MID-YEAR UPDATE

The State of Industrial Augmented Reality: A Spotlight on Industrial Innovation

Authors

Mike Campbell, EVP, Augmented Reality Products

Don Busiek, SVP, Corporate Strategy

Jon Lang, Lead Principal Business Analyst, Corporate Marketing

The State of Industrial Augmented Reality is an ongoing series of market research and analysis conducted by PTC. These reports explore the robust and increasingly complex opportunities presented by the Industrial Augmented Reality (AR) market. Tapping into PTC's 30 years of technology expertise, 30,000 global customers, and 1,000 technology and service partners, the State of Industrial Augmented Reality series delivers actionable trends and insights across the entire IIoT ecosystem.

Executive Summary

Over the life of our survey, use case adoption and customer business goals have shown that industrial enterprises are starting augmented reality projects internally, often piloting one or two use cases within their operations or service functions to prove value before expanding AR initiatives. Companies universally recognize the importance and benefits of adopting AR for their internal use. In today's business climate of razor-thin operating margins and mounting economic pressures, the race for efficiency is starting to receive a nitrous boost from AR.

This mid-year spotlight edition of our State of Industrial Augmented Reality series examines development and adoption trends for companies primarily focused on developing augmented reality experiences for their end customers externally, by enhancing their customer-facing products, services, and solutions through the use of AR technology versus for their own internal use and benefit within their internal value chain. Our key findings include:

- Industrial enterprises are keen to improve customer experiences, open up new revenue streams, and disrupt competition by leveraging the new augmented reality capabilities for product and service differentiation.

- Use cases being developed for end customers have a strong focus on service or maintenance instructions, helping to reduce machine downtime and maximize product value.

- Operator-focused companion experiences provide new opportunities for value-add offerings and improving customer experiences.

- Customer-facing AR experiences are being developed and deployed rapidly, with an anticipated surge of such experiences going live in the next 12 months. This high pace of adoption represents both an opportunity and a disruptive threat.

Methodology

The insights contained in this iteration of the State of Industrial Augmented Reality report series have been developed through primary and secondary market research conducted by PTC. The primary research includes exclusive data related to one of the largest sets of industrial enterprises pursuing AR in the market: Vuforia Engine and Vuforia Studio customers. PTC has been engaging with its customers since 2016 to reveal their current and planned use of augmented reality to drive digital transformation across their operations and products. These customers include a global sample representative of multiple verticals with a focus on industrial settings. We supplement this proprietary data with market projections and case studies from dozens of analyst firms and consultancies in the broader market. The State of Industrial Augmented Reality distills this vast set of knowledge and provides a comprehensive view of the current state of the market. In this mid-year update, we'll focus on findings from our recent research and provide a view into a particular subset of enterprises capitalizing on the opportunity presented by industrial augmented reality.

Business Drivers & Beneficiaries

As stated, the majority of enterprises today are piloting and adopting AR use cases for their internal use and benefit, marking improvements in "Operational Efficiency" or "Lower Costs" as main drivers. However, 50% of respondents surveyed noted "Differentiated Product or Service Offerings" and "Improvement in Sales and Marketing" as key business goals they are addressing with their AR initiatives. In our previous report, we examined closely those companies using AR for internal benefit. In this mid-year breakout report, we'll pivot our data to focus on the responses of those whose primary use is for strategic differentiation, or offering AR to their customers through innovative new products, services, and solutions.

To achieve these goals, companies pursuing AR for external use are building experiences designed around service at a rate twice as high as companies developing AR for internal use (19% versus 10%). It should be noted that maintenance use cases—which are similar but developed for internal use—

are equally prevalent. This is because service and maintenance are, without question, the "killer use cases" for AR in the market today.
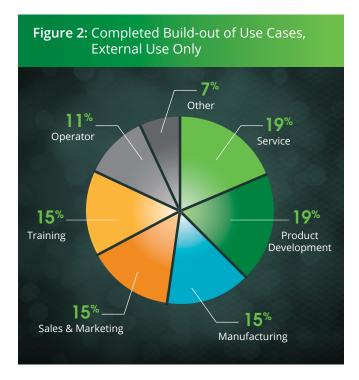
Driven by the same high downtime costs forcing companies to develop AR maintenance experiences internally, customers of industrial enterprises are open to receiving value-add services that utilize AR to reduce downtime and streamline their service experience. Either through cost premiums for unique new service and maintenance offerings or by improving relations and customer experiences, companies providing AR experiences that assist with customer service requests are capitalizing on the service opportunity afforded by AR.

