

# **Stakeholder Management and Best Practices for AR ROI Success**

15th October 2025



## **The Human Factor in AR ROI**

AREA research consistently shows that successful ROI analysis relies on implementations that **involve the end user** through the entire process. From defining and measuring the use case, during pilot testing, and through final implementation, effective stakeholder engagement generates significant benefits to the ROI process.

### **Identify and Engage Stakeholders Early**

Think beyond the C-suite. Include IT, operations, HR, and end users. Each group has unique concerns and priorities:

- Executives: Focus on financial impact and strategic alignment
- IT: Address integration, security, and support requirements
- Operations: Highlight process improvements and efficiency gains
- End Users: Emphasize ease of use, training, and day-to-day benefits

AREA best practices emphasize involving stakeholders early, especially those who will use the technology daily. This approach maximizes user buy-in, ensures integrity of time and motion studies, and uncovers potentially unforeseen costs associated with different work environments.

### **Tailor Your Message with Data and Stories**

Combine hard numbers from the AREA ROI Calculator with real-world examples. The AREA case study demonstrates how one company achieved remarkable results:

- 45% reduction in mean-time-to-repair
- 20% reduction in customer churn (from 2.5% to 2%)
- 90% reduction in parts inventory
- 25% reduction in audit costs

Use these concrete examples alongside your own projections to build credibility with different stakeholder groups.

### **Best Practices for Cross-Team Collaboration**

AREA research identifies several critical success factors:

**Establish Clear Metrics:** Target specific business outcomes using Key Performance Indicators (KPIs). Common metrics for MRO applications include Mean Time to Failure (MTTF), Mean Time to Repair (MTTR), and Overall Equipment Effectiveness (OEE).

**Ensure Financial Rigor:** Collaborate with finance teams before pilots to ensure buy-in on business problems and measurement metrics. This cross-team collaboration is essential for ROI analysis that stands up to scrutiny.

**Manage Change Effectively:** Involve end users throughout the process to minimize “human” costs related to ongoing process change during deployment. Give users the ability to provide input on solutions, from hardware comfort to application value.

**Assign a Champion:** Organizations committed to maximizing ROI assign a “Champion” with sound grasp of both business and technology challenges. These individuals ensure projected ROI is realized after deployment and manage issues that could impact cost estimates.

### Scaling Best Practices

For organizations moving beyond pilots to enterprise-wide deployments, AREA research recommends:

- Evaluate ROI on each pilot using the same framework
- Explore environmental factors that may differ from the pilot
- Standardize your approach to business case development
- Create rules-based frameworks for integration cost allocation

### Leveraging AREA Resources

The AREA community provides extensive resources for stakeholder engagement:

- Case studies and best practice documents
- ROI Calculator with detailed instructions
- Research reports on specific use cases and industries
- Community insights and benchmarks
- Templates and frameworks for standardized analysis

### Conclusion

With the right tools, data, and stakeholder engagement, you can turn AR from a “nice-to-have” into a strategic advantage. ROI is your bridge between innovation and impact—use it wisely, and leverage the proven methodologies developed by the AREA community to ensure success.

As AREA research concludes: “Understanding the potential ROI and following best practices is important for enabling the broader development of the enterprise AR ecosystem and driving AR solutions into the mainstream”.

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# Solving the Skills Crisis with Augmented Reality

15th October 2025



## **Where have all the workers gone?**

The skills gap is the greatest threat to manufacturing today, second only to supply chain challenges: Nearly 45% of manufacturing leaders admit having turned down business due to lack of talent, while nearly half of frontline workers say the skills gap negatively impacts their productivity.

To understand why AR helps address the skills gap, it's helpful to look at some of the factors that produced the gap in the first place:

### ***Shrinking Workforce***

Starting in the Eighties, a stigma around blue-collar work and the heightened importance of a college education led to fewer and fewer high school graduates joining the trades. Generational misconceptions about manufacturing work, automation and outsourcing, and the pandemic also contributed to the dwindling talent pool. Now, as Baby Boomers age out of the workforce, younger generations aren't replacing them.

### ***Pace of Innovation***

Technology like automation, robotics, and 3D printing are slowly moving people off the factory floor into roles demanding more advanced (digital) skills. At the same time, increasingly complex products and processes are raising skill requirements in manufacturing and turning the skills gap into a moving target.

