White Paper

Augmented Reality Is Ready and Open for Business

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Ramon T. Llamas   Mukesh Dialani
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IDC OPINION

Today, an increasing number of companies seek to implement digital transformation programs to drive higher growth, productivity, profitability, and customer satisfaction. The ongoing COVID-19 crisis has accelerated the need for investments that will enable companies to become efficient and resilient. One technology that these programs should consider is augmented reality (AR), in which digital content is placed in the user's field of view while still maintaining sight of the physical, real-world environment. This allows the viewer to access valuable information to complete different tasks. For example, within an industrial setting, a user can bring up digital manuals and videos to diagnose and fix complex machinery, speeding the time to repair and returning the machinery online. Another example is AR acting as the connective tissue among frontline workers: workers can hold virtual "see what I see" meetings to examine equipment and processes, bring up work history and digital content, and determine the best course of action to move forward. In both cases, AR can improve first-time fix rates and reduce errors.

AR can address skills gaps for new and current workers more efficiently than traditional learning methodologies, improving knowledge retention and worker productivity. AR also provides powerful ways to capture the knowledge of workers, especially important as companies address the challenge of the baby boomer retirement wave. As companies discover their "next normal," AR brings new ways to work to achieve productivity.

The number of companies considering and deploying AR has steadily increased, with AR solving business problems and delivering real value. In the process, these companies and their partners have developed best practices to navigate the AR deployment process from concept to execution and scale. For them, AR has become a key competitive advantage.

Yet, for all the promise that AR has to offer, many companies have yet to explore, let alone deploy AR, citing cost, cultural resistance, or lack of a clear use case.

This white paper examines why now is the right time for companies to deploy AR while examining various key considerations for success, partnership strategies, and adjusting for the technological and cultural shift, and the importance of setting key performance indicators (KPIs) that will enable objective and transparent assessment of an AR deployment.

SITUATION OVERVIEW

Introduction: Why Now?

Consider the confluence of trends taking place right now that is pushing AR front and center: today, AR presents enterprise-ready solutions, ranging from see what I see and accessing digital content to capturing knowledge and expertise and sharing that to other workers, all of which keep frontline workers connected and productive. Moreover, AR continues to evolve with other fast-growing and business-changing technological forces, including artificial intelligence (AI), cloud computing, the Internet of Things (IoT), machine learning (ML), and natural language processing (NLP) to surface the right information at the right time. Next, looking at the larger ecosystem of players, multiple leading companies continue to pour in investment into AR, resulting in enterprise-ready hardware and software solutions. Finally, the COVID-19 pandemic forced companies to shift the way they do business, and AR played a key role in helping workers stay connected, train workers faster, and troubleshoot problems quicker. Those companies that have deployed AR have derived real and tangible benefits across the entire value chain. With AR solutions in place, companies are realizing AR as a competitive advantage. Respondents were polled about the benefits that companies have derived from using AR; the results are shown in Figure 1.

FIGURE 1

**Benefits Derived from Using AR**
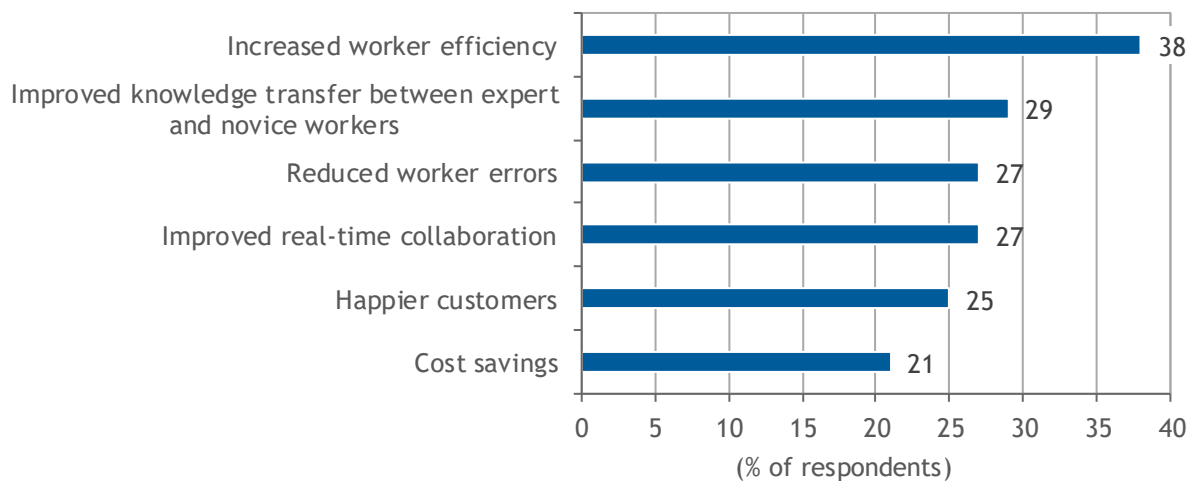
n = 200

Source: IDC's *Commercial AR/VR Survey,* 2019

Just as there are numerous benefits to be captured with AR, AR also lends itself to multiple use cases showing how AR is not simply a single use case solution. This increases companies' return on investment (ROI). Moreover, companies use AR within multiple departments as well as internally and externally. Respondents were polled about how companies are using AR to solve real problems; the results are shown in Figure 2.

