

Deloitte.

The metaverse is coming.

AI could be the mastermind.

Are you ready for a transformation?



About the Deloitte AI Institute

The Deloitte AI Institute helps organizations connect all the different dimensions of the robust, highly dynamic and rapidly evolving AI ecosystem. The AI Institute leads conversations on applied AI innovation across industries, with cutting-edge insights, to promote human-machine collaboration in the “Age of With”. Deloitte AI Institute aims to promote a dialogue and development of artificial intelligence, stimulate innovation, and examine challenges to AI implementation and ways to address them. The AI Institute collaborates with an ecosystem composed of academic research groups, start-ups, entrepreneurs, innovators, mature AI product leaders, and AI visionaries, to explore key areas of artificial intelligence including risks, policies, ethics, future of work and talent, and applied AI use cases. Combined with Deloitte’s deep knowledge and experience in artificial intelligence applications, the Institute helps make sense of this complex ecosystem, and as a result, deliver impactful perspectives to help organizations succeed by making informed AI decisions.

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This is likely the beginning of the next era... in innovation and business disruption.

This may be where technologies converge with major cultural and behavioral shifts just like when the Internet began to unfold in the 1990s. It could carry unlimited possibilities and has lots of facets. It's the metaverse—and it's arriving.

The metaverse is considered the next evolution of the Internet. It will likely evolve into a series of public and private digital platforms that can enhance the real world in increasingly sophisticated and valuable ways. Web 3.0 is a driver—a convergence of multiple technologies such as artificial intelligence (AI), Internet of Things (IoT), 5G, and blockchain—that could open a world of possibilities and inspiring innovation.¹ You may immediately think of gaming, consumer interactions at stadiums, and new retail experiences when you think of metaverse, but enterprises and governments can also create virtual worlds. For example, immersive simulations of physical environments can be made hyper-realistic and physically accurate. Humans, robots, and AI agents can work together to plan, design, and test—accelerating innovation and development cycles for a variety of business and community needs. Can you imagine testing new product features to ensure they work before the product is even released? Well, consider this: Immersive simulation could be used to simulate the ergonomics of automobile console design. Are knobs or touch points on the console easy to use while driving? Can everything be accessed safely in a dark interior? Immersive simulation can test for all these issues, and more, and could lead to a more well-designed product before it ever hits the market.



The value of immersive simulation

Immersive simulation uses innovative technology for business and government applications, which can change the game for how we work and learn. These simulations, or digital twins, mirror the physical world as we know it. By perfecting actions in a digital environment, we may be able to remove cycles of prototyping and testing to help organizations and government make more informed and efficient decisions. It could take “practice makes perfect” to a whole new level. Not only can these new approaches create value for organizations, but they could also create entirely new revenue streams, which could indeed disrupt status quo companies. It’s a new paradigm, [an Unlimited Reality™](#). Who wouldn’t like to be the inventor of the next disrupter?



How it works

Immersive simulation can create a living replica of a physical environment. In its optimal state, it can live and breathe just as its real-world counterpart does. It’s all about the data, data running from sensors that are all over a hyper-connected physical world. Machines, cell phones, cameras, temperature gauges, and sensors can all feed information into the simulation. This massive wave of data is what we mean when we talk about the IoT. The more sensors, the more data, the better the simulation gets and the more informed our decisions in the physical world can be.

Immersive simulation can help streamline and enhance the design process as in the case with the car, potentially creating time and space for more design iterations and speed to production by removing cycles of prototype testing. The next generation of immersive simulation may help engineers identify potential manufacturing, quality, and durability issues—all before the designs are finalized. Today, it can be used to explore space, optimize manufacturing systems, generate renewable energy more effectively, and even undertake patient surgery more safely.

At the Scripps Clinic in California, surgeons are using a new mixed reality headset that gives them a 3D holographic view of a patient's surgical plan. The technology lets doctors superimpose the 3D surgery plan over the patient's anatomy so they can replicate it more easily.² In manufacturing, maintenance, and warehouses, workers could achieve significant efficiency gains through IoT and augmented reality tools.³ And cities are creating entire 3D replicas of themselves, helping to improve decision-making and transportation scenario-planning.⁴

Scenario planning is also likely to be part of the Department of Defense's push into advanced digital and artificial intelligence capabilities—the Pentagon recently hired its first chief digital and AI officer. The goal appears to be to fast track the development of AI capabilities that can be used by U.S. forces from the Pentagon to the battlefield. In the world of sports, the New York Mets baseball team recently bought an AI-based pitching machine that analyzes MLB ball-tracking data to replicate the delivery and pitches of any pitcher inputted into its system. If the Mets want to see a pitcher they are going to play in an upcoming game, the machine will give them that specific pitcher—his windup and his pitches. In a game, batters typically get better after their first at-bat against a pitcher—now, teams could have the ability to accelerate that process using immersive simulations.

