SPOTLIGHT
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This IDC Spotlight looks at how industrial companies can leverage augmented reality to improve current operations with digital content and real-time information.

Accelerating Digital Transformation with Augmented Reality

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Written by: Ramon Llamas, Research Director, Mobile Devices and AR/VR

Introduction

Industrial companies looking to accelerate their digital transformation should consider augmented reality (AR). AR places digital content within the worker's line of sight via a head-mounted display (HMD) or with a smartphone or tablet yet maintains the user's view of the physical environment and task at hand. AR is a highly visual experience, and visual information can be perceived and processed faster than information in a manual or textbook. By bringing the right information in the right situation and at the right time, AR enables users to complete their tasks quickly and easily, resulting in increased worker focus, efficiency, productivity, and safety.

Examples of AR at work are not limited to just one use case; there are multiple use cases that benefit different users and situations. These include:

- Technical skills training
- Expertise capture
- Field service repair
- Logistics and shipping
- Compliance assurance

Through these use cases, AR can help companies develop a competitive edge, deliver faster processes, and reduce errors, resulting in overall efficiency gains.

AT A GLANCE

KEY TAKEAWAYS

Augmented reality places digital content (pictures, videos, diagrams) within a field worker's line of sight while connecting them with other team members and company systems, allowing workers to become more efficient and productive. With multiple use cases available and new ones emerging, companies can scale AR across the enterprise and develop a competitive edge.

Definitions

IDC defines digital transformation as the process by which companies use digital technologies to redesign, reenvision, and renovate their business processes to achieve their business objectives more efficiently. Augmented reality plays a key role by placing digital content (including static maps, pictures, and diagrams to dynamic video and holographic images with which users can interact) within the worker's line of sight. To view digital content, a worker dons a head-mounted display or, alternatively, uses a smartphone or tablet. With an HMD, a worker's hands are free to handle and operate machinery or tools; the worker can also use vocal commands to navigate and execute tasks. Finally, an HMD's embedded cameras can scan the physical environment and objects and detect a user's hand gestures.

How does AR assist industrial workers? At the individual level, AR provides visual cues and confirmations to keep workflows running smoothly, especially given their need to access, update, and distribute information to other workers and systems. At the business unit level, AR collects worker performance and connects to other applications and back-end servers in the industrial workplace, avoiding knowledge silos and adding real-time data insights. Essentially, AR improves existing processes instead of replacing and altering them. In addition, AR helps managers create the content they need to train workers on the proper techniques to address a task. In all, AR helps to increase productivity and efficiency.

The following is a list of examples of how companies leverage AR today:

- **Digitalized training:** Managers and subject matter experts train industrial workers with digital step-by-step instructions to develop their skills before completing the task in the real world. Self-authoring tools provide simple drag-and-drop designs to quickly create instructions while artificial intelligence (AI) or hologram builders support AR content creation. These same guides can follow the trainees into their production tasks as helpful refreshers or be integrated into their ongoing business processes.
- **See what I see:** Field service workers connect with remote experts to diagnose, review, and approve their work. This expedites reporting and documentation.
- **Logistics and distribution:** AR solutions connect to a company's warehouse management system (WMS) to direct workers to the right location to pick the right items for delivery. AR is uniquely positioned to provide advanced visualizations for better product placement in pick-to-tote and palletization operations. Because AR connects to a WMS, it also provides updates on inventory availability, key performance indicators, and communication to workers in real time.
- **Compliance assurance:** Inspectors review work performed on a machine in-person and via see what I see to ensure that the worker followed the required steps and the machine works properly. In addition, managers can create digital checklists to review and record results while onboarding and training new workers.

Benefits of AR

Companies that have incorporated AR into their workflows cite several key benefits:

- **Efficiency.** This is the most cited benefit. Industrial workers learn to accurately complete their tasks the first time and every time. With integration to back-end systems and servers, all information is available, thereby eliminating siloed knowledge. Information can be displayed for easy consumption and for quick action to be taken.

Another example illustrating AR's benefits of efficiency is see what I see. Industrial workers can have a real-time view and conversation with managers, instructors, or subject matter experts, eliminating the need to have someone come for an onsite visit. This multiperson collaboration enables immediate troubleshooting and gets the team to arrive at a solution sooner.

