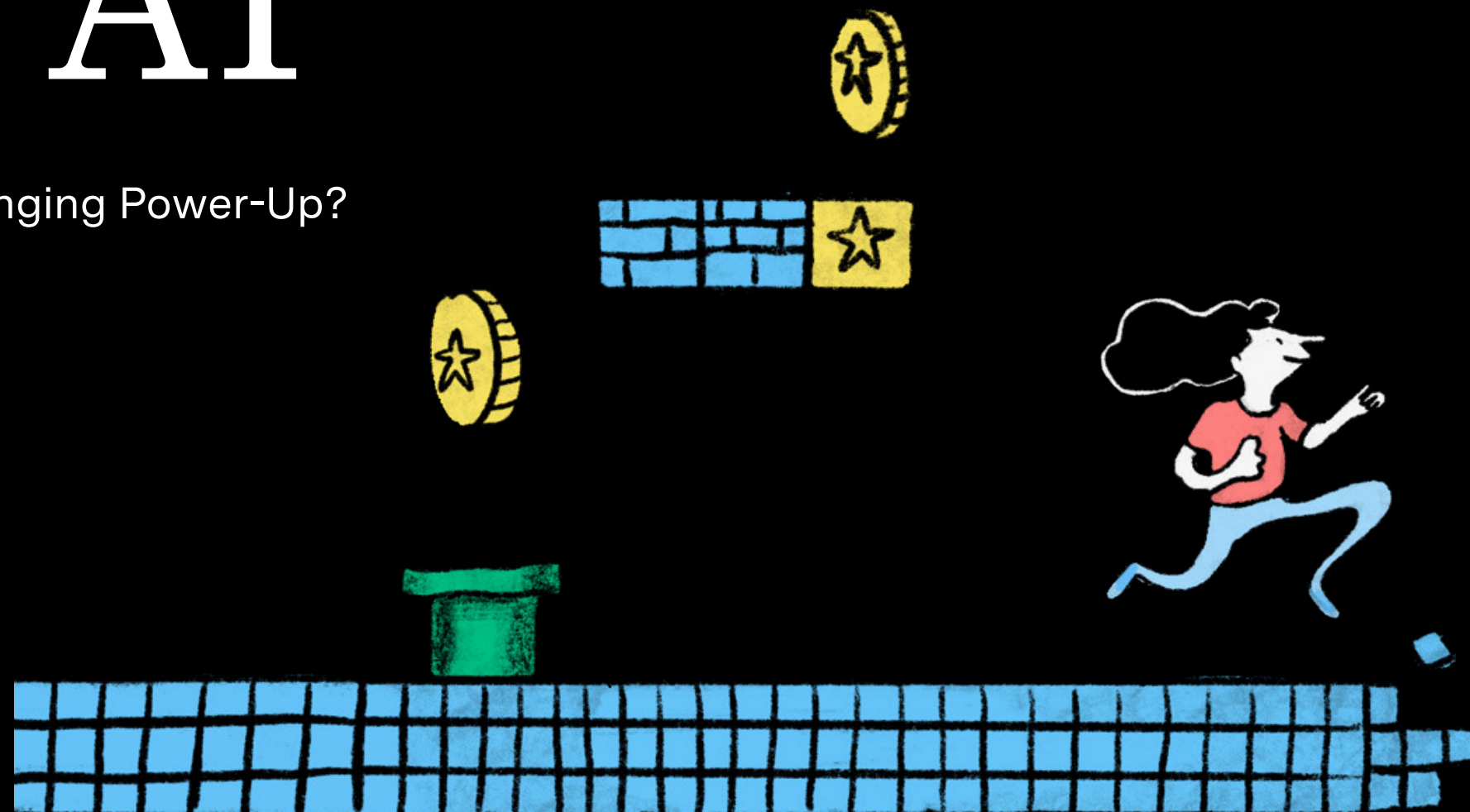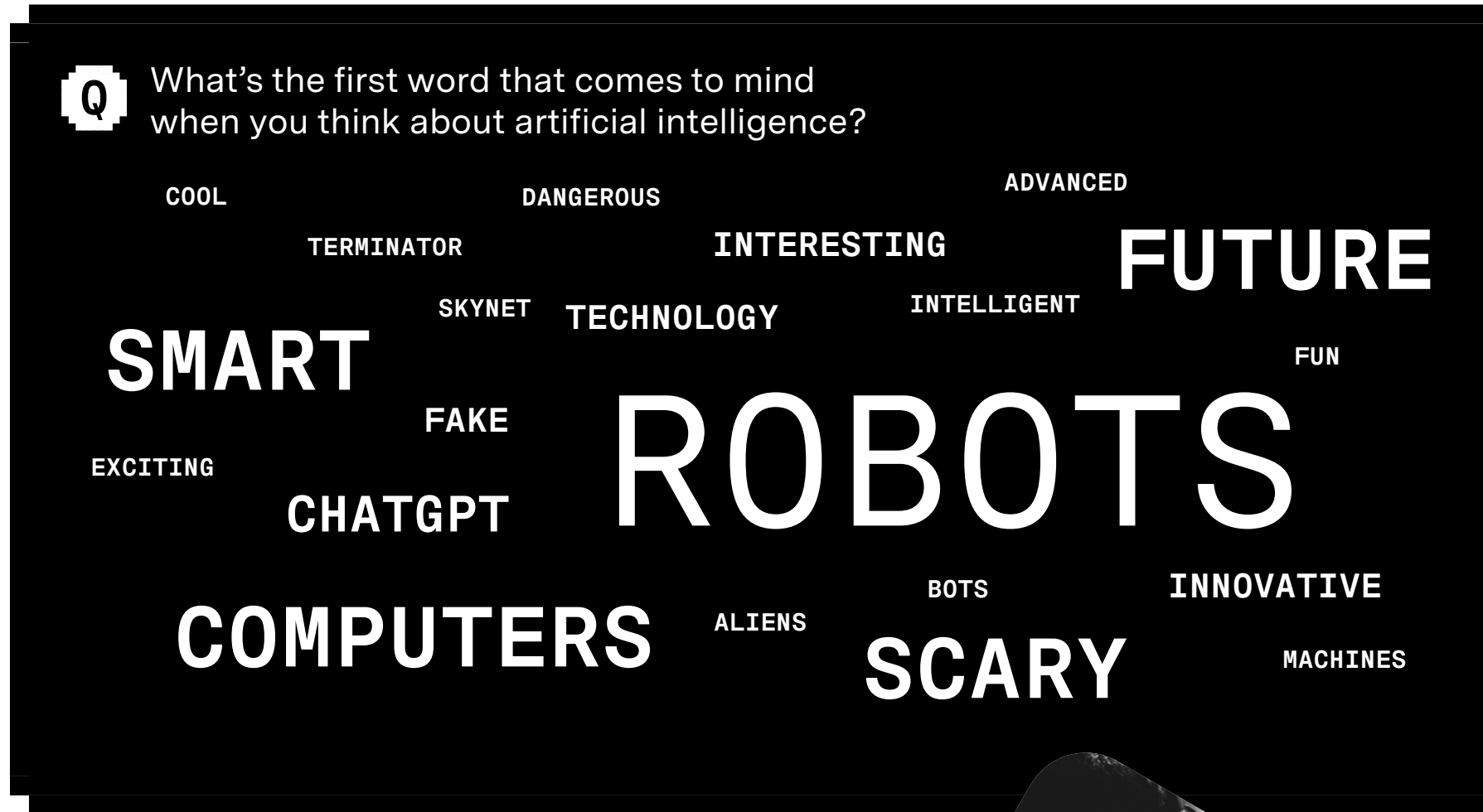# Pressing Play on AI

A Game-Changing Power-Up?

Generative AI is here– and video games may never be the same...

Over the past few months, large language models like OpenAI's GPT4 and AI-powered art generators such as Midjourney have radically redefined expectations of what mechanical intelligences are capable of. Depending on who you ask, that's either the beginning of a bold new era for story-telling and digital art, or the harbinger of a doomsday scenario for creatives.

Whatever your feelings on these new technologies, one thing is clear: the gaming industry is likely to play a major role in pioneering practical use cases for these new technologies. Already, a number of major studios have announced plans to incorporate AI-driven experiences into their titles. And there's now a vibrant ecosystem of start-ups and next generation development tools that seek to integrate AI into the heart of the game design process.

But, are players really ready to embrace the idea of open-ended, AI-powered gaming experiences? Or is there a risk that studios that go all-in on AI could provoke a backlash among their most dedicated fans similar to that seen against NFTs and blockchain-based games in 2022?

This study sets out to separate the myths from reality when it comes to generative AI in gaming–and to unpack what this new technology will mean for players and developers alike.

Q What's the first word that comes to mind when you think about artificial intelligence?

