros, and North America’s, where investment reached between 12.1 and 18.6 billion euros.⁵ Additionally, the entrepreneurial ecosystem in Europe is often considered more conservative compared to the Silicon Valley model, favourable for rapid innovation and risk-taking in emerging technologies like AI.

Mistral AI could change this perception. This French AI venture, founded in April 2023 by a team of experts formerly associated with Meta and Google – Artur Mensch, Timothée Lacroix, and Guillaume Lample – achieved a notable milestone by securing €385 million in funding as of October 2023.⁶

Mistral AI’s Mistral 7B model has garnered attention for being 187 times more cost effective than GPT-4.⁷ Furthermore, the company’s latest release, the Mixtral 8x7B, launched in December 2023 and has already outperformed models like GPT-3.5 and Llama 2 70B across various benchmarks.⁸ Another European-made open-source model worth mentioning is the YugoGPT, which has recently significantly beaten Mistral and Llama 2, and is now recognized as the best open-source LLM for Serbian and other similar languages like Croatian, Bosnian or Montenegrin.⁹ These advancements suggest a bright AI future within Europe.

This same month, the European Union finalised an agreement on the AI Act,¹⁰ introducing a comprehensive framework for the regulation of AI systems developed within member states. This legislation outlines prohibited AI practices, establishes a risk-based classification system, mandates human oversight in critical uses, and enforces significant penalties for non-compliance.

The AI Act's risk-based tier system is a critical component of this legislative framework, designed to safeguard against potential harms while balancing the need for innovation. Although the Act does impose certain constraints that could potentially limit innovation in specific sectors, it's crucial to stay up to date with the evolving AI landscape within Europe.



Risk – based tier system proposed in the EU Act.

Source: [European Parliament](#).

Other updates to AI frameworks, strategies, and regulations include South Korea's AI ethics checklist,¹¹ India updating its national strategy for AI,¹² China beginning to review the draft of an AI law, and 15 US states passing related laws or resolutions.¹³



In 2024, I anticipate increased regulation and ethical scrutiny of AI, coupled with continued advancements in its capabilities. However, these regulations might decelerate the pace of these advancements. As AI becomes more deeply integrated into business and consumer products, we may encounter new challenges, especially as we develop solutions on a larger scale."

Danuta Mikhailova, Associate Director of Digital Engagement

1.4. Why multimodality is a big deal

Despite many multimodal AI systems popping up in 2023, there were very few significant MLLM (multimodal large language model) developments in 2023.

LLMs are language models that are specifically designed to understand, generate, and manipulate human language. They are trained on vast amounts of text data.

MLLMs are more advanced models that can process and understand multiple types of data inputs, not just text. These inputs can also include images, audio, and video.

Multimodal AI systems are not MLLMs, and instead use combined capabilities of large language, diffusion, and other models. For example, GPT-4 isn't a single monolithic dense model, but a mixture of models.



Google's Gemini and Apple Ferret are the 2023-released MLLMs. These are cutting edge models designed specifically for multimodal integration. They are built from the ground up to be multimodal. MLLMs can generalise and seamlessly understand, operate across, and combine different types of information including text, code, audio, image, and video. Their functioning closely resembles the multisensory processing of the human brain, much more so than the LLMs. The next step in the AI evolution will be the MLLMs' ability to seamlessly process information from various senses – olfactory, tactile, gustatory and others.

According to Zhe Gan, a contributor from research paper on Apple's Ferret MLLM, Ferret is more precise at understanding small image regions and describing them than OpenAI's GPT-4V while producing fewer hallucinations. In 2024, we might see the first iPhones equipped with AppleGPT, running natively on devices, and presenting a safer way of communicating with AI than current solutions.¹⁴ Gemini Nano, on the other hand, is already operational on the latest models of Samsung and Google Pixel smartphones.

Marketing – Big AI Impact and Social Media Changes

Feb	<ul style="list-style-type: none"> Meta tested a paid verification badge service for Instagram and Facebook. Meta moved Creator Studio to Business Suite.
Mar	<ul style="list-style-type: none"> LinkedIn enabled Page owners to schedule posts. Salesforce introduced Einstein GPT, the first AI for CRM. Adobe added AI CRM features to AEM. TikTok launched a Keyword Insights tool.
Jun	<ul style="list-style-type: none"> YouTube shut down YouTube Stories. TikTok announced Subscriber-only content. LinkedIn enabled companies to send and receive DMs. TikTok cancelled its BeReal clone, TikTok Now.
Jul	<ul style="list-style-type: none"> Twitter introduced a revenue-sharing program for creators, known as Twitter (X). Meta launched Threads, a competitor to Twitter (X).
Aug	<ul style="list-style-type: none"> Meta launched a web version of Threads. TikTok Shop launched fulfilment service in the UK. Instagram rolls out improved DM control options.
Sep	<ul style="list-style-type: none"> Meta debuted AI Studio for building AI chatbots for its platforms. Meta introduced AI Stickers for its platforms. TikTok launched TikTok Shop in the US. Pinterest updated its algorithm and revealed new ad options. Instagram tested Reels up to 10 minutes long.
Oct	<ul style="list-style-type: none"> Facebook and Instagram announced a no-ads experience under a subscription model. Instagram starts testing polls in comments.
Nov	<ul style="list-style-type: none"> OpenAI announced the GPT Store, which launched in January 2024. TikTok cancelled the Creator Fund and launched the Creativity Program to incentivize long-form content. Omegle shut down due to a lawsuit over defective design and lack of moderation. Instagram allowed multiple links in bios. The biggest Twitch streamers migrated to Kick.
Dec	<ul style="list-style-type: none"> Google announced the shutdown of third-party cookies on January 4th, 2024. Brussels initiated legal action against [Company X] over illegal content and disinformation. Instagram continued to slowly roll out the feature for scheduling posts within the app.

In this section, we explore how AI is reinventing CRM and CMS, bringing improved personalisation and efficiency to customer interactions and content management. We also delve into the evolving social media world, where platforms like YouTube, TikTok, and Meta are reshaping user engagement and content monetisation strategies. This exploration extends to innovative brand collaborations and the future directions of marketing, highlighting the significance of long-form content and other emerging trends.

2.1. AI for CRM and CMS

AI acts as a force multiplier for some of the key marketing infrastructure elements, enhancing capabilities beyond the traditional scope and enabling businesses to operate more effectively in a digital landscape. CMS and CRM, integral parts of that structure, have gained significant AI boost.

Leading solutions like AI powered CRM from Salesforce⁴⁹ or AI powered CMS from Adobe⁵⁰ signal a new age of hyper-personalised marketing and digital experiences. In 2024, we expect to see an escalation in personalised experiences, with AI analysing vast datasets to tailor content, recommendations, and interactions on an individual level.

AI for CMS

Content personalisation

Analysis of large sets of data to deliver highly personalised content – text, visual, and audio.

Content management automation

Automation of routine tasks such as tagging, sorting, and organising content, which can significantly streamline content management workflows.

SEO optimisation

Optimisation of content in real-time, suggesting improvements and predicting the performance of various content strategies.

Content scalability

Helps create at scale; it can generate articles, images, and other content types quickly, based on trends and data insights. This content can also be easily repurposed for multiple markets.

Predictive analytics

AI can predict content trends and user behaviour, enabling proactive content strategy adjustments.

AI for CRM

Enhanced customer insights

Analysis of large sets of customer data to provide deeper insights into customer behaviour, preferences, and needs.

Predictive sales

Prediction of customer purchases and trends, allowing businesses to tailor their sales strategies accordingly.

Improved customer service

AI-powered chatbots and virtual assistants can handle customer inquiries in real-time, improving response times and customer satisfaction.

Automation of tasks

Supports automation of repetitive tasks such as data entry, scheduling, and email marketing campaigns.

Personalised marketing

AI can deliver highly personalised marketing messages to customers based on their previous interactions and behaviours, increasing conversion rates.

The ways in which AI will help us make better business decisions are endless. We're a step closer to having ever-evolving customer personas and segments, that grow and evolve in real time based on data they're fed with.

By harnessing AI to analyse and interpret a company's brand and customer data, we can lay the groundwork for creating a 'brand brain'. Think of this as a company's very own version of GPT. Businesses can utilise this tailored AI tool to simulate and evaluate potential business strategies.

2.2. Social media updates

YouTube

The discontinuation of YouTube Stories, short and vertical videos that appear at the top, like Snapchat or Instagram Stories, comes as no surprise. The service received mixed reactions when it launched in 2018, as it failed to introduce innovative functionalities that would have made them more attractive to users. Examples of functionalities that may have caused this downfall is having stories last only seven days before disappearing and making them available only to channels with more than 10,000 subscribers.

TikTok

TikTok's introduction of subscriber-only content presents new monetisation opportunities for creators, encouraging a strategy that cultivates exclusive communities and enhanced brand loyalty. Users can reward subscribers with exclusive behind the scenes, blooper, and other content.

This rollout may come as an option for Western users and most other users outside of East Asian markets that have not yet warmed up to the concept of live shopping – which is now the biggest revenue stream of the Chinese version of the platform (Douyin). TikTok may be confident that things are about to change in the West, due to recent news of TikTok Shop officially launching in the US or upgrades being made to the already established Tiktok Shop feature in the UK. In 2023, TikTok Shop launched fulfilment service in the UK.

