techUK
FOR WHAT COMES NEXT

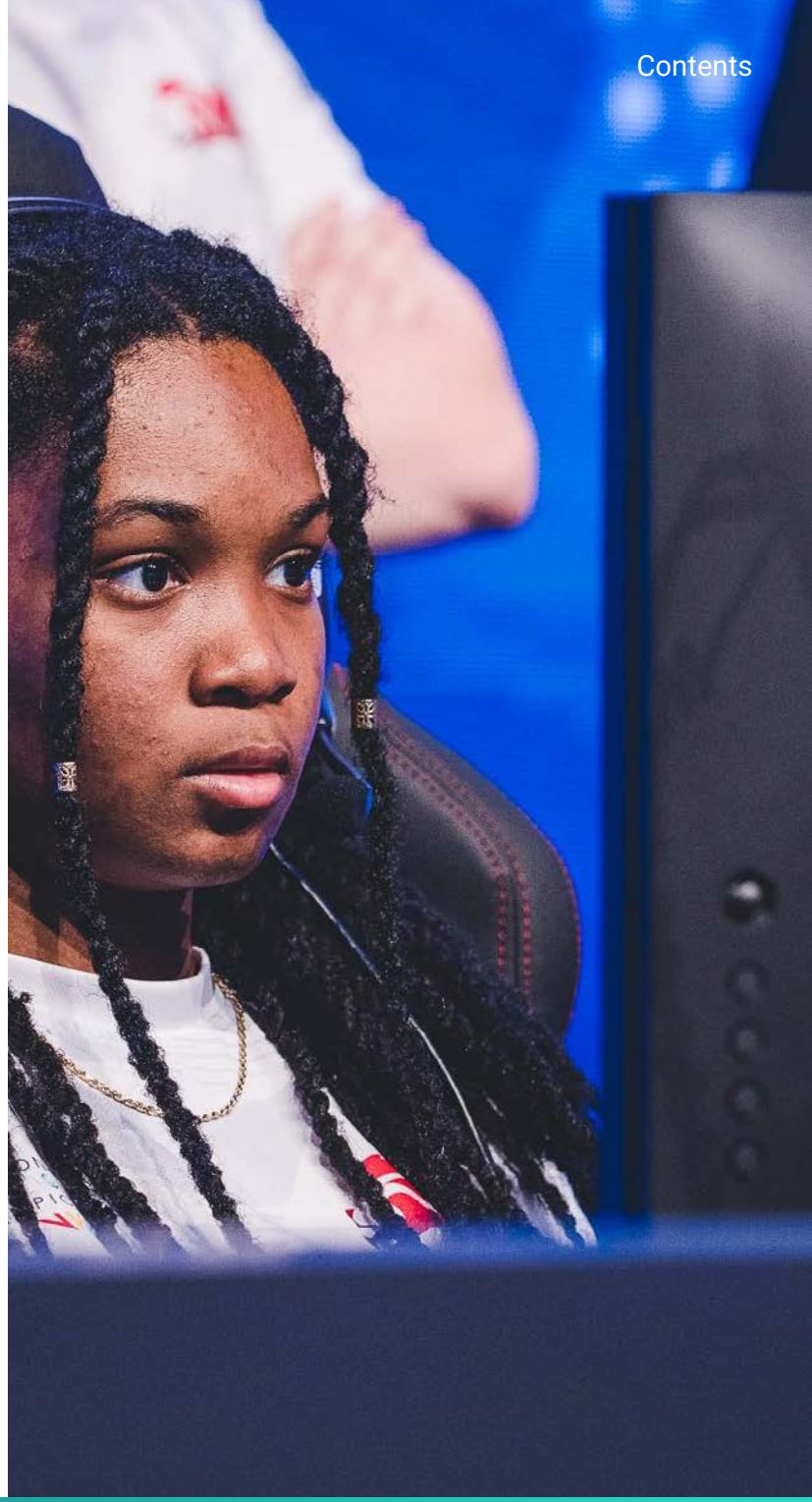
# Gaming & Esports Technologies of the Future

## A techUK report

**Unleashing the Potential of UK Tech and Innovation**

# Contents





# Introduction

The technologies that underpin gaming and Esports are transforming these industries before our very eyes. Artificial Intelligence (AI) is enabling players to customise their gaming experience like never before, immersive technologies like Augmented and Virtual Reality (AR & VR) are revolutionising how fans participate in Esports events and paving the way for gaming in the metaverse, while Web3 technologies like blockchain are driving the creation of a virtual gaming economy in which for the first time players are empowered to design, own, and transfer digital assets.

**From truly immersive virtual worlds to AI-driven gaming analytics, the UK is leading on the development and application of many of these technologies.**

Notable successes include the development of the ZX Spectrum home computer, creation of global hit video games such as Grand Theft Auto and Lara Croft: Tomb Raider, and introduction of the Esports BTEC qualification: the first internationally available qualification of its kind.[1]

The UK is also leading on the application of these technologies across non-game sectors. Notable examples of such cross-industry innovation 'spillovers' include the use of game engines to create state-of-the-art visual effects (VFX) for hit television shows and deployment of VR technologies to enhance the skillsets of surgeons and treat patients in the healthcare sector.[2]

However, future leadership is not inevitable. The technologies underpinning the gaming and Esports sectors of today will be different tomorrow and the UK's technology companies must continue to innovate if they are to stay ahead of the game.

**The potential reward is immense.**

**The global gaming industry generates more revenue than movies (i.e. box office sales) and music combined,[3] achieving a valuation of $184 billion in 2022, while the number of gamers is expected to hit 3.8 billion by 2026.[4] In the UK, the video games industry contributes over £6 billion to the economy and supports 76,000 jobs across the supply chain.[5] As of 2021, the impacts of video game technology 'spillovers' in other sectors of the UK economy included 9,900 jobs and £1.3 billion in economic output.[6] Almost 38 million people across the UK regularly engage with video games[7] while over 23 million people are predicted to participate in Esports by 2029.[8]**

The UK's technology sector will be crucial to driving these trends and translating them into economic growth. As outlined in techUK's Growth Plan, **the tech sector's Gross Value Add contribution to the economy now exceeds £150 billion, having risen by over 25% from 2010 to 2019.**

**This report sets out eight tech trends set to shape the gaming and Esports sectors of the future and, through advice for businesses and six recommendations for Government, proposes ways in which the UK can harness the technology sector's potential to lead on these.**

The content of this report has been informed by a six-month 'sprint campaign' – which ran from January to July 2024 - in which techUK's Technology & Innovation programme convened many of our 1100+ member organisations, along with Government, academia and wider stakeholders, to explore how the UK can turn its current success into future tech leadership. Activity has included:

- A workshop to facilitate coordination between gaming studios, network providers, and Government around unscheduled game updates causing unpredictable network peaks
- A roundtable, held just outside Leamington Spa's world-leading gaming cluster and featuring local gaming studios, Digital Catapult, DCMS and regional organisations, exploring what more the UK should do to incentivise investment in the key technologies underpinning the UK's gaming sector
- Panel discussions on immersive and metaverse gaming, the gaming industry of the future, and Esports to inform members of the latest technologies, trends and business opportunities
- Technology demos and networking sessions to showcase how our member organisations are developing or applying world-leading gaming technologies and facilitate discussion between key stakeholders across the industry

**There are no cheat codes for UK leadership in the gaming and Esports technologies of the future. The trends and recommendations set out in this report should serve as a useful guide for technology companies, Government, and wider stakeholders as we step up to the challenge.**

# Future Gaming & Esports Trends

## Enhanced Gameplay and Personalisation

AI will further enhance gameplay by shaping characters and worlds in response to (or in anticipation of) the player's actions or preferences.

## AI-Driven Content Creation

AI will increase the sophistication of gaming content, making experiences more engaging and empowering players to become creators.

## More Immersive Experiences

The gaming environment will increasingly become three-dimensional and multi-sensory, resulting in a more convincing and authentic player experience.

## More Persistent and Connected Environments

Players are increasingly coming together on metaverse gaming platforms to participate in a wide range of virtual experiences. These will be enabled by a web of connected technologies and take place in 24-hour worlds.

## Casual Gaming

Significant improvements in mobile, cloud, semiconductor, and Internet technologies mean that gaming is now more accessible than ever, enabling new demographics to participate in the experience.

## Ownership and the Web3 Economy

Web3 technologies are set to transform the gaming and Esports experience by enabling players, streamers, and communities of fans to participate in new forms of ownership and decision-making.

## Enhanced Broadcast & Viewing Technologies

Gaming will become easier and more engaging to watch as new technologies enhance the viewing experience.

## Social Gaming & Esports

Gaming experiences and Esports events are becoming increasingly social activities as technologies such as AI, AR, and VR enable players to consume, share, interact, collaborate, and compete in new ways.

# Recommendations for Government

**Recommendation 1: Ensure gaming is prioritised as a sub-sector within the new modern Industrial Strategy**

This will drive the creation of an ambitious and targeted sector plan that is designed in partnership with industry and intended to address barriers to growth. Such barriers include access to finance, investment, skills development, training, and business resilience, all of which were identified during techUK's gaming roundtable in early 2024. Any sector plan should ensure consistency between the 'creative industries' and 'digital and technologies' growth-driving sectors set to underpin the Strategy.

**Recommendation 2: Create a Future Gaming & Esports Strategy to set the foundations for long-term UK leadership**

This should improve the UK's understanding regarding the potential of these sectors, increase support for the wider gaming ecosystem, position the UK as a global pioneer, and ensure a coordinated and long-term approach to the strategy and investment necessary for UK leadership on the technologies that will underpin the gaming and Esports sectors of the future. While Scotland has already committed to developing a National Gaming Strategy, a UK-wide vision and action plan is also required.

**Recommendation 3: Incorporate an explicit focus on the use of AI in gaming in a future UK AI Strategy**

Doing so should help ensure that the UK's gaming sector continues to serve as a developer, incubator and early adopter of advanced AI models. This builds upon techUK's recommendation that the Government updates the UK's AI Strategy for the mid 2020s, as set out in **our Growth Plan**.

**Recommendation 4: Support the adoption of AR technologies with a particular focus on gaming**

The UK has a significant opportunity to lead on the development and adoption of AR technologies in gaming. Doing so could drive AR adoption rates in other sectors and leverage the UK's strengths in related technologies and fields. This builds upon techUK's recommendation that the Government develops a plan for the deployment of AR technologies alongside the UK Industrial Strategy, as set out in **our Growth Plan**.

**Recommendation 5: Accelerate the rollout of the UK's digital infrastructure by putting digital at the heart of reforms to the planning system**

Doing so should facilitate the development of the next generation of telecoms and compute infrastructure set to underpin the gaming and Esports sectors of the future. Such infrastructure will span 5/6G, Wi-Fi 7, and cloud. This recommendation is included in techUK's **Growth Plan**.

**Recommendation 6: Consider including gaming and social gaming as focus areas within a new online safety sandbox**

A joint regulatory sandbox for online safety would help test how new technological solutions can support the implementation of the Online Safety Act and Age-Appropriate Design Code. Including social gaming in the online safety sandbox presents an opportunity to test solutions at the forefront of technological innovation and societal change and would build on the Information Commissioner's Office's (ICO's) **Regulatory Sandbox**. This currently includes immersive technology and virtual worlds as one of its focus areas. It could also offer a valuable opportunity to explore innovative solutions for critical challenges such as age verification and tokenisation and their application in the gaming industry. This builds upon a recommendation set out in techUK's **UK Tech Plan**.

# Turning Trends into Leadership

**The eight future trends identified in this report illustrate how technologies are set to transform gaming and Esports by making them increasingly personalised, intelligent, interactive, immersive, accessible, decentralised, and social.**

This chapter explores each trend in turn, outlining which key technologies are set to underpin them, showcasing how techUK members and stakeholders are bringing them to life, and proposing ways in which the UK's technology companies can benefit from and shape the opportunities set to result from these trends.

For the purposes of this report, Gaming refers to "any interactive game operated by computer circuitry"[9] while Esports refers to "organised and competitive video gaming, often at a professional or semi-professional level, where players compete individually or in teams against other players, often at events with both live and online audiences."[10]

Esports competitions involve video games protected by copyright law. There cannot be Esports tournaments without the express permission of the Intellectual Property (IP) owner of the game itself. This report calls for a holistic approach that acknowledges such a relationship.

### Event round-up: Industries of the Future: Gaming

This **techUK webinar** explored the gaming industry of tomorrow and asked what steps businesses can take to lead in the development, commercialisation, application and adoption of the key emerging technologies that will underpin it.