FIGURE 2

## Use of AR to Solve Real Problems
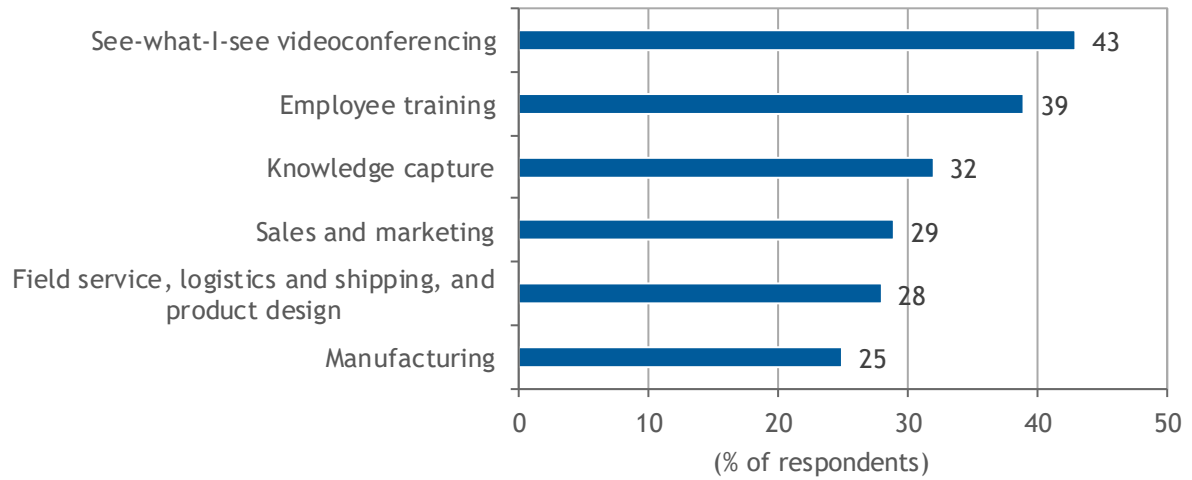
n = 200

Source: IDC's *Commercial AR/VR Survey,* 2019

Consider how see-what-I-see videoconferencing leads all other use cases (43%), followed by employee training (39%) and knowledge capture (32%). Anecdotal evidence during the pandemic points to increased usage of these features, particularly among frontline workers to meet and troubleshoot technical problems on the work floor, not unlike desk workers having a virtual conference call to meet. Consequently, companies have reported being able to maintain business processes.

Given the benefits and use cases of AR, where do companies stand on their deployment plans? As of 2019, AR remained in the initial stages, with most respondents (37%) saying that they are at very early stages of discussing AR (see Figure 3).

FIGURE 3

Stage of AR Exploration and Deployment
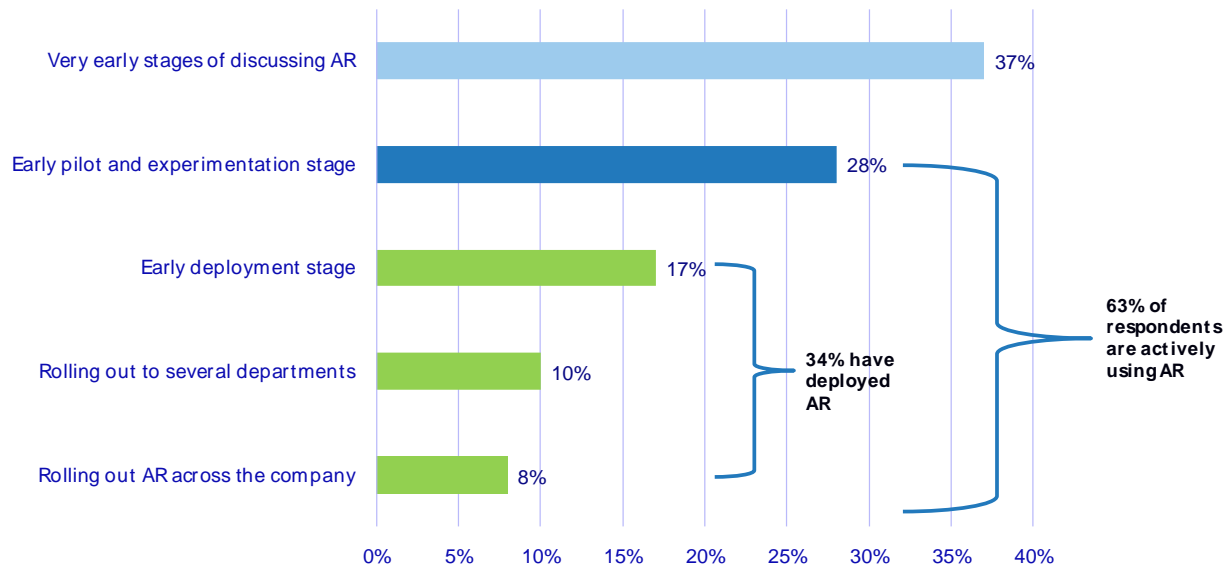
n = 200

Source: IDC's *Commercial AR/VR Survey,* 2019

Two points need to be raised about Figure 3: first, a combined 63% of respondents have moved beyond discussion and are actively using AR, highlighting companies' interest and commitment; second, a combined 34% of respondents are deploying AR beyond experimentation (i.e., early, to several departments, across the company), underscoring AR's viability as a business solution. The bottom line is that AR is not something that will happen in the future, it is open and ready for business today.