### ***Outdated Tools***

Despite talk of smart factories, old equipment and paper-based processes remain in manufacturing: 81% of frontline workers still use paper for day-to-day tasks, while 76% rely on in-person communication. In most factories, machinery older than some workers is a common sight alongside newer electronics. This complicates digitization and training and turns off younger workers.

### ***Ineffective Training***

Today's manufacturing workers describe a technology gap and training gap. Conventional training methods like classroom courses, shadowing, hands-on training, and written manuals are costly, limited to instructors' availability, and insufficient for keeping up with the industry's rising learning curve. Moreover, they're unsuitable for digital natives.

### ***New Tools for the Frontline***

77% of frontline workers say they don't have the technology they need to be productive. Optimizing these workers' productivity is the first step to blunting the impact of the skills gap. Second is to replenish the workforce with faster training and reskilling, and third is to improve the industry's image. Augmented Reality (AR) can accomplish all three.

### ***Fact: Augmented Reality is Narrowing the Skills Gap***

Augmented Reality presents critical, contextual information, real-time insight, and remote expertise to frontline workers at the point of need, directly in the user's line of sight on industry-leading mobile devices and hands-free headsets. Augmented work instructions, 3D products, video tutorials, schematics, IoT data, and other digital content appear on top of the work environment, directing frontline workers to do the job efficiently and accurately *the first time*.

## ***Applications***

### ***Remote Assistance***

What if your senior technicians were accessible to less experienced workers anytime, anywhere? Using an AR-supporting device, a junior technician can instantly share her view of a machine with a remotely located SME. The SME sees what the tech sees (live) and can guide her through the task remotely, even annotate her screen for precision. Later, a recording of the session can be repurposed as training material.

AR-powered remote support improves first-time fix rates, reduces the need for follow-up visits, and allows senior employees who might otherwise retire the opportunity to continue offering their skills. Experts can assist more workers in one day through AR than they could traveling to each worksite, effectively scaling expertise across the workforce.

### ***Knowledge Transfer***

Another way to pass on domain expertise is to have SMEs record their actions on the job, documenting specific procedures to turn into AR training material and work instructions. By having senior technicians wear smart glasses to capture tacit institutional knowledge, new employees gain a database of best practices and standardized instructions that can be superimposed in the context of the machine or task at hand for reference.

### ***Augmented Work Instructions***

Today's manufacturing workers often work with ambiguous, outdated paper-based instructions that are difficult to follow. This wastes time and increases the likelihood of errors. AR provides on-demand access to information and turns complex processes into fool-proof visual workflows that reduce inefficiencies, increase productivity, and improve accuracy.

Humans process visual information like AR-guided work instructions better than any other type of data. Frontline workers using AR instructions don't need to be familiar with a particular machine to service it, so manufacturers can confidently assign tasks to employees regardless of experience.

### ***Training***

When you follow AR instructions to do a new task, you're learning that task at the same time. This is learning by doing and how younger generations learn best. AR makes it possible to safely and effectively learn on the job, in a live production environment, with significantly less supervision or downtime. Having AR as a digital mentor frees up training resources while improving time to proficiency. Off the job, AR makes training available on-demand, visually demonstrating complex processes in a way that's easier to grasp and more engaging than e-learning and can be consumed from anywhere.

### ***Reskilling & Recruitment***

AR enhances learning for new and seasoned workers alike. More than 100 million workers will need to find different occupations by 2030, as manual and operator positions are replaced by higher-skilled, knowledge-based roles. AR-enabled upskilling programs ensure workers don't get left behind, aid retention, make the workforce more agile, and help convince young people that

manufacturing is actually a high-tech, future-looking career.

### *The Future of AR in Manufacturing*

The benefits of augmented reality are not theoretical. Adopters are seeing greater year-over-year improvements in training time, retention of skilled workers, and hiring costs. PTC customers report significant impact like productivity, safety, and quality despite labor shortages. Frontline workers feel the value, too, in the form of increased safety and higher productivity. By driving digital transformation into the hands of workers today, AR is creating a more resilient workforce capable of closing the skills gap once and for all.

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## **Rockwell Automation Interview**

15th October 2025

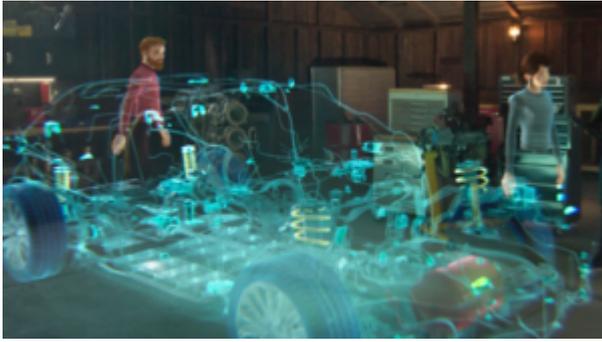


The AREA speaks with Rockwell's Andrew Ellis shortly after the company joined the AREA as a Sponsor member.