COOL · DANGEROUS · ADVANCED · TERMINATOR · INTERESTING · FUTURE · SKYNET · TECHNOLOGY · INTELLIGENT · SMART · FUN · FAKE · ROBOTS · EXCITING · CHATGPT · INNOVATIVE · COMPUTERS · ALIENS · BOTS · SCARY · MACHINES

01 INTEREST AND AWARENESS

02 PLAYER ATTITUDES TOWARDS AI

03 USE CASES FOR AI

04 GETTING THE MOST OUT OF AI

05 A LOOK AHEAD

AT A GLANCE
Three key takeaways

✓ Within the gaming community, there's a broad sense of optimism about the potential for generative AI to have a positive impact on the industry. And the more they find out about the technology, the more that optimism grows.
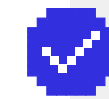
✓ However, this sense of enthusiasm is not without reservations. Players think it's important that developers have the right safeguards and precautions in place before they start experimenting with AI.

✓ The biggest concern among players is that mass adoption of AI could lead to a "creativity drain" within the industry. To avoid that scenario, studios will need to learn to think of AI as an enabler of, rather than a replacement for, human talent.

01

**INTEREST
AND AWARENESS**

Players are closely following the debate around AI–with streamers and content creators driving the conversation

Since the launch of ChatGPT in November 2022, the media has been awash with stories about the latest developments in generative AI. And there's been substantive public debate about the moral, legal, and social ramifications of these nascent technologies–from metaphysical questions of whether AIs deserve rights[1] to more prosaic challenges around how this new class of products ought to be regulated[2].

So it's hardly surprising that the majority of gamers have at least some level of awareness of these new technologies. **More than three-quarters (77%) of them say that they have heard the term "generative AI"**, and about half as many (39%) feel that they have a "good idea" of what it means.

1. Noor Al-Sibai, "Experts Urge Personhood Rights for the "Conscious" AIs of the Future", Futurism, March 6, 2023
2. Sophie Bushwick, Madhusree Mukerjee, "ChatGPT Explains Why AIs like ChatGPT Should Be Regulated", Scientific American, December 28, 2022
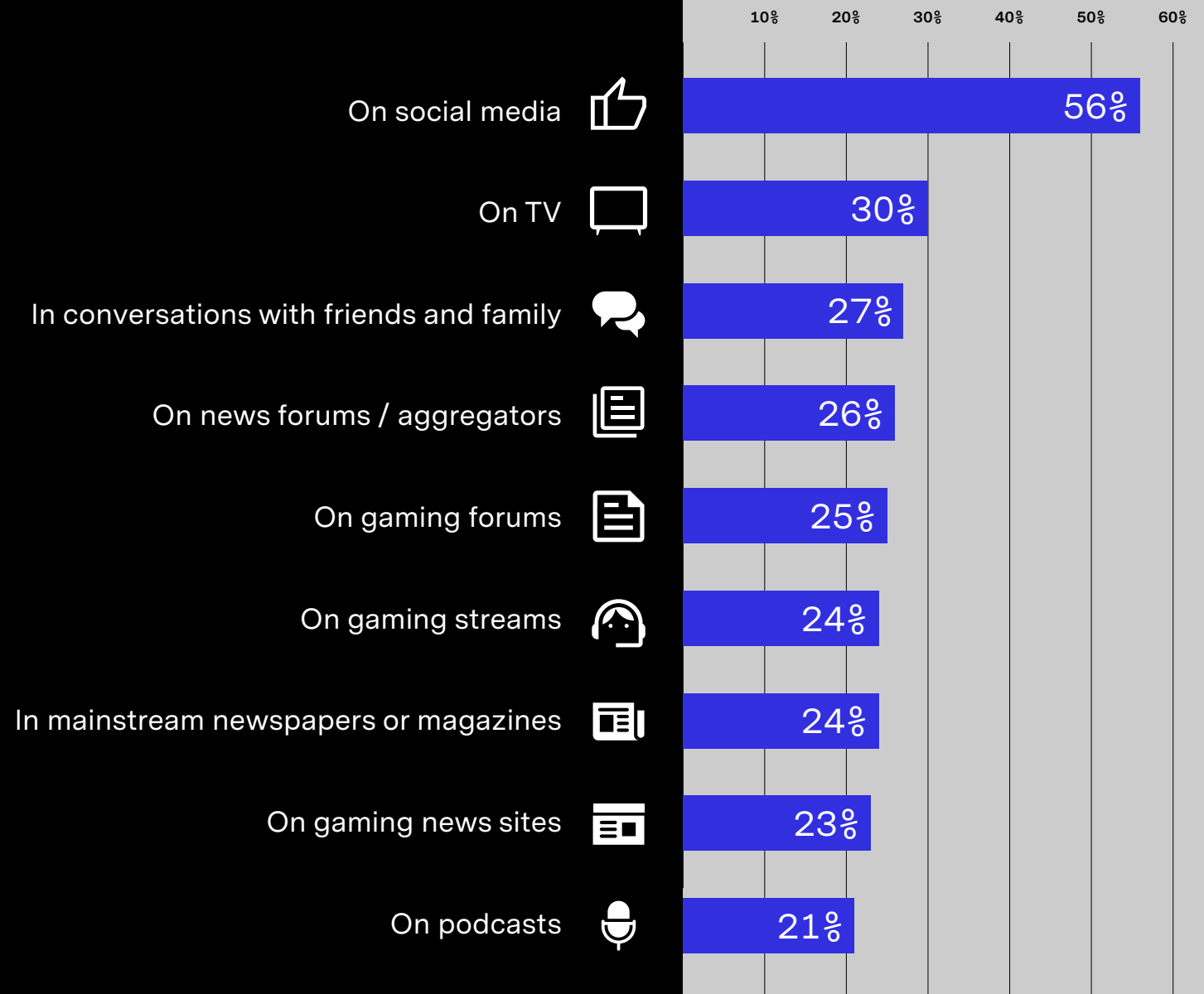
While news coverage of generative AI–in both the mainstream and gaming press–has certainly played a role in educating players about the technology, it's social media that has been the biggest driver of awareness. For many, their first exposure to the new wave of AI platforms likely came in the form of seeing friends share screenshots of conversations with ChatGPT, or influencers reposting memes generated by DALL-E or Midjourney.

77%

of players say that they have heard the term "generative AI"

Q Where have you seen the terms "generative AI" or "conversational AI" used?

Players with some level of awareness of generative AI

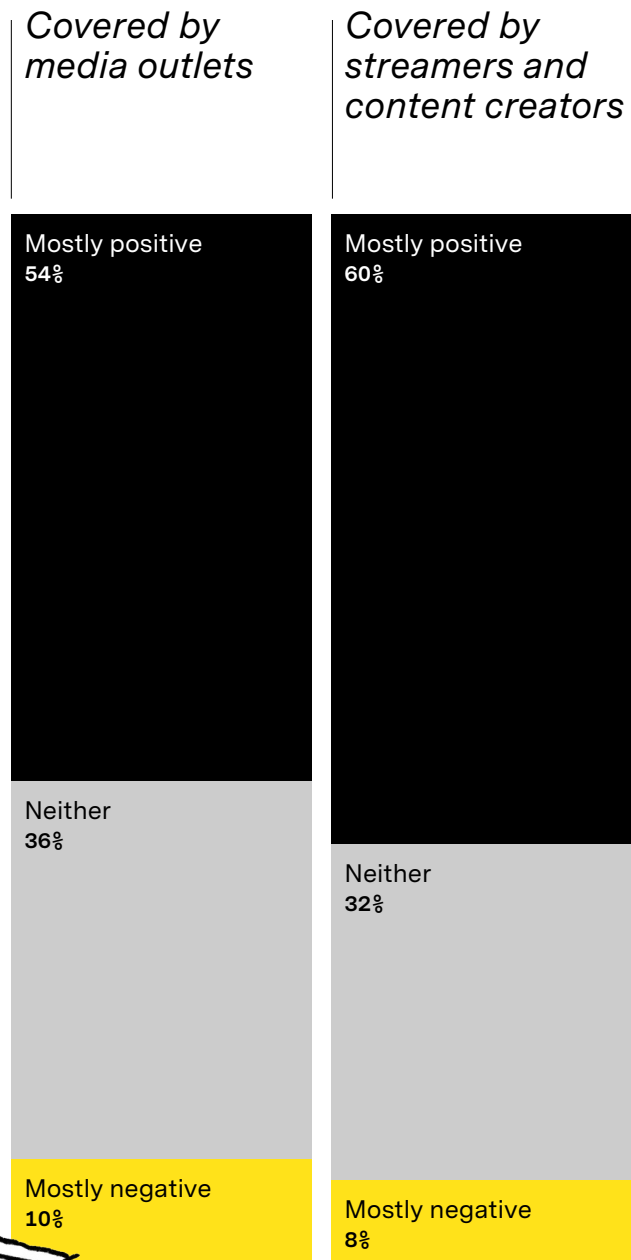|	
On social media	56%
On TV	30%
In conversations with friends and family	27%
On news forums / aggregators	26%
On gaming forums	25%
On gaming streams	24%
In mainstream newspapers or magazines	24%
On gaming news sites	23%
On podcasts	21%

While the mainstream press has been covering broader issues relating to artificial intelligence, gaming news sites like Kotaku have been opining on the impact that the technology could have on game development[3]. **More than half (52%) of players say that they've seen at least one piece of media coverage about studios and developers exploring the use of generative AI within their games.**

However, much of the conversation around the use of AI in video games has bypassed these traditional outlets—and has taken place, instead, in the comments of Twitch streamers and the replies of prominent influencers. Among gamers who follow streamers or other content creators, 68% have seen at least one of those creators talk about the issue of AI within the gaming industry.