70%

of TikTok users discover new brands and products on TikTok. (Tiktok, 2023)⁵¹

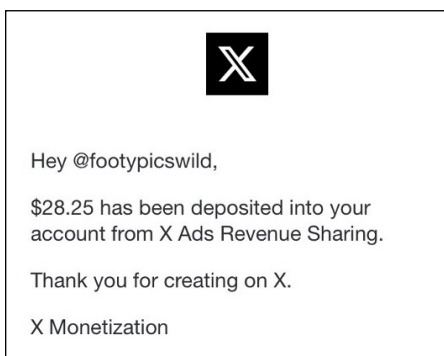
The closure of TikTok's creator fund might seem concerning, but there is a replacement program in the works, promising opportunity of much higher incomes for the creators. The new Creativity Program is inviting creators who love sharing high-quality and, specifically, long form content.⁵² TikTok, as of recently, also allows a 10-minute video upload. These updates further suggest brands should consider long form video content as a part of their social media marketing strategy in 2024.

Twitter (X)

Twitter has gone through many changes this year – including being rebranded to X. By the close of 2023, a major development emerged: the prominent social media platform found itself grappling with financial challenges. These difficulties arose as they tried to implement a new revenue-sharing model⁵³ designed to reward creators. Compounding the issue, several brands withdrew their advertising from the platform, seeking to distance themselves from the controversial opinions expressed by Elon Musk.

Additionally, The European Commission has launched legal action and investigation into X⁵⁴ under the Digital Services Act (DSA) over illegal content, disinformation, lack of transparency and deceptive design features of X's user interface – such as the paid blue checkmark feature making users seem active, notable, and authentic.

In November 2023, X released GrokAI. The advantage of GrokAI highlighted by X is the real-time knowledge of the world via the X platform. As a bonus, it will also answer spicy questions that are rejected by most other AI systems. X has taken an interesting approach by initially making GrokAI available only to Premium+ subscribers. This exclusivity could potentially hinder its success by limiting its accessibility to a broader user base, thereby reducing potential market reach, and slowing down the gathering of diverse user feedback that is crucial for iterative improvements.



Twitter user getting their first X revenue sharing deposit.

Source: [Twitter](#).

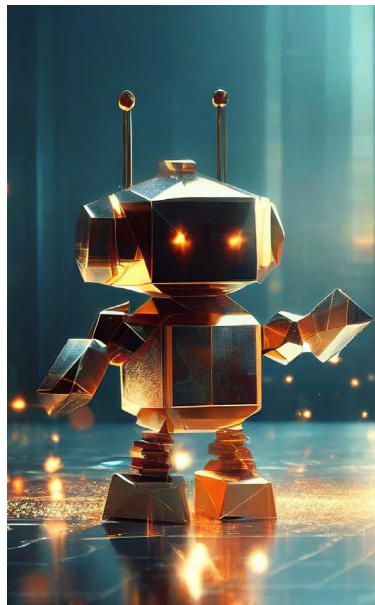
Meta

Seeing X going through hard times and similar platforms like Mastodon or BlueSky not picking up traction, Meta launched a new competitor social media platform: Threads.⁵⁵

News of Threads' success was spreading fast, amassing a user base of 100 million in just five days. However, daily active users have been telling a different story.

Threads Android app peaked at 49.3 million daily active users worldwide on July 7, according to SimilarWeb estimates. But on August 7, the app was down to 10.3 million daily active users. That's a drop in daily active users of 79% in just a month. It's soon to declare Threads a failure, but it certainly confirms the hype doesn't equal success, and that the users are not willing to move to a product that's too similar or even worse than what they already have.

Facebook and Instagram’s ad-free subscription⁵⁶ announcement in Europe presents a novel challenge to ad visibility, yet they also offer a compelling case for investing in quality content over quantity. The service will be available throughout the EU for about €9.99-12.99 a month. It addresses EU concerns about Meta’s ad targeting and data collection practices by essentially offering users to pay for their data to not be collected. Given that the ad-free option limits data collection, advertisers may need to find new ways to target audiences effectively. This could lead to a resurgence in contextual advertising, where ads are placed based on content relevance rather than user data. With third-party data becoming less accessible, brands should focus on building their first-party data capabilities. This involves collecting data directly from customers with their consent, to personalise and tailor marketing efforts effectively. This scarcity in the ad space might drive up the cost of ads. Advertisers will need to be more strategic with their budgets, ensuring they are investing in campaigns that yield a high return on ad spend (ROAS).



Lastly, Meta reported that 80% of story content with voiceover or music drive better low funnel results.^{57,58} Audio elements can make content more dynamic and immersive, capturing attention more effectively than silent or text-only posts. It’s important to use sound in social media content, strategically. This means selecting voiceovers and music that align with a brand’s identity and the message of the content. As with any other type of content – it’s not just about having sound but having the right sound.

Pinterest

Despite being one of the top 15 social media networks in the world based on monthly active users, Pinterest is not as talked about. In 2023, the platform introduced impressive updates and ad options for brands. Reports are also showing a solid increase in active users, and steady revenue growth, underlining its rising relevance, and value, for millions of users – of which 482 million are monthly active users.

Premiere Spotlight allows brands to own exclusive in-feed or search ad placements for maximum visibility.

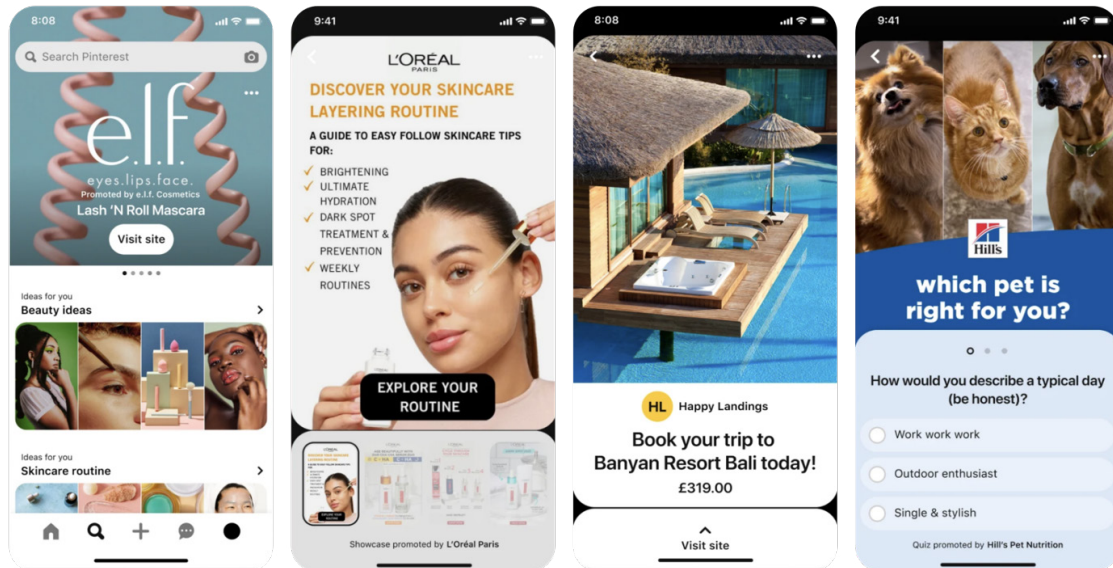
Showcase ads are a new interactive ad solution that allows users to preview and explore a brand’s content by swiping through branded images.

Travel Catalogues builds on Pinterest’s product catalogue technology, allowing travel brands to easily upload their travel products to the platform. Once their catalogue is uploaded, Pinterest automatically turns each listing into a dynamic shoppable product Pin with relevant travel booking information such as the hotel brand name, pricing, images, descriptions and more, as well as a link to the booking website.

Quiz ads offers a deeper level of personalisation to a brand’s idea on Pinterest. Brands can include up to three questions per quiz to create an entertaining experience for people to engage with.

A new algorithm update focuses on inclusivity, meaning users searching for women's fashion will see a range of body types and skin tones represented.⁵⁹ This move is not just a social win, it's a call for brands to embrace diversity in their marketing messaging.

Ecosystem expansion includes new options for Salesforce Commerce Cloud and Adobe Commerce. Merchants that already using these platforms now have a simpler way to get onto Pinterest.



Latest Pinterest updates.

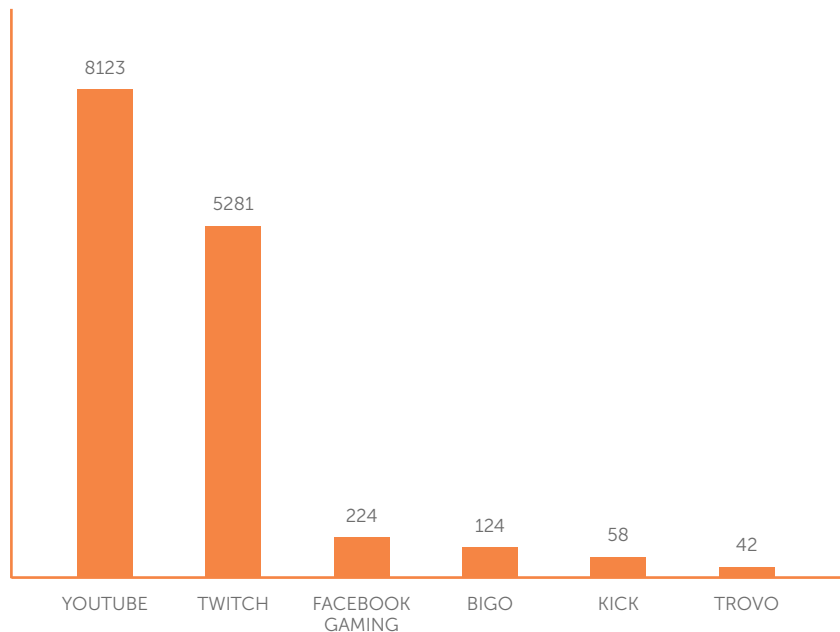
From left to right: Premiere Spotlight, Showcase Ads, Travel Catalogues and Quiz ads.