Top Use Cases and Examples of AR for End Customers

Industrial enterprises focused on harnessing the new AR capabilities are taking a phased approach to deploying AR technology across their value chains. The path to value that PTC observes is that pilots start with internal proof of concept and quickly

Figure 1: Stated Objective of AR Experience

GREEN BARS: External Cutomers. For the remainder of this report, data will be pivoted to represent only those companies that identified as primarily pursuing AR for external use and excluding software developers to further examine the intent and priorities of customer-facing AR products, services, and solutions.

BLUE BARS: Internal Customers.

Figure 2: Completed Build-out of Use Cases, External Use Only

7% Other
11% Operator
15% Training
15% Sales & Marketing
15% Manufacturing
15% Manufacturing
19% Product Development
19% Service

become deployed across multiple areas, including customer-facing product and service initiatives.
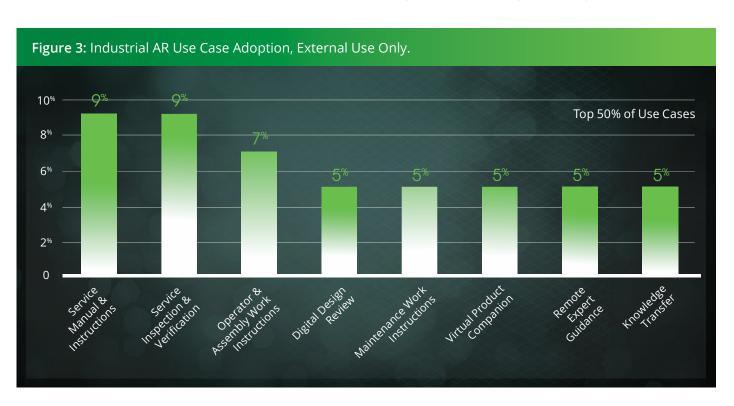
Looking at those companies that are developing for external use shows an increased focus on

service as well as marketing and sales as the key beneficiaries of AR deployment. As industries shift toward service-oriented business models, industrial enterprises are eager to leverage the same capabilities to visualize data and provide instructions related to smart, connected products with their customers the same way they do internally.
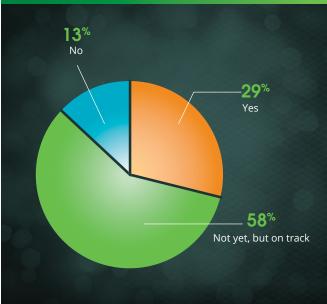
Top 50% of Use Cases

For industrial enterprises offering AR experiences that serve their end customer, service-related use cases garner a combined 26% of responses (including a few use cases not listed). From providing instructions to the customer to pre-empt and reduce service calls to equipping their own service teams with service inspection apps to increase first-time fix rate, the ultimate goal of service-related use cases is to maximize the value customers receive from their products.

Another combined 20% of responses (including a few use cases not listed) focuses on use cases that enhance or extend a customer's "operator" experience with the product. Operator and

Figure 3: Industrial AR Use Case Adoption, External Use Only.

Top 50% of Use Cases

	Percentage
Service Manual & Instructions	9%
Service Inspection & Verification	9%
Operator & Assembly Work Instructions	7%
Digital Design Review	5%
Maintenance Work Instructions	5%
Virtual Product Companion	5%
Remote Expert Guidance	5%
Knowledge Transfer	5%

Figure 4: Completed Build-out of Use Cases , External Use Only.