Starting and Moving Your Company Forward with AR

The following five-step process helps envision, start, and scale your AR deployment:

- **Identify and understand the problem.** Pose the question: What are the problems to be solved with AR? This helps identify the clear need and benefit for AR and compares AR against other approaches and their benefits. Furthermore, understanding the problem or opportunities also leads to an understanding of the interdependencies of the technology, people, and processes that surround the problem. A careful analysis of these key areas will reveal your requirements to realize value with AR. As part of this process, you may realize the need for partners at the get go.

- **Define a business case, impact, and expected KPIs and ROI.** Having identified and understood your business problem, the next step is to define a formal business case with expected impact, key performance indicators, and ROI. This will require a structured process to set clear goals, organize and outline how AR will be deployed, and monitor to ensure that predefined metrics are realized. In details:

  - **Define the business case to drill into the finer details of your problem.** If you could solve your business problem, how does it impact your process and what are the benefits? For example, a team at a fulfillment center pointed out the problems its service workers had

when repairing machinery, specifically the time spent travelling to the worksite, assessing the situation, going back to the office to retrieve the required manuals and tools, and then returning to the worksite to complete the job. In some cases, the travel time was longer than the repair time itself. With this problem identified, a business case began to crystallize: With the time to prepare or travel to a job reduced or eliminated, workers could fix machinery faster and move on to the next task.

- **Establish KPIs in alignment with business goals to show *how* the company expects to create value once those goals are met.** Essentially, the question is asked: What should AR deliver? While companies may have multiple goals to reach – ranging from time saved and improved first-time fixes to efficient training and increased customer satisfaction – every key performance indicator should focus on business value. In the aforementioned example, the goals were to reduce or eliminate the time needed to prepare for a job and keep the workforce equipped with the tools and information they need. As the company achieves these goals, it realizes the cost savings of keeping the machinery online and the cost savings of not having to send a repairperson onsite, both of which present real dollar value. Moreover, as the company becomes more efficient and nimbler in reaching these goals, it can create new KPIs. Keeping in the context of our fulfillment center example, the new KPI could be shortening the time required to complete a repair ticket.

- **Estimate and measure business value and ROI as important and critical parts of the process.** As mentioned previously, if business problems are understood correctly and relevant KPIs are defined and monitored, AR will deliver high ROI via process efficiencies and cost reductions. The challenge, however, is judging ROI: What is considered acceptable, and what is still aspirational? A good answer for that is comparing your own results with other companies employing similar use cases with AR or against companies within the same industry. These numbers will vary but eventually normalize as the company scales AR across the organization and use cases improve.

- **Establish organizational buy-in and key stakeholder alignment.** As AR affects multiple business units in different ways, establishing buy-in from multiple internal stakeholders becomes a critical piece to a successful deployment. The lower the maturity of the AR deployment, the higher will be the buy-in activity. Involving information technology (IT) is a critical step, but just as important is bringing in non-IT professionals. The means involving members from the C-suite to the line-of-business (LOB) executives and leaders and even customers. Depending on the business, one of these stakeholders will emerge to champion and lead the AR initiative. Collectively, people in these roles can assess digital readiness in context of the company and the industry. In details:

  - **C-suite.** The C-suite's involvement and sponsorship secures the funding, talent, and resources while creating accountability for the project. The C-suite will also look for other use cases in which AR can be used.

  - **LOB executives and leaders.** This group will drive much of the AR experience to align the AR experience with the work experience. In addition, LOB managers and workers will help champion AR to other work groups. To this end, LOB plays a critical role in being both a producer and a consumer of content, as well as the evangelization of AR use to the workforce.

  - **IT and operations.** Each IT and operations organization is faced with device procurement, preparation, and management (head-mounted displays, AR-ready PCs, charging stations and accessories, and smartphone software); content storage and access (cloud, on premises, or a hybrid thereof); and network and infrastructure setup (Wi-Fi and workstations). Essentially, AR marks another endpoint for IT and operations to monitor and manage.

- **Finance.** AR represents a present cost to the company, with the promise of future value. Later on, finance should be able to see return on investment results through expense reduction, infrastructure optimization, increased worker productivity, or revenue generation.

- **Corporate trainers.** Corporate trainers can integrate AR into a worker's training curriculum. In addition, when creating content, corporate trainers are in a strong position to customize the experience to the employees.

- **End customers.** End customers can share firsthand experience of what their experiences are like, including pain points and their experience with a company product or service. This ensures a realistic AR experience.