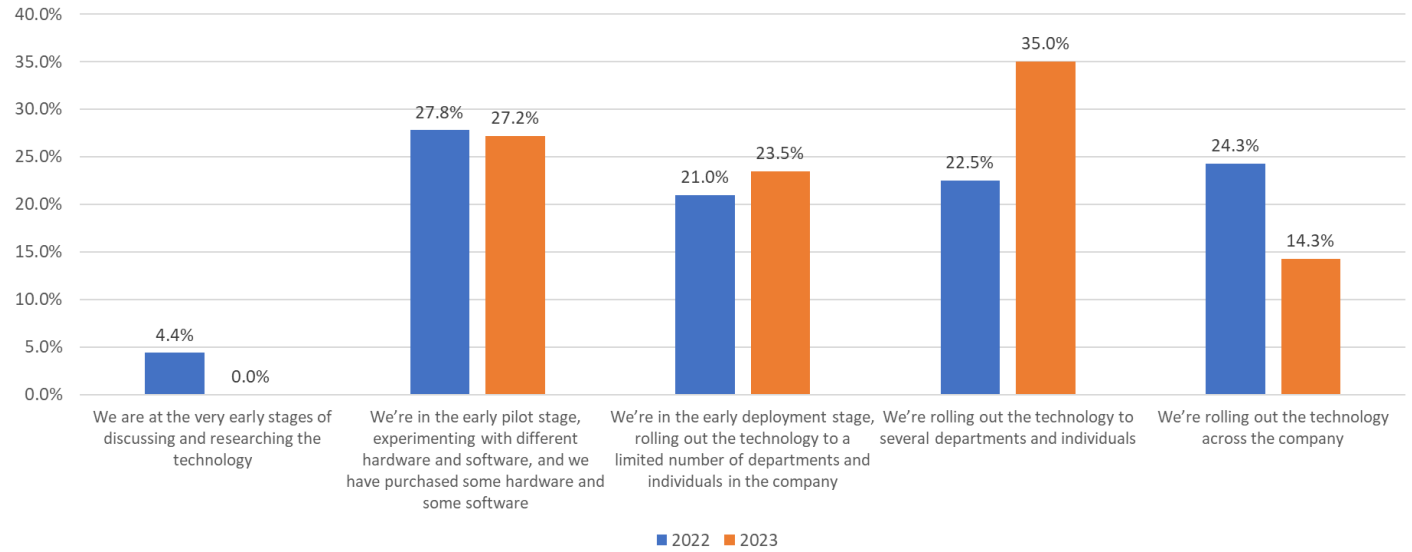
- **Productivity and quality.** Industrial workers develop the proper skills and procedures to arrive at desired outcomes by learning the correct techniques within a risk-free learning environment. AR documents and verifies the steps a worker has taken, practically eliminating any errors in the process. In addition, AI can track workers' progress to coach them through each step to help minimize mistakes.
- **Improved training results.** With AR, learners develop the muscle memory before they execute a real task. With access to a library of content and subject matter expertise, industrial workers can quickly learn best practices to become more efficient and productive. By shifting training to AR, training resources can be reallocated to other priorities.
- **Scalability.** Companies deploying AR see multiplied benefits as they scale AR solutions into multiple users, work shifts, worksites, and use cases. This results in strong ROI and usage going forward. Moreover, AR can help companies overcome some of their labor shortage and retention issues by engaging workers more effectively to develop their skills, and an engaged worker is a happier worker that is less likely to leave the company.

Trends

Recent data from IDC shows an increasing trend toward AR adoption (see Figure 1).

FIGURE 1: ***AR Adoption Within the Enterprise (United States)***

Q At what stage would you say your company is regarding researching, piloting, or deploying AR software and/or hardware?



n= 338 (2022); 349 (2023)

Source: IDC's U.S. AR/VR Commercial Survey, 2023

There are several key takeaways from this data. When IDC conducted these surveys, responses came from multiple industries, highlighting that AR is not confined to just one or even several vertical markets. Instead, AR cuts across many vertical markets, and companies are leveraging it in various use cases. Given the diversity of responses, AR can benefit practically any business.

Next, notice that 72.8% are at least at some stage of deployment in 2023, up from 67.8% in 2022. This reflects the trend over the past several years where companies have been moving out of the very early and early pilot stages to actual deployment. Note also that the most respondents landed in "multiple deployments" in 2023 (35.0%) showing that not only has adoption of AR increased but it has also been put into multiple use cases.