3. Sisi Jiang, "What People Get Wrong When They Think About Video Game AI", Kotaku, February 16, 2023

Q How would you describe the tone of the coverage you've seen relating to the use of AI in the gaming industry?

Covered by media outlets

Mostly positive
54%

Neither
36%

Mostly negative
10%

Covered by streamers and content creators

Mostly positive
60%

Neither
32%

Mostly negative
8%

Streamers, it seems, are playing a crucial role in building fans' excitement about the potential gaming applications of AI. Players who've seen creators talk about AI generally say that their tone has been largely positive—more positive, in fact, than the tone of traditional media outlets that have been covering the topic. And those who watch streams and follow creators tend to be more optimistic about the benefits of AI for the gaming community and less worried about the potential risks.

4. Liam Ho, "Asmongold freaked out by shockingly accurate AI stream of himself: "I don't know what to say" ", Dexerto, February 6 2023
5. Chloe Xiang, "This Virtual Twitch Streamer is Controlled Entirely by AI", Vice, January 4, 2023Scientific American, December 28, 2022
6. Cedric Pabriga, "Controversial AI streamer Neuro Sama finally banned on Twitch", Dot Esports, January 12, 2023

How AI is shaking up the world of streaming

Streamers may be shaping the conversation around generative AI–but it's also increasingly clear that this technology has the potential to disrupt the landscape of streaming itself.

AI "deepfakes" of high-profile streamers have become something of a meme on sites like YouTube and Twitch. Popular *World of Warcraft* streamer **Asmongold**, for example, has posted multiple videos reacting to AI versions of himself[4].

And in December 2022, we saw the debut of **Neuro-Sama**, the world's first AI-powered V-Tuber. Created by AI-enthusiast Jack Vedal, Neuro-Sama plays games like *Minecraft* and *Osu!* while interacting with her nearly 300,000 followers on Twitch[5].
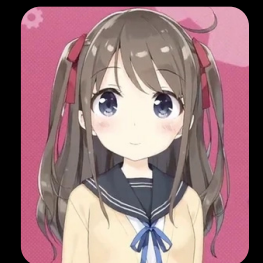
However, these examples also illustrate the dangers of allowing gamers free reign to interact with conversational AIs. Neuro-Sama has already been suspended by Twitch for making racist and misogynistic comments, forcing her creator to introduce stricter moderation controls moving forward.

02

**PLAYER ATTITUDES
TOWARDS AI**

Players are optimistic about the benefits of AI for the industry–provided the technology is used responsibly

The hype and excitement around generative AI among streamers, creators, and–for the most part–the gaming press have helped to create a strong sense of optimism towards the technology within the gaming community. **In total, 60% of players expect AI to have a net positive effect on the industry**–while only 11% think that it is likely to have an overall negative impact.

This broad sense of optimism towards AI is not limited to any one particular niche of the gaming community. PC, console, and mobile gamers alike all say that they're excited to see what the technology can do for the industry–although male gamers and those who post regularly on gaming-related social media communities are particularly likely to see the potential benefits of these technologies.

While some are excited to start interacting directly with AI-powered NPCs within their games and exploring other new types of gaming experiences, others see it as a useful behind-the-scenes tool for developers that could help to increase the quality of new releases and shave time off of development cycles.

60%

of players expect AI to have a net positive effect on the industry
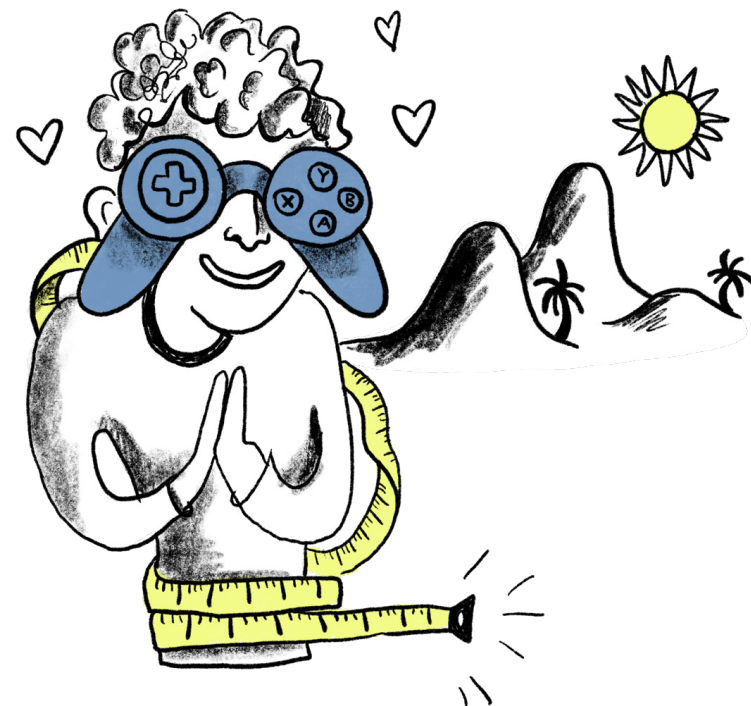
IN THEIR OWN WORDS

## Why players think AI could benefit the industry…

"You could keep playing the same game for years and have a different experience every time."

"It could let developers customize their games to their players' wants, needs and interests."

"If we give the robots all the dull jobs, developers will have more time to innovate and create great games."

"Developers will be able to create triple-A titles in far less time. With a full team using AI tools, they can create enormous game worlds that would otherwise take a dozen years to make."

"When I played around with ChatGPT, it felt like I was talking to a human Google who understood me on a deeper level than any search engine could. I'm excited to see what that technology could do for gaming."
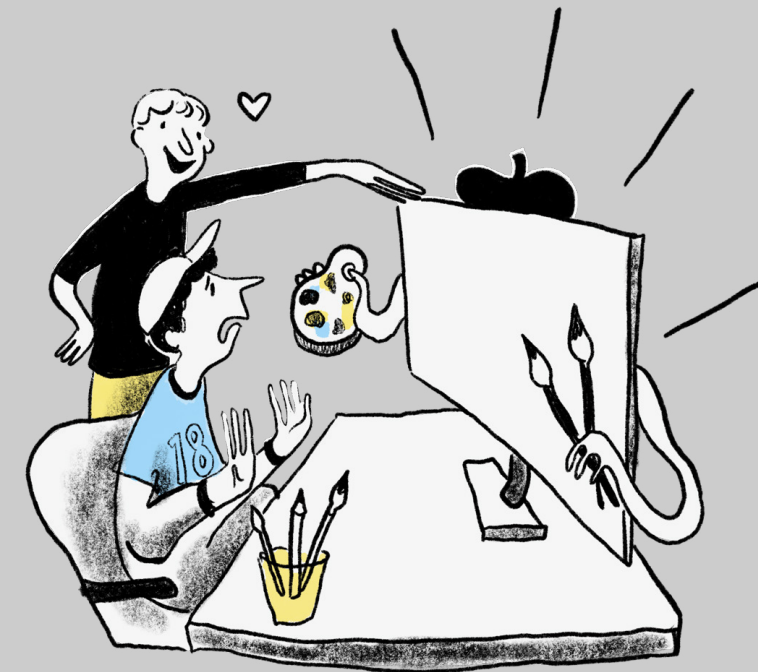
And what they're worried about…

"I'm worried about blurring the lines between gaming and reality. Gaming is already addictive enough."

"AI is going to promote laziness and take the human touch out of game development."

"I'm not convinced that AI-generated worlds and stories will be as appealing or creative."