*Artificial Intelligence*

**The UK is a world-leader in the development of AI. It is home to over 3000 AI companies which generate more than £10 billion in revenues and employ more than 60,000 people in related roles.**[11]

AI has been used by video game developers for decades, most notably to plan content or inform the behaviour of non-player characters (NPCs) and their interaction with players or the wider game environment.

Such applications have resulted in relatively minor improvements in the process of developing and playing video games.

However, recent advances in AI models promise to transform the very notion of developing, playing, and viewing games. The first future trend sets out how developers are utilising such models, in combination with their creative and artistic skills, to make gameplay more immersive, engaging, and personalised.

# Trend 1: Enhanced Gameplay and Personalisation

## Non-Player Characters (NPCs)

The concept of 'non-player characters' can be traced to the 1975 board game, Dungeons and Dragons.[12] This introduced the use of fictional characters that added to the player experience, typically through means that were instrumental (moving the story or game along), oppositional (slowing progress), allied (assisting the player), or atmospheric (making the experience more believable).[13]

Due to limited computer memory capabilities, early video games prioritised the inclusion of NPCs that fulfilled the first three criteria. These took the form of characters with predetermined scripts or movements. However, as computer memory and processing technologies have rapidly developed, so too have both the abilities of NPCs and the number of them in a single video game. In 2014, The Elder Scrolls Online was recognised for containing the most unique NPCs of any video game, at 10,202.[14]

Recent advances in AI models promise to transform how NPCs shape the gaming experience. NPCs are quickly becoming more intelligent, with their actions driven less by simple predetermined scripts and more by complex motivations, rules and goals. Picture bumping into a character that is aware of your gameplay up to that point and is able to suggest new quests based on your skill level or topics of interest. They are also becoming more customisable, enabling creators to build NPCs with distinct logic.

Such capabilities, when leveraged by developers in ways that more effectively bring their creative and artistic vision to life, will make future gaming experiences feel more personalised and immersive.

One AI model, called Language Agent for Role-Playing (LARP), employs a 'cognitive architecture' that enables NPCs to have long-term memory, smarter decision-making skills, and more intelligent interactions with the game environment. This could take the form of NPCs exhibiting emotional responses or discussing open-ended topics.[15]

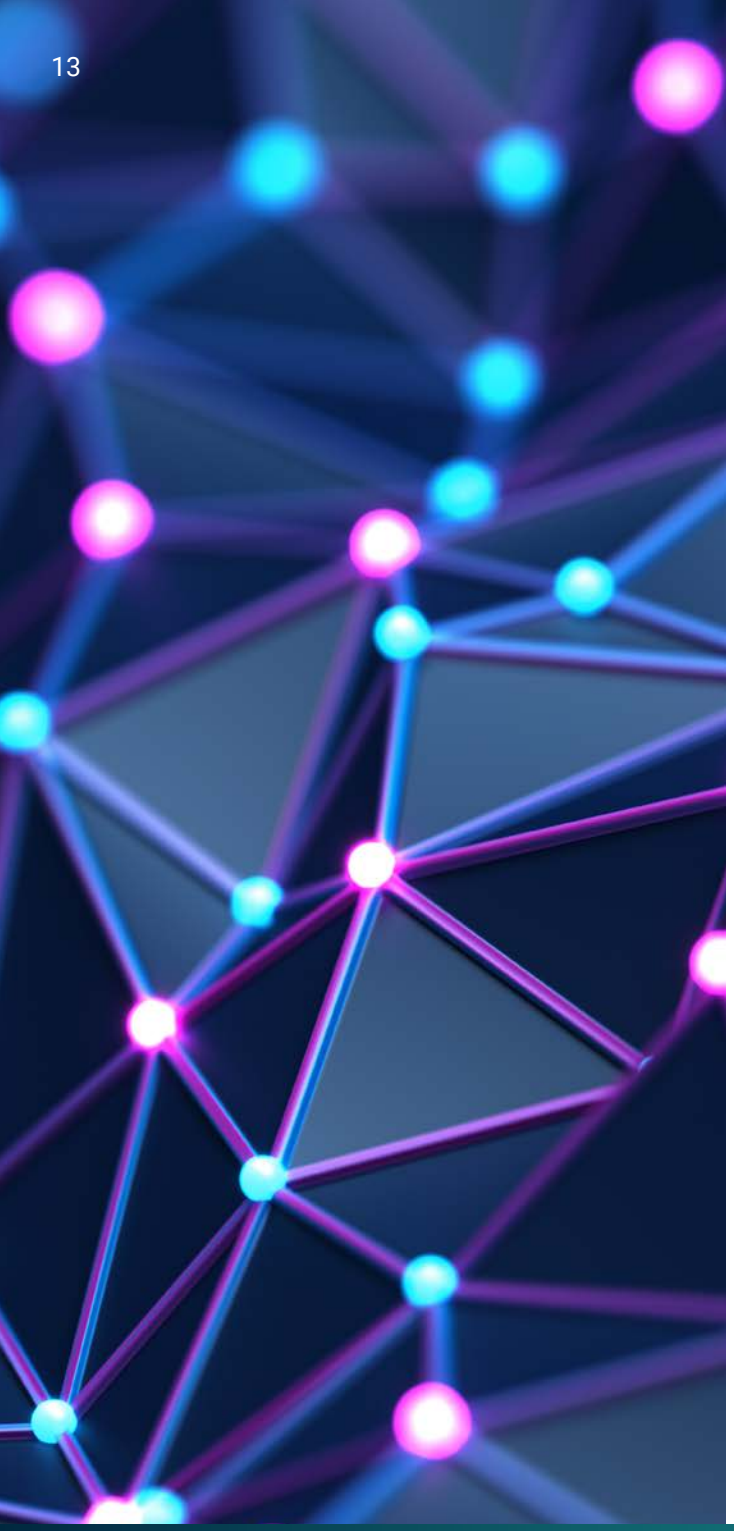
Models such as LARP will have numerous applications in sectors beyond Gaming and Esports. For example, their use in education could make learning more interactive and personalised, subsequently improving rates of engagement and information retention.

## Avatars


A game avatar is a digital representation or character that a player controls or embodies in a video game or virtual world.[16] Many avatars are now underpinned by detailed character models, giving them realistic movement, facial expressions, lip-syncing, and voice capabilities. They are also highly customisable, with options to select or purchase a virtually unlimited array of digital add-ons such as clothing or accessories. These items are increasingly tied to physical versions of the product that can be purchased directly through the game platform.

AI models are now accelerating these advancements by empowering developers to enhance avatars' visual details, expand their conversational abilities, create more lifelike animations, and generate new digital add-ons on an unprecedented scale. These will be complemented by improvements in immersive technologies which provide touch sensations that correlate with the actions of an avatar.

The development of more realistic, expressive, and customisable gaming avatars will have significant implications for a wide range of sectors. For example, e-commerce companies will be able to construct increasingly accurate and predictive models of consumer behaviour as they take data gathered from an avatar's virtual consumption patterns and apply these to the associated user in the real world. However, in turn, they must also be equipped to interact with avatars, most likely in the game environment itself.





## Large Language Models (LLMs)

> **Large Language Model: A model capable of understanding human language by processing vast amounts of text data.**[17]

LLMs were first used to great effect in a video game in the 2005 interactive story, Façade. This enabled players to converse with the game's characters by typing simple sentences.[18]

Over time, an almost exponential increase in the availability of data and computing power has resulted in the development of far more sophisticated LLMs. These provide the underlying technical infrastructure for computer programmes designed to simulate conversation with human users, commonly referred to as 'chatbots'. An example of a popular chatbot is OpenAI's ChatGPT.

Developers are increasingly embedding such chatbots and LLMs in video games. This is resulting in the introduction of AI agents (to guide players) or masters (or dictate or manipulate the environment) and creating truly living virtual worlds that evolve in anticipation of and response to those who inhabit them. This shift towards dynamic content, experiences, and pricing is producing gaming experiences that can more effectively capture a player's attention and convert this interest into engagement or purchases.

As seen through the lens of NPCs, avatars, and LLMs, the use of AI in video game development will only accelerate over the coming years. Success will require addressing several longstanding and emerging issues, including changing risks to user privacy and safety, concerns around the position of creators in relation to the development of Generative AI, and the technology's impact on copyright and Intellectual Property. Crucially, such issues cannot be separated from the development of the technology and how it may be applied.

The UK must also ensure that there is a robust pipeline of skilled workers with expertise in Science, Technology, Engineering, and Maths (STEM) to drive future AI innovations in gaming. onalised through the creation of a Future Gaming & Esports Strategy or by prioritising gaming as a sub-sector within the UK's modern Industrial Strategy, both of which are recommendations in this report.

# Case Study: Linklaters

*A massively multiplayer gaming company sought detailed advice from us regarding the implementation of AI in gameplay and development. As with many others in the industry, the company has long seen the significant opportunities AI provides to enhance player experience, improve game development and productivity, and offer new revenue streams.*

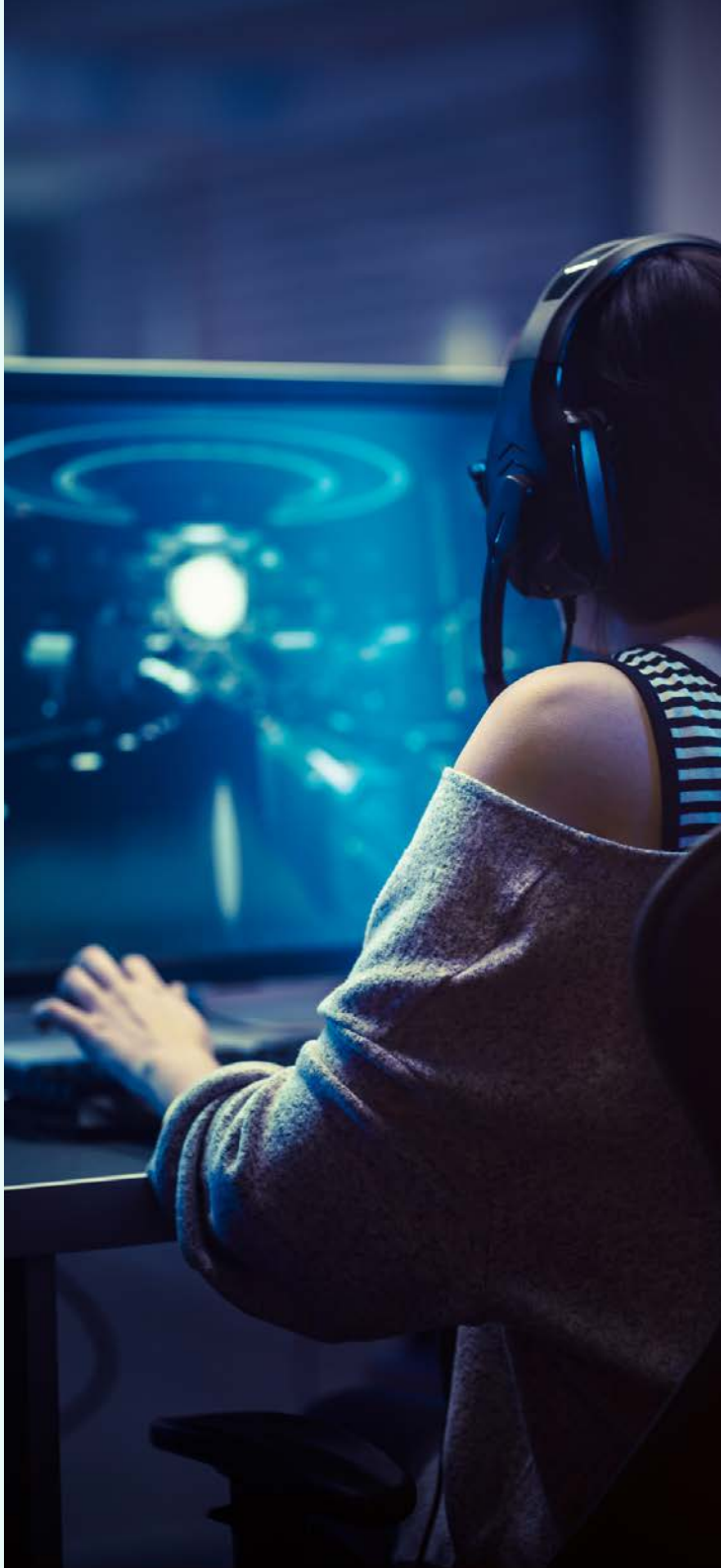
*However, as a responsible company dedicated to protecting the privacy and safety of its players the company wanted to ensure it addressed the evolving legal landscape, especially in the UK and EU, and establish the right governance and risk management models.*

*A key part of the advice was providing a policy on the use of AI with player data. The policy addresses GDPR compliance, accuracy and bias, MTX, engagement, dark patterns, cyber threats and defences, and AI governance.*

*The policy also provides guidance on onboarding third-party AI suppliers, with an AI supplier due diligence questionnaire and examples of acceptable and unacceptable clauses from the terms and conditions of market leading AI providers.*

*Our advice enabled the company to capitalise on existing and new AI work streams while respecting player safety and privacy.*

**Richard Cumbley, Partner and Patrick O'Connell, Managing Associate at Linklaters**



# Trend 2: AI-Driven Content Creation

**Developers are also utilising LLMs to drive the application of Generative AI to video game development and content.**

> **Generative AI: AI systems that can create new content, such as text, images, audio, video, visual art, conversation, and code** [19]

Gaming studios are increasingly leveraging Generative AI tools to make the production of video games quicker, more sophisticated, and more cost effective. Such tools complement the skillsets and creative abilities of human developers, enabling them to automate more manual tasks while freeing up their time and attention for creative or artistic ones.