- **Assess internal capabilities and scope for partnerships.** As various company stakeholders come together and understand what is required to deploy a successful AR solution, they could realize that in order to accelerate innovation and achieve the desired deployment speed and scalability, they need to partner and collaborate with consulting and systems integrators that have domain-specific experience in strategizing, deploying and, in many cases, managing similar AR initiatives on an ongoing basis. These providers offer services throughout the life cycle – from concept/vision/strategy to managing operations and leveraging their experience in deploying other AR implementations. They also provide benefits of reusable standardized intellectual property, technology partnerships and assets, and globally distributed scalable AR-experienced engineering talent.

- **Think big, start small, and scale rapidly.** If the true benefits of AR must be realized, key decision makers and stakeholders should understand how AR fits in the overall scheme of their companies' quest to transform their business, increase productivity and profitability, ensure high levels of customer satisfaction, and become more resilient. Once the bigger picture is understood and created, it can be broken up into various phases. This will ensure minimal business disruption and enable a quick recharting of its course based on learnings. Consulting and systems integration partners have the ability to provide the support in this envisioning process.

Change Management Considerations

Successful deployment of AR within a digital transformation program often requires a bifurcated approach to change management. One track focuses on the worker and the other focuses on organizational change management and governance.

From a worker's perspective, you are at a fundamental level deploying new tools and processes that change how they work on a day-to-day basis. You must ensure that you are providing adequate training on the tools, including how to potentially wear a head-mounted device and how to operate it either by voice or gestures, which workers may be unfamiliar with. Health and safety considerations should be paramount. Business process and standard operating procedure documentation will likely need to be digitized for consumption on devices. Concerns over potential monitoring by devices need to be addressed transparently as these devices can provide a wealth of data and analytics to perform business process reengineering and provide other insights.

At an organizational level, there are fundamental governance questions to be addressed including decision rights related to AR within any digital transformation program. Information technology will be an important stakeholder and participant where new devices are concerned. There will likely be organizational capabilities that are missing that companies will need to either outsource to qualified partners or build internal competency. For example, if holograms are used in the AR experience, 3D modelling capabilities may be needed. As companies start small, they will likely rely on out-of-the-box solutions, but as they mature on their AR and digital journey, they will likely need to develop custom applications and integrations.

As part of *understanding the problem,* companies should look to past technology deployments such as mobile devices, robotic process automation, or others and frankly assess whether they would benefit from outside assistance in the area of change management.

Finding the Right Partners and Applying the Best Practices

To move through deployment smoothly and reduce the risk, companies that lack AR experience should engage with a partner or possibly multiple partners. These partners can include ecosystem players with solutions, specialized agencies, or global systems integrators. Regardless of whom you choose to work with, consider the following factors to ensure your success:

- Identify a dedicated internal team to work with your partner.
- Identify the project scope, responsibilities, and schedule.
- Ensure the combined teams work seamlessly toward the goal by building relationships at every level.
- Stay committed to the end goal even in the face of hiccups.
- Document and monitor everything.
- Avoid considering pricing as the sole criterion for partner selection.

For larger and more ambitious transformation programs, look to partners that:

- Understand your business problems and areas where you can realize value and are committed to business outcomes.
- Understand the AR domain and have knowledge and relationships with hardware and software solutions.
- Have AR-first capabilities such as 3D or AR practices.
- Can address other critical areas of the program such as change management.
- Provide a financial construct that meets your needs.

To understand your business problem, a partner needs to understand your business and how it works: the who, what, where, when, why, and how. A partner will look to you as the subject matter expert. This is where having your business problem, KPIs, and ROI all defined ahead of time is critical. Effectively, these discussions will take place outside any conversation about technology to provide a thorough understanding of what you are trying to achieve.

A partner's goal is to determine those critical points embedded within the business problem to create and deliver business value. Creating value may take on different forms, especially for those companies that are still in the initial stages of digital transformation. Not only will it involve a change in the way a company does business, it will also necessitate examining the company's digital transformation journey and analyzing where the company is today. In our fulfillment center example, where repairpersons retrieve manuals to fix a machine, digital transformation not only includes transforming manual content into digital content but also changing the way the repairperson interacts with the data to find the information faster and complete the task sooner.

With a thorough assessment of the problem and goals, your partner should factor in multiple considerations when connecting the problem with a solution. For example, with respect to hardware, what kind of head-mounted display would be more appropriate: the one with a monocular view or a binocular view? Will it be worn in hazardous environments? What battery life should be expected? How would a worker prefer to wear and interact with it? Or would a smartphone or tablet be more suitable?

The answers to these questions and others like them will eventually move the company to a hardware solution that meets the necessary criteria. The process can be duplicated for other elements involved in the solution. At the end of this, your partner would have assembled a complete end-to-end solution.

With a solution mapped out, your partner should be able to leverage its network of hardware, software, and infrastructure providers to assemble and, if the need arises, to deploy, manage, run, and scale your AR system. These providers have worked with your partner before and are familiar with their requirements and needs so that nothing is overlooked or forgotten. It could also be the case that a provider could have something immediately available off the shelf, making it easier and faster to assemble a system. A savvy partner should also look beyond the providers as different and individual pieces and instead see them as parts of a larger whole. This gets away from any potential siloed approaches and accelerates the transformation journey.