"All the AI-generated media I've seen feels fake. From a distance, it can look rich and detailed, but when you get up close something seems off about it."
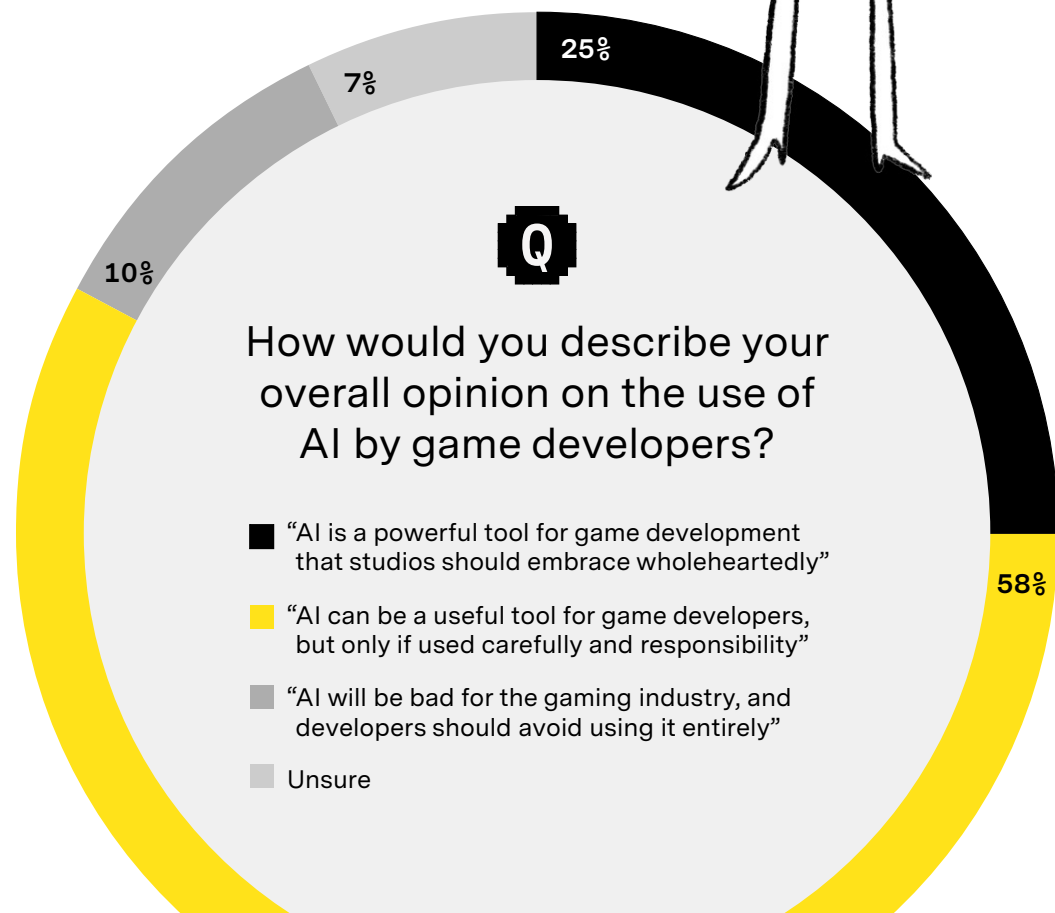
"AI is going to put a lot of people out of work, and make gaming a less attractive career path for creatives."

This doesn't mean, however, that players are blind to the potential risks created by mass adoption of generative AI within the industry. Only 25% think that studios should embrace the technology "wholeheartedly"; **the majority (58%) see AI as a potentially useful tool for developers, but one that must be used carefully and responsibly.**
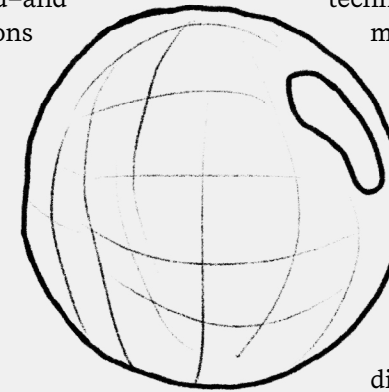
For example, 80% of players agree that, if developers are going to make use of AI-powered tools, it's important that they put the right safeguards and filters in place to prevent offensive content from making its way into their games. Any games that feature open-ended conversations with AI-powered NPCs will need, therefore, to ensure that those AIs are embedded within a strong contextual layer that prevents them from breaking character and stepping into real-world controversies—even when players try to push them to their limits.

Similarly, players are also aware of the ethical issues surrounding AIs and intellectual property; the question of whether, for example, artists need to consent to the inclusion of their work in the training data for AI art programs. While ongoing court cases may soon establish a legal precedent for resolving these questions, most gamers say that they want studios to be proactive about ensuring that these technologies are deployed in a way that respects the work of human creators. **Eighty percent say that studios using AI-powered tools need to take steps to ensure that the AIs they use are not plagiarizing the work of artists, voice actors, writers, or other creatives.**

Q

How would you describe your overall opinion on the use of AI by game developers?

- ■ "AI is a powerful tool for game development that studios should embrace wholeheartedly"
- ■ "AI can be a useful tool for game developers, but only if used carefully and responsibility"
- ■ "AI will be bad for the gaming industry, and developers should avoid using it entirely"
- ■ Unsure

25%
7%
10%
58%

AI The Web3 hype cycle all over again?

Some AI-skeptics, however, have warned that this current wave of interest around the technology might prove to be short-lived—and have drawn comparisons to other recent technologies that failed to live up to initial expectations. Prominent tech journalist Cory Doctorow, for example, recently declared that enthusiasm for AI was "the new crypto hype bubble"[7].

And within some parts of the gaming industry, there's a worry that generative AI could follow a similar trajectory to that taken by NFTs in 2022: a huge surge of initial interest as studios announce plans to incorporate the tech into their new releases, followed by a dramatic reversal driven by an intense fan backlash. By the end of last year, NFTs had become so toxic to a certain slice of the gaming community that a number of developers had to cancel or quietly shelve previously announced plans to incorporate blockchain technologies into their products[8].

So, is there a risk that generative AI could suffer the same fate? Will players start to turn on the technology once they become more aware of the risks and potential downsides?

Fortunately for developers, the early signs indicate that this will not be the case. Instead, generative AI appears to be following a very different trajectory than Web3 technologies like NFTs–at least, within the context of the gaming community.

Sixty-nine percent of players have at least some understanding of what an "NFT" is, meaning that levels of familiarity towards the technology are similar to those enjoyed by generative AI. However, opposition to their use within video games is significantly more intense and more widespread. **Forty percent of players think that NFTs are bad for the gaming community and studios should avoid using them entirely; whereas only 1 in 10 feel the same way about generative AI.**

40%

of players think that NFTs are bad for the gaming community and studios should avoid using them entirely

10%

feel the same way about generative AI

7. Cory Doctorow, "The AI hype bubble is the new crypto hype bubble", Medium, March 9, 2023
8. Tomas Franzese, "Every canceled video game NFT project (so far)", digitaltrends, April 6, 2022

But there's another crucial difference. Over the last two years, as players developed a better understanding of NFTs, opposition to their use within the industry started to swell. But with generative AI, the opposite appears to be happening: the more media coverage people see about AI, and the more they hear it talked about on social media and on streams, the more excited they are about its potential applications for the gaming industry. Among gamers with a high level of knowledge about AI, 68% expect it to have a positive effect on the industry–compared to only 42% of those who are less familiar with the technology.

As more and more players start to try out AI-powered applications for themselves, there's a strong chance that this sense of enthusiasm will become even more commonplace. **So far, only around a quarter (26%) of players have used a generative AI platform themselves**–with ChatGPT being, by a substantial margin, the most commonly used service. And most of those who have used a service like ChatGPT say that they've done so, primarily, to see for themselves what the technology was capable of, rather than to help them with their jobs or other important tasks.

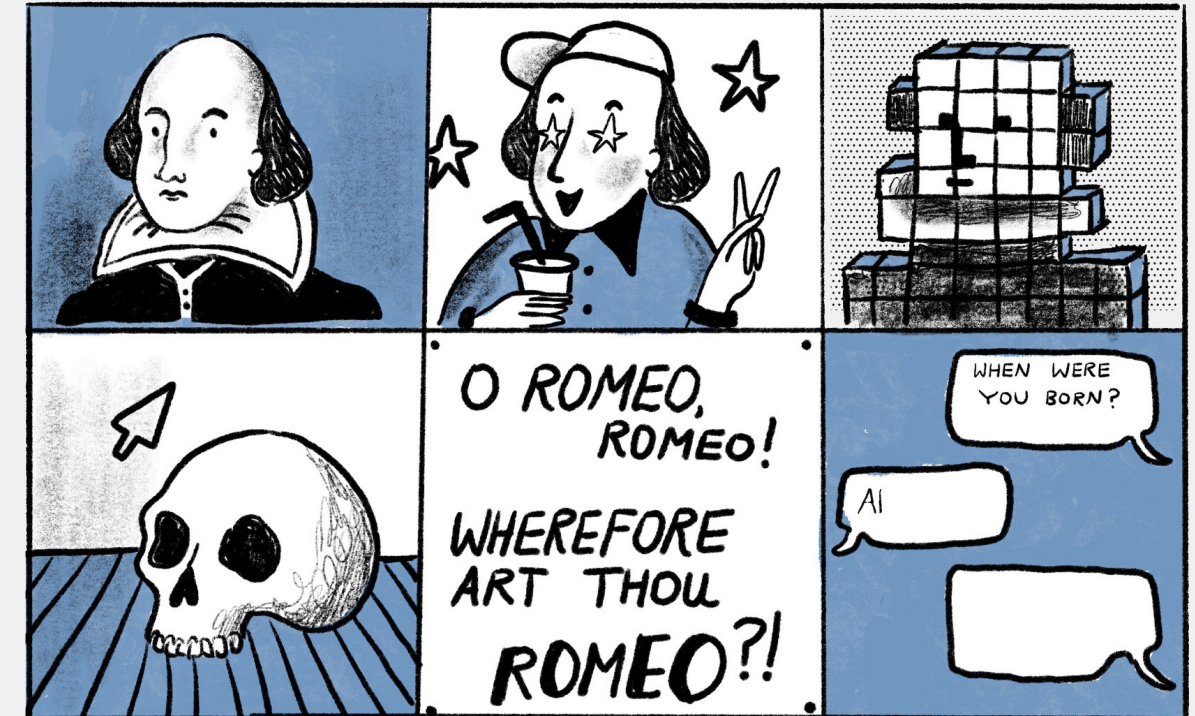## Q : What have you used generative AI for?