With the metaverse, the world of possibilities could soon become a new reality. Here's what's driving human curiosity about it—and how it's resulting in innovation.



The Internet is going 3D with new, center-stage experiences. Take a look at the future.

Imagine gaming engines intersecting with signature business issues like training technicians, creating customer experiences, and supporting decision-making. In fact, many of the world's premier gaming engines are already servicing corporate entities. For example, NVIDIA is entering the Edge AI market, which could enable more immediate, even life-saving, actions in the field. London-based, Proximie is [leveraging NVIDIA](#) products to build a telepresence platform for real-time, remote surgical collaboration.

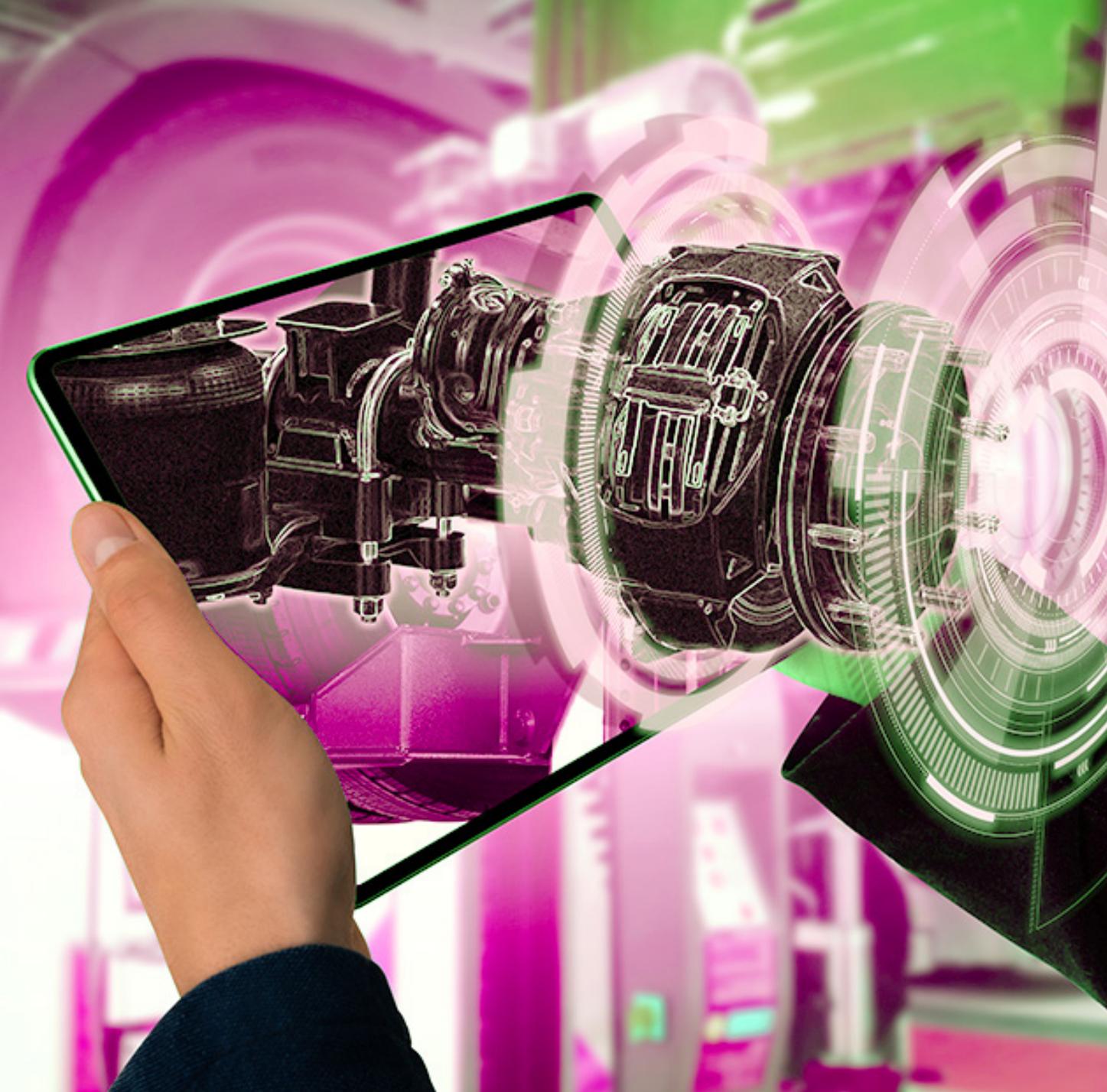


New devices could change our daily interactions

Some major technology companies are already in product planning phases to create more fluid experiences with the Internet.⁵ Through next-generation interfaces—for example, smart glasses or voice—it is expected that we will be able to interact with contextual, real-time information that has been called up by intuitive and sensory triggers such as geolocation, computer vision, and voice, gesture, or biometric commands.⁶ **People may even be less dependent on computer and laptop screens** in the future.

Augmented Reality and Virtual Reality (AR/VR) devices are expected to be a primary gateway for humans to access new types of platforms, ranging from AR glasses or digital contact lenses to haptic wearables and sensors. Artificial intelligence and machine learning (AI/ML) are expected to play a foundational role in Web 3.0 computation. It could also help drive personalized experiences via AI's ability to self-program, continuously learn, and make contextual decisions—but will likely require immense amounts of processing power and networking speeds. This requirement can make 5G connectivity and edge computing core enablers. Without them, the metaverse would likely have a hard time going mainstream.





Digital twins should get better in 3D and proliferate

In a digital environment, sensors and 3D maps can help to create a twin image of many objects in many places. Today, this type of digital information is primarily accessed via screens and dashboards. In the future, the twin may pop up in the middle of a conference room table so people can see the effects of different scenarios live. These twins mimic the world as we currently know it. If a piece of machinery in the factory is getting hot to the touch, the twin reflects the same temperature change and can alert the operator of a pending issue. Digital twins can also identify the best way to carry out operational or emergency tasks—**anything requiring significant capital expenditure or risk to human life could be more cost effectively and safely simulated** and tested via a digital twin.