Throughout the process, your partner should be able to collaborate with the different stakeholders to move the project forward to address their concerns. As with any other major project, there are bound to be questions, ranging from the smallest detail to its overall feasibility, and these can become localized to the different business units and departments. Through a series of updates communicating needs, next steps, and milestones as well as regular meetings with different stakeholders, your AR deployment will encounter less resistance and eventually find other champions within the company.

Deploying the End-to-End, Out-of-the-Box Solution

Deploying the AR solution with your partner includes looking at software, hardware, and infrastructure not as separate pieces bolted together but as a holistic end-to-end, out-of-the-box solution. Within each of these categories is a list of multiple considerations. We look at each one individually.

Software

Applications

When thinking about applications, companies have two choices: use out-of-the-box applications or collaborate with your partner to codevelop one. Out-of-the-box applications save time and money and, for most companies, solve their business problems. This is especially helpful if companies deploy AR for the most popular use cases: see-what-I-see videoconferencing, employee training, and knowledge capture as highlighted previously. Collaborating with your partner to codevelop an application should be considered after exploring "out of the box" solutions. This leverages their expertise and will tailor to your specific needs. To expedite the process, a good partner will already have software templates available to save you time.

Content

A key part of developing applications is developing content (text, audio, photo, and video) to go with the application. This is where companies should prepare all their contents to go digital if they have not done so already. CAD designs and digital twins could be exported quickly into AR, but paper manuals — particularly older ones — will require additional time to be transcribed into digital formats, especially if they have to be broken down into smaller, digestible pieces for the user to view. In many situations, digital twins for many older machines on the shop floor are available for purchase from the manufacturer or from other marketplaces.

Companies should also prepare to cocreate content with their partner. The part of the benefit of augmented reality is that digital content can be inserted into an AR application. While your partner can design the look and feel of the content and how it interacts with physical assets, the company brings the subject matter expertise to ensure the content aligns well with the workflow and with the user. Continued collaboration with LOB managers, workers, and corporate trainers is key to providing the desired results.

With IT involved, expect security to be one of IT's leading concerns for your AR deployment. Having a device management solution that not only secures the device but also updates the software as needed on a regular basis is essential to deployment. In most cases, leveraging the management solutions used for other devices will suffice but clearly should be incorporated into the process.

Hardware

Companies have several options when considering AR hardware, but one good guideline to follow is to let the use case determine the hardware. More specifically, how does the user want to view the content while working with a physical asset? For example, a user who needs to use his hands to operate machinery or tools while looking at AR content may benefit from a head-mounted display. Meanwhile, a user who needs to make annotations while looking at a physical asset may benefit from using a tablet or a smartphone. Clearly, these will vary from one use case to the another, but the guideline is that the hardware should be a part of the solution and not another asset to manage before getting to work.
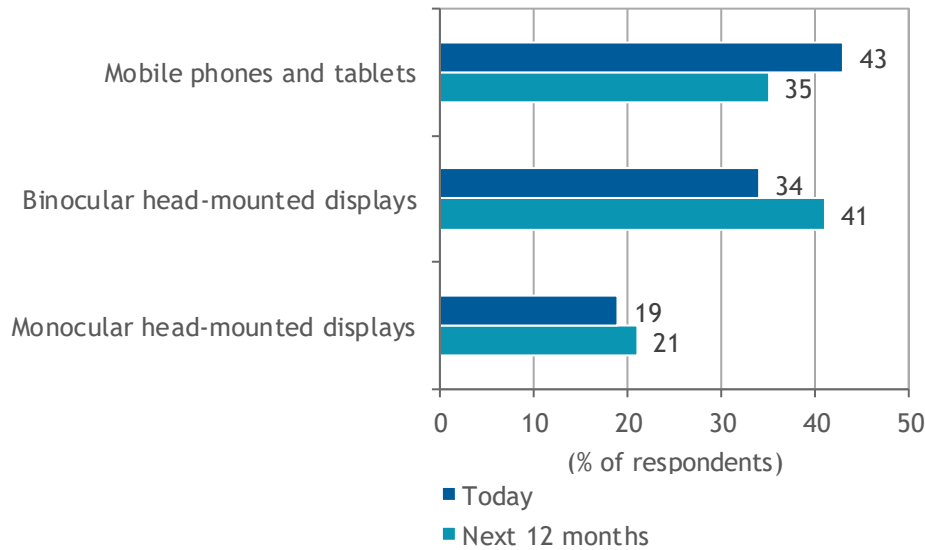
If selecting a head-mounted display, another consideration is viewability as devices offer a binocular or a monocular view. Binocular views allow the user to view the content directly in front of both their eyes. This is helpful when manually interacting and getting different views of a digital asset. Head-mounted displays with a monocular view allow the user to view content just below or just to the side of one eye. The experience is akin to having a tablet or a computer monitor close to your face. In this setup, the user can view content but cannot manually interact with the digital asset.

Another consideration when selecting a head-mounted display is the user interface (UI). Many rely on voice commands, requiring the user to learn the appropriate words to execute a task. Available on a select few are hand gestures, either with the user's own hands or with a hand controller. This adds another piece of hardware to the experience. Another UI option is a touchpad, either on the head-mounted display itself or as a module worn on the belt. Selection of the user interface will depend on the use case.