To play around with the technology and see what it could do 59%

To search for information 41%

To have conversations with fictional or historical figures 27%

To help write or edit documents 37%

To create art 26%

But even so, this early exposure to interacting with virtual intelligences has helped to create a rapidly growing community of AI evangelists; **76% of players who've used an AI-powered platform say that they expect the technology to have a positive impact on the gaming industry.** As tools like ChatGPT and Midjourney become more sophisticated and more accessible–and as major software providers like Microsoft[9] and Adobe[10] start incorporating AI "copilots" into their application suites–this community of evangelists will continue to grow.

This is the crucial difference between NFTs and generative AI. Unlike NFTs, enthusiasm for AI among players is being driven not by speculators, but by actual exposure to the technology–by people using the technology for themselves or seeing others use it, and starting to think about all the applications it could have for their favorite gaming properties. There's an organic sense of optimism around this technology within the community, as fans await to see what developers are able to do with it.

9. Daniel Howley, "Microsoft is dominating the AI wars…for now", Yahoo! Finance, March 29, 2023
10. Stephen Shankland, "Adobe Reveals New Firefly AI Tool to Help Illustrators Color Their Art", March 30, 2023
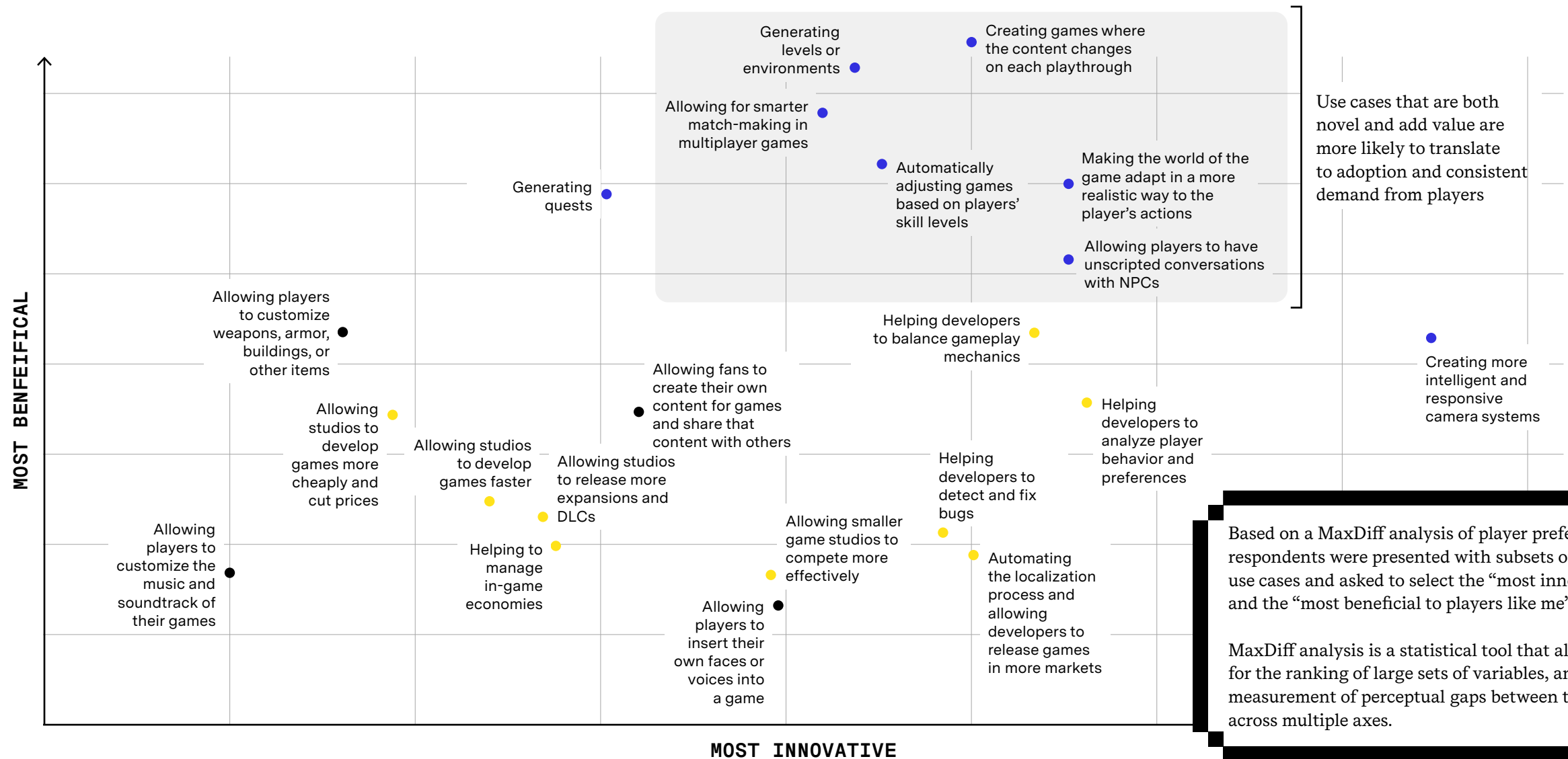
03

USE CASES FOR AI

The most exciting applications of AI, for players, are those that could add a new level of immersiveness to virtual worlds

Currently, major studios and indie developers alike are exploring an enormous range of use cases for generative AI–and with so much hype surrounding the technology, it can be hard to distinguish between genuinely impactful use cases and those that are merely "AI for AI's sake".

It also remains to be seen just how transformative the technology will truly be for the industry. Will it lead to the emergence of entirely new genres of games, where players freely interact with responsive environments and richly imagined NPCs? Or will it be a technology whose primary benefits are mostly incremental in nature, helping to expand the scope and quality of existing game franchises?

Use cases for generative AI in gaming

● **Player customization and creation**

● **In-game AI-driven experiences**

● **Developer tools**

Use cases that are both novel and add value are more likely to translate to adoption and consistent demand from players

Scatter plot (MOST BENEFICIAL vertical axis, MOST INNOVATIVE horizontal axis) with the following labeled points:

- Generating levels or environments
- Creating games where the content changes on each playthrough
- Allowing for smarter match-making in multiplayer games
- Generating quests
- Automatically adjusting games based on players' skill levels
- Making the world of the game adapt in a more realistic way to the player's actions
- Allowing players to have unscripted conversations with NPCs
- Allowing players to customize weapons, armor, buildings, or other items
- Helping developers to balance gameplay mechanics
- Creating more intelligent and responsive camera systems
- Allowing fans to create their own content for games and share that content with others
- Allowing studios to develop games more cheaply and cut prices
- Allowing studios to develop games faster
- Allowing studios to release more expansions and DLCs
- Helping developers to analyze player behavior and preferences
- Allowing players to customize the music and soundtrack of their games
- Helping to manage in-game economies
- Allowing smaller game studios to compete more effectively
- Helping developers to detect and fix bugs
- Allowing players to insert their own faces or voices into a game
- Automating the localization process and allowing developers to release games in more markets

Based on a MaxDiff analysis of player preferences; respondents were presented with subsets of these use cases and asked to select the "most innovative" and the "most beneficial to players like me".

MaxDiff analysis is a statistical tool that allows for the ranking of large sets of variables, and the measurement of perceptual gaps between them across multiple axes.

Understandably, players are particularly excited about use cases for AI that would enable them to interact directly with AI-powered game elements–such as having unguided conversations with human-like NPCs, or interacting with a virtual world that responds organically to their decisions and actions.

In particular, the types of AI-driven experiences that players are most interested in are those that promote one or more of the "three Rs":

REALISM

Improving the quality of in-game assets and creating environments that feel immersive and lived-in.

RESPONSIVENESS

Allowing players to interact freely with a world that responds to their actions.

REPLAYABILITY

Creating new experiences with every play through, allowing players to spend more time in the worlds they love.

There are certainly use cases for AI that stretch beyond these core concepts. For example, AI could help to facilitate a new level of player customization–allowing them to scan their faces or record their voices and add them into the game, or composing a new soundtrack on the fly based on their favorite music genres.

But while there may be an audience for these kinds of experiences, they're not what the community is getting most excited about right now. **Gamers, ultimately, want developers to prioritize applications for AI that push them deeper into immersive virtual worlds and blur the boundaries between fiction and reality**–rather than those that take them outside of that world and remind them that they're playing a game. This is also why players are particularly excited about seeing AI deployed in games where the exploration of the world is a core part of the play experience–such as open-world action games–or those where the game revolves heavily around interactions with NPCs–such as RPGs or interactive story games.