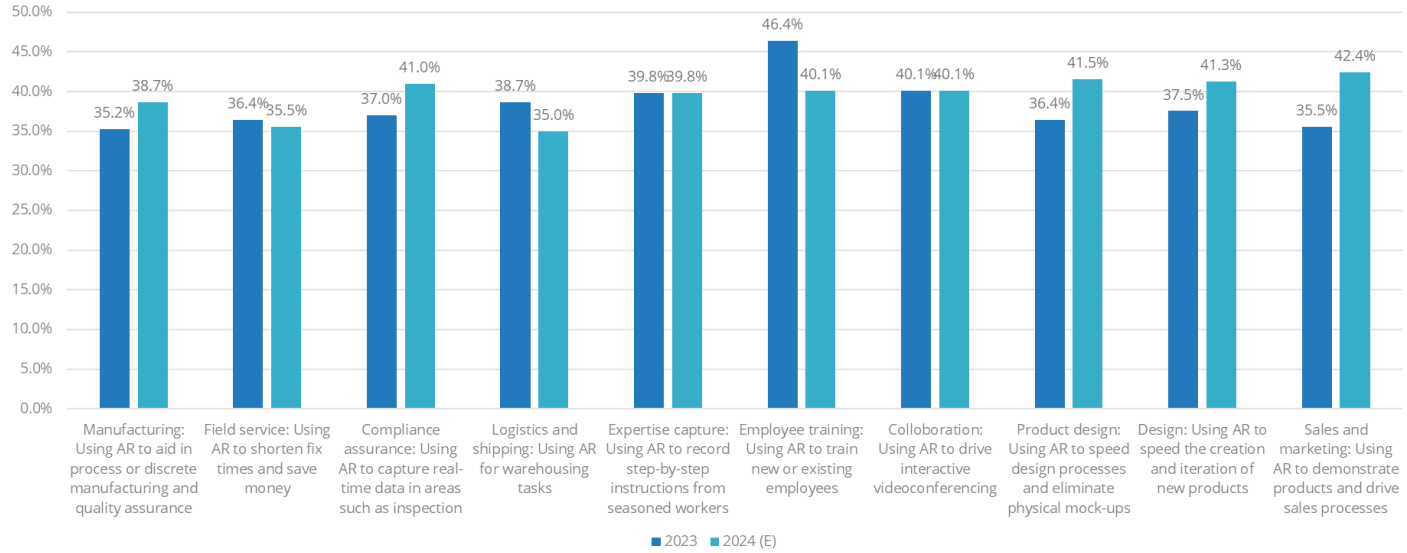
Finally, none of the respondents said that they were in a "very early stage" in 2023. This is a powerful data point, showing that companies are at some stage of AR deployment. Considering how AR can play a significant role in a company's digital transformation, companies not looking at AR risk being left behind in the digital transformation race.

Figure 2 shows how companies have been using AR today and how they plan to use it in 2024.

FIGURE 2: ***Future AR Adoption Trends***

Q Which of the following augmented reality use cases is your company employing today?

Q Which of the following augmented reality use cases will your company employ in 2024?



n = 349 (2023)

Source: IDC's U.S. AR/VR Commercial Survey, 2023

Although there is no one use case leading all others, the fact that there are multiple use cases ranking close to each other indicates how companies have been using AR in multiple ways, often within the same company. Also note how these use cases can be mutually supportive of each other as in the case of compliance assurance with manufacturing and expertise

capture and employee training. Altogether, AR has a far-reaching presence within the enterprise, bridging multiple use cases and benefits.

About TeamViewer

With numerous companies utilizing AR for multiple use cases, finding a company that can help with the convergence of IT and OT to extend remote support across the enterprise becomes imperative. TeamViewer has long been involved with connecting workers to systems and each other through a variety of devices — including those capable of augmented reality. With a global footprint and customers across multiple vertical markets, TeamViewer is well positioned to meet the needs of companies seeking to add AR to their digital transformation. The following is a list of AR solutions the company provides:

- TeamViewer **Frontline** AR platform features xPick, xMake, xInspect, and xAssist designed to help frontline workers efficiently complete their tasks and workflows.
- TeamViewer's **Tensor** is for IT connectivity use cases but also converges into OT for remote access with connected devices. Its Assist AR solution connects frontline workers with experts for remote assistance and see-what-I-see capabilities enabling an in-person view in real time with others, complete with annotations, markers, live video calls, and chat.

Challenges

Industrial AR is an emerging technology, and one of the biggest challenges that companies face when deploying it is shifting away from the status quo — even if it means accepting delays, errors, and costs. Workers can point out that their current methods work, so why change it? Furthermore, any changes could materially affect their current processes and workflows. However, industrial AR is designed to cause as little disruption to workflows as possible by complementing and improving existing processes and connecting workers with valuable data from back-end systems. This, in turn, reduces those delays, errors, and costs. To better illustrate how AR can address these challenges, consider its impact on culture, technology, and processes.

Culture

As with most changes involving emerging technology — including AR — some workers may perceive it as a threat to the way that work has always been done. More extremely, some may resist AR, seeing it as a way to monitor or replace workers. This is where companies and their solutions providers and partners can point out how AR can help them do their jobs better, including saving time, reducing or eliminating errors, and accomplishing more with actionable, real-time data. Already, workers feel the pain of not having enough manpower or having to deal with cumbersome old methods; industrial AR presents a win-win situation.