Figure 4 shows a snapshot of which devices companies use for AR and what they plan to use in the future, according to IDC's *Commercial AR/VR Survey,* 2019.

FIGURE 4

Hardware Used for AR

Mobile phones and tablets — Today: 43, Next 12 months: 35
Binocular head-mounted displays — Today: 34, Next 12 months: 41
Monocular head-mounted displays — Today: 19, Next 12 months: 21

(% of respondents)

■ Today
■ Next 12 months

n = 200

Source: IDC's *Commercial AR/VR Survey,* 2019

Just as your partner will have a list of software options for you, they will also have a list of potential hardware options for you.

Infrastructure

For AR to work, it needs a robust infrastructure. This includes several key components: connectivity, security, and storage.

Connectivity

For devices to communicate effectively, they require a strong connection. These connections can be impeded by large physical assets or surroundings. Take, for example, a large machine located deep within a factory. Impeding the connection to a Wi-Fi node could be the concrete surroundings, other machinery, or other devices competing for the Wi-Fi connection. Consequently, companies should assess the spaces where workers will use AR to complete their work and consider installing additional Wi-Fi nodes to maintain a strong and consistent connection.

Security

AR represents another endpoint for IT to secure, and most mobile device management software solutions offer the same security capabilities found on other devices that companies use. Security should be built into the system from the very start and not a feature tacked on at the end. Finally, security should also include considerations around how companies work with their clients' own firewalls to transfer and share data back and forth.

Storage

With all the digital contents that will be generated for AR, companies must consider where and how to store them: on premises or within the cloud. This will vary from one use case to the next, but one guideline that has come up repeatedly is that companies that work in industries that require a high level of security should strongly consider using on-premises storage solutions. This does not rule out the possibility of cloud storage, which allows for scale across multiple locations. Companies can also take a hybrid approach. Your partner can help design and implement a storage solution for you.

Launching the Program

With your software, hardware, and infrastructure in place, test the AR experience as designed in a pilot deployment with your partner and with members of your team, including IT, LOB executives, and corporate trainers. If possible, include your customers who will be using your AR solution. This allows you to review the system, troubleshoot bugs, and adjust accordingly. As you launch, keep the following in mind:

- **Performance:** Does your AR system work as designed? This is where you can revisit your key performance indicators to determine why and why they were not achieved.
- **Consistency:** Does your AR system operate as designed every single time? Your AR system needs to get it right every time.
- **Reliability:** Does your AR system operate under different conditions (i.e., throughout your work facility)?
- **Different users:** Can users outside of the team navigate their way around the AR system to complete the steps to execute a task?
- **Data collection:** Purposefully collect data about your AR experience with an eye to how your data could improve your processes later on.

Evaluating your AR system for performance and making requisite adjustments is an iterative process. But part of that process is that you will see new opportunities to develop your AR experience further. Using our fulfillment center example in which a user can access information via AR on how to repair a machine, saving the company time and returning machines back online were the original business cases. Consider also, then, what other features and functionalities could be introduced. Within that same experience, that user could also bring up archived videos done by worker experts, showing how they diagnosed and fixed the same problem. Or a user could have a real-time see-what-I-see conversation with an expert who could then annotate within the user's line of sight to walk through the different steps. These will generate new KPIs and ROI and eventually drive additional value for you to capture. This will help quantify your benefits.

Scalability

With a successful pilot launch, you are ready to introduce AR to other parts of the company. Scaling AR does not just mean extending AR technology, it means extending value creation to other parts of the company.

A successful pilot launch will draw the interest of multiple parties. Requests to deploy AR in different business units – whether identical to the pilot program or not – will follow soon after. One guideline to follow is to have a cross-functional team made up of members of the pilot program and members from upper management to act as a review board to vet out new AR use cases and to prioritize which ones come first. This prevents the company from starting the process all over again and leverages many of the same processes – now best practices – that were installed before. Your cross-functional team can formalize the process going forward. And, as part of the formalization process, consider further integration and implementation processes into current business system, including quality management and security.

Another guideline to scalability is to have a limited launch of a new use case before rolling out to the entire company. Essentially, the same steps should be taken in accordance with best practices established by the pilot program while determining value-driven solutions. As such, setting new KPIs and ROI for each deployment becomes a key element. The cross-functional team can assist with the process. Another guideline is select a person or persons to champion the process, demonstrating how and why AR will be used and what it will accomplish.

When scaling broadly (i.e., other locations), avoid the notion that it will be a matter of duplication. To a certain extent that will be true. But new locations will have their own set of challenges that could require new software, hardware, or infrastructure. To this end, a thorough assessment of each location's needs and readiness should be completed prior to launch. Another consideration is how content should be stored: locally on premises, in the cloud, or a hybrid of both. Depending on the hardware solution, some content could be saved directly on the device. But in other cases, companies may have to set up local storage and improved network access to ensure complete workability.