Source: [Pinterest Newsroom](#).

Kick

Kick is the latest streaming platform challenging the likes of Youtube and Twitch. This underdog platform is quickly gaining an audience, and for a very good reason. Some of the biggest Twitch streamers like Ninja, xQc, Amouranth and Adin Ross have moved to Kick in 2023.⁶⁰ Why? Kick is backed by Stake.com, an Australian-Curaçaoan online casino raking in big bucks and luring in influencers and famous personalities to the platform with deals allegedly worth millions.

It's speculated that, as a part of the deal, streamers must host gambling streams occasionally. Another reason for its growing popularity is also the fact that Twitch has banned gambling content, making some of Twitch audience move to gambling-friendly Kick. While it's too soon to say whether the platform will be successful (as with Threads), it's certainly one to keep an eye on – gambling content was the second most popular stream category before it was banned on Twitch. Additionally, data from multiple sources suggests popularity of online gambling will grow, despite regulation attempts.



Some of the leading live streaming platform worldwide Q1 2023, by hours watched in millions.

Data Source: [Statista](#).

2.3. Ads in post-cookie era

Google is officially phasing out third-party cookies in 2024.⁶²

However, Google Ads will continue to benefit from first-party cookies.

If a customer accepts cookies: When people click on your ads, the URL of your website's conversion page usually contains information about the click. The **conversion linker** feature ensures this ad click is detected as data and stored as first-party cookies on your domain. It's a helper inside your website noting *'This person came because of your ad'*.

If a customer doesn't accept cookies: It leaves your helper powerless, but a customer may provide their email when they're buying a product. Google can use this email to say *'This person bought a product after seeing your ad.'* When a customer doesn't accept traditional cookies but provides personal information like an email during a transaction on your website, an **enhanced conversions** feature ensures this data is collected and hashed (encrypted) for privacy and then matched with the user's Google account. This way, Google can track that the customer made a purchase after seeing your ad, even without traditional cookies.

If a customer rejects cookies: If a customer says "no" to all cookies, or their email can't be associated with a Google account, Google ads can rely on other collection method like the **consent mode** feature. It means anonymous info (like a secret code) will be associated with the event of someone clicking on the ad. Later, if a product is bought with that code, Google knows the ad worked. This method collects more limited, anonymised data to assess ad performance while respecting user privacy.

The key element: All these features use something called 'Google Click ID' – a unique ticket each customer gets when clicking the ad, helping track whether customers have bought an item or not. This 'ticket' could be seen as personal info, because you could technically tell who the person is from their ticket number. This is a big deal for privacy rules, meaning businesses need to continue to:

- 01** Clearly inform users about the data being collected and obtain their consent, in line with regulations like GDPR or CCPA.
- 02** Ensure that any personal data collected is securely stored and processed.
- 03** Collect only necessary data and give user the option to opt out of data collection.

2.4. Brand collaborations

This section consists of a selection of 2023 brand collaborations, some of which demonstrate a high level of strategic thinking, while others appear to have been executed with less deliberation. These partnerships, ranging from the highly effective to the seemingly hasty, offer valuable lessons insights into the dynamics of brand collaboration in the current market landscape.

*Tiffany & Co. x Nike Air Force 1 Low shoe*⁶³

Merging luxury with streetwear creates an exclusive product that appeals to both high-end fashion consumers and sneaker enthusiasts. The combination of online buzz with the luxurious Tiffany & Co. in-store experience amplified the exclusivity and desirability of the product. Though the collaboration has received short-term success through being sold out, it may have damaged Tiffany's image, as some netizens claim collaborating with Nike has cheapened them. Though the sneaker is now going for up to \$3000 on sneaker reseller websites, Tiffany's may have gotten the shorter end of the stick within this collaboration.

*Heinz sauce x Absolut vodka x Gigi Hadid's recipe*⁶⁴

As a tribute to Gigi Hadid's TikTok-famous pasta recipe from 2020, Heinz and Absolut Vodka joined forces to debut the perfect vodka infused sauce. This campaign leveraged the power of social media trends and unusual food combinations that appealed to culinary adventurers. The campaign resulted in 52% sales uplift across the Heinz pasta sauce range.

*Elf x American Eagle*⁶⁵

By partnering with American Eagle, Elf Beauty taps into the Gen Z demographic that is highly engaged with fashion. This collaboration can diversify the reach of Elf Beauty and align it with lifestyle and apparel, possibly driving up sales as indicated by Elf Beauty's 48% growth in fiscal year 2023.

*Charlotte Tilbury x Disney*⁶⁶

Using an animated short film leverages Disney's storytelling prowess to create a captivating marketing campaign for Charlotte Tilbury. It's a blend of nostalgia and charm that can effectively capture the audience's attention.

*Barbie x Multiple brands*⁶⁷

Mattel's marketing team has pushed out several campaigns to promote the latest Barbie movie, ranging from collaboration with affordable Zara to luxurious Balmain, therefore reaching consumers across various age groups and interests. These extensive marketing efforts made Barbie the highest grossing movie in 2023.

*Rhode x Krispy Kreme*⁶⁸

The cross-promotion of a skincare product with a popular food item creates an unexpected but memorable pairing. It leverages the indulgence factor of donuts with the self-care aspect of skincare, appealing to sensory experiences and self-pampering trends.

*KAWS x Uniqlo*⁶⁹

KAWS's unique art has a dedicated following, and by collaborating with Uniqlo it brings 'affordable luxury' to the masses. It allows fans of KAWS's work to own a piece of his art in a wearable form, potentially bringing in customers who are fans of both streetwear and contemporary art. Shirts reportedly sold out on release day.

3V Influencers - Viral, Virtual and Vivid

Jan	<ul style="list-style-type: none"> Kakao debuted its virtual Kpop group 'Mave', which received widespread approval from netizens. People interacted with Joken, the first AI NPC in VRChat
Feb	<ul style="list-style-type: none"> Maybelline enlisted its first-ever digital avatar for a mascara launch. EPAM unveiled its AI metahuman 'Vivien'.
Apr	<ul style="list-style-type: none"> Tencent Cloud released an intelligent, low-cost digital human production platform.
Jun	<ul style="list-style-type: none"> Epic Games released MetaHuman Animator.
Jul	<ul style="list-style-type: none"> Shiseido appointed the virtual influencer 'Ayayi' to endorse its products during a livestream.
Aug	<ul style="list-style-type: none"> IMG signed the virtual model Zlu.
Sep	<ul style="list-style-type: none"> Meta announced that AI NPCs would be available for Meta Horizon. Fitness influencer Pamela Reif partnered with virtual influencer Noonoori to jointly deliver a workout session. Chinese virtual influencers, indistinguishable from real humans, went viral. There was a 2,400% increase in searches for AI girlfriends.
Oct	<ul style="list-style-type: none"> Baidu's virtual humans were revealed to possess both general and domain-specific knowledge. The virtual influencer 'Miquela' starred in a BMW campaign. The Japanese company Ito En released a commercial featuring a virtual human.
Nov	<ul style="list-style-type: none"> Virtual human Aitana Lopez went viral due to claims of earning up to €10,000 per month. Replica Studios released a game with AI-generated NPCs. HeyGen launched a near-instant avatar generator.

As all the other landscapes, digital influencing is facing a big shift, propelled by advancements in artificial intelligence, augmented and virtual reality and 3D modelling. In this part, we delve into the fascinating developments in the world of influencers. It is worth noting differences between digital influencers and virtual characters, and how a combination of the two makes virtual influencers.



Digital Influencer

An individual who mostly uses social media, blogs, or other digital platforms to influence the opinions or behaviours of their audience, often through content creation. Pictured is one of TikTok's most followed influencers, Charli D'Amelio, who has endorsed Hollister, Dunkin Donuts, Prada and others. Image source: [Youtube](#).



Virtual Character

A fictional, computer-generated persona which can range from realistic human-like figures to imaginative and fantastical creations, often found in video games, movies, or online platforms. These characters do not usually actively and continuously influence audiences. Pictured is a virtual character Astarion from the game Baldur's Gate 3. Image source: [Baldur's Gate 3 Wiki](#).

Virtual Influencer



Virtual influencers combine best of both worlds – digital influencing and virtual characters. It is a fictional, computer-generated persona which can range from realistic human-like figures to imaginative and fantastical creations, and whose purpose is to influence the opinions of behaviours of their audience on social media, blogs, or other digital platforms. Pictured in one of the most popular virtual influencers, Lil Miquela, who was featured in campaigns by BMW, Prada, Dior, Calvin Klein and more. Image source: [Instagram](#).

3.1. Virtual influencer takeover



Aitana Lopez (@fit_aitana) is a 25-year-old Spanish model with pink hair who is passionate about gaming and fitness. This completely virtual and AI-powered influencer sells exclusive content on Fanvue, an OnlyFans-like platform.