According to research from Bain & Company, while less than 5% of video game content is currently developed using generative AI, gaming industry executives expect this figure to reach 50% in the next 5 to 10 years. [20]

Generative AI will also transform the in-game experience by driving procedural content generation. This process, in which algorithms play

a greater role in the creation of in-game assets and environments, will lead to the emergence of vast in-game asset libraries and truly expansive virtual environments (or 'worlds'). Such a shift should make the gaming experience more customisable and engaging.

These changes will benefit a wide range of companies, including studios looking to reduce risk or increase productivity when developing games, brands looking to create then sell virtual assets to gamers, and AI companies seeking new applications for advanced models.

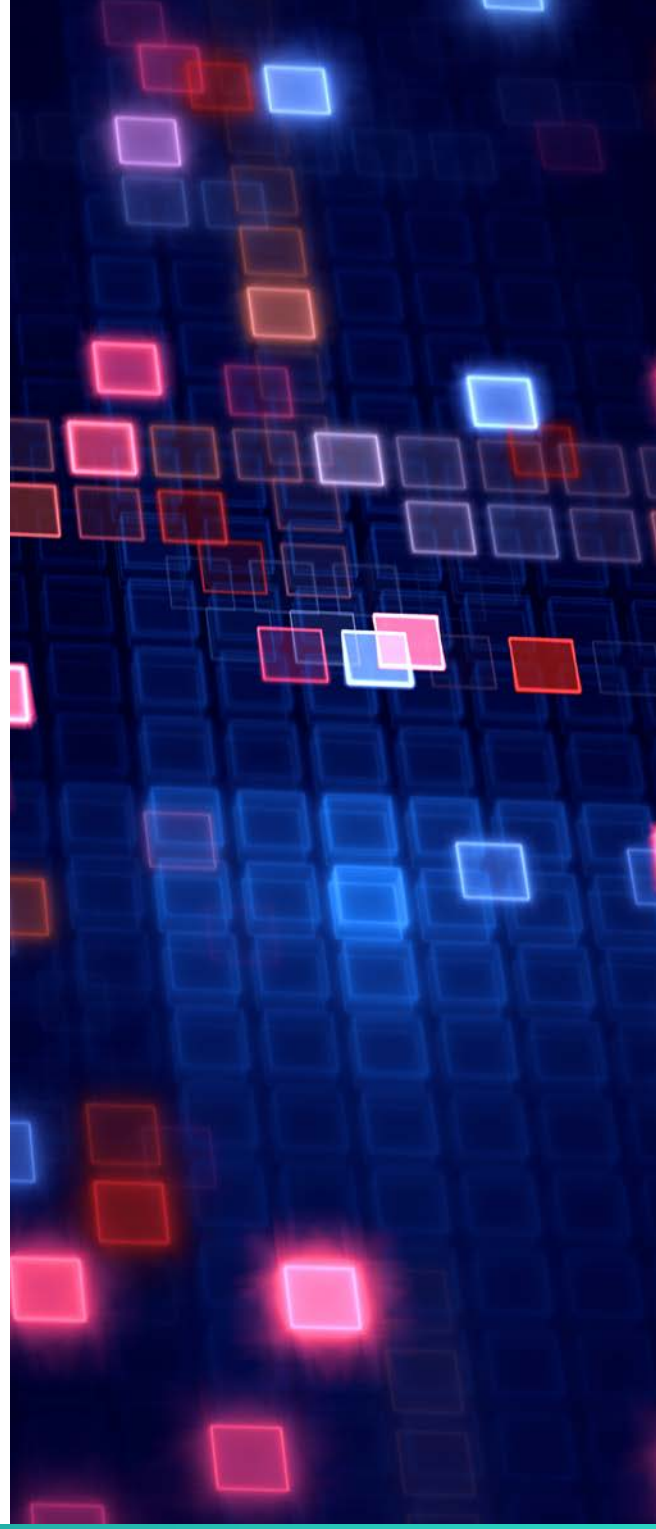
## Assets & Environments

In-game assets include personalised skins (a graphic download which changes a character's appearance), artwork, 3D models, and animations. These allow players to customise their gaming experience and creators to sell their content to the gaming community.

At present, many developers and studios are experimenting with the use of AI in the creation of virtual assets and environments. Specific use cases, including the production of concept art to assist human designers, have the potential to improve the quality and quantity of in-game content while retaining the important role of human artists and creators.

However, as confidence and investment in these tools grows, they will inevitably be used by developers to generate entire in-game environments. For example, in 2018, Nvidia published research showing how AI-generated visuals can be combined with a traditional game engine. The result was a driving simulator that utilises AI-generated graphics.[21] While such environments will be increasingly generated by sophisticated AI models, they will still be envisaged and shaped through the imagination, emotion, and intuition of human artists and creators.

Many types of company stand to benefit from the increasing use of Generative AI in the creation of in-game assets and environments. For example, brands will be able to create engaging virtual experiences for potential customers at lower costs and timeframes. This may disproportionately benefit smaller brands over larger, more established ones, as limited resource becomes less of a constraint to customer engagement at scale.



## User-Generated Content (UGC)

Perhaps the most significant use case for Generative AI in gaming will be the creation of user-generated content (UGC).

Many of today's most popular games are those in which users are empowered to create content of their own, with notable UGC platforms including Fortnite and Minecraft.

Platforms such as these equip gamers with tools with which they can create and modify everything from in-game clothing and accessories to the environment's structures and terrain. As a result, a whole new generation of gamers is emerging who could just as easily be described as 'creators' as they could 'players'.

> **As UGC platforms continue to grow in popularity, their use of Generative AI will become more ubiquitous, sophisticated, and embedded.**

Andreessen Horowitz, the US venture capital firm, predicts that this will occur in two phases; the first in which new Generative AI tools or platforms continue to serve as a co-pilot for creators and the second in which Generative AI is built into the game's engine or operating system from the ground up. The latter phase may be characterised by new user experiences, custom rendering capabilities, or even a new programming language made specifically for AI-powered creation.[22] Gaming studios are already investing in this future. In late 2023, Rockstar Games, the creators of the Grand Theft Auto (GTA) series, acquired FiveM, the community-driven server provider behind most of GTA's UGC.[23] This decision to integrate FiveM's multiplayer modification tools suggests that UGC will play an increasingly central role online gaming experiences.

Platforms are also increasingly leveraging AI to provide creators with more sophisticated analytics capabilities. These provide deeper insights about the game and improve the ability of creators to monetise their UGC.

Many companies could benefit from this shift towards AI-powered UGC in gaming. This includes brands wishing to tap into the ability of large online creator communities to imagine or design new products and technology companies seeking brand new approaches to designing everything from search engines to operating systems.

# Case Study: Tencent

*Tencent recently unveiled GiiNEX, an advanced game AI engine to power the next generation of games, including those being created here in the UK.*

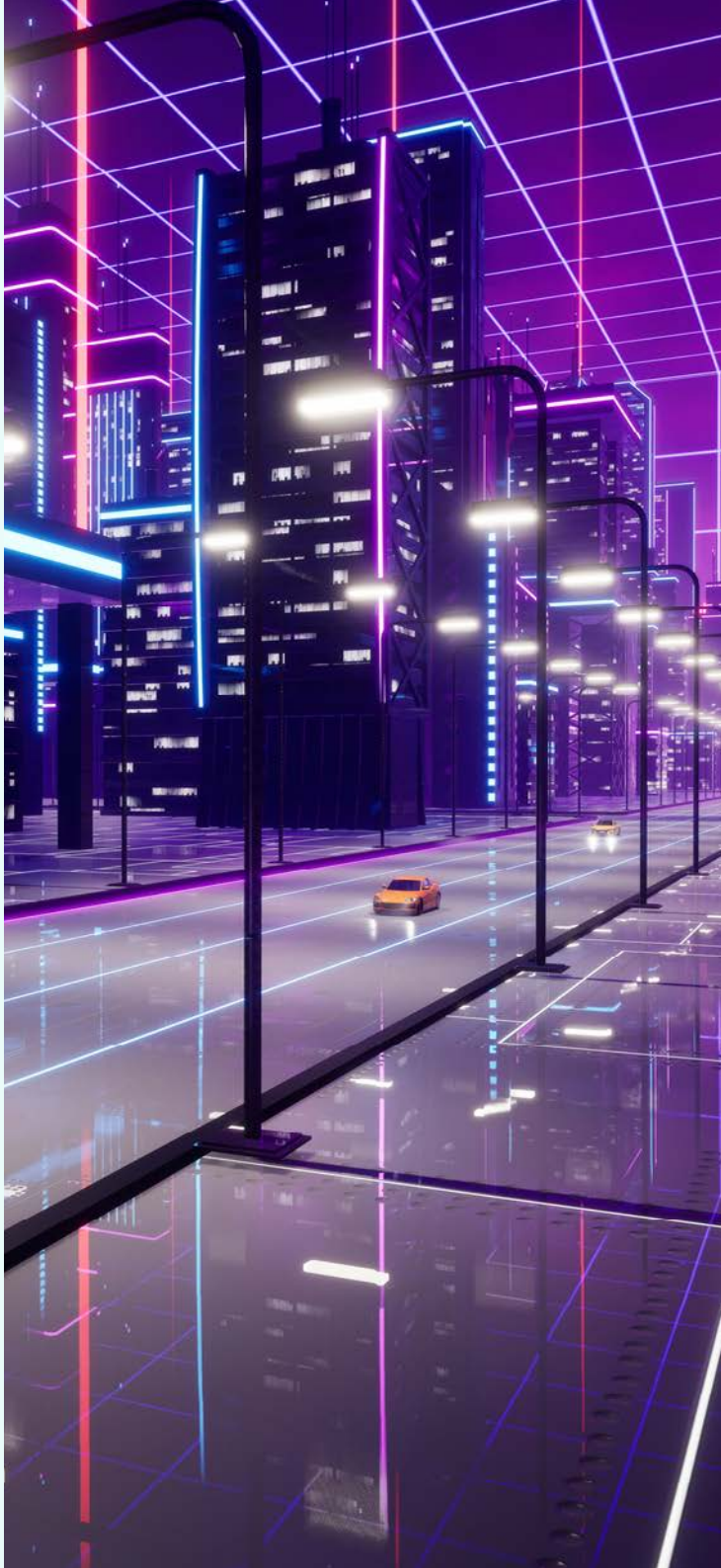
*GiiNEX lets developers use generative AI and other innovations in 3D city-building to streamline content creation. It supports Non-Player Content and scene generation - everything from 2D images and animations to dialogue.*

*GiiNEX's three elements - its algorithm model, AI training platform and online inference engine - seamlessly address the full lifecycle of a game, from research and development to operations.*

*The GiiNEX toolkit streamlines the creation of photorealistic 3D virtual cities, with enhanced options for city layouts, buildings and interior mapping.*

*GiiNEX also empowers user-generated content creation and engagement. Its user-friendly tools let players create models like vehicles and furniture, personalizing creative gameplay. By capturing player actions and adapting NPC behaviours, GiiNEX allows more natural movements and ensures dynamic, immersive worlds that respond to player preferences.*

**Stephane Decroix, VP at Tencent Games, Europe**



# Recommendation 1

## Incorporate an explicit focus on the use of AI in gaming in a future UK AI Strategy

Doing so should help ensure that the UK's gaming sector continues to serve as a developer, incubator and early adopter of advanced AI models. This builds upon techUK's recommendation that the Government updates the UK's AI Strategy for the mid 2020s, as set out in our **Growth Plan**.