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## **Matt Fleckenstein on Mixed Reality and New Microsoft Mesh**

15th October 2025



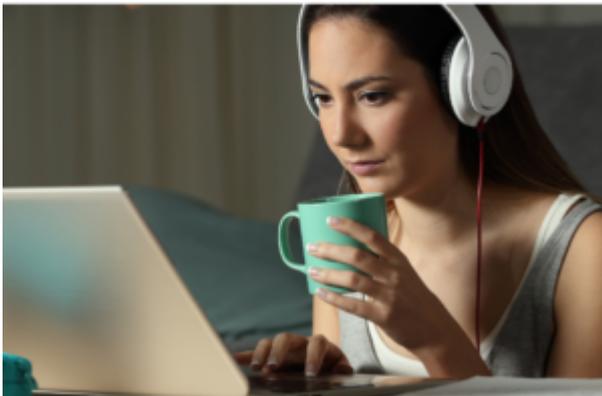
Are you aware of Microsoft's AR strategy beyond its successful head-mounted display HoloLens 2? AREA speaks to Matt Fleckenstein, Head of Strategy, Commercial and Consumer Mixed Reality.

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15th October 2025

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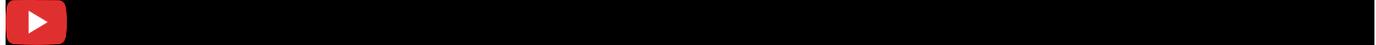
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Better yet, why not subscribe to keep up to date on everything connected with AR for the Enterprise?

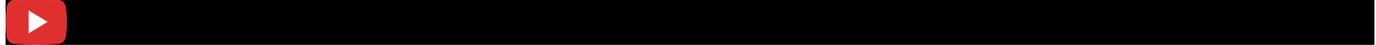
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Fireside Chat: Raven Glass and the Future of Everyday AR



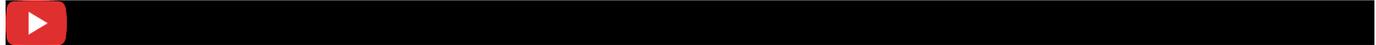
Fireside Chat: Reimagining Augmented Vision



Fireside Chat: Helping Redesign The World



Fireside Chat: What's Next in AR Wearables



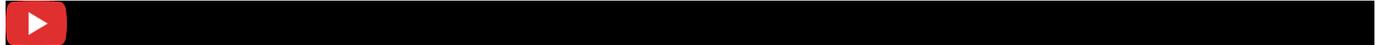
Fireside Chat: AR on the Assembly Line - A Vision for Connected Workers



Unlocking XR Data: How ArborXR Insights Transforms Enterprise Training



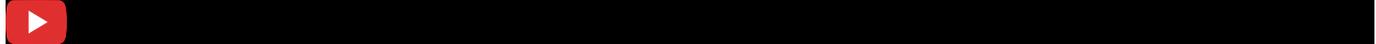
How Interoperability Can Scale Industrial Augmented Reality in Manufacturing



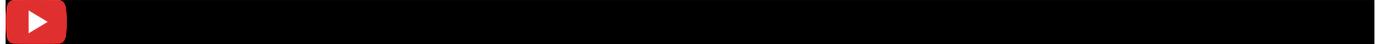
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Fireside Chat: Empowering the Industrial Workforce



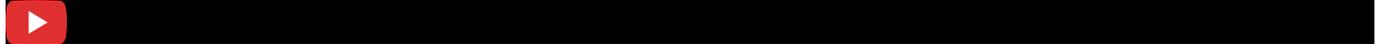
Fireside Chat: Turning Complexity into Clarity - Reimagining 3D Development



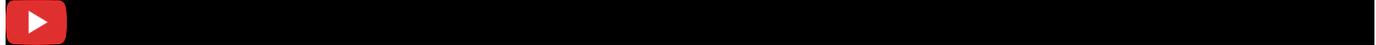
Fireside Chat: Making XR Work for the Enterprise



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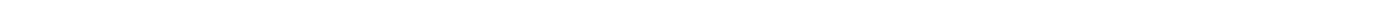
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# **Stereoscape brings AR to B2B segment in Finland**

15th October 2025



Stereoscape, a new AREA member, was founded in 2009 in Helsinki, Finland by a team of creative and technology experts specializing in stereoscopic 3D for films. Today the company is focused on using interactive 3D and XR technologies to enable people to work smarter and learn faster. We spoke with the Stereoscape team recently to learn more.