CASE STUDY

The steps listed previously provide a framework for prospective companies to follow and to better illustrate how a company moves through these steps to solve its business problems and achieve its goals, IDC interviewed a company that recently deployed its own AR solution. This provides prospective companies the proof they need to see that AR solves real business problems and delivers real value-driven solutions to companies. Moreover, this case study highlights the best practices that the company took along the way that can be leveraged toward other companies as they walk through their own AR journey.

Background and Initial Planning

The company involved in this case study designs and delivers high-tech machinery costing several million dollars and include several thousand pieces. It employs several hundred workers, and its machines are shipped throughout North America. Traditionally, when a customer needed help fixing a machine, it would contact the company and someone from the company could guide the customer over the phone. But as the machinery became more complex to deliver greater efficiency and productivity, that approach became more difficult to manage. This presented a challenge, which is to bridge the gap between machinery complexity and the inexperience of its customers. Another challenge facing the company is its most experienced and most knowledgeable workers began aging out, and younger ones had to be hired and trained. As such, the company sought to retain the knowledge from its veteran workers and put it into a sharable format.

To better understand the possible solutions and determine the right solution, no budget was set. This allowed full exploration of different hardware and software solutions and potential expansion of its feature sets in the future. This did not mean that the company was not cost conscious; instead, it ensured that the company was getting the solution that was right for it.

One important step that the company took from the very beginning was to establish buy-in across the company, including upper management, line-of-business executives, and IT managers, as well as its customers. This brought clarity and a mutual understanding why AR was a top priority and something that will have long-term implications and benefits instead of a passing fad. It also made AR a common goal among the different participants. To maintain interest and momentum, the team sent constant reminders, seeking input up and down. Meanwhile, within the project team emerged an AR evangelist

to champion the solution throughout the company, understand the different parts and components as well as the company's needs, and be a part of the process from start to finish.

Determining key performance indicators proved a difficult task in that the value it sought (customer satisfaction) was external, not internal. To this end, getting the AR solution to work right for its customers was the value it pursued. Was there a metric for that? Not immediately, as no key number was involved. Instead, it looked to the number of customer touch points to get feedback from customers to make sure they got a positive experience, and each positive experience increased the likelihood that they would come back.

To bridge the gap between machinery complexity and the inexperience of its customers, the company searched for a solution that enabled real-time communication with its customers and annotation of images to show how to repair a machine. In addition, the company began capturing expert knowledge and experience to build a video library of on-demand content showing customers how to diagnose and fix a problem step by step. Launching these only required in-house talent; no external sources were necessary.

Selecting a Vendor

In the company's search for a potential technology solution vendor, it looked for a company that could:

- Provide an end-to-end, out-of-the-box solution from concept to finish
- Bring the AR perspective to its specific business problems and needs
- Have familiarity with its systems and machines
- Capture procedures easily and quickly
- Provide the users with some freedom in how they learn
- Offer remote support

Over the course of their working relationship, the technology vendor it chose proved "very good to work with, very accommodating, and very responsive." For its part, the vendor made it clear that it wanted to understand the company's needs and situation before showing the company the tools that aligned with the company's needs. In addition, the vendor provided access to product managers, allowing the company to present use cases and pose questions to it. Conversely, the vendor relied on the company to explain its situation, what it saw in the marketplace, and how AR could become a competitive advantage, because the rate of innovation ultimately determined how well the company could deliver. This also required the company to provide a candid assessment of its capabilities and how the vendor could address any gaps.

Deploying the Solution

The company's goal was simple when deploying the software solution: It just had to work every time, all the time, and be simple and intuitive. The "out of the box" solution had to offer flexibility, and custom solutions were not an option. Another requirement was installing security from the ground up instead of as an add-on.

For hardware, the company used a combination of tablets and head-mounted displays. This allowed for different approaches to view and access content while maintaining a consistent approach across all devices. Tablets were used internally, while head-mounted displays were deployed to customers, and all were given the same treatment in terms of software and security. One challenge that the company and the partner faced was working with clients so that the head-mounted display could get through the

firewall to access content. Instead of leaving this to the client, the company and partner collaborated to provision the devices themselves to make the process as easy and as seamless as possible.

Another common challenge that clients had was infrastructure: the machines were kept in large, old buildings with thick brick walls. AR devices required Wi-Fi or cellular connectivity. While clients worked to enable stronger connectivity throughout their buildings, the partner made it possible to download and store content directly onto the device, temporarily bypassing the need for a Wi-Fi or cellular connection.

Launching the Solution

Before sending the solution to its customers, the company tested the AR system. To test annotations, the team conducted multiple instances of tech-to-tech communication, and with each instance, it examined whether a worker could effectively walk through a mock situation and arrive at a solution correctly. Next, with the help of its vendor, the company created content put together from its subject matter experts and tested it on a new employee. During the process, the team watched whether the employee could follow the required steps to fix a machine. What it noticed was that as each employee became more familiar with the correct processes, it built up their confidence. Finally, the company also built its own digital content based on engineering design reviews. The company could place a virtual machine inside a factory and workers could explore the machine to evaluate and provide feedback. As a result, the team saw increased peer interaction and approved concepts faster than before. To do this, not only did the company rely on the partner but additional third parties to fine-tune the solution.

In the process, the company maintained its original goal: saving itself and its clients more time. If that is accomplished, then its customers can get back to being productive.