# Trend 3: More Immersive Experiences

**Immersive technologies are continuing to transform how people participate in and view the gaming and Esports experience.**

> **Immersive technology: Technologies that enable a person to feel part of an artificial, simulated environment [24]**

The history of electronic gaming is one in which new technologies have continually improved the degree of immersion (and therefore believability) experienced by players.

Key milestones include the release of the first home game console in 1972,[25] introduction of three-dimensional (3D) graphics in the late 1990s and early 2000s,[26] and launch of the crowdfunding campaign for Oculus Rift (marketed as the first truly immersive virtual reality headset for video games) on the crowdfunding platform Kickstarter in 2012.[27]

Today, gamers have access to a wide range of immersive technologies, including Augmented, Virtual or Mixed Reality (AR, VR, MR) headsets, haptics (controllers that create an experience of touch), and holograms (3D images produced through light). These are collectively known as Extended Reality, or XR.

**Augmented Reality (AR): The ability to overlay digital information on the real-world environment through devices including mobile phones, glasses, projections, and heads-up displays[28]**

**Mixed Reality (MR): Like AR, this brings together real world and digital elements, however in MR the user can interact with and manipulate both physical and virtual items and environments through the use of next-generation sensing and imaging technologies[29]**

**Virtual Reality (VR): The ability to experience a virtually rendered 3D environment through a VR headset[30]**

Such technologies are improving the gaming and Esports experience in several important ways:

**Sensory stimulation:** Devices are engaging and heightening senses that until recently had not formed part of the gaming or Esports experience. These include touch (through haptic controllers and devices), sight (through a wider field of vision, eye-tracking or three-dimensional environments) and sound (through features such as 3D or spatial audio). In gaming, the result is a gradual transition from Graphical to Natural user interfaces in which users feel like they are physically touching and manipulating information rather than doing so indirectly through basic inputs such as a computer mouse or keyboard.[31] In addition, Esports audiences will increasingly feel more immersed in the action, regardless of where they may be sitting in an arena.

## Haptics: Devices such as controllers or joysticks which convey the sense of touch and the associated perception and manipulation of objects that result from any form of interaction involving touch. [32]

Haptic motors were first added to video game controllers in 1997 with two located close to each player's palm.[33] This enabled 'rumble' or low-frequency vibration to occur during important moments in a game. It was only in the past five to ten years that this configuration began to significantly change. The introduction of high-definition (HD) vibration means devices are now capable of rendering nuanced textures while devices such as PlayStation's DualSense Edge wireless controller now contain a suite of immersive features. These include haptic feedback, adaptive triggers, a built-in microphone, and motion controls.[34]

We can expect to see a move away from 'quad haptics' (four channels of touch: two in each hand via a gaming controller) and towards multi-channel haptics in which a suite of haptic 'endpoints' are positioned on and around the body. These may include gaming mice and keyboards, wearable devices, and gaming chairs. Realising the potential of this immersive set-up will require a degree of coordination between game developers and haptic device manufacturers. Other future developments may include thermal actuators (that become hot or cold in response to changes to the in-game environment) and new materials (that enable games controllers to physically change shape). One day, haptics may not be required as electrical signals imitate a physical interaction with the world by directly stimulating the player's nerves.[35]

**Increased realism:** Advanced algorithms are creating cutting-edge computer graphics that replicate light, shadow, and real-world mechanics with extreme realism. This is resulting in more life-like virtual environments capable of transporting players to (rather than just showing them) new worlds and experiences.

**Spatial gaming:** AR devices are blurring the divide between the virtual and physical worlds by situating digital elements such as characters and items in real world settings. Pokémon Go, the hit AR game released in 2016,[36] demonstrated the potential for the technology to facilitate social interaction, improve mental health, and encourage physical fitness. It went on to reach a peak of 133 million players in 2018.[37] AR technologies are also creating more connected virtual experiences, with Snap stating that 41% of consumers want to project their AR avatar into their favourite games, media, and entertainment.[38]

**Metaverse gaming:** Immersive technologies are providing a gateway to a set of interconnected digital spaces in which users can socialise, learn, play and more – commonly referred to as the metaverse.[39] These include features such as 3D visualisations and spatial audio, many of which were first developed for gaming before 'spilling over' into other sectors.[40] According to a survey from EY, 97% of gaming industry executives say gaming is at the centre of the metaverse in its current form.[41]

> **Metaverse: A concept derived from science fiction in which spatial, embodied, and immersive experiences are enabled through the combination of digital technologies such as 5G, AI, Internet of Things, Web3, AR, and VR.[42] Such experiences are expected to span gaming, socialising, commerce, education, enterprise, and more.**
>
> According to a survey from EY, 49% of gaming executives are prioritising investments in virtual, augmented, or mixed-reality experiences.[43]
>
> In addition, The Metaverse Society states that "gaming, and its developers, will remain the dominant driver for VR/MR metaverse entertainment for the rest of the decade [due to] the industry's long-standing expertise in 3D environment creation and storytelling".[44]
>
> techUK has been equipping our member organisations to understand and realise the benefits of the metaverse for many years. Previous activity includes our **Making the Metaverse campaign**, podcast on metaverse technologies, and events exploring the intersection between the metaverse and topics such as **workplaces**, **transport**, healthcare, and **policing**.
>
> In July 2024, techUK launched a **campaign** exploring how the UK can lead on the development, application, and commercialisation of Web3 and Immersive technologies. The emergence and utilisation of the metaverse has emerged as a consistent theme throughout this campaign.


Perhaps the most interesting and transformative use cases in immersive gaming will occur at the intersection of these improvements, all of which are poised to make experiences more accessible and authentic. They will also extend into other aspects of life, including work and family, and across a wide range of non-gaming sectors such as manufacturing to energy.[45]

Immersive technologies will not only augment existing gaming experiences but also create new ones that leverage their distinct properties. The adoption of these technologies is expected to rise over the coming years as a wider range of devices and applications hits the market.[46]

Companies can benefit from the development of more immersive gaming and Esports experiences by transforming passive spectators or consumers into active participants, reaching new online audiences in more engaging and authentic ways, or providing vital services that ensure player safety, privacy and trust.

# Case Study: Improbable

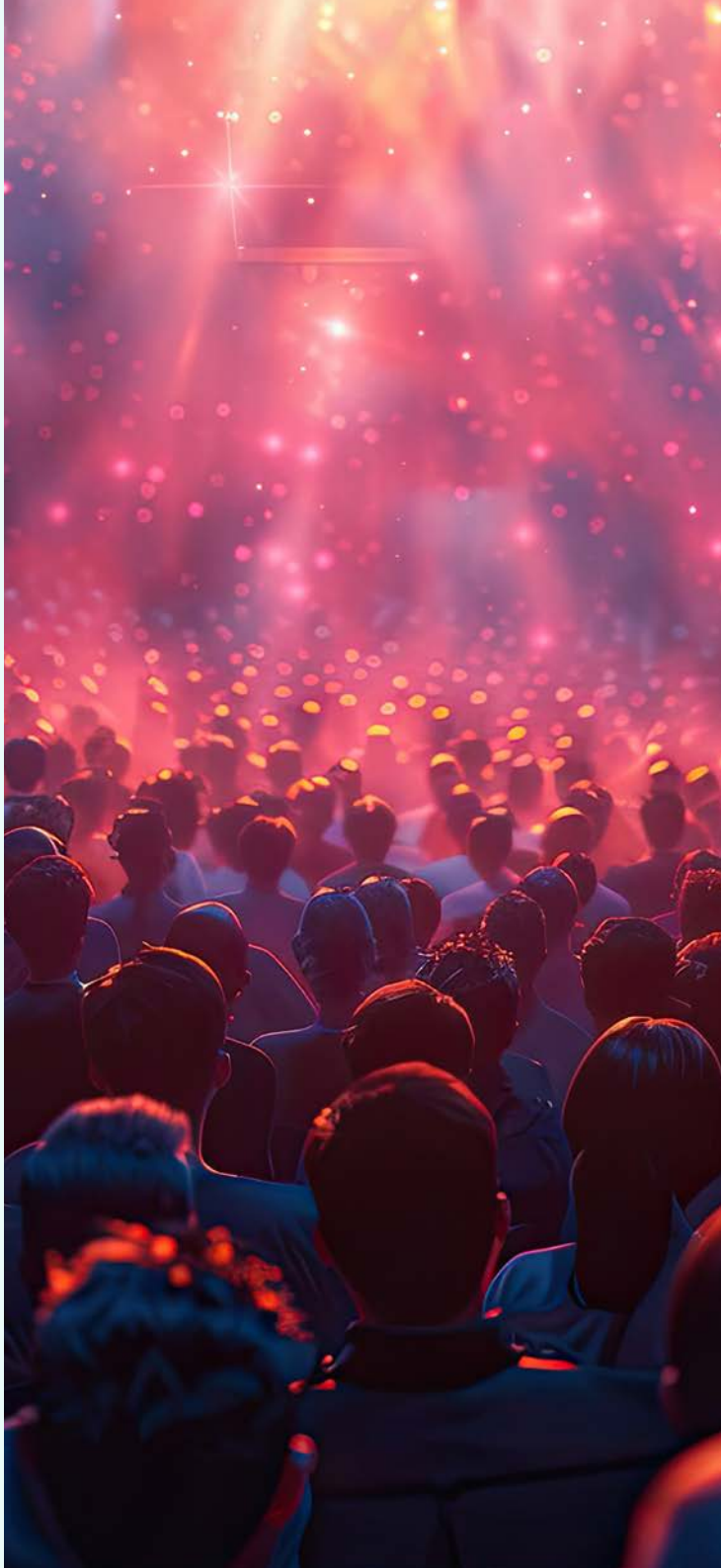
*Improbable's metaverse tech enables mass-scale interactive 3D worlds that capture the energy and excitement of live events, elevating game and game-like experiences.*

*With MLB Virtual Ballpark, which debuted in July 2023 and returned for a four-game run in September 2024, we bring thousands of baseball fans together in a shared virtual space. Real-time 3D game visualisations let them view the action from any angle. Spatial audio enhances the sense of presence, from the roar of the crowd to intimate chats. Gamified missions transform passive spectators into active participants. The result: an authentic, immersive, unique experience blurring the lines between physical and virtual worlds – and between sports consumption and gaming.*

*Applying this tech to our ongoing collaboration with Yuga Labs demonstrates how it can cater to a younger, tech-savvy audience. Across monthly live events starting in July 2024, over a thousand players were embroiled in each wild multiplayer FPS contest. Spatial audio played a crucial role, letting players discuss tactics among the chaos. Players could enter as their bored Ape, furthering authenticity and engagement.*

*These very different experiences both showcase the future of virtual worlds, by encouraging immersion and active participation, and surrounding players with crowds that react in real time.*

**Herman Narula,**
**CEO at Improbable**



# Case Study: Yoti

*How Yoti and Avakin Life are using age assurance to improve player protection*

*With online games becoming more immersive and realistic, effective age assurance is becoming increasingly important for player safety. This case study looks at how Avakin Life, a 3D life-simulation video game, is using age assurance to improve player safety and introduce exclusive age-restricted content.*

*Exclusive age-restricted features*

*Adult players can choose to verify their age to unlock exclusive features, including age-restricted spaces with less restrictive chat filters, and a unique badge which displays their 18+ status.*

*Players can verify their age using Yoti's facial age estimation technology or by uploading an identity document. Both options are privacy-preserving, accurate and quick. Lockwood Publishing, the creator of Avakin Life, chose facial age estimation due to its speed, accuracy, inclusivity and ease of use.*

*Players who haven't verified their age cannot access age-verified spaces. This ensures players aged 18+ can confidently interact and chat with other adults, and have a safe immersive experience, while also enhancing the safety and experience for younger audiences. Players who are suspected to be underage are also asked to confirm their age.*

*With effective age checks, Avakin Life is creating age-appropriate experiences and content for different age groups.*

*Once a gaming platform knows the age or age range of users, it can adapt the content to be age-appropriate, including:*

- *having age-appropriate prompts to encourage players to take breaks*
- *having the highest privacy settings as default for children*
- *ensuring voice chat is turned off by default*
- *offering age-appropriate terms and conditions, privacy information, and support*

*With innovative and robust age solutions, gaming platforms can comply with regulations and keep players safe whilst giving them incredible, immersive and age-appropriate experiences.*

**Rachael Trotman, Comms Manager at Yoti**

# Recommendation 2

## Support the adoption of AR technologies with a particular focus on gaming

The UK has a significant opportunity to lead on the development and adoption of AR technologies in gaming. Doing so could drive AR adoption rates in other sectors and leverage the UK's strengths in related technologies and fields. This builds upon techUK's recommendation that the Government develops a plan for the deployment of AR technologies alongside the UK Industrial Strategy, as set out in our **Growth Plan**.