13%
No

29%
Yes

58%
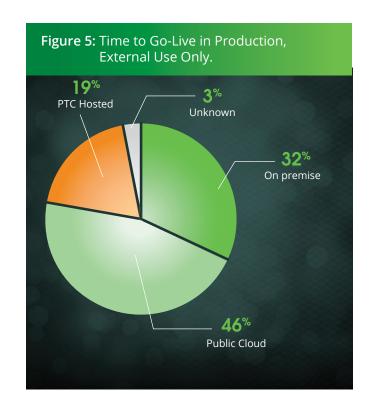Not yet, but on track

TRO**X** TECHNIK
The art of handling air

For example, Trox do Brasil, a manufacturer of central air conditioning components, is developing several service-related augmented reality experiences to better serve their customers. By enabling augmented service manuals and instructions, service inspection, and remote expertise, Trox do Brasil is working to ensure that, no matter the challenge, they will be well equipped to instruct and guide their customers through repairs and maintenance hurdles. These new service capabilities will reduce the need for on-site service trips in addition to reducing the customers' downtime and improving their overall experience and value from Trox do Brasil's products. For the customer, Trox do Brasil is helping to reduce downtime and streamline the operations by providing increased transparency into asset and overall operational performance.

assembly instructions guide customers through product setup and operating, reducing frustration and ensuring safe and compliant product use.

Customers can also easily and quickly request consumables, replacement parts, or other assistance or value-add services direct from the manufacturer.

cannondale

Cannondale, a global leader in cycling equipment, is offering a bike called Lefty Ocho, which ships with AR companion experiences that include operator and assembly instructions. Originally intended for dealers of the bikes to showcase features to end customers or to help with service and parts inventory replenishment and instructions, the app is also available to end customers. Within this companion experience, customers can learn about the features of their new bike, mechanics, and proper use to ensure the safest and best product experience possible. It also provides a key voice-of-the product feedback loop for Cannondale to incorporate into product development in addition to reducing basic customer service calls and questions.

Figure 5: Time to Go-Live in Production, External Use Only.

19%
PTC Hosted

3%
Unknown

32%
On premise

46%
Public Cloud

For all customer-facing AR experiences, the window to leverage AR to differentiate is limited, as it will soon be an industry standard add-on to physical products. Companies are accelerating development to capitalize on this key opportunity; our data shows a stark difference when comparing companies that are developing experiences primarily for customers versus those focused on internal pilots and initiatives.

Comparing the two, companies developing for customers report having completed successful use case development at nearly three times the rate of those developing internal use cases (29% versus 11%). This suggests that companies developing for internal use may be experimenting more with AR technology to find the best fit for optimizing their internal operations. They may also be taking on more ambitious projects, such as integrating enterprise systems or building use cases that span multiple functions in the value chain.

We see a similar trend when examining the timeframe that companies expect to move from pilot to production. For those developing experiences for customers, 86% of respondents anticipate bringing their experiences live within 12 months, compared to 58% for internal use. In either case, the majority of enterprises pursuing any flavor of augmented reality are standing up projects and experiencing ROI within 12 months.

While both internal and external AR initiatives have been proven in the market to deliver rapid ROI, external-facing experiences may have a more limited window to create and sustain strategic differentiation, and are therefore being moved to production more aggressively in this fast-moving new market. The speed can be daunting for some, but as augmented reality technology is adopted at a faster rate than ever before by end users, the enabling toolkits and platforms to construct those experiences are making it easier and faster to build and deploy AR.

The Bigger Picture

With this significant increase in AR technology adoption, enterprises undergoing digital transformation cannot afford to wait. Whether for enhancing products, services, and solutions offered to customers or to drive operational excellence within the enterprise, AR provides new transformative capabilities that cannot be overlooked.

Market analysts' and PTC's forecasts predict that industrial augmented reality has the potential to create significant economic disruption and impact. To capitalize on this opportunity, industrial enterprises should seek partners and technology providers that have solutions ready to deliver value and build augmented reality experiences as quickly and easily as possible.

> **For more information, [contact an expert](#) to learn about the Vuforia Studio augmented reality experience platform.**