⁷ Astronauts and soldiers can carry out missions with better scenario planning. Engineers for high rises could have the ability to identify and implement fixes to structural issues in a virtual world before carrying them over to the real world, [cutting down long testing cycles](#). How we enhance the physical world for greater beauty, utility, and environmental sustainability can be designed and modeled in an immersive twin. Humans are at the center of both worlds.

Early consumer simulations could inspire organizational ones

It's easy to imagine how digital worlds and real worlds can have mega impact in **the world of sports**. Digital experiences for fans are already getting innovative. In collaboration with US Golf Association, Deloitte created an [augmented reality experience](#) that immersed fans in the 2021 US Open and US Women's Open in ways previously unimaginable.⁸

The [2021 US Open AR app](#) allowed fans to explore not only the historic clubhouses at The Olympic Club and The Lodge at Torrey Pines, but also to experience 3D views of every hole and every shot—in near-real time—during championship play. It was developed with graphics so lifelike you think you're on the course. Because it's a mobile experience, it's not just for home. You could be on the course, walking the 9th hole and experiencing the action taking place on the 18th.

Off the course, such possibilities with new tech can address **signature business issues such as employee training**. Take service or fleet technicians for example. Training them is often time consuming. But, if technicians could start with virtual reality training that lets them see the systems they are working in 3D and guides them through the repairs in a gaming-like environment, training time could be cut.⁹ Technicians could get to independent work more quickly and companies may be able to attract a new generation of recruits. It's apt to change how next generations might work in the future. It's still challenging to simulate the variety of scenarios that will occur in the real-world today, however...





Today is the perfect time to collaborate and experiment.

For example, consider how meetings might change. Imagine moving around an office from room to room via your own virtual avatar, passing other colleagues' avatars in the halls or interacting with colleagues from across the globe in a digital meeting space. These are all new opportunities for design, workflow, and immersive collaboration. Younger employees who are often naturally more comfortable in these environments will likely gravitate toward them, making them a potential recruiting magnet down the road.