Another cultural challenge that companies face is the skills gap. As one generation ages out of the workforce, companies will need to hire and train a new generation of workers. Today's workforce is a generation of digital natives accustomed to and expecting to use modern work tools, including AR. This will expedite knowledge transfer, streamline training, and instill the key best practices that allow for efficiency and productivity. In the end, AR helps create a modern workplace.

Most challenges around culture can be solved with thoughtful implementation and involvement. Upper management provides the strategic vision and support for AR. Select managers and workers who will use AR and can outline its use cases, goals, and milestones. IT can help connect AR to existing back-end systems and demonstrate how users can access

and share data. Throughout the process, transparent communication during the evaluation and deployment phases can keep all participants apprised of results and timelines.

Technology

AR is technology requiring careful orchestration of hardware, software, and services with a company's back-end servers, its legacy systems and, most importantly, its people. While some companies may be equipped with the staff and expertise to create their own AR solutions, others may not, especially as new developments and innovations are introduced. Instead, these companies would do well to find a vendor who can do it for them. Companies should find a vendor that not only has expertise addressing their specific needs but also has a network of partners to help support a proposed AR solution, has developed actionable best practices to developing and deploying solutions, and can provide guidance as the company scales AR across the enterprise.

Processes

Processes refer to the way tasks get done, and moving some of these processes into the digital realm requires revisiting those same processes and rethinking not only with AR in mind but what the worker seeks to accomplish. By way of example, a warehouse worker may have had to use a sheet of paper to track which items to pick for an order. This involves going to the correct location, finding the correct items, and picking out the correct number of items before moving on to the next one. However, this approach can be fraught with errors such as going to the wrong location, picking the wrong items, or picking the incorrect amount. There have even been instances when the order has been cancelled but the order is already en route. What would this look like in AR? An AR solution that works in conjunction with the warehouse management system would show which way a worker should go, confirm which items and the number of items to pick, and feed that data into the WMS. Taking this example further, picking can go from single-order to multi-order processing. Overall, AR streamlines the process, reduces errors, and keeps all people involved well-informed.

Conclusion

The past several years have shown many companies embracing augmented reality to digitally transform their operations. To do this, companies have leveraged AR into multiple use cases across the enterprise, ranging from training and expertise sharing to remote assistance and compliance assurance. Combined with artificial intelligence, AR can assist industrial workers with valuable guidance while providing real-time data insights. The result? AR improves efficiency, productivity, and quality and modernizes the workplace. Branching out further, AR improves customer satisfaction and business resilience. To deploy AR successfully, companies should consider their culture, technology, and processes. Companies that have already deployed AR see it as a competitive advantage.

IDC believes the AR market will continue to grow, and to the extent that TeamViewer can address the challenges described in this paper, the company has a significant opportunity for success. With its multiple use case–specific solutions, TeamViewer is well prepared to help companies integrate AR into their workflows and operations and scale them throughout the enterprise. Moreover, TeamViewer can help companies navigate through the many important challenges and questions that they may have. Given its combination of AR expertise and solutions involving OT and IT, TeamViewer stands ready to help companies on their own digital transformation journeys.

About the Analyst

Ramon T. Llamas, *Research Director, Mobile Devices and AR/VR*

Ramon Llamas is a research director with IDC's Augmented Reality and Virtual Reality (AR/VR) team. His core research includes sizing and forecasting the U.S. AR/VR market, analyzing emerging hardware and software solutions, and monitoring vendor and end-user strategies.

MESSAGE FROM THE SPONSOR

TeamViewer enables companies of all sizes and industries to digitalize their business-critical processes through seamless remote connectivity and industrial augmented reality platforms and solutions. To help customers tackle business challenges, TeamViewer proactively shapes digital transformation and continuously innovates in the fields of Augmented Reality, Internet of Things and Artificial Intelligence. TeamViewer's connectivity platform enables secure remote access, control, and support to any device, in any location. TeamViewer's software has been installed on more than 2.5 billion devices globally. Its leading enterprise AR platform for deskless workplace digitalization helps streamline onboarding, training, and operational work processes across the entire value chain, increasing productivity, reducing errors and inspection times, and simplifying daily tasks for frontline workers. Learn more about TeamViewer's *Frontline industrial AR solutions*.

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IDC Research, Inc.
140 Kendrick Street
Building B
Needham, MA 02494, USA
T 508.872.8200
F 508.935.4015
Twitter @IDC
idc-insights-community.com
www.idc.com