This Instagram post is showcasing Aitana endorsing Olaplex, Pandora and Mango. Source: [Instagram](#).

Creators of Aitana Lopez claim she earns an average of €3,000 per month.⁷⁷ As a recently created virtual influencer with around 250,000 followers, she is yet to reach popularity of influencers like Lil Miquela, Lu, and Nobody Sausage.



Lil Miquela, endorsing Alexander McQueen.

Source: [Instagram](#).

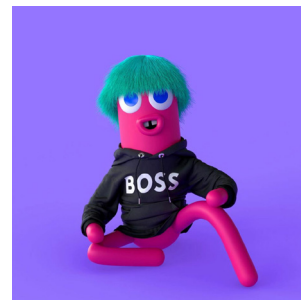
Instagram: 2.6 m followers
Tiktok: 3.5 m followers



Lu, the face of Magalu, the "Amazon of Brazil."

Source: [Instagram](#).

Instagram: 6.7 m followers
Tiktok: 7.3 m followers



Nobody Sausage, endorsing BOSS.

Source: [Instagram](#).

Instagram: 7.8 m followers
Tiktok: 21 m followers

At the very beginning of 2023, Maybelline, a cosmetics titan, broke new ground by enlisting its first-ever digital avatar for a mascara launch.⁷⁸ This move is a testament to the growing acceptance and appeal of virtual personas in advertising.



Screenshot from a video of the Lil Miquela x BMW "Make it Real" 2023 campaign.

Source: [Youtube](#).



In July, Shiseido, a beauty giant, made a bold statement by appointing Ayayi, a popular virtual influencer, to endorse its Ultimune collection within a video campaign and on Tmall's livestreaming channel.⁷⁹ Ayayi appeared alongside a human anchor in Shiseido's livestream room on Tmall. This partnership underlines the increasing clout of virtual influencers in the beauty industry, especially in markets like China where digital trends often set the global pace.

A month later, IMG, a prominent modelling agency, signed Zlu - a CGI model and 'alien influencer',⁸⁰ highlighting the expanding scope of digital personalities in fashion and entertainment.

In the entertainment sector, the success of virtual K-pop group MAVE,⁸¹ created with Unreal Engine Metahuman Creator, whose 2023 single "PANDORA" garnered almost 30 million views, illustrates the immense potential of virtual performers. Their popularity signifies evolving preferences towards digital entertainment. MAVE consists of 3D models powered by real human motion capture and real human voices.

Studios are likely to soon replace expensive motion capture equipment with AI-powered motion tools. However, until text-to-motion tools significantly advance, human actors will still be required to perform the motions. Explaining desired motions to AI may be challenging, but text-to-motion tools like Mootion AI present a safer option compared to hiring stunt performers.

The same applies to voice generation, where humans may primarily be needed only for training AI models. This is further evidenced by the numerous AI-generated covers that have flooded social media platforms in 2023.



Screenshot of Ayayi endorsing Shiseido live on July 25, 2023.

Source: [Tmall](#).



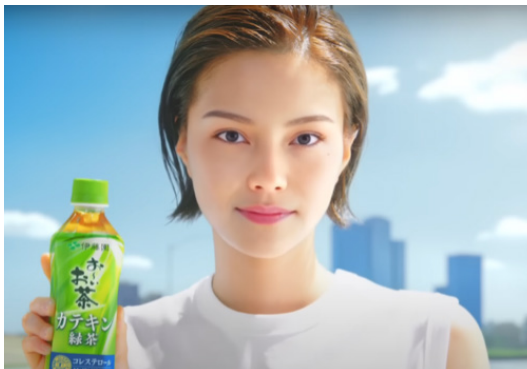
Vogue Zlu 2023 cover.
Source: [IMG Models](#).



Screenshot from a video showcasing MAVE performing their single, Pandora, on Korea's MusicCore Show.
Source: [Youtube](#).

3.2. Future of brand endorsement is virtual and AI-powered

Meta's Connect 2023 Event was filled with interesting announcements. Apart from launching AI chatbots for Instagram, Facebook and WhatsApp, Meta has announced AI Studio that will let businesses build custom chatbots that can be deployed across Meta platforms.⁸² This includes Meta Horizon Metaverse. This further signifies that the future of virtual influencers is a lot richer than just starring in social media campaigns and involves actively interacting with the customers through all the digital channels.



Screenshot from a video of a 2023 Ito En commercial featuring a virtual human.
Source: [Youtube](#).

In China, livestreams featuring AI-powered virtual influencers are garnering massive attention. Baidu Virtual Human platform can recreate a digital human anchor in less than 30 minutes using a video of a real person to train it.⁸³ Another Chinese company creating virtual influencer hosts for live streams, Silicon Intelligence, claims even less minutes of training material are needed nowadays to catch the voice, face, and mannerisms of real humans.⁸⁴ Other popular tools for creation of AI personas for videos are HeyGen and Synthesia.



A screenshot of a video showcasing youtuber Trevor Martin talking to the AI powered NPCs in a game demo launched by Replica Studios.

Source: [Youtube](#).



EPAM has their very own virtual human, built with Unreal Engine Metahuman platform, and powered by AI – Vivien.⁸⁵ Vivien is an end-to-end, secure, and scalable solution that can be configured to any industry and for various applications such as technical support, sales, customer service and others. Vivien’s appearance and voice can also be customised to portray the customer’s desired image. AI used to power Vivien is Vertex AI from Google, EPAM’s partner of 15 years. Vivien has been attending various events like MWC where visitors could speak with her in real-time.



In the realm of marketing and brand promotion, a significant shift is anticipated. Brands are likely to cease investing in human influencers and instead, create their own digital influencers. These brand-generated avatars offer a cost-effective and highly controllable alternative to human influencers, enabling brands to tailor their messaging and actions precisely as desired.”

Thomas De Vos, Associate Director of Experience Consulting



Vivien at the EDAY event in Netherlands.

Source: Cheryl van Scheppingen-Heineman, Senior Marketing Manager.

New realities - virtual and augmented

Jan	HBO debuted 'The Last of Us', a series based on Naughty Dog's 2013 game.
Feb	Roblox Studio for asset creation received an AI upgrade. BlackRock launched a Metaverse-Themed ETF.
Mar	Epic Games revealed the Unreal Editor for Fortnite. Google shut down the Google Glass project.
Apr	Support for WebGPU in Chrome was announced. A photorealistic Unreal Engine 5 Shooter went viral. The Super Mario movie made its debut.
May	Microsoft acquired Activision Blizzard. Google introduced the Geospatial API and Geospatial Creator, compatible with Unity and Aero.
Jun	Epic Games revealed the Metahuman Animator. Roblox opened its immersive ad partner program. Apple announced VisionPro, set to hit stores on February 2, 2024.
Aug	Twitch expanded its ban on gambling livestreams. Call of Duty used AI to filter hate speech during online matches. NVIDIA unveiled upgrades to the Omniverse platform.
Sep	Unity announced that refined royalties for engine use would become subject to new terms. Meta Horizon became available on mobile and web. Roblox opened dating experiences to players aged 17 and above. Meta launched new Ray-Ban Smart Glasses.
Oct	Epic changed Unreal Engine's pricing for non-game developers. The Meta Quest 3 was released
Dec	Baldur's Gate 3 won Game of the Year. ByteDance cancelled production of the Pico 5 headset. Sideloaded was announced to come to iOS in the EU by March 2024, meaning game companies may build their own app stores for iOS.

4.1. Games as cultural pillars and brand touchpoints

We can start comparing the cultural significance of video games today to that of books in the past. In the evolving tapestry of storytelling and entertainment, video games have risen to an esteem books once exclusively held. This esteem has put games on the same journey books have been on for a while, leading them straight to the big screens. In 2023, we've had the pleasure of seeing a series adaptation of the game 'The Last of Us' and a movie adaptation of the Nintendo's Mario video game franchise.



Piccadilly 3D billboard advertising Call of Duty Modern Warfare 2.

Source: [Youtube](#).

These cases underscore the recognition that rich-narrative video games receive, but also marks a cultural renaissance. Interactive digital experiences are being recognised as potent sources of storytelling, parallel to traditional literature.

Brands are recognising this trend and therefore increasingly setting up virtual spaces within metaverses and games – Walmart in Roblox, LEGO in Fortnite and Burberry in Minecraft, to name a few recent successful collaborations. Importantly, Newzoo November 2023 data shows that IP and brand collaborations boost game DAU by +11% in the short term but then declines over time. New non-IP related games are seeing a different trend where DAU is low just after release and keeps increasing.⁹³



Emakina Offices Fortnite Island, accessible via code 4244-7568-8494.

Source: [YouTube](#).

This indicates there's a huge opportunity for brands to start treating game and metaverse entrances as long-term projects, instead of short-term campaigns. Considering most audiences in most popular games are young, these brands would be consequently raising groups of loyal customers they've established connections with before they acquire purchasing power. For our clients, these platforms represent fertile ground for innovative campaigns, community building, and direct user engagement.



When it comes to virtual experiences, we've seen that the 'wow factor' wears off pretty quickly. Brands playing on that will always be running a rat race to produce the next shiny thing. The brands that got it right in the past and those that will get it right again in the future, are the ones that focus on the experience itself – on the story they tell and the way they make their users feel."