Players also say that they're excited to see what AI can do for popular sports titles like *FIFA* and *Madden NFL*. While sports games are not a genre that features the exploration of virtual worlds, they could benefit greatly from the added realism that AI can provide; just imagine, for example, putting Messi or Ronaldo on your team and knowing that they'd make exactly the same decisions that their real-life counterparts would.

The genres where players think AI could have the biggest impact

1. Open-World Action

2. Role-Playing (RPGs)

3. Action-Adventure

4. Interactive Story

5. Sports

CASE STUDY

inworld

Kylan Gibbs
Co-Founder and Chief Product Officer,
Inworld AI

Q: *What is Inworld AI–and what are the benefits it can provide to players and developers?*

Inworld is the developer platform for AI characters. For gaming, we're enabling players to have unscripted conversations and interactions with NPCs. We've all seen the recent explosive growth of generative AI—but what we've heard from developers who were trying to use tools like ChatGPT for immersive, real-time experiences was that there are limitations to the platform. Inworld goes beyond a large language model and adds configurable safety, lore/knowledge, memory, narrative controls, multimodality, and more.

Q: *What do you see as the major challenges to making generative AI function within the context of a video game, and how have you tried to address those challenges at Inworld?*

There are three general problems with using raw large language models today. The first is that they are not optimized for real-time performance. Milliseconds matter in real-time, and latency breaks immersion for gamers. Obviously, that wouldn't work in the context of a video game, so real-time performance was the first problem we had to solve. Our founders built Dialogflow, Google's conversational AI platform used by millions of developers, after their company was acquired, so we have deep experience in building for scale.

Another thing we do is put personality at the center of your AI through our Character Engine. Large language models have generic personalities out of the box–but for games, you need heroes, villains, merchants, and characters who are essentially actors in your game. Moreover, human communication is more than what you say, it's how you say it. It's the nonverbal *and* the verbal. Real world data is multimodal. So the Inworld platform goes beyond language to give characters full, humanlike expression, orchestrating across multiple models to give voice intonation, emotions, gestures, facial animations, and more.

The last piece is a Contextual Mesh. What large language models give you is access to all of human knowledge: all of the fact, all of the fiction. But when you're in a game or immersive experience and interacting with an AI character, you need that character to have an awareness of what their context is: "What is my world? How do I not break that fourth wall?" So, we've created this mesh on top of the experience that keeps the NPC character in-world or on-brand.

Q: *How do you see the landscape of generative AI platforms for developers changing over the next three to five years?*

In the future, while I expect that the large language models coming from providers like Google and OpenAI will continue to grow and proliferate, I also think we'll see the emergence of more verticalized providers who create value-added services on top of each of those. Instead of having to fine tune large language models themselves, developers will be able to choose from a range of more targeted solutions–providing more depth to the experience and also allowing them to make more efficient use of their resources.

Q: *How can developers make sure they're embracing these tools in a way that enhances and facilitates human creativity–rather than pushing it out of the process?*

The feedback we've gotten from creators who've used the Inworld platform is that working with an AI is a lot like having another collaborator around the writer's table. We've heard this from renowned authors like Neal Stephenson and Academy Award-winning creator John Gaeta.

Inworld doesn't replace the writing or creative team. You still have to design the character's brain; you have to give them motivations, back story, a personality. It might not be a traditional writing process, but it's still an inherently creative exercise.

There are different ways of engaging with the Inworld platform. Some people use our platform more as a kind of brainstorming tool–creating interactions that are then rewritten and polished by humans before going into the game. Others are trying to create more open-ended experiences, so they approach it more like they're giving prompts to an actor. Whatever story you're trying to tell, you have to find a way of working collaboratively with the AI.

inworld
AI-driven virtual characters

CASE STUDY

🛸 **charisma**

Guy Gadney
Co-Founder and CEO, Charisma

Q : *What is Charisma, and what type of experiences can it enable for players?*

Charisma's focus is really on characters and narrative–in gaming terms, NPCs and the storyline. It comes from a core premise which is that AI can fundamentally change the depth and breadth of an interactive game experience, specifically around character interactions.

In his book, *The Art of Game Design*, Jesse Schell talked about the idea that the gaming industry has an issue around verbiage. If you look at the verbs used in games–'run', 'jump', 'punch', 'kick', and so on–you can see they're all below the shoulder. Hollywood, on the other hand, tends to use above-the-shoulder verbiage: 'make them laugh', 'make them cry', etc. If we can bring those two together, we can create an incredibly powerful new storytelling medium. And that, to me, is the most exciting thing about generative AI.

Q : *Charisma recently published an AI-powered adaptation of John Wyndham's novel, The Kraken Wakes. Why did you choose that book to adapt–and what does that say about the kinds of gaming experiences where AI can have the biggest impact?*

Greetings from
ESCONDIDA
A TROPICAL PARADISE
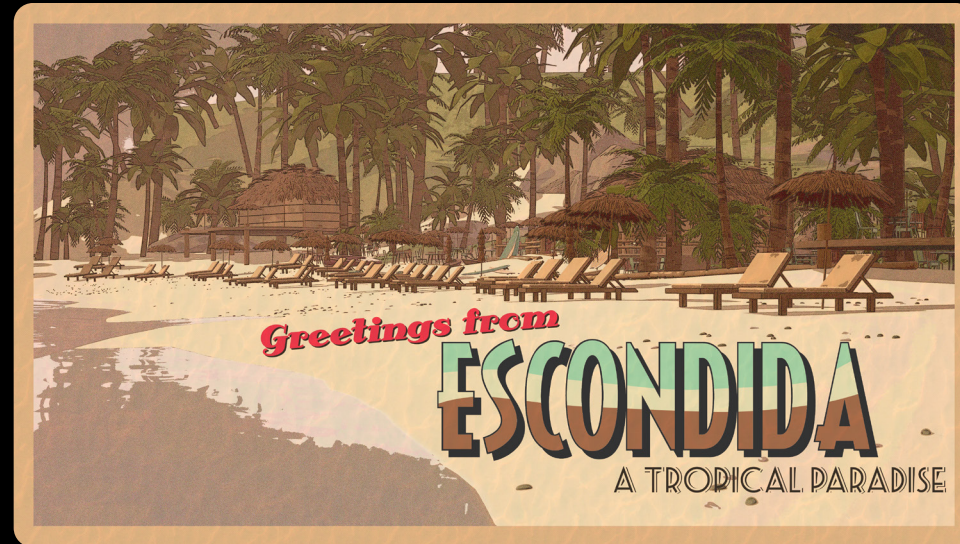
The first thing that attracted me to the book were the characters–the characters are great. If the book had been more action-driven or prose-driven, it may not have worked as well. But because the story was rooted in those characters, that gave us a great starting point for building scenarios for the player to experience. In the game, you're cast inside the story. You speak to the characters, they speak back, and what you say to them influences their emotions and the way that the gameplay and the narrative progresses.

We also wanted to use that game as a test case to prove that you could maintain these narrative experiences over a long period of time. ChatGPT isn't built for that; it's built for short conversations, not for maintaining context over a long period of time. And that's where Charisma comes in.

Q : *What steps have you taken to preserve that context–and make sure that players are kept within the story?*

Context is the key to pretty much every form of human interaction, broadly speaking. Context–what you can and cannot say in any given social environment–is at the root of comedy, drama, really every relationship we have as humans. And context is just as much about what to say as what not to say–and I mean that in a political sense as well as a storytelling sense.

Think about *Star Wars*, for example. If you were going to create a GPT4-powered version of Luke Skywalker and ask him "Who's your father?", the answer to that question is going to be completely different depending on what moment in the story you ask it.

We think of it almost like a skateboarding halfpipe. So, the story moves along at the bottom of the halfpipe, but a player can move up and down as they go through it. They can explore, they can have conversations around the backstory, they can have natural deviation away from the core narrative–but then we'll bring them back down again, as gravity brings you back down, because we want to keep moving them forward in the story.

Ultimately, we want people to move forward; we're not building a chatbot. A chatbot is a question-and-answer session, its goal is to complete the knowledge transfer as quickly as possible. That's not the goal of entertainment; the goal of entertainment is to keep people involved and invested in the story for a long period of time, and that's hard. That's the problem we're solving for.

Q : *How do you see AI changing the role of creatives and developers within the gaming industry?*

Our core ethos at Charisma has been to put creativity first, and build the tech around that. We don't want studios to look at the creative act as a problem to be solved. Instead, they need to think of generative AI as a paintbrush; a new kind of tool for creatives. And like any paintbrush, the value you get out if it is going to be determined by your ability to use it effectively–and by knowing which brush to use in which situation. You can't just paint everything one color.

Q : *Do you think there'll always be a place for human creativity within gaming–regardless of how sophisticated generative AIs become?*

In his book *On Writing*, Jorge Luis Borges talked about the idea that there are two types of aesthetics. There's the passive aesthetic, which is a mirror, and then there's the active aesthetic–the prism. Right now, generative AI has become an incredibly efficient mirror; it's very good at reflecting back to us what we put into it. But we can't lose sight of that other element. Truly transformative art is still going to require that human element of creativity–and that's something we should celebrate, not try to automate away.