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# **AREA Safety Committee Recommendations for Cleaning AR Headsets Under COVID**

15th October 2025



Whether or not you agree with the old saying that “cleanliness is next to godliness,” in the COVID-19 age, cleanliness is paramount when it comes to preventing infection. The U.S. National Institutes of Health report that SARS-CoV-2, the virus that causes COVID-19, can be detected in aerosols for up to three hours and on plastic and stainless steel surfaces for up to three days.

That’s why it’s so vital to regularly – and thoroughly – clean all AR devices, particularly for organizations where headsets and handheld devices are shared among multiple users. We consulted with the AREA Safety Committee to learn how best to handle headset cleaning.

While no official industry best practices have been established for coronavirus cleaning (and there are no guarantees that your cleaning regimen will prevent transmission of the disease), the AREA would like to share these recommendations. They begin with separate cleaning materials and processes for each AR headset component, as follows:

### ***Optics***

Lenses and cameras can be damaged by abrasive cloths or cleaners. The Safety Committee’s advice is to unplug the camera from its power source, then wipe clean with a microfiber cloth. Lenses get the same treatment, with the microfiber cloth applied in a circular motion, beginning at the center of the lens and moving outward.

### ***Cushions***

To clean headset cushions, first remove the cushion from the headset. Take a soft cloth dampened with warm (40°C/104°F) water, gently wipe, and allow to dry at room temperature.

### ***Headset Plastics***

Hard surfaces, such as headset plastics, are where the coronavirus is likeliest to survive. The Committee recommends isolating the component, wiping with a soft cloth or cotton swab, then thoroughly wiping it down with a non-abrasive antibacterial wipe.

### ***Headset Electronics***

The preferred way to clean a headset’s electrical parts is by isolating the component and wiping thoroughly with a dry soft cloth or cotton swab.

In addition, the Safety Committee recommends avoiding exposure of devices to UV rays or direct sunlight, reducing sharing of devices when possible, and using personal or disposable covers for high-contact areas, such as brow pads.

Finally, please keep in mind that public health officials are still learning about the coronavirus and any guidance or recommendations may be subject to change. Please consult your jurisdiction’s infectious disease experts for the latest information.

The AREA Safety Committee is dedicated to identifying and prioritizing AR safety risks and recommending steps that enterprises can take to manage and reduce those risks. Visit [here](#) to learn more about the Committee, its work, and how to join.

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# **BSI's Tim McGarr on Enterprise AR and Standards Development**

15th October 2025



## **AREA: Where do things currently stand in terms of standards development for AR?**

McGarr: There are a few things that are going on in international standards. For example, there are already standards for spatial recognition, amongst other areas. But the reason I've been focused on getting new standards going is that some of the barriers to AR becoming mass-market relate to aspects of the technology that are not standardized.

That's where I see BSI coming in. As the UK national standards body feeding into European and international standards, we span a broad spectrum of standards, from door locks to ethics to cybersecurity and everything in between. For VR and AR to become a mass-market proposition, they will have to interact with the way many industry sectors already successfully work, which is generally based on longstanding areas of standardization. Such standardization is in place to deal with the challenges mature sectors have dealt with in the past. For this reason, the new standards work is focused primarily on ensuring health and safety are taken into account.

Among many industry sectors, such as construction and manufacturing, there are commonly accepted procedures and equipment to ensure health and safety. So even if AR technology delivers increased productivity, if it doesn't align with existing health and safety procedures or equipment, it's not going to be accepted or widely used.

There are several aspects to consider; first, ensuring that the technology itself doesn't introduce new concerns – for example, if a person on a manufacturing floor using VR or AR stops using the technology and feels dizzy in a potentially dangerous environment. Second, the technology has to

be interlinked with other standardized personal protective equipment (PPE) – such as protective gloves or hardhats. The technology has to work within those parameters which are generally supported by standardization. Then there are areas of standards that are likely to follow – for example, ensuring that a device is robust enough to work within an environment like a building site or ensuring appropriate cybersecurity and privacy management.