# Trend 4: More Persistent and Connected Environments

**Players are increasingly transitioning from solo experiences of a particular game to multi-player ones in which people come together on metaverse gaming platforms to participate in a wide range of virtual experiences underpinned by a web of connected technologies and taking place in 24-hour worlds.**

These online spaces are evolutions of today's Massive Multiplayer Online (MMO) games, in which hundreds or thousands of players interact in a shared environment. These span role-playing (RPG), first-person shooter (FPS), and real-time strategy (RTS) games and popular examples include World of Warcraft and RuneScape.

> **Researchers predict that the size of the global MMO games market will almost double between 2022 and 2031, expanding by 10.74% per year and reaching a valuation of over $100m USD.[47]**

## Persistence

Unlike traditional console-based gaming experiences, the duration of which is determined by when the player switches the device on and off, many future experiences will last indefinitely with players across geographies and time zones continually jumping in and out.

Such metaverse-like experiences are enabled by 24/7 server farms with built in redundancy to account for unexpected faults or surges in demand, with continued participation incentivised through regular updates and content drops.

They are also increasingly becoming platforms that equip creators and studios with the capability to build and share gaming experiences, including UGC tools, marketplaces, and options for streaming.

This degree of persistence, in which players keep returning to the same space to create or share an experience with others who have similar interests, can often breed a strong sense of community. The subsequent shift from passive players to active participants will have significant implications regarding levels of engagement and brand loyalty for companies operating in such spaces.

## Connection

Connection is becoming an increasingly important aspect of the experiences, environments, and technologies that sit within and behind online gaming.

**Experiences:** Already, many of the largest MMOs have incorporated activities beyond gaming, including live events such as concerts, sporting matches, and fashion shows. These are increasingly designed for older audiences with the aim of building a social ecosystem of content and communication that caters to a wide range of demographics. Such experiences further reinforce the sense of community fostered by

the persistence of these environments. The rise of phygital gaming experiences, in which real life events, tournaments and community gatherings complement online experiences, will offer further opportunities for socialising, immersion, and revenue generation.

**Environments:** More companies are creating branded experiences in online gaming environments than ever before. Doing so enables them to reach and engage entirely new demographics in more interesting and novel ways. This includes non-entertainment brands such as Walmart or Vans.[48]

**Technologies:** Advanced game engines are connecting all objects in virtual worlds in more sophisticated ways, providing creators with an extensive toolbox spanning everything from gameplay systems and set dressing to audio and video effects (VFX).[49] In addition, the proliferation of Web3 technologies, many of which enable data to be shared between gaming platforms and systems in new ways, is increasing the degree of interoperability between online gaming experiences. This is translating into tangible benefits for players, such as enabling them to retain their achievements or position on leaderboards and seamlessly transfer avatars or digital assets such as skins and collectibles as they move between environments.

> **Web3: A new, decentralised version of the internet built on blockchain technology and communally controlled by its users[50]**

One company that embodies this trend is Epic Games. The company is currently building a metaverse that connects the game platform 'Fortnite', the popular 3D computer graphics game engine 'Unreal Engine', and a new persistent universe developed in partnership with Disney. This combination of Unreal Engine's sophisticated simulation software and Unreal Editor in Fortnite's user-friendly interface should empower creators and add more value for companies in the form of greater engagement and more purchases.

**Event round-up: Future Visions: Immersive Gaming**

This techUK webinar convened experts in the field of immersive technologies to discuss how immersive technologies are set to transform the gaming experience, what technical infrastructure they will depend upon, whether the UK is well positioned to lead in these areas, and what more UK industry and Government can do to maximise the opportunities of immersive gaming.

# Case Study: The Metaverse Institute

*The Metaverse Institute has taken a lead in setting up an inclusive, accessible and sustainable metaverse standards at the ICT agency of the UN, International Telecommunication Union (ITU), in their Metaverse Working Group on Sustainability, Accessibility, Inclusion.*

*In addition, the first UN Survey on "Metaverse For All" was led by The Metaverse Institute from June 2023 to June 2024. This contains several key findings that will be fundamental to paving the way for gaming in the metaverse:*

- ***Audio Accessibility:*** *A significant portion of respondents (27%) expressed a need for captioning or subtitling, highlighting the importance of making audio content accessible to gamers or audiences with hearing impairments.*
- ***Language Barriers:*** *Another 27% indicated a desire for translation features, suggesting a demand for tools that can break down language barriers and foster global communication within the gaming metaverse.*
- ***Hands-Free Interaction:*** *Speech recognition (18%) and keyboard navigation (9%) were frequently requested, indicating a need for more accessible ways to control avatars, participate in viewing or playing games, and generally interact with the virtual environment.*
- ***Visual Accessibility:*** *Screen readers (17%) and magnifiers (12%) were mentioned by a notable number of respondents, highlighting the need for features that support gamers or audiences with visual impairments.*

*Only by acting upon these findings can game developers in the UK and beyond create a metaverse that is truly inclusive and welcoming to gamers or audiences of all abilities.*

**Dr Christina Yan Zhang, CEO at The Metaverse Institute**

# Trend 5: Casual Gaming

**Significant improvements in mobile, cloud, semiconductor, and Internet technologies mean that gaming is now more accessible than ever, enabling new demographics to participate in the experience.**

Since the invention of the first handheld mobile phone in 1973,[51] mobile and 'tablet' technologies have become increasingly compact, connected, intelligent, and powerful. Contributing factors include the continued miniaturisation of silicon chips, transition from physical keyboards to touchscreen displays, and integration of successive generations of Internet technologies such as 4G and 5G.

Casual and mobile gaming began in the 1990s with simple, pixellated games such as "Snake".[52] The launch of Apple's App Store in 2008 – complete with 500 applications, or 'apps' – revolutionised how games were distributed and played on mobile devices.[53] Mobile gamers now had far more choice, albeit still with significant limitations around storage capacity, graphics capabilities, and online connectivity. Independent ('indie') game developers quickly followed, as did the introduction of free-to-play games which offered new ways to monetise gaming experiences such as in-app purchases.

Today, many mobile games contain visually stunning graphics that would rival those on consoles or Personal Computers (PCs) and feature everything from immersive AR experiences to UGC tools. Many are 'hyper-casual', containing simple, easy-to-understand gameplay mechanics, minimalistic designs, and quick sessions. This makes them ideal for people looking to game between activities or on the move.

**The global mobile gaming market is estimated to be approximately $100.54 billion as of 2024 and is forecast to reach $164.81 billion by 2029.[54]**

Several developments are expected to contribute to the continued rise of casual and mobile gaming:

The rise of Cloud Gaming Services: People can increasingly stream high-quality games directly to their mobile devices without the need for powerful hardware, lengthy downloads, or local storage. They can also benefit from seamless gameplay across devices, enabling them to start a game on one device and continue playing on another. Nvidia's cloud-based game streaming service, GeForce NOW, already provides access to over 2000 games on any device and at PC quality.[55]

**The global cloud gaming market size was valued at $5.76 billion in 2023 and is projected to grow from $9.71 billion in 2024 to $126.62 billion by 2032.[56]**

In addition, the increased use of Edge Computing, in which delay-sensitive and bandwidth-hungry games are processed near the gamer's location, will further reduce latency.[57]

**More advanced semiconductors:** The mobile gaming experience is quickly becoming more comparable to that on console or PC, in part due to advancements in semiconductors or 'chips'. These are more powerful, efficient, and miniaturised than ever due to shrinking transistor sizes and improved fabrication techniques. As such, video games will increasingly benefit from more powerful processors, graphics cards, and memory modules capable of producing higher resolutions, smoother frame rates, and sophisticated graphical effects. This increasingly means players will have access to portable gaming experiences reminiscent of AAA games on console or PC. In addition, portable devices are increasingly incorporating energy-efficient chips that are tailored for mobile gaming by balancing performance with battery life and reducing the need for additional cooling systems. Plus, server-grade chips can now better handle the immense computational demands of cloud gaming services. Over time, advancements in other compute architectures could mean devices move beyond graphics processing units (GPUs) to incorporate new architectures such as neural processing units (NPUs). These should be capable of driving the advanced AI algorithms behind the graphical simulations, NPCs, and AI-generated content creation demands of the future.[58] The global gaming chips market size was estimated at approximately £10.5 billion as of 2021 and is projected to reach £28.7 billion by 2031.[59]

**Higher-quality displays:** The invention of the capacitive touchscreen revolutionised mobile gaming, enabling gamers to control a display through the touch of their finger or specialised input device such as a stylus. Today, mobile devices are increasingly adopting larger, better-quality screens with higher resolutions and smoother frame rates. This is making mobile gaming experiences more immersive, reducing the need for headsets or holographic software. The continued adoption of foldable phones will begin to bridge the gap between mobile and tablet screens.

**The transition to 5/6G & Wi-Fi 7:** Improvements in mobile access and internet technologies will enable more gamers to enjoy sophisticated graphics and seamless online multiplayer experiences by providing faster and more reliable internet connectivity. This will result in a wider selection of high production-value AAA (studio quality) mobile games for players and a larger potential audience for the streaming of Esports competitions. The seventh generation of Wi-Fi, Wi-Fi 7, is up to four times faster than Wi-Fi 6 and already supported by the latest mobile devices.[60]

> **According to Ericsson, 5G subscriptions are expected to overtake those for 4G in 2028.[61]**

Companies can benefit from the rise of casual gaming by exploring what other services can move from PC-only to mobile and invest in the technical infrastructure that will underpin the sector in the future.

# Case Study: Miniclip

*Mobile gaming now represents approximately 50% of the global gaming market, with the UK playing a crucial role due to its robust development ecosystem and high consumer adoption rates. Miniclip, a leading global developer and publisher, has significantly contributed to this growth, particularly within the UK.*

***Miniclip operates 20 studios globally, with six in the UK employing over 300 skilled professionals—nearly 30% of its global workforce. This demonstrates the UK's vital role in Miniclip's operations and its standing as a hub for mobile game development and publishing talent.***

*Over the past year, Miniclip has solidified its position as a powerhouse in the industry, becoming the 4th largest mobile games publisher worldwide with over 800 million game downloads globally. Specifically in the UK, Miniclip ranks as the 7th largest mobile game publisher, achieving about 11 million downloads.*

*Miniclip's flagship titles, '8 Ball Pool' and 'Subway Surfers,' have shown exceptional performance in the last 12 months, with global downloads of 111 million and 205 million respectively. In the UK, these games have achieved significant success, with '8 Ball Pool' reaching 1.6 million and 'Subway Surfers' 2.2 million downloads over the last year.*

*Miniclip's strategic focus on the UK market has not only enhanced its global footprint but also reinforced the UK's prominence in the global mobile gaming sector. Miniclip continues to leverage local talent and innovation, driving further growth and success in this vibrant industry.*

*Building on this, the UK's unique combination of a highly engaged consumer base and advanced development capabilities positions it as a key player in shaping the future of mobile gaming, both in terms of technological innovations and creative content development. As the global mobile gaming landscape continues to evolve, the UK's approach to leveraging local talent pools and fostering innovation hubs serves as a blueprint for sustainable growth and international competitiveness in the gaming industry.*

**Saad Choudri, CEO at Miniclip**

# Case Study: VE3

*Advancing Esports with Real-Time Analytics and Cloud Solutions*

*An Esports organisation sought to gain a competitive advantage by leveraging real-time data and cloud technology. To achieve this, they partnered with VE3 to develop an analytics platform that would improve performance, refine strategies, and enhance engagement.*

***Challenge:***

- *Managing vast real-time data*
- *Ensuring optimal player and viewer performance*
- *Attracting and retaining fans for growth*
- *Balancing technology implementation with cost efficiency*

*Solution Implementation & Impacts:*

*We collaborated to create a cloud-based analytics platform, and this is how we did it:*

1. ***Real-Time Analytics Platform:*** *We developed a machine learning platform to process Esports data, providing insights into player performance, game strategies, and audience engagement, leading to better outcomes and optimised strategies.*
2. ***Cloud Infrastructure:*** *Our cloud-based infrastructure supports the analytics platform, ensuring optimal performance and seamless operations during peak events.*
3. ***Performance Optimisation:*** *Integrated monitoring tools track player metrics in real-time, enabling data-driven decisions to enhance player outcomes.*
4. ***Enhanced Fan Engagement:*** *An interactive viewing platform with high-quality streaming and engaging features significantly improved the fan experience and increased the fan base.*
5. ***Cost Optimisation and Market Position:*** *Cloud-based solutions reduced costs, optimised resource allocation, and facilitated investment in growth areas, positioning us as an industry leader and attracting sponsorships.*

# Recommendation 3

## Accelerate the rollout of the UK's digital infrastructure by putting digital at the heart of reforms to the planning system

Doing so should facilitate the development of the next generation of telecoms and compute infrastructure set to underpin the gaming and Esports sectors of the future. Such infrastructure will span 5/6G, Wi-Fi 7, and cloud. This recommendation is included in techUK's **Growth Plan**.