CASE STUDY

Jali

Sarah Watling
CEO, JALI Research

Q : *Could you give an overview of JALI's speech and animation software, and the role that AI plays in helping to power those tools?*

The core JALI toolset consists of production-ready tools for artists that are creating believable speech (lip sync) and facial animation for series or games as well as interactive virtual human applications. It automatically generates animation from the analysis and alignment of audio inputs; that could be a recorded voiceover, text-to-speech or some other synthetic speech input. That animation is then applied through a series of procedural or programmatic rules to a 3D character rig. That rig acts as the underlying skeleton

that drives the various parts of the face that you see moving in correspondence with the sounds that are being uttered.

AI is one of many different tools we use to power that technology. We've trained a number of speech language models, each of which has to be language-specific. The more language models we train, the tighter or less expansive any one additional model needs to be, but that smaller model still needs to contain enough examples of various audio phenomena that occur in regular speech for it to not break anytime you introduce a character that has a unique vocal characterization.

There are a lot of hidden complexities to the way that people speak. The way a sound manifests on the face can be heavily influenced by the sounds before and after it, for example. This is called co-articulation. So, by building models that are rooted in the observation of those kinds of natural phenomena, we're able to generate animation that matches the way real people speak as closely as possible, and have built a user interface that allows the user to direct an animated character's performance such that it can reflect the context of the story and the intention of the creator. There's a lot of nimbleness involved; often, we're building hand-coded models that allow us to guide the data that goes into our AIs.

Figuring out that process has involved a lot of trial-and-error.

One of our first major projects was *Cyberpunk 2077* for CD Projekt Red; for that, we built 10 different speech language models, and that provided a strong foundation on which we've continued to build ever since.

Q : *What were some of the unique challenges of working on a game like Cyberpunk–and how did AI help you overcome them?*

One of the defining characteristics of the game was the vast number of different cultures and languages it featured. That created a lot of complexity; we had to make it so that characters in-game could seamlessly transition between different languages mid-sentence. It was also a game that featured a lot of character customization options, such as implants and body-mods– so we had to find a way to make sure that our facial animations would integrate seamlessly with all of those different possibilities without breaking the player's sense of immersion in the world.

As we started training the speech language models for the game, we would amalgamate those into one general model so that we could make the individual ones more robust, but at the same time we would often go back to creating smaller unique ones with more curated or individual data for a specific character. We now

have this built-in behind the scenes mechanism called "train and align" that allows you to create on the spot a mini model for a character when that character has vocal qualities that are unique or are outliers that may break the model otherwise.

Q : *How do you see tools like JALI's opening up new possibilities for developers?*

One of the things we saw working on *Cyberpunk* was the enormous potential of these tools to aid with localization. In the past, a lot of players have been reluctant to buy games in their native language, because they can tell that the quality just isn't as good as the English version. If a line of dialogue takes 20% longer to say in a different language, then that can make it so the animation is now out of sync with the voiceover–and then everything else that's timed around that dialogue starts to break down.

Historically, it was far too expensive for studios to redo the animation for every single market. But with JALI, we can simply take the VO files for each different language and re-run the animation around that; and we only have to step in to make minor manual tweaks around the edges. It was eye-opening for us , when *Cyberpunk* released, to see players engaging with the game in their own languages. We were overwhelmed by the gratitude

we saw among fans; it was a real testament to how discerning players are and how meaningful innovations such as these can really be to a developers bottom line.

Another aspect is the power of the iterative capacity that JALI enables. Being able to rehearse scenes, and dialogue over and over, even with the likeness of a captured (motion/appearance) A-list actor, without the budgetary impact of continuing to have that artist in person in the studio is a tremendous boon, one that, once adopted, will be impossible for developers of interactive entertainment and experiences of scale to do without.

Q : *How do you see the role of AI in the gaming industry continuing to evolve over the next few years?*

One thing that is clear to me, when I reflect on how our customers leverage tools like ours right now, and the tools of the future that will refine applications of generative AI, is the acceleration and amplification of certain aspects of the creative process such that animators and interactive creatives are able to converge on their desired outcomes faster.

Big studios are certainly looking at the applications of this technology, however it is safe as well to say that the larger studios generally have greater inertia (not a bad thing in itself) due to established workflow, job classification, and sunk cost in software infrastructure. While this allows them to have a consistently strong product in principle, smaller studios are likely to be more agile. They would not survive if they were not.

04
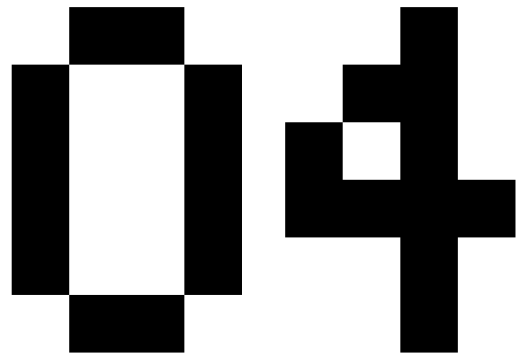
**GETTING THE MOST
OUT OF AI**

At its best, AI can be a powerful tool for harnessing human creativity

Clearly, generative AI can be a powerful tool for developers–and the technology is already finding a home in a wide range of projects across the industry. But, for players, it's important that developers approach this tool in the right way. Specifically, **they want studios to treat AI as an enabler for human creativity, not a crutch to rely on in its absence or an excuse to cut costs.**

Seventy-eight percent of gamers believe that it's important that the use of AI in game development doesn't push out human creativity from the process. And over a third (35%) think there's a real danger that studios could become less innovative or creative if they rely too heavily on AI.

To some extent, these concerns may be rooted in past experience. In the late 2010s, there was something of a backlash against games that relied too heavily on procedural generation; titles such as *No Man's Sky* received criticism for promising infinitely explorable worlds that turned out to be filled mostly with repetitive stock assets[11]. And there's an emerging fear amongst players that the promise of generative AI could end up being squandered by studios who treat it as simply a more powerful form of procedural generation[12].
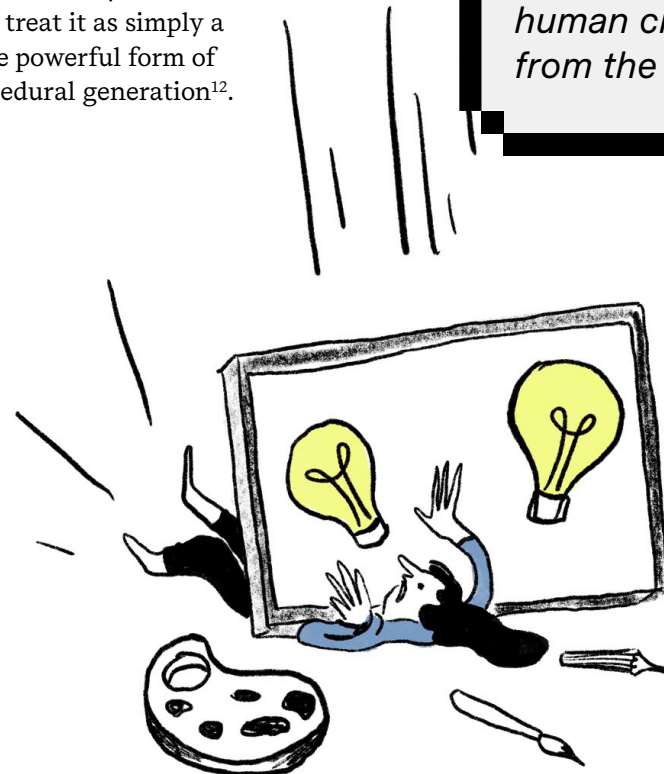
11. Tim Martin, "The infinitely boring No Man's Sky",
    The Economist, August 19, 2016
12. Iwan Morris, "AI promises to make your game for you.
    But there's a catch.", PocketGamer.biz, December 16,
    2022

78%

of players believe that it's important that the use of AI in game development doesn't push out human creativity from the process

The most common worries players have about AI

Overreliance on AI could lead to less human creativity and innovation in game development	AI-based tools could make it easier for hackers and scammers to take advantage of players	Players could use AI tools to harass others or propagate hate speech	AI could make it harder for illustrators and artists to find work	AI could make it harder for developers to find work
35%	31%	31%	30%	29%

To avoid repeating the mistakes of the past, studios will need to learn to think of the AIs they work with as partners and collaborators, not replacements for their artistic talent. For example, generative AIs can act as a sort of "muse" for artists, providing initial concepts for character or item designs that can then be refined and implemented manually. Alternatively, AI can serve as a scale modifier for human creativity–taking characters that have been lovingly crafted by a writing team and a set of voice actors, and enabling them to go "off script" and respond to players in new ways. **However studios choose to implement AIs into their workflows, it's vital that they don't deprioritize the element of human creativity that makes games worth playing in the first place.**

While most gamers are confident that generative AI will be a net good for studios and for players, they also express concern that creatives such as writers, artists and voice actors are going to lose out from the mass adoption of AI-powered tools within the industry. Artists, in particular, have been vocal about the negative impact that generative AI could have on their livelihood[13]. And there's a real risk that fewer talented young artists will be interested in pursuing a career within the gaming industry if it becomes a place where genuine creativity is undervalued.