Meeting and collaborating in a virtual world is one thing, but what **about designing products and workflows to deliver better goods and services using a virtual 3D environment?** We'd like to introduce you to a few friends of ours. If you haven't met Deloitte's virtual rubber ducks, [take a look](#). These virtual rubber ducks can help illustrate the ways factories of the future are working today. The [Virtual Factory Duck App](#) lets you change product features, test them to increase performance, and alter production specs before a single duck is made. AI is fueling a lot of the capabilities—and, this isn't just imaginary; it's already operational, it's real.

Can immersive simulation really make organizations smarter? In some cases, they already are.



Factories

At one global shipping company, a pilot project incorporated IoT sensors to help predict maintenance failures before they happened and ensure reliable, on-time deliveries. This facility was operating 24/7, which reduced the opportunity for routine maintenance activities and led to unplanned downtime for emergency maintenance. The downtime left several hundred million dollars on the table and negatively impacted service delivery. By leveraging IoT and edge computing, Deloitte was able to help the company reduce unplanned downtime by identifying likely machine failures before they occurred. The impact: Once scaled up, this client should unlock 5 percent of capacity across nearly 50 automated facilities and save nearly \$100 million annually. With maintenance issues minimized, they can provide better service to customers, despite the pandemic and labor shortages. This is metaverse technology in action and organizations are experimenting with it at [Deloitte's Smart Factory @ Wichita](#) today.





Government agencies

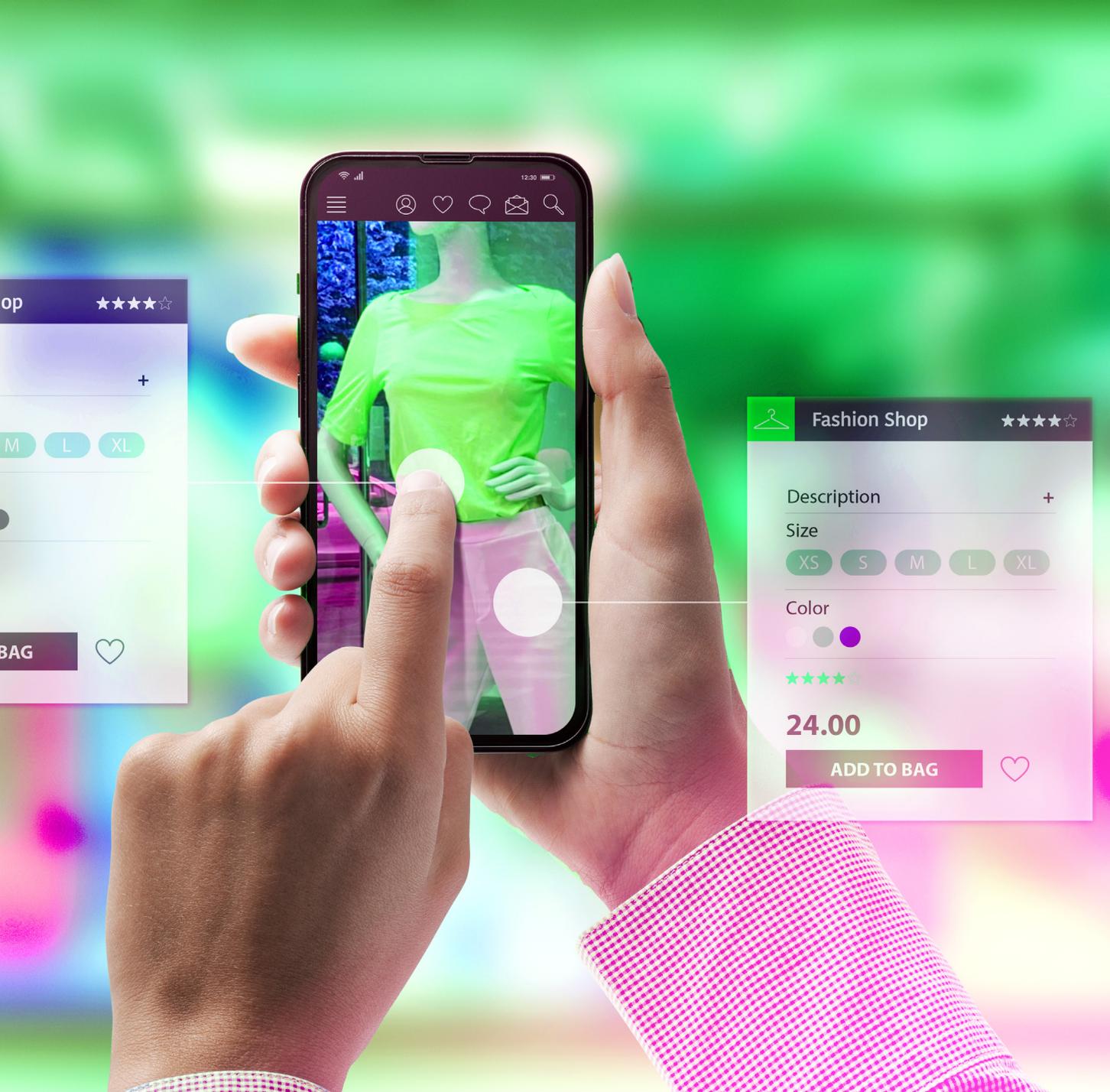
Factories are undoubtedly great examples, but the benefits of immersive simulation go farther. **A government agency in Australia** is working with Deloitte on a first-of-its-kind immersive application based on simulation techniques pioneered in **Formula One** racing. [Optimal Reality](#) predicts and responds to traffic patterns using real-time data and AI-driven tools to reveal solutions too complex for humans to see on their own and underpins next-gen traffic management. Faster-than-real-time analytics calculate network metrics and predict network conditions to support proactive decision-making in seconds for optimizing traffic signals, prioritizing buses through congested roads, alerting customers to network disruptions, or monitoring emissions, which may be critical given the environmental impact of transport.