Sarah Claeys, Director of Content Design

Google Time Capsule⁹⁴ data on most searched terms reveals that Roblox, Fortnite, Minecraft, GTA V and Garena Free Fire are the games standing the test of time and are consistently the most searched for.

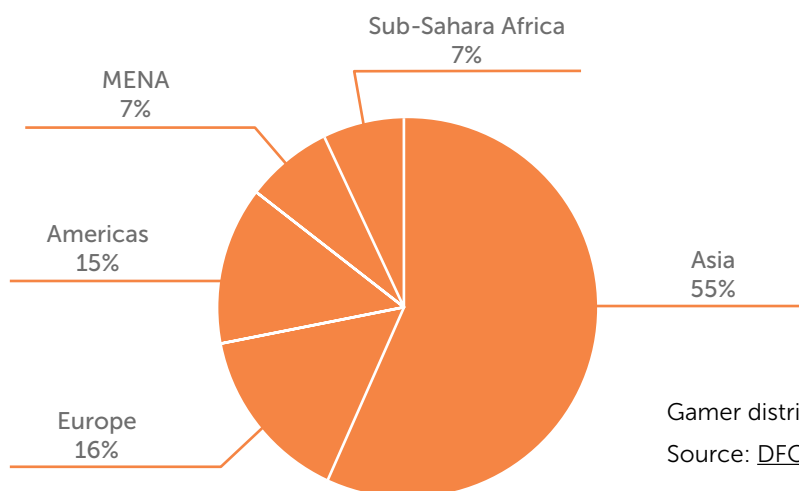
Patrick Jones, Senior Motion Designer and 3D Generalist, who often works on projects leveraging the tools of EPAM's partner, Epic Games, shared his thoughts on these developments:

"In 2023, it was fascinating to watch Epic Games continue to transform the success story of Fortnite. The game has successfully shifted its identity, evolving from a simple shooter game into a diverse experience encompassing exploration, survival, racing, and music games. This transformation brings it closer to the concept of a metaverse, akin to that depicted in 'Ready Player One', though it lacks VR support and seamless transitions between experiences. Fortnite also maintains its relevance by consistently integrating elements of pop culture into its skins and events."



As we step into 2024, the progress of Roblox will be worth observing. With its immense popularity and vast user base, it will be particularly intriguing to see how they handle the introduction of AI-driven tools, while also addressing pressing issues like content moderation."

Patrick Jones, Senior Motion Designer and 3D Generalist



Gamer distribution per region, 2023.
Source: [DFC intelligence](#).

4.2. WebGL walked so WebGPU can run

Revealed in 2021, WebGPU is a new web standard designed to provide modern 3D graphics and computation capabilities on the web. It offers more direct control over the GPU, leading to significantly improved performance for graphics-intensive applications compared to older web graphics technologies like WebGL. It's developed with engineers from Apple, Mozilla, Microsoft, Google, and many others.⁹⁶

On April 6, 2023, Google announced wider WebGPU Chromium support, meaning we can now build more sophisticated and graphically complex 3D web browser experiences for ChromeOS, macOS, and Windows, ensuring a wider audience reach.

There are couple of reasons why WebGPU hasn't picked up traction yet. Apart from Google announcing support only in 2023, other reason could be that most game developers prefer building experiences using tools like Unreal Engine, Unity and Godot that are already supported by a lot of devices and consoles. However, the standard is not to be dismissed just yet, especially not by businesses looking to create branded experiences. Those businesses do not necessarily want to gate their immersive experiences only for users with the right gear and expensive consoles. WebGPU allows brands to connect their audiences with higher quality immersive experiences right from their browser.

WebGL remains a more widely supported option, but WebGPU is the one to keep track of due to exciting enhanced supported performance and control capabilities. This [LinkedIn video](#) is showcasing a a comparison of WebGL and WebGPU game playthrough.



4.3. Headsets and wearables

There are some interesting updates in the AR and VR space, including rumours of Sam Altman and Jony Ive teaming up to build OpenAI's first hardware device. Despite Google ending Google Glass for real this time, 2023 was marked by Meta, Apple and OpenBCI headsets, Meta, and Amazon smart glasses, as well as Humane AI pin and Rewind pendant wearables.

Headsets

This year's Meta Quest 3 and Apple Vision Pro indicate a shared vision of Meta and Apple in building better augmented and virtual reality experiences. However, the vision starts to part ways when it comes to positioning. Meta is focused on creating device that incentivizes shared and entertainment-centric

experiences. Apple, on the other hand, is positioning their device as a spatial computing device meant to transform professional workflows and everyday tasks. Currently, eyeglass wearers cannot use Apple Vision Pro with their glasses on. Detachable prescription lenses are available for separate purchase. Those who wear contact lenses can use Vision Pro without the detachable lenses, but Apple recommends using only soft contacts, as hard contacts may impact the device experience. These limitations might soon disappear. A newly granted Apple patent (US 11880111 B1) describes a unique tunable lens system, expected to be incorporated into Apple's upcoming smart glasses or headsets. This advanced, adjustable lens system could eliminate the need for detachable lenses or soft contact lenses.

Robin Moser, Head of Web3 and Metaverse, had the opportunity to try the Vision Pro back in November 2023 and share first thoughts: "2024 will be the year when spatial computing becomes available to the masses. It begins with the Apple Vision Pro, which is a top-tier device. Everyone has been asking, 'What will be the killer app?' I believe there will be no single killer app for Spatial Computing, just as there is none for our laptops or phones. The real differentiator between devices is the quality of the ecosystem and whether any app can run seamlessly – something Apple has been excelling at for a while."



Just as we have integrated new technologies into our daily lives, spatial computing will emerge as another computing paradigm. It may not transform our way of doing things overnight, but it marks a significant milestone in the way we interact with computing technologies."

Robin Moser, Head of Web3 and Metaverse, DACH region



Spatial computing holds the potential to revolutionise how brands approach consumer experiences. Imagine appliance brands offering real-time recipe assistance through Apple Vision Pro, or automotive brands enabling you to visualise your future car in full detail from your sofa. Brands must embrace this evolution and consider how their experiences can be integrated into our digitally enhanced lives."

Ana Gassie, Senior Content Strategist



Vision Pro, poised for cautious acclaim, hinges on creative use cases and content depth. Initially a hit in entertainment, its long-term appeal may wane due to headset weight and novelty. Manufacturing constraints will limit its market, spurring Apple to develop and drive demand for a 'lite' version. The most exciting commercial prospects lie in luxury, aligning with early adopters' preferences, and spatial commerce, offering personalised, high-end experiences."

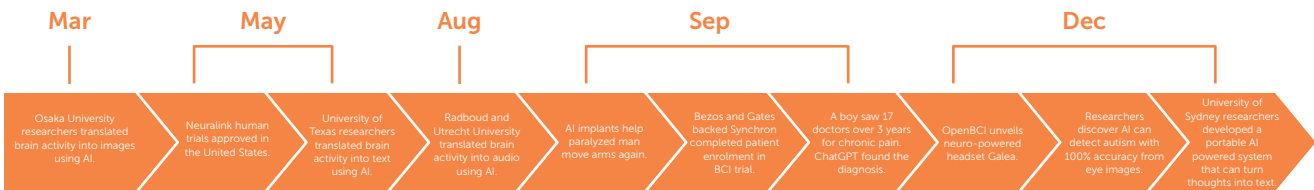
Alex Black, Director of Project Management



The focus in 2024 will be on augmented reality, evident from headset developments from Apple, Meta and Varjo. It's not just for traditional gamers but for everyday life and productivity. Expect a new breed of gamers, with Pokémon Go as a forerunner. Beyond hardware, industries like gaming will increasingly use AI for asset production and avatar creation. Techniques like Gaussian splatting will be integrated into rendering engines, enhancing visuals on low-computing devices."

Victorien Sonneville, Senior Creative Technologist

OpenBCI is a company challenging the traditional conscious way in which we interact with these computers, where input is carefully thought through before being deployed. In December 2023, OpenBCI revealed their Galea Beta headset, the first device that integrates EEG, EMG, EDA, PPG, and eye-tracking into a single headset – or simply, the device tracks heart, skin, muscle, eye and brain activity and translates it into output automatically.⁹⁷ However, although the tech is here and research on BCI and AI is progressing (timeline below), these types of devices likely won't see mass adoption anytime soon due to current high cost of development and limitation to B2B cases in specific industries, like healthcare.



Associate Director of Experience Design, Thomas De Vos,
shared his thoughts on the future of BCI:

"As we look towards the impact of brain-computer interfaces and AI advancements in 2024, we see a landscape of both promise and caution. The year is marked by significant improvements in AI models, making them more accurate and versatile than ever before. This leads to enhanced abilities in visualisation and the development of more sophisticated robotic models. However, these advancements have sparked intense discussions about the freedom of thoughts and privacy, as there is a growing concern over the potential misuse of this technology for extracting confidential information. Predictions for 2024 suggest that while there will be notable advancements in health audits and the creation of more efficient, tailored medicines, these developments will not be without their controversies. There are anticipated discussions to limit BCI technology, reflecting public apprehension about the ethical implications of such intimate integration of technology and biology. Public backlash against invasive implants is also expected, highlighting concerns over personal autonomy and the invasiveness of these technologies."