# Trend 6: Ownership and the Web3 Economy

**Many experts believe that Web3 technologies are set to transform the gaming and Esports experience by enabling players, streamers, audiences, and communities of fans to participate in new forms of ownership and decision-making.**

Many companies have begun to explore how Web3 technologies can be utilised to improve the gaming and Esports experience.

These include Decentraland, a virtual world built on the Ethereum blockchain which enables its over 300,000 monthly active users to purchase, develop, and monetise virtual land through a user-driven economy facilitated by cryptocurrency.[63] The use of blockchain technology ensures that ownership over each parcel of land is secure while decisions about the development and evolution of Decentraland are made collectively.[64] Trust-enhancing features such as these turn visitors into active and engaged participants in the virtual experience.

> **Web3: A new, decentralised version of the internet that is built on blockchain technology, operates through incentives rather than trusted third parties such as banks, facilitates payments through cryptocurrency (digital currency), and is communally controlled by its users who adhere to open standards and protocols[62]**

Another example is VEXT, a digital currency for immersive gaming and Esports experiences. Created for UK-based Veloce Media Group - the world's largest motorsports media platform – this aims to amplify engagement and loyalty by enhancing fan experience, connectivity, and interaction.[65] Token holders can transact across mobile games, web games, and live interactive sports features, vote on key decisions within the Veloce ecosystem, and win prizes such as merchandise and real world experiences.[66]

There are three properties of Web3 technologies that make them uniquely placed to shape the future of gaming and Esports:

**Ownership:** Distributed ledger technologies (DLT) spread data across many locations to ensure security and transparency.[67] These will create more trusted systems for in-game transactions and ownership while enabling players to safely trade, sell, and control digital items such as non-fungible tokens (NFTs). These will often be tied to players or avatars rather than individual games, empowering players and fans to use them seamlessly across an expanding universe of online experiences. Some online gaming platforms will give away "Free UGC" collectibles to further incentivise this participation. The use of blockchain technologies at Esports events can increase the fairness of competitive matches by leveraging the ability of fans to collectively verify players' activity, perhaps through mobile technologies in the arena. It will also equip teams and streamers with new ways to connect to their fans, for example by enabling them to collect limited-edition digital assets or vote on future decisions such as sponsorship deals.

**Non-Fungible Token (NFT): A unique digital asset, such as a video or graphic, that cannot be replaced.**

**Decision-making:** The continued adoption of blockchain technologies is expected to result in more decentralised gaming platforms that are governed by the community rather than the gaming studio. Some will take the form of Decentralised Autonomous Organisations (DAOs) which enable token-holders on a blockchain to participate in the management and decision-making of an entity.[68] This could enable them to influence or set the direction or development of their favourite games, placing players at the centre of the future gaming and Esports ecosystems.

**Interoperability:** Many Web3 technologies enable different systems, platforms, and applications to work together seamlessly. When applied to gaming, players become empowered to use and transfer everything from achievements to identities across gaming platforms without losing their value or functionality. This leads to gaming experiences that are more continuous, personalised, and

unified.[69] Studios and developers will increasingly discover that it is not sufficient for games to simply adopt these technologies. Instead, gaming content and experiences must be created in such a way that they leverage the unique properties of Web3 technologies to improve the player's sense of immersion or level of engagement.

These properties, which have been consistently referenced throughout techUK's Gaming & Esports sprint campaign, have the potential to enable and complement everything from more sophisticated data management systems set to underpin future AI models to the payments economy behind metaverse gaming environments.

However, despite the immense promise of Web3 technologies, few companies have yet managed to leverage their full potential to transform how we participate in gaming or Esports. For example, many Web3 gaming experiences are too complex for casual players to easily grasp while efforts to adopt Web3 technologies within companies built during and for the Web2 era have rarely succeeded.

Doing so will require developers to begin with the experiences they wish to create rather than Web3 technologies themselves and regulators to set the boundaries within which experimentation and innovation can take place.

**Event round-up: Redefining Web 3.0: Emerging economies in the new age of the internet**

This techUK event contained a panel discussion on the topic of gaming in the metaverse. The conversation touched upon existing metaverse gaming environments and their intersection with Web3 technologies, challenges such as skills and funding, and the UK's legacy in the technologies that underpin the sector.

# Trend 7: Enhanced Broadcast and Viewing Technologies

**While the phenomenon of live video streaming began around 2005 with the launch of YouTube,[70] it was not until 2011 that the world's largest video game streaming platform, Twitch, came into existence. For the first time, video game enthusiasts could access virtually unlimited content made by and for the community. The recent rise of AI-powered UGC is set to take this to another level.**

In the years since, platforms such as Twitch and YouTube Gaming have significantly improved the technologies that underpin the streaming of gaming and Esports matches, resulting in higher resolution and lower latency broadcasts.

For example, AI algorithms now create "game-content-aware" encoder configurations to allow for more efficient compression and easier computational resource management. This enables streams to keep up with the requirements behind increasingly advanced game engines.[71]

> **In 2022, viewers across the globe streamed 5.4 billion hours of Esports content. This was up 19.6% year over year.[72]**

Livestreaming is predicted to become a $4.2 billion market by 2028.[73]

There are several key technologies set to shape the future Esports event streaming experience:

**Immersive:** Streaming platforms are increasingly utilising Augmented Reality overlays within live streams of Esports matches to provide real-time data, player statistics, and interactive elements. This is enhancing levels of audience comprehension and immersion and paving the way for the merging of 3D gaming worlds and the physical stages of Esports events. The increased use of 360-degree cameras will further improve the feeling of immersion. In addition, wearable devices such as haptic wristbands will enable audiences to experience an even greater sense of immersion while at events, regardless of their physical proximity to the action.

**Mobile:** Esports fans are increasingly attending events dedicated to mobile games as the mobile format continues to grow in popularity relative to console gaming. Future advancements in the hardware and Internet connectivity infrastructure

that support mobile devices will accelerate this trend. **According to Boston Consulting Group, in 2020 only two mobile games ranked in the top ten Esports games by hours watched (ML:BB and PUBG Mobile), however by 2022 this number had doubled to include Free Fire and Arena of Valor.**[74]

**Advertising:** Interactive ad formats are going beyond traditional static ads by incorporating features such as overlays and extensions to drive audience participation and engagement. This is enabling brands to create increasingly immersive experiences. The inclusion of polls, games, and exclusive content builds deeper relationships with viewers. Hyper-targeting capabilities are creating increasingly personalised advertising experiences within games. **Deloitte estimates that by 2020, 60% of the gaming industry's revenue will come from advertising,**[75] **while 72% of Twitch users aged 18+ claim that they are more likely to consider brands that support their favourite streamers.**[76]

> **58% of Twitch users report that they have posted a review of a product, company or service in the past month. This is 1.4 times the global average.**[77]

# Case Study: Tencent Games

*At Tencent, we recognise that enjoyment is subjective, varying greatly from one viewer to the next. However, our goal remains steadfast: to elevate the viewing experience for every member of our audience. In the realm of broadcasting, physical space may be limited, but augmented reality (AR) opens up new vistas of engagement. AR allows us to visually enhance the appearance of 'stars', magnify commercial messages, and seamlessly integrate game-specific themes into our broadcasts.*

*Take, for instance, the inaugural 2024 PUBG MOBILE WORLD CUP in Saudi Arabia. During this event, we showcased the latest in-game theme, Ocean Odyssey, using AR elements that transformed both the stage and the casting areas. These AR enhancements were not merely passive decorations but interactive elements that our on-screen talent brought to life, creating a dynamic and immersive experience. Fans were invited to dive virtually into the depths of the game's oceans, exploring the new mode as if they were part of the adventure themselves. This innovative use of AR not only entertains but also deepens fan engagement, making every moment on screen resonate more profoundly with viewers.*

*Looking ahead, we are excited to harness the power of AR at the upcoming PUBG MOBILE Global Championship Grand Finals in London this December. This technology will ensure that our audience enjoys a premium and unforgettable experience. At Tencent, we continue to explore these advanced technologies to enrich and enhance every broadcast.*

**James Jinho Yang, Senior Director of the Esports Center in Level Infinite at Tencent Games**

# Case Study: Esports Insider

*There are so many ways esports broadcasts & the viewing experience could be enhanced, including both the live at-event experience and the watching-wherever via a screen, and moreover there are a few great companies exploring this currently.*

*Skybox is one exciting example, founded by the legendary Anders Blume. You can see an example of him discussing it here. The overwhelming amount of data intrinsic to games and esports means the potential to enhance broadcasts is incredible, and this is what Anders wanted to tap into.*

*Accessing & in turn contextualising that data is of course a major challenge, but regarding the ability to use it for storytelling and of course analysis (both for coaches and casters etc), is vast and there are so many layers to this.*

*UK-based Virtex are doing some cool, quite different stuff in terms with their 3D virtual esports stadium allowing you to be 'in the map', so far for Counter-Strike only. There's Spectatr by Fanclash who have built a suite of products around interactive features for live streaming, one of which is AI-enabled highlights.*

*One big challenge in esports is to make the actual viewership experience at the venue superior (forgetting here of course the 'being a part of it' feeling), but that said there are plenty of ways that the viewership full stop can be enhanced too. With the likes of BLAST (a major tournament operator) creating & adding to BLAST.tv, through to the Esports World Cup securing broadcast deals with the likes of DAZN, CCTV+ (China), Star Sports Network (India), and more, there's no doubt this area will see more and more innovation.*

*As I say some really exciting companies exploring this area already, but we need more!*

**Sam Cooke, Co-Founder and Managing Director at Esports Insider**

# Trend 8: Social Gaming and Esports

**Gaming experiences and Esports events are becoming increasingly social activities as technologies such as AI, AR, and VR enable players to consume, share, interact, collaborate, and compete in new ways.**