The adoption of AI will almost certainly force studios to rethink how to get value out of their workforces and their contractors–and may even herald a seismic shift in labor dynamics within the industry. **Sixty-seven percent of players believe that the growing use of AI will make it more important for developers and other creatives to create strong labor unions.** Ultimately, the studios that will have the most success with AI are likely to be the ones that tackle this challenge head on, and take the needs of their creatives seriously.
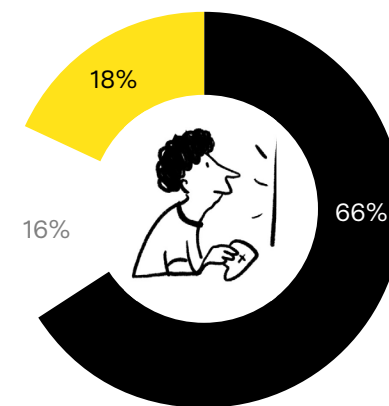
13. Jade King, "AI Art Has No Place In Gaming", The Gamer, December 20, 2022

> However studios choose to implement AIs into their workflows, it's vital that they don't deprioritize the element of human creativity that makes games worth playing in the first place.

Who will win and lose out from AI–according to players
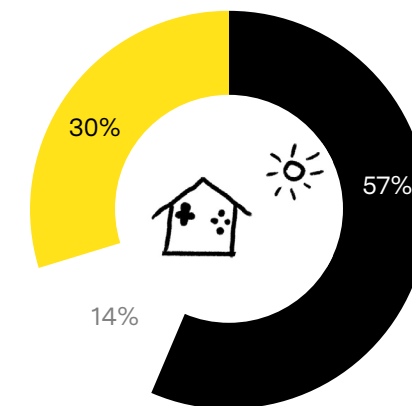
■ **Likely to benefit**   □ **No impact**   ■ **Likely to be harmed**
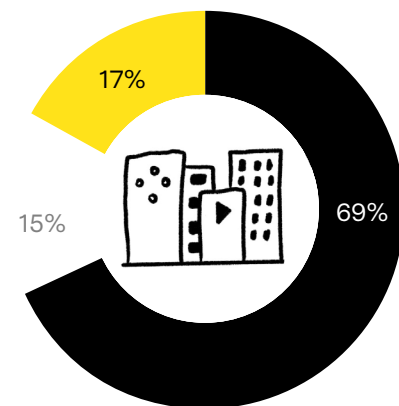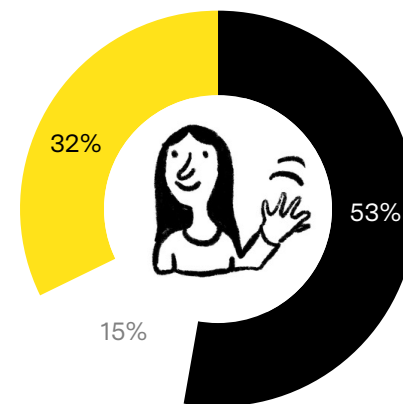

Large game studios
17% / 15% / 69%

Players
18% / 16% / 66%

Small game studios
30% / 14% / 57%
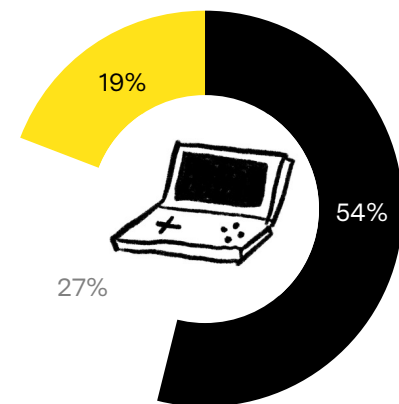
Console manufacturers
19% / 27% / 54%

Individual developers
32% / 15% / 53%
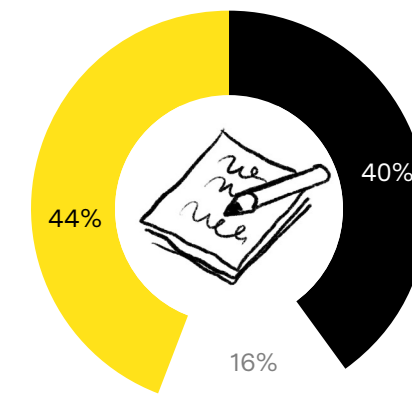
Writers
44% / 16% / 40%
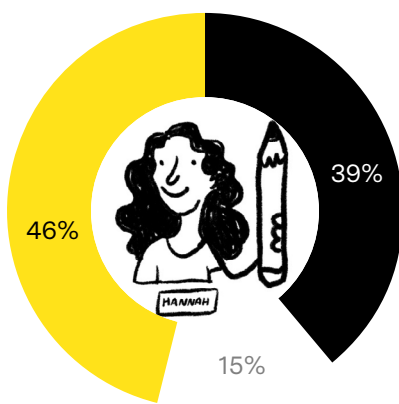
Artists and illustrators
46% / 15% / 39%
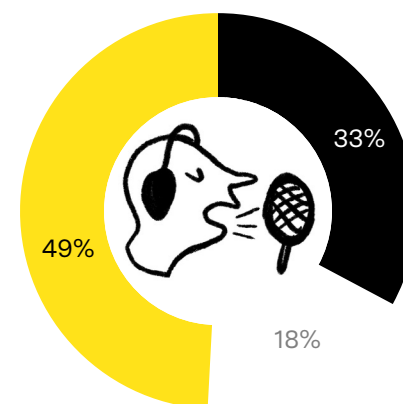
Voice actors
49% / 18% / 33%

While AI can play an important role in allowing studios to maximize the output of their staff, it can also help to harness the creativity of players themselves. Part of the appeal of generative AI is that it can make creative tasks more accessible to those who lack specialized training or expertise. And, in theory, that could provide a way for studios to turn casual players into invested creators, and build vibrant peer-to-peer content ecosystems within their games.

Roblox already operates an extensive creator marketplace where users can design and share new models, audio files, plugins and more–and *Fortnite* developer Epic Games recently announced plans to launch a similar service of their own[14]. Thanks to generative AI, these sorts of P2P marketplaces could become accessible to a wider range of players than ever before. **Fifty-four percent of players would be interested in buying content from a marketplace where players could use AI to create content, while 39% would be interested in creating content themselves and selling it through such a store.**

14. Armando Roggio, "Fortnite Maker Pivots to the Creator Economy", PracticalEcommerce, March 7, 2022

05

A LOOK AHEAD

What happens next could have repercussions far beyond the gaming industry...

The gaming industry is far from the only sector of our economy that is likely to be upended, over the coming decade, by advancements in the field of generative AI. To a large extent, the opportunities and the risks that lie ahead for developers are simply a microcosm of larger changes that are sure to play out across the entire fabric of our society.

What makes this industry unique, however, is just how far along the curve it already is. Historically, gaming has often played a key role in spearheading the refinement and the commercialization of new technologies. For that reason, **73% of players believe that game developers are likely to play a major role in blazing a trail for the development of AI technology over the next 5 years.** In this industry, generative AI is more than just a novelty or a hypothetical: the tools are already here, and they're already finding applications in major new product releases.

By the same token, the gaming industry is likely to be the battleground over which many of the major ethical and legal conflicts surrounding generative AI will be resolved. In particular, the adoption of AI tools by the industry has already started to throw up a whole host of thorny questions surrounding intellectual property rights: Is it acceptable for studios to train AIs on games put out by their competitors? Do artists deserve compensation for AI-generated art that imitates their styles? Who is the rightful owner of content generated by players using in-game AI co-creation tools?

The biggest challenge for this industry, however, is the question of how to effectively balance artificial and human creativity. Right now, there's a lot of enthusiasm towards AI among ordinary gamers; they're willing to give developers the benefit of the doubt when it comes to experimenting with this new class of technologies. That enthusiasm, however, could dissipate quickly if AI ends up leading to a "creativity drain" from the industry.

To avoid that nightmare scenario, studios will need to think outside the box; they'll need to take apart their development processes and rebuild them around wholly new models of human/machine cooperation. If they're willing to take on that challenge, the benefits–to players and to creatives alike–could be substantial. Moreover, if studios can successfully resolve these challenges, that will bode well for the incorporation of AI-powered tools into a wide range of other industries.

AT A GLANCE
Five key lessons for developers

01 Prioritize applications for AI that contribute towards a greater sense of realism, responsiveness, or replayability– and those that pull players deeper into the game world, rather than push them away from it.

02 Avoid using AI as an excuse to deprioritize or underinvest in human creativity; don't make the mistake of treating AI as just another form of procedural generation.

03 Ensure that you have the right safeguards in place and that in-game AIs are embedded in a contextual layer that restricts opportunities for abuse.

04 Work collaboratively with the creatives you employ–especially artists, writers and voice actors–to find use cases for AI that feel like organic extensions of their work, rather than challenges to it.

05 Explore opportunities to empower players to create and share content through AI-enabled creator marketplaces.