Smart glasses

Meta Ray-Ban Smart Glasses have received impressive upgrades - a 12-megapixel camera, live-streaming option and AI assistance allowing users to get information about objects in front of them.⁹⁸ And though they don't have AR or VR capabilities yet, it's assumed they didn't want to rush it. It's expected that future editions of the Smart Glasses will have the HUD (head-up) display. Meta RayBan Smart Glasses come at a very affordable price tag of approximately \$300.

Unlike Ray-Ban Smart Glasses, the Amazon Echo Frames Generation 3 released the same year don't feature a built-in camera for snapping photos and video, and neither do other recently released 'smart' glasses from Bose, Vue or Razer. While Amazon's Alexa AI is present in the glasses, the glasses don't really offer something beyond what a pair of earbuds connected to a voice assistant is already capable of - like playing and pausing sound, making calls, and setting reminders. The Amazon smart glasses come at a price of \$270, but social listening reveals that most users are opting for Meta smart glasses over an insignificant \$30 difference in pricing.

AI wearables

In 2023, Humane released their AI pin for \$700,⁹⁹ positioning it as an alternative to smartphones. However, social listening indicates that consumers remain sceptical. The device features a monochrome interface that projects onto the user's palm and primarily interacts through a speaker - not ideal for noisy environments. Moreover, the device is not waterproof, lacks payment capabilities, and is restricted to the 'Humane' network, specifically T-Mobile.

Another interesting gadget, the Rewind Pendant has been introduced to the market.¹⁰⁰ It records the wearer's spoken words and ambient sounds throughout the day, transcribes the recording, then encrypts it and stores the transcription locally on the user's phone. The companion Rewind AI app is currently available for iOS devices and is expected to launch for Windows soon. Notably, the app functions independently of the pendant. Backed by Sam Altman,⁴² this start-up has received 170 investment offers and achieved a valuation of \$350 million in 2023. Reports towards the end of the year also hinted at a collaboration between Sam Altman and Jony Ive, suggesting they might be developing OpenAI's inaugural hardware product.⁴³

It appears that the future is trending towards a world without the need for smartphones. However, the current alternatives, including noteworthy devices like Rabbit R1, haven't yet presented a compelling enough case to dethrone smartphones. These devices, though innovative, offer solutions that may not be the most appropriate for the correctly identified user problems. Future iterations of these devices must address challenges such as their reliance on constant internet connectivity, the necessity for users to create and manage multiple accounts to ensure seamless operation, or high pricing and additional subscription costs. As technology progresses, it's anticipated that wearables will evolve to overcome these challenges, ultimately leading to their broader adoption.

Blockchain – re-emergence and resilience despite setbacks

Jan	- The launch of Bitcoin NFTs, known as Ordinals, occurred.
Feb	- A new token standard, ERC-6551, was introduced.
Mar	- The new token standard BRC-20 was unveiled. - Meta cancelled NFTs on Facebook and Instagram.
May	- New token standards were introduced: ERC-721C, BRC-721E, and SRC-20. - The EU adopted new rules on markets in crypto-assets (MiCA). - Bhutan announced a \$500 million fund dedicated to crypto mining. - Visa launched a blockchain pilot for farmers.
Jun	- Statista data showed a continuing rise in cryptoasset users worldwide. - Mastercard filed for blockchain-related trademarks.
Aug	- Shopify integrated Solana Pay. - PayPal launched its stablecoin.
Sep	- MetaMask added support for Solana and Bitcoin. - A report revealed that the majority of NFTs had become worthless.
Nov	- SBF, the founder of the crypto exchange FTX, was convicted of fraud and related crimes. - Phantom wallet added a Cross-Chain Swapper for SOL & ETH. - SEC charged crypto company Safemoon for fraud.
Dec	- ORDI grew by 50% since its launch. - El Salvador launched the "Freedom Visa" program in partnership with Tether. - Dapp Radar data revealed that 5 crypto games reached millions of daily unique active wallets. - The launch of a Bitcoin ETF was set for January 2024.

The blockchain landscape in the past year has been a mixture of novelties and significant setbacks. High-profile incidents like the FTX founder's fraud conviction¹⁰⁵ and the devaluation of most NFTs have cast shadows over the industry. However, amidst these challenges, blockchain has shown remarkable resilience and capacity for growth. This year's timeline highlights both the hurdles and triumphs of blockchain, from the introduction of the new European Markets in Crypto-Assets (MiCA) regulation and new token standards to the involvement of major financial players like Visa and Mastercard, paving the way for a more integrated, digital, and financially innovative future.

5.1. First NFTs living directly on the blockchain

Bitcoin Ordinals are Bitcoin NFTs that allow embedding data directly onto the individual Satoshi – the smallest unit of bitcoin.¹⁰⁶ 1 Bitcoin = 100,000,000 Satoshi. Being able to embed non-financial data like text, images, and other digital artifacts directly onto the Bitcoin blockchain is revolutionary, because on competitor chains like Ethereum, NFTs are typically tokens that point to an external URL where the non-financial data is hosted and stored. Common storage systems include IPFS (InterPlanetary File system) or Arweave. Basically, if storage systems 'go down', all the images, text and other data go down with them. The price of the Ordinals token ORDI was up 50 percent in December 2023, since its January launch.¹⁰⁷

5.2. New token standards

Token standards are a set of rules that define how digital tokens should behave within a specific blockchain system. Notable standards introduced include Ethereum standards ERC-6551 and ERC-721C, as well as bitcoin standards BRC-721E, BRC-20 and SRC-20.¹⁰⁸

BRC-721E simplifies the migration of Ethereum NFTs to Bitcoin, where they can start to live as Ordinals. BRC-20 is meant to aid minting and trading of Ordinals and SRC-20 offers an extra level of decentralisation compared to BRC-20, ensuring data stays within the Bitcoin network.

ERC-6551 allows an NFT to act like an app. This means that this NFT can collect tokens, earn rewards, and communicate with other NFTs, eliminating dependency on the wallet holding it. When we create game making use of this new standard, the character the user creates can be an NFT that evolves. This makes games more attractive, because even if the user falls out of love with the game – they can still trade the character transparently on the blockchain and earn money.

ERC-721C enforces on-chain, programmatically enforced royalties earned from NFTs. It allows creators to choose where their NFTs will be sold and limit interactions with specific contracts and applications, ultimately preventing exchanges from being able to platform other people's works freely and for their own benefit.



Victorien Sonnevile, Senior Creative Technologist, suggests blockchain enthusiasts should keep an eye on February and April 2024: *“In February, The Ethereum network is set for the Cancun upgrade, introducing proto-danksharding aka. EIP-4844 standard. Despite its unusual name, this mechanism aims to slash transaction costs significantly. The anticipated outcomes are a surge in adoption and usage, as well as a boost in innovation and development. In April, a critical event for Bitcoin, the halving, is scheduled. Post-halving, new Bitcoin blocks will generate only half of their current output. This isn’t new; it’s a recurring event designed to regulate Bitcoin’s total supply. Historically, each halving has triggered a spike in Bitcoin’s price, often uplifting the entire crypto market.”*

5.3. Beyond the monkey pictures

Although the Bored Ape Yacht Club monkey NFTs come to mind as a prominent example in blockchain discussions, the field is witnessing numerous significant advancements beyond such cases. Shopify, one of the top five eCommerce platforms worldwide, has integrated Solana Pay,¹⁰⁹ allowing users to pay with cryptocurrency and for brands to gate content and give discounts to holders of specific NFTs. Tokengated commerce, or allowing NFT holders to access exclusive content and discounts, further facilitates loyalty and audience growth, and allows brands to create customer segments based on NFT ownership.

Visa’s pilot for programmable finance in Brazil¹¹⁰ powered by blockchain technology showcases a practical, real-world application of this versatile technology. Visa identified the struggle of Brazilian farmers in accessing financing due to rigid market structure as well as the need for a more efficient way to get the best prices for crops. The solution Visa came up with allows farmers crops to be tokenised on the blockchain, creating a two-sided market, aligning demand and supply. Smart contracts enable real-time settlements, allowing farmers to receive payment in their preferred currency. Key behind the success of this case is that the process was made accessible and easy, and all complexity has been kept in the back end – ensuring a user-friendly front-end experience.

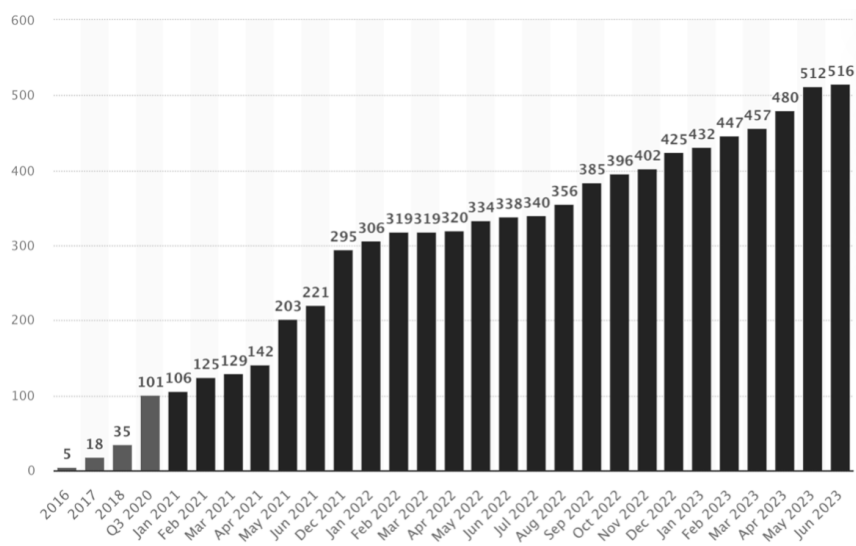
Mastercard’s trademark application garnered attention and intrigue. The application, discovered by patent attorney Mike Kondoudis, indicates Mastercard’s intention to develop software specifically optimised for bitcoin and blockchain-based transactions.¹¹¹ Another financial giant, PayPal, launched their own stablecoin, PYUSD, on the Ethereum blockchain.¹¹²

Metamask wallet integrating Solana and Bitcoin support, and Phantom wallet, adding a cross-chain swapper allowing easy token bridging across Solana, Ethereum and Polygon,¹¹³ indicates a growing ecosystem and user base – as

further corroborated with data collected by Statista from 2016 to June 2023. The data indicates users have grown from 5 to 500 million from 2016-2023.¹¹⁴

Moreover, the regulatory landscape began to adapt, with the European Union introducing the groundbreaking Markets in Crypto-Assets (MiCA) regulation,¹¹⁵ setting a global precedent for crypto governance. This move, along with others like Bhutan’s ambitious plan for a \$500 million crypto mining fund, signalled a recognition of the need for balanced oversight and the potential for sustainable growth in the sector.