All our work is about taking what is a great technology proven to make organizations more efficient and get it to a place where it is accepted by most mainstream organizations.

**AREA: Does BSI begin by identifying which issues are the highest priorities?**

McGarr: We started by commissioning independent research to determine where standards broadly were needed. Using that as a starting point, we've talked with a lot of people in the market to determine what the main priorities are. So we'll work on the main ones first and then build further out. In AR, the highest priorities are safety, which includes setup and immersion time, linking up with PPE, and cleanliness, since we have people sharing devices. Cleanliness of devices has been especially important in healthcare, but it has taken on greater importance in all sectors during the pandemic.

**AREA: How does that process of industry outreach work?**

McGarr: A lot of it is finding and reaching out to the right people. We think about who the main stakeholders are. That can include people from the academic world, government, trade bodies, consumer groups, as well as companies of all sizes. We work to get the right stakeholders around the table and give them the opportunity to represent their views. Part of the reason that we are AREA members is about reaching out to those people, both from the UK and the AREA members from other countries who can feed in locally.

**AREA: Tell us about your recent AR and VR standards development workshop.**

McGarr: We've spent a lot of time determining how best to proceed to get standards that can grow the AR market. International standards committees work in various ways. You can develop a new committee or start a working group within an existing committee. After lots of discussion we have recently had agreed the best approach is in forming a new "Working Group" (WG11) within the [ISO/IEC SC24](#) committee. This Working Group will be developing standards to build out areas of standards to aid the AR market to grow with standards specific to AR/VR such as Health & Safety, Personal Protective Equipment, hygiene, diversity/equality/inclusion, robustness, content capture/processing/postproduction, and cybersecurity/privacy/online harms. The initial standards proposals to start this work are being voted on and can hopefully start very soon.

**AREA: When can we expect to see the fruits of this AR/VR standards development work?**

McGarr: We hope to get work started in a few months' time. The international standards will be there in approximately two to four years. If there is a desire to do things more quickly, there are ways to do them more quickly. It's all about bringing stakeholders together, bringing in a wide variety of views, building consensus, and establishing best practices.

**AREA: If people reading this want to get involved or get more information about your work, what should they do?**

McGarr: I'm happy to be the main point of contact. People can reach me at [tim.mcgarr@bsigroup.com](mailto:tim.mcgarr@bsigroup.com). We'll also be feeding back into the various AREA groups.

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# **Academic support for AR educational needs** **- an AREA survey**

15th October 2025



## **Overview**

A key component of the AREA's goal is to help accelerate the growth of a comprehensive AR ecosystem. Our **Educate** initiative advances this goal by seeking to further engage with academic institutions to provide feedback on how they can help equip the graduates of tomorrow with the AR skills needed to positively contribute to the workforce.

Earlier in 2020, the AREA, together with our academic members, conducted a survey to capture industrial perspectives on both educational needs for future graduates, as well as an assessment of the current state. In this editorial blog, we'd like to share the main findings of the survey results.

## **Summary**

The survey highlighted several key results:

1. There is a high level of agreement, across multiple industries, that AR is either in mainstream use now or will be in the next few years
2. Industry views educating students in AR as important,
3. The business aspects of AR, rather than deep technical knowledge, are deemed to be of higher importance.
4. Recent graduates are typically under-skilled in AR.

5. Industry is willing to engage with academia to help address these challenges.

### Survey respondents

The survey attracted 43 respondents, with a good mix between those *providing* AR solutions and services (58% of respondents) and those *using* them (42% of respondents). Perhaps more importantly, we captured perspectives from a wide range of industries, as shown in Figure 1, with the highest levels of response from the automotive, industrial equipment and power and energy industrial sectors.

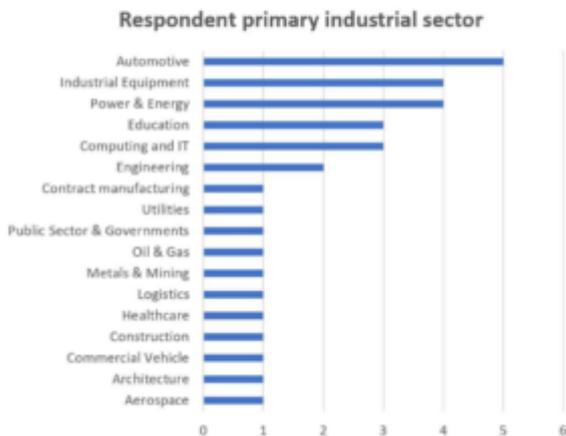


Figure 1 Primary industrial sector of survey respondents

### AR adoption now and in the future

When asked “When do you see AR becoming mainstream in your business?”, 20% of our survey respondents stated that **AR is already mainstream** in their business. Another 60% of respondents believe that AR will become mainstream within 1-2 years, with the remaining 20% suggesting a longer timescale of 3 to 5 years, as shown in Figure 2. Perhaps unsurprisingly, no respondents chose “never.”