Even the car you drive

And speaking of cars on city streets, immersive simulation is being used to help train autonomous cars, helping make cars safer and more reliable, while speeding up the learning process for autonomous vehicles.¹⁰ It's a continuation of the partnership with Formula One racing on pioneering simulation techniques that allow users to set up scenarios in the digital world to more safely and quickly test how cars react in various circumstances.

And it all goes back to data. A challenge for autonomous vehicles is the amount of data that flows to and from the cloud and built-in edge components and sensors. They receive, integrate, and learn to help make critical decisions in real time in response to their environments. With immersive technology to run simulations on a virtual test track on an autonomous cloud platform, huge amounts of data can be managed and integrated with no time lag. Autonomous vehicles can be tested in a variety of situations without involving a human driver or external obstacles like pedestrians, cyclists, or stray dogs. This could help improve the speed, safety, and cost of bringing autonomous vehicles to market. In essence, cars are being trained in a metaverse-like environment.





Get started

So, what does all this mean? It's about new ways to combine people and machines—in a collaborative, human-centered way, one that improves the way people work, live, and learn. It's the promise of all this new tech that's fueling the metaverse. While its capabilities could delight consumers, its value to business is already proving significant. All it takes is imagination and technical know-how, and your organization can transform into its next natural evolution.

End notes

1. Deloitte, "The Spatial Web and Web 3.0." July 21, 2020. <https://www2.deloitte.com/us/en/insights/topics/digital-transformation/web-3-0-technologies-in-business.html>
2. Debbie L. Sklar, "Scripps Clinic First to Use 3D Hologram Tech for Surgery in Southern California," Times of San Diego. July 5, 2022.
3. Deloitte Insights. "The Spatial Web and Web 3.0" https://www2.deloitte.com/content/dam/insights/us/articles/6645_Spatial-web-strategy/DI_Spatial-web-strategy.pdf
4. Ibid., Deloitte Insights.
5. Jack Kelly, "The Metaverse Set Off a Battle Between Tech Giants Google, Apple, Microsoft and Meta to Build Virtual and Augmented Reality Headsets," Forbes. January 21, 2022 <https://www.forbes.com/sites/jackkelly/2022/01/21/the-metaverse-set-off-a-battle-between-tech-giants-google-apple-microsoft-and-meta-to-build-virtual-and-augmented-reality-headsets/?sh=56e3e642239c>
6. Ibid., Deloitte Insights.
7. Deloitte source.
8. Deloitte, "Take a Scroll Down Every Fairway." [Deloitte and the United States Golf Association | Deloitte US.](#)
9. Tyler Fussner, "How AR and VR assist in technician outreach and recruitment," FleetMaintenance. December 16, 2021. [How AR and VR assist in technician outreach and recruitment | Fleet Maintenance.](#)
10. Deloitte source.



Author



Kuder, David J

AI & Data Engineering

Principal, Deloitte Consulting LLP

Email: dkuder@deloitte.com

Deloitte.

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