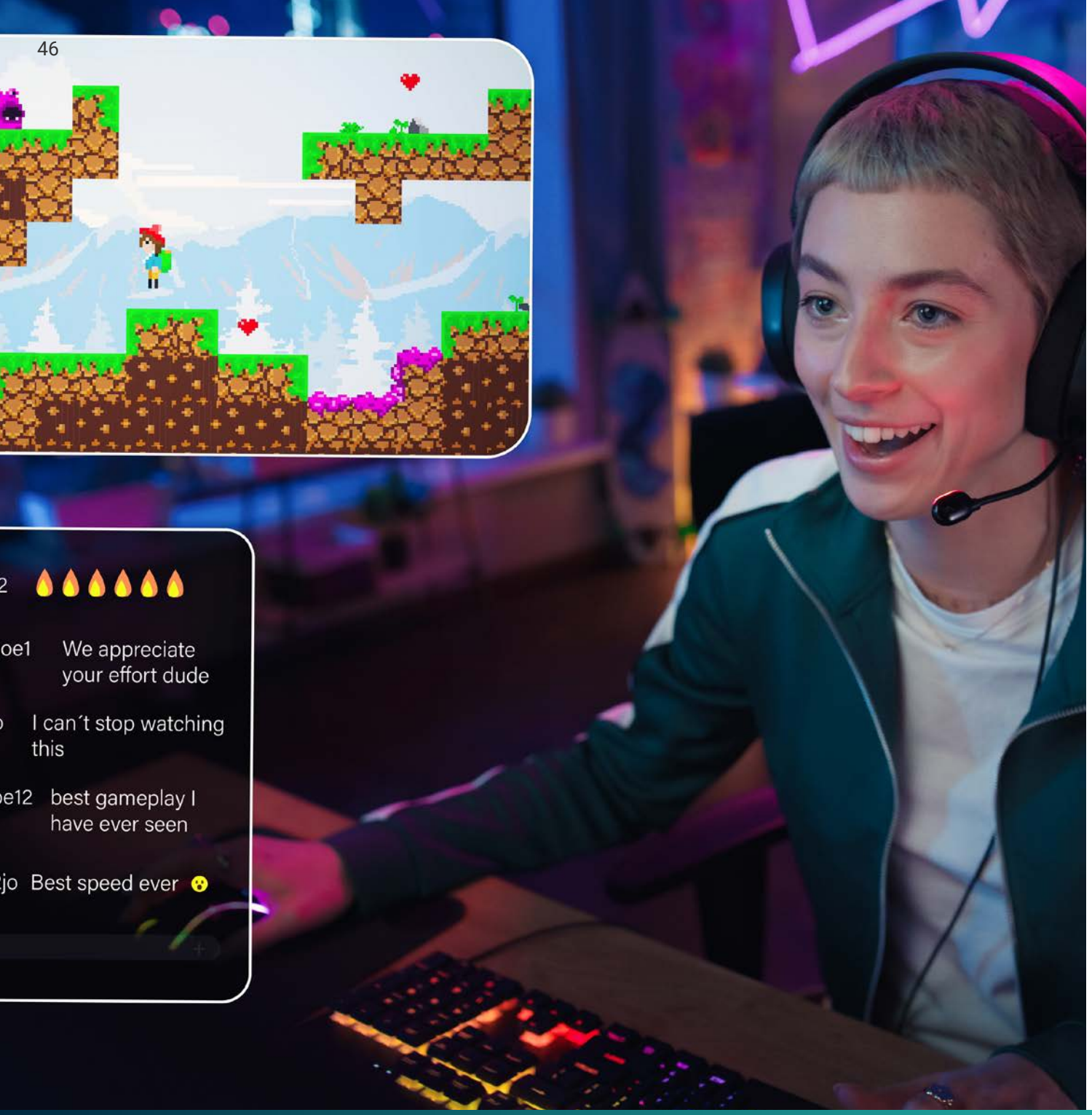
The first multiplayer video games enabling real-time competition emerged in the arcades of the 1970s. Networked multiplayer games, in which several PCs could connect to a local area network, were also developed in the same decade. It was not until the proliferation of the Internet in the mid-1990s that online multiplayer games emerged. Innovations since have included cross-platform play and cloud gaming,[78] all of which have enabled players to simultaneously game and socialise in increasingly sophisticated ways.

Today, games like 'Among Us' and 'Fortnite' enable millions of players from across the world to team up, socialise, and compete in real-time. Despite the development of more intelligent NPCs, many gamers still prefer playing with or against other humans as these tend to be less predictable and more creative, resulting in a more enjoyable or rewarding gaming experience.

Several factors are set to make the future of gaming and Esports even more social:

**AI-driven socialising:** Voice assistants and AI chatbots will facilitate real-time translation and moderate conversations to ensure players can communicate with ease. In addition, Natural Language Processing will enable more seamless and intuitive interactions between players and in-game characters or systems, adding a social element to previously basic or inauthentic conversations. AI algorithms will match player based on skill level, interests, and social behaviour to create more harmonious and enjoyable gaming experiences.

> **Natural Language Processing (NLP): A subfield of computer science and AI that employs machine learning to enable computers to understand and communicate using human language[79]**




**Social immersion:** The growing use of immersive technologies such as AR and VR is set to enable more natural and engaging social interactions. AR games that blend the real world with digital enhancements will allow players to interact socially in real-life locations. VR lounges and meeting spaces will enable players and streamers to meet, chat, and interact outside traditional gameplay while VR events and gatherings such as concerts will become increasingly commonplace on online gaming platforms. Haptic feedback devices will provide increasingly tactile sensations that enhance physical interactions between players, albeit with safeguards to ensure player safety and wellbeing. Esports events will embrace many of these technologies to bring audiences closer to the action and the players themselves, regardless of where they are seared in an arena.

> **It's estimated that by 2025, 45% of people in the UK will be using AR and almost all people who use social or communication apps will do so frequently** [80]

**Social environments:** Socialising will increasingly take place in mass-scale interactive 3D worlds built by metaverse companies such as Improbable. These will offer new ways to interact online such as real-time avatar chats, cooperative gameplay featuring dozens or hundreds of teammates, and tournaments or leaderboards to foster a sense of collaboration and competition. In addition, the persistent nature of these worlds will facilitate more meaningful engagement, long-term relationships, and a deeper sense of community. This will be accelerated by the continued growth of cross-platform play as players can increasingly interact and compete regardless of their device.

**Social media integration:** Games and Esports events are increasingly directly integrating social media and live streaming features. This is making it easier for players to capture or create 2D and 3D content before sharing this and interacting in real time with their communities. Such features will facilitate more continuous social interaction as players can follow and message each other during or outside of active gameplay. This will also become increasingly granular as players and streamers acquire the ability to quickly and easily share micro experiences such as individual skill moves or skins. Many Esports teams will leverage their already extensive expertise in social media content and promotion by bringing their communities even closer to the live action and individual players. Social media users will soon be able to click through the platform to download a game directly onto their preferred device.

**Games as social spaces:** Video games are social experiences in which family and friends can play and connect online wherever they may be and whenever it may well be. Immersive online platforms are becoming more popular as destinations for entertainment content of all types, with video gameplay being just one of a growing number of activities available to audiences worldwide. Looking ahead, we can expect current and new platforms to increasingly enable interactions between fans, players, and viewers through a wide range of converging communications media and forms of content. As all this continues to develop, it is important to point out that there is a clear distinction between platforms that enable video game fans to communicate with each other and platforms that are owned and controlled by publishers for the purpose of game play.

**Casual gaming:** Social activations will enable people to easily discover simple, quirky games that are highly bingeable and designed for social media and viral sharing. These micro gaming experiences will be instantly accessible with players joining either through social media platforms or a dedicated platform, app, or gaming-related app store.

These factors will be driven in part by the exponential growth of gaming and Esports content on social media platforms, which now serve as global forums in which billions of fans and players can come together to view and share their experiences.

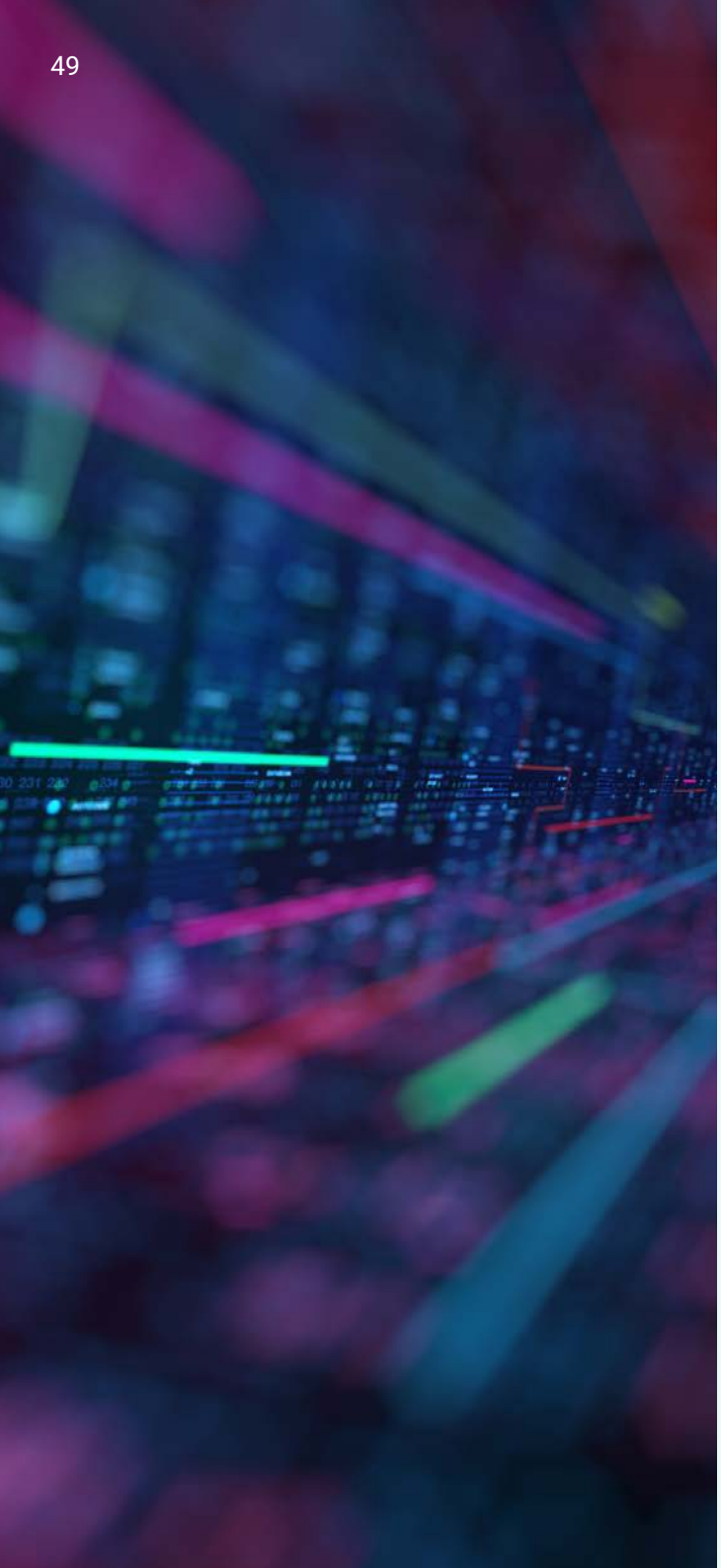
**In 2022, TikTok registered over 3 trillion views of gaming-related content.[81] The following December, just one day after the release of the first GTA 6 trailer, the platform had already generated over 10 billion views associated with the #gta6 hashtag.[82]**

Such platforms will play an even larger role in the sale of games, gaming accessories, and merchandise as the global e-commerce market continues to grow.

Age appropriate design – in which relevant parties know the age of participants to ensure that content, contact, and conduct are age appropriate and that they are old enough to enter into a contract – will be integral to the safe and ethical development of the above factors. This approach is crucial for creating safe gaming environments, as it allows platforms to implement appropriate content filters, adjust communication features, and tailor monetisation strategies based on user age. Age-appropriate design helps protect younger players from exposure to inappropriate content, potential exploitation, and predatory marketing practices while ensuring they can still enjoy gaming experiences suited to their developmental stage. It also enables platforms to maintain compliance with child protection regulations and create more trusted environments for parents and guardians. Age assurance approaches can be tokenised; where regulations allow this. Tokenisation replaces sensitive information such as user age with unique identifiers called "tokens". The tokens act as substitutes for the original data, rendering them useless to unauthorised users.[83] Other countries have issued guidance regarding tokenisation and UK-based companies would also benefit from similar support.

### Event round-up: Exploring the future of Esports

This techUK event explored the key emerging technologies set to transform the Esports experience, how these may impact sectors beyond tech, how businesses in other sectors can take advantage of and contribute to the UK's growing Esports scene, whether the UK is well positioned to establish and maintain global leadership in this area, and what more industry and Government can do to maximise future opportunities.