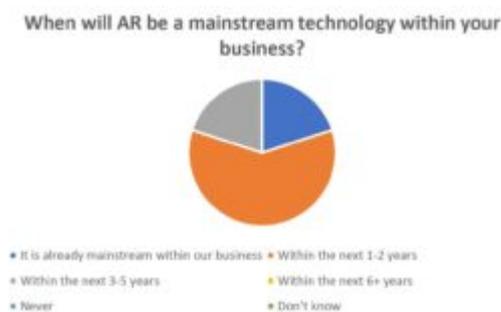


Figure 2 Perspectives of when AR will become mainstream

## Where should academia focus on educating students?

Our next question, perhaps the most significant of the survey, requested views on where academia should focus on educating the graduates of tomorrow. Respondents were asked to rate each of the following graduate attributes from 1 (least important) to 10 (most important):

- Deep technical familiarity with the underpinnings and principles of AR software or hardware
- A strong theoretical foundation of how AR technologies can benefit industry and society
- Practical experience developing (coding, authoring) AR applications
- Practical experience and understanding how to apply AR technology to “real-world” business challenges
- Familiarity with using AR as a tool in business settings and use cases
- An understanding of the business aspects of AR (costs and cost savings, ROI, safety, security, privacy)
- Awareness of global and industry trends in the adoption and usage of AR
- Experience with the human factors, ergonomics or user interface design of AR solutions

The distilled answers to this question are shown in Figure 3. We order the answers by the number of respondents that suggested a value of between 8 and 10 (inclusive) for each educational need.

The responses clearly show that the “business-oriented” aspects of AR are believed to be more important than the underlying technologies and ergonomics. **75% of all respondents ranked the business aspects with scores of 8 to 10.** In particular, 100% of respondents scored the educational need “*Practical experience and understanding how to apply AR technology to ‘real-world’ business challenges*” with a score of 8 to 10.

Perhaps this reflects an industrial requirement that graduates better understand how to *apply* AR technologies rather than the ability to *build* such technologies.

As such, it is clear that the results of our survey highlight a need for academia to equip the graduates of tomorrow with the skills addressing **how to apply AR to business challenges and how to quantify and qualify business value, cost and other practical considerations.**

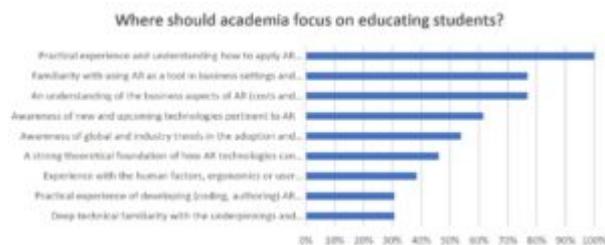


Figure 3 Where should academia focus?

## The importance of AR in university curricula

When asked “...how important do you believe it is, that academic institutions should include AR in their curricula?”, the answers were as shown in Figure 4.

61.5% of respondents answered, “Very important.” Interestingly, 92% of respondents deemed academic support for AR as either “Very” or “Quite” important.

The importance of AR in academic curricula

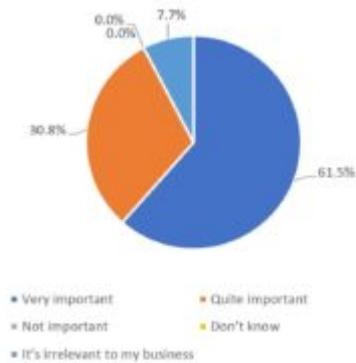


Figure 4 The importance of AR in university curricula

If these answers reflect a sentiment shared across industries, then there is a clear message to academic institutions to include aspects of AR in various university courses of study.

### AR skill levels of recent graduates

We then asked respondents to rate their impressions of the AR skills and experience of *recent graduates*. The results are shown in Figure 5. Of these results, 42.4% of respondents believed that the skills and experience were either adequate, good or excellent. More worryingly, **45.5% of respondents were of the opinion that the AR skill levels were either poor or non-existent.**

The question did not dig into how the skills were acquired (e.g., by way of new-hire training) but nevertheless, the answers clearly represent a set of mixed opinions of how well-equipped recently graduated staff are to embrace and apply AR within the workplace.