Conclusion

Launching an AR solution is a significant undertaking — one that if done correctly can deliver the desired value to customers. To this end, it requires the participation of multiple players taking the right steps toward the same goal. As such, the company in this case study offers the following best practices to companies exploring AR solutions:

- Designate a champion to guide the process and communicate its progress internally and collaborate with partners externally.
- Get buy-in from top to bottom to drive commitment, gather feedback, and listen to or answer concerns.
- Seek out the user's wants and needs as early and often as possible.
- Explore solutions and how they align with your problems before determining a budget.
- Find a partner with end-to-end solutions, not just parts of the solution.
- Consider out-of-the-box solutions instead of diving into custom solutions.
- Leverage your partner's expertise and add your own input to develop the solution.
- Enlist assistance from other third parties through your partner.
- Test-drive your solution internally multiple times before delivering to users.
- Revisit alignment with goals early and often.

FUTURE OUTLOOK

The commercial AR market is still in its early phases, and while the use cases and features clearly bring value to current and prospective companies, they will certainly evolve in the coming years. That is why, as another best practice, companies would do well to revisit AR developments early and often. Looking ahead, companies will use AR for onboarding and training, for safety and compliance, and for prototyping, testing, troubleshooting, and quality control. In addition, new features including integration with artificial intelligence and machine learning for better predictive and prescriptive data will become available. For companies whose workers operate in hazardous environments, expect additional sensors to detect hazardous materials and fumes as well as changes in temperature. Essentially, the developments in the AR market will continue and make today's solutions look quaint. Constant monitoring of the market will lead to new value-creating opportunities for your company.

CHALLENGES/OPPORTUNITIES

Two challenges that can inhibit or derail a successful AR deployment are employee resistance and cost.

Internal Stakeholder Perceptions

The first challenge can be attributed to employees' natural reactions of how AR could displace their jobs. Certainly, AR can make a work process faster and easier, and employees could point out that the status quo works just fine.

However, AR is not a replacement for workers but a tool to complete their task. Likewise, an employee is necessary to complete the task. Furthermore, resistance could underscore the lack of in-house knowledge about AR. Beyond the logistics of how it works, employees can and will learn its purpose and benefits to them. This is where having the right vendor will help communicate AR's benefits and how it fits into – and not replaces – employees. Done well, not only will employees become more receptive of AR but also enthusiastic about its usage and promise.

Cost Concerns

The second challenge is a natural concern: How much will this cost? Moreover, how soon will I see a return on this investment?

The intent of AR is to uncover and capture value by carefully planning your KPIs to hit expected ROI. This translates into top-line revenue generation and/or cost savings, both of which positively impact the bottom line. Consider the running example of fixing machinery at a fulfillment center in this paper: by keeping the machine online, the company continues to generate revenue instead of making money when it is offline. Moreover, some AR costs can be mitigated. For instance, many companies leverage smartphones and tablets to run AR apps. As such, these represent little, if any, additional hardware spends for the company.

In both cases, finding the right vendor with the qualities mentioned previously will get you through the deployment process sooner and unlock the value you seek to uncover.

CONCLUSION

This white paper began with the question, "Why now?"

Now is when companies are looking to trim costs and remain productive.

Now is when companies are seeking business continuity and resiliency in the face of COVID-19.

Now is when companies are struggling to remain relevant to their customers.

Now is when companies are trying to keep workers – both behind a desk and on a floor – connected.

All of these are important questions to raise, not just in the current era of COVID-19 but well after this era has finished and workplaces have settled into a new definition of normal. But look closer at these statements: these are real problems that companies are trying to solve, and augmented reality can deliver real value to those companies. Early adopters have already discovered this and have used AR as a tool and turned it into their competitive advantage. In the process they – and their partners – have assembled a list of best practices, examples, and ecosystems to help the next wave of AR adopters get through their own AR deployment and expansion. That makes "now" the right time to move forward with your AR plans.

Make no mistake; installing an AR system is a significant undertaking, one that requires the participation of many to determine the right path to take. This is where finding the right partner – one that can understand your business problem, communicate with all of the different constituencies and their concerns, can bring to bear a host of solutions and best practices, and see you from conceptualization to execution to scale – can help you uncover and capture value that you originally sought but also others that have yet to be considered. Take advantage of your partner's knowledge and expertise now to move your AR plans forward.

As companies ask themselves how they can work faster, smarter, and better in the age of digital transformation to become digital companies, augmented reality plays a key role in the digital disruption. In the many use cases that AR has brought forth – ranging from see-what-I-see videoconferencing and view annotation to accessing videos and interacting with digital content – AR not only transforms the process and ways in which companies work but also transforms companies to become more agile and responsive to changing conditions in the market. Numerous organizations across a wide array of verticals have discovered and leveraged this and, in the end, they enjoy the competitive advantages that impact their bottom line. Those customers that move with agility and not just pilot, but scale AR implementations, will be able to see internal operational benefits and deliver differentiated customer experiences.

About IDC

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Global Headquarters

5 Speen Street
Framingham, MA 01701
USA
508.872.8200
Twitter: @IDC
idc-community.com
www.idc.com