With challenges abound, the persistent rise in identified cryptoasset users worldwide, and the entrance of financial giants like Mastercard and Paypal into the blockchain space with their respective innovations, affirm the enduring allure and potential of blockchain technology. This chapter delves into these contrasting narratives, exploring how blockchain continues to shape – and be shaped – by a world increasingly digital, interconnected, and in search of new financial paradigms.



Number of identity-verified crypto asset users globally from 2016 to June 2023, in millions.

Source: [Statista](#).

5.4. Blockchain games are on the rise

Multiple games have reached millions of daily unique active wallets in December, according to Dapp Radar data.¹¹⁶

MotoDEX is an NFT game, competition of multi-level racing on motorcycles on high-speed tracks with unlimited opportunities for players.

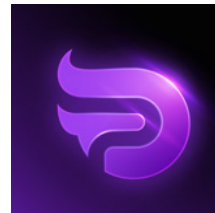
Sweat economy is a dynamic NFT game where players earn SWEAT tokens, solely by movement. The purpose of SWEAT is to bring real value to movement, and thereby incentivises people to get moving. Game's Sweat wallet, available on both for Android and iOS, has thousands of reviews with more than a 4.5/5 star rating.

PipeFlare offers 17+ blockchain-based games where users can play, compete, and earn rewards. PipeFlare allows gamers to collect, buy, sell, and trade unique digital assets like in-game items and digital art.

01 MotoDEX [UAW 2M, UAW +244,96%, TXS 4.54M, TXS +225,44%]

02 Sweat Economy [UAW 1.05M, UAW +11,09%, TXS 7.35M, TXS -1,89%]

03 PipeFlare [UAW 1.04M, UAW +103,27%, TXS 1.14M, TXS +81,06%]

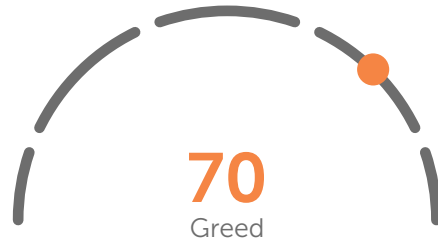


Top blockchain games based on UAW (unique active wallets) and TXS (transactions) in the last 30 days.

Source: [Dapp Radar](#).

5.5. Fear and greed index

Investor confidence in the crypto market has surged since early October, as evidenced by CoinMarketCap's Fear and Greed Index hitting a record high in December – surging above 70. Indexes by other providers place it as the highest since November 2021's peak bull run.



CoinMarketCap Fear and Greed Index, December 2023.

Source: [CoinMarketCap](#).

In 2024, businesses need to navigate the space with a strategic approach, leveraging the technological advancements and expanding user base while staying abreast of regulatory changes and market fluctuations. This technology must be approached with a thorough understanding of its risks and an adaptable strategy that can respond to the rapidly evolving nature of the blockchain sector. With the right partner, businesses can use blockchain for improvements in various areas – especially customer engagement and loyalty.



Crypto's been in a bear market since February 2022 – a time for tech advancements, proven by 2023's progress. 2024's focus is on user-friendly blockchain interaction and cutting transaction fees. Upgrades like L2 and Ethereum's rollups aim to broaden usage. Expect a rise in blockchain's non-financial applications, like zero-knowledge proofs for authentication or event admission as seen in the cases of Zuzalu, Zupass, Zupoll and Zucast."

Victorien Sonnevile, *Senior Creative Technologist*

Emerging consumer trends

While established consumer profiles such as digital nomads, sustainability advocates, health tech adopters, privacy-conscious users, and ethical shoppers will continue to be relevant, this section highlights consumer profiles that rose in prominence in 2023 and may have a significant impact in 2024.

6.1. Diverse gamers

The UIs we're designing are no longer just two-dimensional, and the audiences we're designing them for are no longer homogenous.

239%

more time is dedicated by men to gaming compared to reading books. Women dedicate the same amount of time to both activities. (WordsRated, 2023)¹⁴⁶

47%

of console gamers in the US are women. About 52% of Nintendo Switches are female-owned. (PlayerPulse study by Circana, 2023)¹⁴⁷

87%

of US moms are gamers. Gamer moms are reported as more likely to have a closer bond with their children, feel more hopeful about children's future and can more easily relate to their children. (Activision Blizzard Mom's Got Game Report, 2023)¹⁴⁸

46%

of gamers in US are women and 47% in the UK. (Statista, 2023).¹⁴⁹

3,7 billion

gamers exist worldwide, according to latest data. (DFC Intelligence's Global Game Consumer Market Overview, 2023)⁹⁵

6.2. AI companion seekers

Your customers are anthropomorphising AI and attributing it human characteristics. They will expect nothing less but human or near human experiences online. One of the most visited AI websites in 2023 was Janitor AI,⁴⁵ which offered NSFW (Not Safe For Work) AI chatbots without filters, simulating roles such as jealous, BDSM-involved, or drunk partners.

2,400%

search increase for AI girlfriends. (Google Trends Data, 2023)¹⁵⁰

1 in 5

men on dating apps are turning to AI in hopes of scoring better responses from potential matches. (Attractiontruth Study, 2023)¹⁵¹

55%

of netizens say "please" or "thank you" when speaking to a digital or AI assistant. (@nickkrewson poll, 2023)¹⁵²

11%

boost in AI chat performance is achieved when users interact with it positively and politely. (Cornell University study, 2023)¹⁵³



The rise of virtual entities might inadvertently boost the value of human interaction. As virtual avatars become standard in social training and as daily coaches for those with specific needs, we're likely to see a heightened demand for human assistants, acknowledging the unique subtleties of human touch. However, this doesn't imply that virtual assistants will be less in demand. The choice between virtual and human assistance will largely depend on the consumer's purchasing power."

Thomas De Vos, Associate Director of Experience Consulting

6.3. Resourceful researchers

Consumers are increasingly turning to social media and AI assistants, in addition to search engines, for their research and shopping needs. Consequently, an effective SEO strategy must now encompass not just search engines and social media, but also AI assistant tools. These same consumers are increasingly using voice to interact with various interfaces and conduct their research.

40%

of young people, when looking for a place for lunch, go to TikTok or Instagram. (Google's Senior Vice President Prabhakar Raghavan, 2022)¹⁵⁴

9%

of consumers already prefer to use AI chatbots to get answers to their questions over online search or social. (Hubspot, The State of AI in Marketing Report, 2023)¹⁵⁵

42%

of professionals think they'll use AI-powered chatbots over search engines in the future. (Aberdeen Strategy & Research, 2023)¹⁵⁶

62%

of 18+ (US) consumers use a voice assistant on any device, and those devices can include speakers, smartphones, TV remotes, in-car systems, a computer/laptop, and tablet. (NPR & Edison, 2022)¹⁵⁷

6.4. Old-normal opponents

Latest numbers reveal people still have a fear of returning to old norms, e.g., they still prefer a 4-day working week and prefer hybrid or remote work.

81%

of workers prefer a four-day work week. (Bankrate, 2023)¹⁵⁸

68%

of employees support a hybrid schedule instead of an in-person schedule, and of those workers, 73% would be willing to make a sacrifice at work to attain a hybrid schedule. (Bankrate, 2023)¹⁵⁸

56%

of employees are willing to accept a lower-paid job in exchange for a better work-life balance. (Hays Salary & Recruiting Trends report, 2023)¹⁵⁹

6.5. Longevity advocates

There is a shift towards medical (longevity clinic) instead of holistic (wellness/ spa), a market's direct reaction to growing aging population. Additionally, due to a rise in demand for inclusivity and fighting against agism, we're seeing a shift from negatively charged 'fight aging' towards a more positive 'extend life' terminology. While the aging population is seeking to extend life, Gen Z and Alpha generations are driving the pre-juvenation or preventative aging trend. Discussions such as the 'Sephora Kids Epidemic,' initiated by beauty retail employees concerned about 10 and 13-year-olds purchasing products designed for other consumers, are expected to remain prominent in 2024.