AR skills of recent graduates

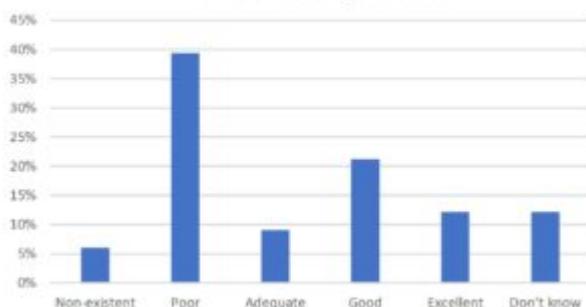


Figure 5 Perceptions of AR skills of recent graduates

### Industry's willingness to engage with academic institutions

The last questions of the survey attempted to measure the level of interest expressed by industry to engage with the education process. Figure 6 illustrates an encouragingly high level of willingness to get involved with students in various ways with 70% of respondents willing to propose ideas for course curricula.

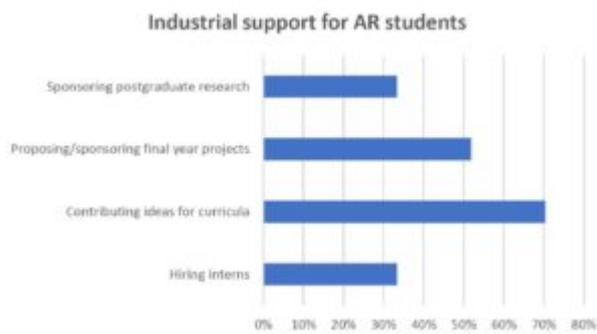


Figure 6 Ways in which industry would support student education

There are some clear indications that industry wants to engage further with academia whether it be by sponsoring postgraduate research, suggesting final year projects, or simply suggesting ideas for course curricula. Perhaps more notable from the point of view of the students, there is clearly an appetite for hiring interns with AR skills.

Finally, when asked if they would be willing to discuss their answers further with AREA staff, 58% of respondents expressed a willingness to do so. We are grateful for their offers to engage further.

## Conclusions

Whilst accepting that a response count of 43 is perhaps not statistically significant, the survey results obtained do highlight some key messages for the academic community:

- The data captured by this survey is from a wide range of industries.
- 80% of respondents believe that AR is either in mainstream use now or will be in 1 to 2 years.
- Industry views AR education as important.
- Academic courses should equip students with the knowledge of how to apply AR to business use cases along with other business aspects such as ROI and cost.
- The majority of respondents believe that recent graduates are under-skilled in AR
- Industry is willing to engage with academia to help improve this.

The message is clear: **there is a need for AR in academic courses and industry is willing to engage to help make it happen.**

## Acknowledgements

The AREA team wishes to thank all of those who participated in this survey.

We gratefully acknowledge the assistance of Professor Barbara Chaparro, Embry-Riddle Aeronautical University, in the construction of this survey.

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# **Augmented Reality in Medical & Pharma: Industry challenges in medical device manufacturing and how to tackle them with AR solutions**

15th October 2025



*This editorial has been developed as part of the AREA Thought Leaders Network content, in collaboration with selected AREA members.*

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Corporations in the medical and pharmaceutical industry need to adhere to the highest standards of quality, with accuracy and precision being the keys to success. If organizations experience equipment errors or healthcare workers make mistakes, they not only put human life at risk but also incur significant consequences for payers, including financial and credibility loss. To reduce error rates and increase quality, businesses across the industry are turning to the latest technologies - including Augmented Reality (AR).

AR and VR technology is already being used and significantly improving processes in medical device manufacturing. This editorial discusses two major use cases in which AR solutions simplify workflows to reduce human error:

1. Medical device assembly
2. Production line changeover

Let's take a closer look at exactly how AR technology can tackle key challenges in both cases, with the help of some first-hand insights from William Harding of industry leader Medtronic, recently interviewed by RE'FLEKT.

## **Key challenges in medical device manufacturing**

Medical device manufacturing typically involves a variety of manual, semi-automatic and automatic processes which makes production particularly vulnerable to error - especially as large manufacturers need to employ the same processes across multiple facilities, often without standardization of production data. In addition, if there is a lack of training among operators it can

increase the risk of mistakes made during manual tasks when medical equipment is assembled and configured.