# Case Study: PwC

*Social media is gamified, but gamers do not make the most of this channel. Gaming content is primarily YouTube / Twitch based, often long-form, and usually narrative. Gaming is not defined by variety and creativity on social media the way it is in games themselves. This plays into the numbers, most leading teams / streamers have followings in the low-double-digit millions - vs hundreds for other best-in-class followings.*

*The challenge here strikes me as one of application. Gaming has not fully embraced the tools available to drive a holistic, multi-platform, social strategy. From fashion to fishing, consumer-facing industries are harnessing a wide range of platforms and formats to drive awareness and engagement. They build relationships with their communities by encouraging user generated content, and engaging directly via contests, challenges and polls. Short-form video content presents a notable opportunity for social gaming. It is accessible, breaks down barriers (especially amongst Gen Z / A), and meets the gaming community where they are (c.34% of UK gamers mainly play mobile games).*

*The industry should look outside itself to improve its social media gameplay. Communities will grow from more, and more varied touchpoints. To break down barriers and drive value, professional gamers and organisations should open up their social strategies and make the most of existing engagement tools.*

**Imogen Glen,**
**Senior Manager**
**at PwC**

# Case Study: India Alanis

*As a professional Esports player, I've seen first-hand how new technologies are increasingly driving the fusion of gaming and social media.*
*I often think about what this will mean for the future gaming and viewing experience.*

*In the past, fan engagement in sports often felt one-sided, with players performing while the audience watched from a distance. Now, new social features incorporated by community-driven platforms like Twitch allow millions of fans across the globe to stream Esports games and engage with streamers like me directly.*

*This could either be in-game or through tiers of subscriptions that grant access exclusive perks such as badges, emoticons or other digital assets.*

*It's this shared sense of passion and enthusiasm that's creating a more social gaming and viewing experience. I can't recall how many times I've taken the energy and enthusiasm experienced during a live stream and used this as motivation during a competition.*

*As I look further ahead, I'm so excited to see how technologies such as AI and XR will create new opportunities for social interactions between fans and streamers such as myself. In particular, my hope is that the greater sense of authenticity, enthusiasm and engagement these will enable is translated into progress across diversity, inclusion and social mobility (and I aim to be an important enabler of this change).*

*One thing's for sure: As the distinction between social media and gaming continues to blur, it'll be streamers like me who ride the wave and experience lots of the early benefits or use cases of such a shift.*

**India Alanis, Pro Esports Athlete**

# Recommendation 4

## Consider including social gaming and gaming as focus areas within a new online safety sandbox

A joint regulatory sandbox for online safety would help test how new technological solutions can support the implementation of the Online Safety Act and Age-Appropriate Design Code. Including social gaming in the online safety sandbox presents an opportunity to test solutions at the forefront of technological innovation and societal change and would build on the Information Commissioner's Office's (ICO's) **Regulatory Sandbox**. This currently includes immersive technology and virtual worlds as a focus area. It could also offer a valuable opportunity to explore innovative solutions for critical challenges such as age verification and tokenisation and their application in the gaming industry. This builds upon a recommendation set out in techUK's **UK Tech Plan**.

# Strategy for future leadership

**The eight trends set out in this report identify many of the key technologies set to underpin and drive the gaming & Esports sectors of the future. The four subsequent recommendations suggest ways in which Government can make leadership in these specific technologies a reality.**

However, these are no substitute for broader, long-term strategies which move beyond individual technologies and consider the gaming or Esports sectors as a whole. Such strategies would encompass everything from access to skills, talent and scale-up funding to public perceptions and trade agreements.

While the two recommendations on the following pages call for the creation and implementation of this broader strategy, techUK looks forward to working with other relevant trade associations and industry stakeholders to feed in the views of technology companies as such strategies are shaped in the months to come.

# Recommendation 5

## Ensure gaming is prioritised as a sub-sector within the new modern Industrial Strategy

This will drive the creation of an ambitious and targeted sector plan that is designed in partnership with industry and intended to address barriers to growth. Such barriers include access to finance, investment, skills development, training, and business resilience, all of which were identified during techUK's gaming roundtable in early 2024. Any sector plan should ensure consistency between the 'creative industries' and 'digital and technologies' growth-driving sectors set to underpin the Strategy.

# Recommendation 6

## Create a Future Gaming & Esports Strategy to set the foundations for long-term UK leadership

This should improve the UK's understanding regarding the potential of these sectors, increase support for the wider gaming ecosystem, position the UK as a global pioneer, and ensure a coordinated and long-term approach to the strategy and investment necessary for UK leadership on the technologies that will underpin the gaming and Esports sectors of the future. While Scotland has already committed to developing a National Gaming Strategy, a UK-wide vision and action plan is also required.

# Conclusion

**This report illustrates how technologies from Generative AI to semiconductors are set to transform gaming and Esports by making them increasingly personalised, intelligent, interactive, immersive, accessible, decentralised, and social.**

Such shifts will have significant implications for how gamers, streamers, fans, athletes, and companies experience and benefit from these phenomena.

As demonstrated by the case studies throughout this report, the UK has an incredible opportunity to be at the forefront of these developments and subsequently capture a significant proportion of the economic and social value they are set to create. This value extends well beyond the gaming and Esports sectors, as evidenced by the statistics regarding video game technology 'spillovers' in the introduction.

Crucially, making this promise a reality will require harnessing the power of the UK's world-leading technology sector, hence this report's six recommendations for Government and suggestions for businesses throughout.

**You can follow the work of techUK across these sectors by visiting our Innovation Hub and subscribing to our monthly Tech & Innovation newsletter.**

# References


1. https://britishesports.org/the-hub/press-releases/pearson-higher-nationals-announcement
2. https://ukie.org.uk/resources/the-economic-impacts-of-video-game-technology-spillover
3. https://gamerhub.co.uk/gaming-industry-dominates-as-the-highest-grossing-entertainment-industry
4. https://newzoo.com/resources/blog/the-games-market-in-2022-the-year-in-numbers
5. https://ukie.org.uk/news/2023/10/ukie-launches-video-game-manifesto-in-the-heart-of-westminster-with-speeches-from-chris-bryant-mp-and-emma-smith
6. https://ukie.org.uk/resources/the-economic-impacts-of-video-game-technology-spillover
7. https://allcorrectgames.com/insights/the-gaming-market-in-the-uk/
8. https://www.statista.com/forecasts/1373885/esports-market-reach-uk
9. https://www.britannica.com/topic/electronic-game
10. https://ukie.org.uk/esports
11. https://www.gov.uk/government/publications/artificial-intelligence-sector-study-2023/artificial-intelligence-sector-study-2023
12. https://inworld.ai/blog/what-is-an-npc-tracing-the-history-and-future-of-npc-meaning-in-games-memes-and-tik-tok
13. https://www.museumofplay.org/blog/the-history-of-npcs/
14. https://www.guinnessworldrecords.com/world-records/first-real-time-strategy-game
15. https://aifocussed.medium.com/how-video-games-are-about-to-get-a-lot-more-real-with-this-incredible-ai-breakthrough-01296f7ccd5d
16. https://medium.com/@spendingcrypto/what-is-a-game-avatar-a0f93a097f56
17. https://www.ibm.com/topics/large-language-models
18. https://medium.com/@jjmcarrascosa/ai-in-video-games-a-historical-evolution-from-search-trees-to-llms-chapter-3-2000-2023-ae286c975387
19. https://www.techtarget.com/searchenterpriseai/tip/Compare-large-language-models-vs-generative-AI
20. https://www.bain.com/insights/how-will-generative-ai-change-the-video-game-industry/
21. https://www.theverge.com/2018/12/3/18121198/ai-generated-video-game-graphics-nvidia-driving-demo-neurips
22. https://a16z.com/the-generative-ai-revolution/
23. https://naavik.co/deep-dives/state-of-ugc2024
24. https://www.digicatapult.org.uk/expertise/blogs/post/everything-to-know-about-immersive-technology/
25. https://artsandculture.google.com/story/early-home-video-game-history-making-television-play-the-strong/EQURMn3lzjV8JQ?hl=en
26. https://watson-henry.medium.com/the-evolution-of-video-games-from-simple-pixels-to-immersive-experiences-f59f1be5cba0
27. https://virtualspeech.com/blog/history-of-vr
28. https://www.techtarget.com/whatis/definition/augmented-reality-AR
29. https://www.intel.com/content/www/us/en/tech-tips-and-tricks/virtual-reality-vs-augmented-reality.html
30. https://www.techtarget.com/whatis/definition/augmented-reality-AR
31. https://principles.design/examples/eight-principles-of-natural-user-interfaces
32. https://www.imperial.ac.uk/engagement-and-simulation-science/our-work/research-themes/haptic-technology
33. https://dl.acm.org/doi/fullHtml/10.1145/3552327.3552333
34. https://www.playstation.com/en-gb/accessories/dualsense-edge-wireless-controller
35. https://www.immersion.com/haptics-and-gaming-a-future-story/
36. https://pokemongo.fandom.com/wiki/Pok%C3%A9mon_GO
37. https://devtechnosys.com/data/pokemon-statistics.php
38. https://downloads.ctfassets.net/inb32lme5009/hSj5P9vzaox79vlTqXZfj/d6094404212f1327e8b7d69535337941/Snap_Consumer_AR_Research_GlobalReport.pdf
39. https://about.meta.com/uk/what-is-the-metaverse/
40. https://ukie.org.uk/news/2023/11/spillover-technology-from-video-games-worth-1-3-billion-in-2021
41. https://www.ey.com/en_us/insights/media-entertainment/what-s-possible-for-the-gaming-industry-in-the-next-dimension/chapter-3-insights-on-the-metaverse-and-the-future-of-gaming

42. https://www.digicatapult.org.uk/blogs/post/the-meteoric-rise-of-the-metaverse-how-can-government-and-industry-regulate-it/
43. https://www.ey.com/en_us/insights/media-entertainment/what-s-possible-for-the-gaming-industry-in-the-next-dimension/chapter-3-insights-on-the-metaverse-and-the-future-of-gaming
44. https://themetaversesociety.com/spatial-computing-and-the-metaverse/
45. https://ukie.org.uk/resources/the-economic-impacts-of-video-game-technology-spillover
46. https://www.pwc.com/us/en/tech-effect/emerging-tech/immersive-technology-trends-in-2024.html
47. https://www.marketresearchguru.com/enquiry/request-sample/24581300?utm_source=LN_Best_Shivay
48. https://naavik.co/deep-dives/state-of-ugc2024
49. https://dev.epicgames.com/documentation/en-us/uefn/scene-graph-in-unreal-editor-for-fortnite
50. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-web3
51. https://www.telefonica.com/en/communication-room/blog/who-invented-first-mobile-phone/
52. https://blogs.windows.com/devices/2013/01/16/10-things-you-didnt-know-about-mobile-gaming-2/
53. https://www.apple.com/uk/newsroom/2018/07/app-store-turns-10/
54. https://www.mordorintelligence.com/industry-reports/mobile-games-market/market-size
55. https://www.nvidia.com/en-eu/geforce-now/
56. https://www.fortunebusinessinsights.com/cloud-gaming-market-102495
57. https://www.pulsant.com/knowledge-hub/blog/the-future-of-gaming
58. https://medium.com/@suvsystemltd/how-is-semiconductor-manufacturing-impacting-the-gaming-industry-c820feb182c0
59. https://www.businessresearchinsights.com/market-reports/gaming-chips-market-105924
60. https://www.wired.com/story/what-is-wi-fi-7/
61. https://www.ericsson.com/en/reports-and-papers/mobility-report/dataforecasts/mobile-subscriptions-outlook
62. https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-web3
63. https://blockapps.net/blog/case-studies-of-successful-web3-games/
64. https://medium.com/@rushaad1810/decentraland-and-the-web3-revolution-navigating-the-metaverse-frontier-43090edef91c
65. https://ukaeg.com/case-study/the-worlds-largest-esports-platform-enhanced-by-web3/
66. https://www.velocemediagroup.com/vext
67. https://www.investopedia.com/terms/d/distributed-ledger-technology-dlt.asp
68. https://www.investopedia.com/tech/what-dao/
69. https://sdlccorp.com/post/interoperability-in-web3-games-creating-seamless-experiences-across-platforms-2
70. https://www.britannica.com/technology/streaming-media
71. https://www.smpte.org/blog/the-future-of-live-video-game-streaming
72. https://london-post.co.uk/the-rapid-rise-of-esports-broadcasting-an-analysis-of-top-streaming-platforms
73. https://www.vox.com/ad/23360491/twitch-livestream-engagement-emotes
74. https://www.bcg.com/publications/2023/how-esports-will-become-future-of-entertainment
75. https://www2.deloitte.com/us/en/insights/industry/telecommunications/capitalizing-on-growth-of-esports-industry.html
76. https://www.vox.com/ad/23360491/twitch-livestream-engagement-emotes
77. https://blog.gwi.com/chart-of-the-week/the-rise-of-twitch/
78. https://agate.id/history-of-multiplayer-games-from-lan-to-cloud-gaming/
79. https://www.ibm.com/topics/natural-language-processing
80. https://forbusiness.snapchat.com/augmentalityshift-uk
81. https://techwireasia.com/2023/08/how-tiktok-gaming-is-crafting-the-future-of-digital-entertainment/
82. https://digiday.com/marketing/the-rundown-one-year-in-tiktoks-gaming-marketing-team-isnt-going-anywhere/
83. https://www.keyivr.com/knowledge/guides/guide-what-is-tokenisation

techUK
FOR WHAT COMES NEXT

# About techUK

techUK is a membership organisation that brings together people, companies and organisations to realise the positive outcomes of what digital technology can achieve. We collaborate across business, Government and stakeholders to fulfil the potential of technology to deliver a stronger society and more sustainable future. By providing expertise and insight, we support our members, partners and stakeholders as they prepare the UK for what comes next in a constantly changing world.


linkedin.com/company/techUK

@techUK

youtube.com/user/techUKViews

info@techuk.org




## Unleashing the Potential of UK Tech and Innovation