3800%

growth in the popularity of a search term "fight aging" in the US. (Google Trends, 2022)¹⁶⁰

70%

of global investment in longevity clinics happens in the U.S., says Phil Newman. (Wall Street Journal, 2023)¹⁶¹

22%

of the global population will be over 60 years old in 2050, compared to 14% in 2022. This percentage is expected to reach 30% in 2100. (Statista, 2022)¹⁶²

68%

of Gen Z and Alpha combined reportedly already have a skincare routine. (Global Cosmetic Industry, 2022)¹⁶³



Conclusion

Aligning new technologies with clients needs

Addressing trends and new technologies requires a strategic approach, considering their impact and implementation costs. At Emakina and EPAM, we meticulously align these technologies with the real needs of our clients and their customers, focusing on human-centric solutions.

For example, our proficiency in creating realistic metahuman assistants powered by AI showcases our capabilities. However, we also recognize that AI chatbot assistants, which offer real-time, personalized recommendations, can be more impact-cost efficient for many businesses. Both the metahuman and chatbot approach powered by AI can enhance customer satisfaction and drive sales but come at different costs. This strategy aligns with the current trend where 69% of customer support leaders plan to invest more in AI, acknowledging its potential to reduce costs and provide a competitive edge.

69%

of customer support leaders plan to invest more in AI in the year ahead, but only 38% have actually done so. (Intercom The State of AI in Customer Service Report, 2023)⁸⁶

60%

of customer support leaders expect to reduce support costs with AI and 72% see AI as competitive advantage. (Intercom The State of AI in Customer Service Report, 2023)⁸⁶

2024 will be the year of spatial computing and AI-powered software and hardware. These advancements will focus on user-friendly interfaces that mask underlying complexities. Increasingly, future interfaces will facilitate implicit interactions and allow control through motion, voice, and, eventually, thought. This is further evidenced by the recent news of the first human recipient of a Neuralink brain implant.

In systems that enable implicit interactions, the system interprets user behaviour or presence in specific contexts, rather than relying on direct commands. Unlike explicit interactions, such as mouse clicks, implicit interaction systems, like AR mirrors, are driven by sensors or vision and depend on detecting user actions or presence. Looking ahead with AI advancements, we can anticipate that even voice assistants might start offering more implicit interactions. Soon, explicit commands like "Hey Siri" might become unnecessary as these systems evolve to understand and anticipate user needs more intuitively.



Our Burberry Virtual Catwalk experience garnered a lot of attention during the Burberry Innovation Day 2023. Built using Unreal Engine, the experience featured a mix of implicit and explicit interactions. Users pressed buttons to change the weather on the catwalk, while the panning and zooming of the camera automatically adjusted based on their hand movements.

Image source: LinkedIn, Phil Wilce, Senior Creative Director.

Experience video: [Vimeo](#).



Over two decades, AI's progression, especially in enhancing customer experiences, has led to a pivotal change in the way we interact with technology. Causal AI and Intelligent Agent advancements are set to improve assistive technologies, making daily tasks more efficient and automated. This shift will redefine digital service design, moving from traditional interfaces to customer-agent interactions."

Lee Allen, *Principal Experience Consultant*

This intuitive need satisfaction is not limited to user interfaces; it extends to customer relationship management and marketing in an era where AI-powered content management, creation, and automation are becoming the norm, brands can no longer take a one-size-fits-all approach with their users. Instead, the user journeys are becoming increasingly personalized, tailored specifically to everyone's preferences and behaviours. Although personalization has been a growing trend over the years, AI is significantly enhancing its depth and impact, raising user expectations. For many users, a simple replacement of the name that the brand is addressing within an email is no longer sufficient for genuine engagement.

As we move forward into 2024, Emakina and EPAM's approach is centered not only on embracing technologies like Large Language Models, Multimodal Large Language Models, and State Space Models, but also on exploring innovative solutions such as metaverses, virtual humans, blockchain solutions and beyond. Throughout the year, our focus will remain on maintaining a strategic balance between technological innovation and responsibility. We aim to ensure that our advancements are not just at the forefront of technology, but also deeply grounded in human-centric solutions and strategic foresight.

Unleashing the potential of AI and advanced technologies

At Emakina, an EPAM company, we recognise the importance of creating experiences that not only keep pace with the latest advancements but also meet the evolving needs of your users. Are you ready to explore the opportunities behind the latest trends and technologies?

Our Experience Design and Innovation teams are dedicated to ensuring that the experiences we create for your users are relevant, personalised, and consistent across all touchpoints. Whether you are curious about innovating digital experiences or already ready to take the leap, our teams are eager to assist you.

[Contact our experts](#)

About Emakina, the User Agency

Emakina is a digital agency with global reach. It is part of Emakina Group, an EPAM Systems Inc. (NYSE: EPAM) company. Its technology and marketing experts work with customers to develop high performance marketing and creative solutions for business challenges, from cutting-edge applications, websites, and eCommerce projects to impactful content and campaigns. As the ambassadors for users, Emakina places the user's requirements and expectations at the heart of every digital experience. This approach offers the agency's customers and their brands a privileged relationship with consumers of the digital age.

Learn more at www.emakina.com.



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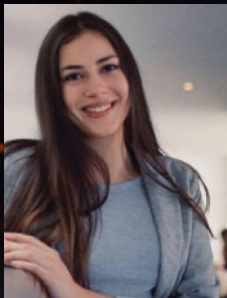
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Innovative brand experiences tailored for tomorrow's users

Team up with our experts to start unlocking opportunities behind the latest trends, and start designing experiences your users dream of.



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Glossary

AI Chatbots: AI software that can simulate a conversation (or a chat) with a user in natural language through messaging applications, websites, mobile apps, or through the telephone.

AR (Augmented Reality): An interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information.

Bull Market (Crypto): A period of rising prices and investor confidence. During this time, the demand for cryptocurrencies like Bitcoin and Ethereum typically surpasses supply, leading to an increase in market prices.

Bear Market (Crypto): A period where prices consistently fall, often reflecting negative investor sentiment. Factors such as regulatory issues, technological challenges, or economic downturns can contribute to this decline, with supply exceeding demand and driving prices down.

BCI (Brain-Computer Interface): Technology that facilitates direct communication between a brain and an external device.

Blockchain: A decentralised digital ledger used to record transactions across multiple computers securely.

CGI (Computer-Generated Imagery): The application of computer graphics to create or contribute to images in art, printed media, video games, films, television programs, shorts, commercials, videos, and simulators.

Cross-Chain Swapper: Technology that allows for the exchange of tokens across different blockchain platforms.

DAU (Daily Active Users): A metric in web analytics that shows the number of unique users who visit a site in a day.

Digital influencer: An individual who uses social media, blogs, or other digital platforms to influence the opinions or behaviours of their audience, often through content creation.

MAU (Monthly Active Users): A metric in web analytics that shows the number of unique users who visit a site in a month.

Netizens: Term used to describe internet users. Originates from terms internet and citizens ('citizens' of the internet).

EDA (Electrodermal Activity): The property of the human body that causes continuous variation in the electrical characteristics of the skin.

EEG (Electroencephalography): A method for monitoring electrical activity in the brain.

EMG (Electromyography): A technique for evaluating and recording the electrical activity produced by skeletal muscles.

LLMs (Language Learning Models): AI models designed for processing, understanding, and generating human language.

Metahuman: A highly realistic human character model created using 3D digital tools, often used in video games, films, and other digital media.

Metaverse: A virtual-reality space where users can interact with a computer-generated environment and other users.

Multimodal AI: Artificial Intelligence systems that can process and understand various forms of data input (like text, images, audio, video) and generate multifaceted outputs.

MLLMs (Multimodal Large Language Models): More advanced AI models that can process and understand multiple types of data inputs, not just text. These inputs can include images, audio, and video, in addition to text.

NFT (Non-Fungible Token): A type of digital asset verified using blockchain technology, representing ownership or proof of authenticity of a digital item.

Ordinals: A concept in Bitcoin NFTs that allows embedding data directly onto the individual satoshi, the smallest unit of bitcoin.

PPG (Photoplethysmogram): A technique used to detect blood volume changes in the microvascular bed of tissue, commonly used for heart rate monitoring.

Programmable finance: Financial services that use blockchain and smart contracts to automate transactions and agreements, reducing the need for intermediaries.

Sentiment analysis: The process of computationally identifying and categorising opinions expressed in a piece of text, especially to determine whether the writer's attitude towards a particular topic, product, etc., is positive, negative, or neutral.

Smart contracts: Self-executing contracts with the terms of the agreement directly written into lines of code.

Token standards (e.g., ERC-721C, ERC-6551, BRC-721E): Set rules defining how tokens behave within a blockchain system. Different standards are used for different purposes, such as trading, ownership proof, etc.

VR (Virtual Reality): A simulated experience that can be similar to or completely different from the real world, often used for gaming, education, and training.

Virtual character: A virtual character is a fictional, computer-generated persona which can range from realistic human-like figures to imaginative and fantastical creations, often found in video games, movies, or online platforms.

Virtual influencer: A virtual character is a fictional, computer-generated persona which can range from realistic human-like figures to imaginative and fantastical creations, and whose purpose is to influence the opinions of behaviours of their audience on social media, blogs, or other digital platforms.

WebGL (Web Graphics Library): A JavaScript API for rendering interactive 3D and 2D graphics within any compatible web browser.

WebGPU (Web Graphics Processing Unit): A new web standard and JavaScript API for accelerated graphics and compute, aiming to provide modern 3D graphics and improved computation capabilities.

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AI

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