William Harding, Distinguished Fellow at Medtronic, reveals which factors medical device manufacturers need to consider when introducing changes on the production floor:

*"If I add a new process to a production line, many questions need to be addressed: How do I get the process to integrate seamlessly (e.g., communication protocols, data aggregation, and data transformation)? How do I accomplish that without using paper-based systems? The goal is to speed up efficiencies and reduce scrap while also reducing human error. When we create a new process in lean manufacturing, we need to establish the most ergonomic way for an operator to perform their tasks within a sterile environment. We also want them to complete these tasks in the most efficient way possible, while delivering a high-quality product. There are many factors to be considered."*

Prior to introducing a new manufacturing process, operators need to be trained on how to perform each step to ensure maximum efficiency and minimum error rates during production. William further explains how Medtronic originally used a cardboard replica of their manufacturing line for training purposes and what challenges came along with it:

*"It used to take us two and a half weeks to build a cardboard set-up with five process stations. For one training session, we also needed at least eight to ten people off the production floor, who then weren't engaged in manufacturing products while they were in training. It would cost us about \$30,000 for one training effort with the cardboard set-up. We usually require five sessions in total to get everything right, and by the time we decide that everything is ready, we're making changes five minutes later."*

## **Simplified training and operations with AR solutions**

With AR technology, medical device manufacturers like Medtronic can not only manage the challenges listed above, but also benefit from significant operational improvements, as the following two use cases reveal.

### **1. Enhanced AR Training for device assembly and set-up**

Training around medical device set-up and configuration is traditionally based on Operating Procedure (OP) documentation that is not user-friendly. Extensive manuals, including complicated 2D diagrams and text-based instructions, make it challenging to find the right information quickly for device operators. Consequently, onboarding is time consuming and devices may be set up incorrectly and/or not used to their full potential.

Many leaders in the medical sector, including Medtronic, are turning to AR to train employees to set up and assemble their equipment. With results that **decrease human errors by 90%** and **improve training times by 60%** (see this white paper for further info) the reasons are obvious. AR training solutions allow device operators to visualize complicated OP documentation in a simple way with the right mixture of videos, text, and images that appear directly in context with the real object. This ensures that device operators always have training content available instantly on their mobile devices, tablets, or smart glasses, thereby experiencing fewer errors during device assembly and set-up.

William from Medtronic shares how AR training guides have replaced the cardboard replica during operator training at Medtronic:

*“With content creation platforms like REFLEKT ONE, we can now create AR applications that allow operators to learn a new process by walking through engaging training guides on a tablet instead of using our cardboard model.”*

## **2. Lean production line changeovers with AR-based procedures**

When switching the production line from one product to the next, every minute of changeover time comes at the cost of missed revenue as production is down while teams rearrange, set-up, and configure the equipment for the next production cycle. Lean manufacturing strategies can help solve the dilemma to shorten downtime and increase the final output.

AR guidance during changeover procedures results in **40% fewer errors and a 25% faster changeover speed (see this white paper for further info)**. The interactive guides show operators the ideal state of the task at hand in AR next to the actual state. This way operators can always see what needs to be done as they are working. As augmented instructions guide operators through each step, the risk of error is ultimately reduced for all manual stages of the changeover.

This digitalized process is faster and more reliable as William confirms from his own experience creating AR solutions at Medtronic:

*“Recently I created a solution to train operators on a manufacturing process for our Linq II battery bond (an implantable 2 lead EKG data recorder for patients). I made the content available to them online, where they could walk through it themselves and learn how to perform the process using gestures in AR. It’s a very fast and effective way of training because it saves resources and is so close to the real manufacturing environment.”*

## **Outlook: The future of XR technology in the medical sector**

These two use cases are great examples of how AR technology is already making a measurable difference in tackling key challenges in training and operations within medical device manufacturing. For the future, William forecasts a growing adoption of AR and ultimately **Mixed Reality** solutions at Medtronic as well as across the industry:

*“Through the use of this technology in the future, I know that Medtronic will be able to more quickly understand the needs of patients, healthcare professionals, and payer’s needs, such that the lifecycles of innovation are reduced in addressing those needs. That same point can be made within the medical device manufacturing industry, specifically as it relates to product and process transfers as well as in the training of the individuals responsible for completing the assembly of those devices. However, it is my belief that AR and eventually MR technology will make the use of VR less important because users will prefer the more relatable MR environments.”*