

ENTERPRISE AR: BREAKING FREE OF 'PILOT PURGATORY'

Optimizing People, Product & Process for AR Success



EXECUTIVE SUMMARY:

OPTIMIZING AR

Technology continues to transform the workplace. Emerging tech like AI and the Internet of Things improve automation, data driven insights and operational efficiency. But the technology that holds the most potential bottom line impact is Augmented Reality (AR).

There are corporate AR applications such as data visualization, but greater impact is happening in industrial settings. There, AR is being used in to streamline machine maintenance or complex assembly. This includes hands-free instructive graphical overlays in workers' line of sight.

Companies from **ABB to Siemens** are realizing strong ROI from such deployments, including more output, faster work and error reduction. For example, project uptime can increase by 20 percent while error reduction can improve by 90 percent. These gains can add up within large-scale operations.

But though this signals exciting opportunities and transformation on the horizon, there are also real challenges to acknowledge. These challenges map to the three P's: *People, Product and Process*.

Like many technologies before it, AR will experience adoption friction in these key areas. That can happen on an organizational level or through inter-departmental barriers, as change agents champion AR while others resist.

The three P's are also at the heart of the most prevalent failure for enterprise AR: 'Pilot Purgatory.' As its name suggests, this is when AR is adopted at the pilot stage, but never progresses to full deployment. It happens when AR strategies aren't aligned with, or optimized for, the three Ps.

What are the main causes of this resistance and how can they be alleviated? For *product*, it's about alignment with solving real operational problems. For *people*, it's about customizing AR's ROI story for their benefit. For *process*, it's about multidisciplinary input rather than top-down innovation.

In this report, we take a deep dive into AR's enterprise challenges and the art of resolving them. We'll outline messaging that can counter objections from internal stakeholders. The name of the game is to set AR up to succeed by optimizing its deployment around these critical factors that can make or break its success.



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PART 1: THE OPPORTUNITY

Technology continues to transform our lives and work. Emerging tech like AI and the Internet of Things improve automation, data driven insights and operational efficiency. Advancing in parallel is Augmented Reality (AR) which holds even greater potential enterprise bottom-line impact.

The full spectrum of enterprise AR includes corporate AR apps such as data visualization. But greater impact is in industrial settings – the focus of this report. There, AR can streamline machine maintenance or complex assembly. Hands free line-of-site graphics can guide workers in operationally-efficient ways.

This can engender greater output, faster work and error reduction. And the Return-on-Investment (ROI) gains speak for themselves. RE'FLEKT has measured a 90 percent reduction in errors and 20 percent greater uptime in industrial processes that use its AR technology (see appendix).

"We realized a significant reduction of time spent on maintenance, accompanied by a notable increase of quality in our inspection reports," said Carl Brockmeyer, General Manager of industrial vacuum products manufacturer, Leybold USA.

90%

Reduction in errors

20%

Greater uptime in
industrial processes
using AR



FORMATS

AR formats include remote assistance. Also known as 'see what I see,' this lets remote Subject Matter Experts (SMEs) see what a front-line worker sees through his or her AR glasses' camera. SMEs can then guide workers by voice and spatially accurate annotations on machine parts, seen through the glasses.

"[AR] enables our specialists to remotely collaborate with workshop mechanics in almost the same way as if they were on site," said Matthias Frödrich, Innovation Engineer at automotive diagnostics company Hella Gutmann Solutions. "AR has turned around our support procedures, making them not only much more efficient but more effective which, in combination, significantly increased our first-call resolution rates."

Another format is pre-authored instructions. Rather than live SME support, animation sequences overlay machine parts with line-of-sight instructions for maintenance or assembly. This has advantages in its dynamic activation by visual markers, thus achieving automated on-demand and on-site support.

TANGIBLE BENEFITS

These methods hold several advantages including hands free work, which saves time and accomplishes the ROI gains referenced above. There are also cost savings from eliminating the common practice of flying experts to the job site, which requires costly travel and machine downtime.

"The real-time video support empowers our specialists to communicate and directly engage with resolving issues without investing the time to travel and provide support on site," said Hella Gutmann's Frödrich. "The functionality to draw and place augmented instructions directly into the shared video stream makes augmented reality much more beneficial for us than any common live-video app."

It's also important to note how AR counteracts an enterprise pain point: Institutional knowledge loss. Remote assistance can boost SME comfort and flexibility by taking the place of strenuous field work, thus delaying retirement. In the same way, AR can automate knowledge transfer to younger employees.

“Because organizations are people, new technology shouldn't be sold as solving business problems, but people problems.”

Wolfgang Stelzle, CEO & Founder
RE'FLEKT GmbH

“We have an aging population of experienced people, and a rising population of inexperienced people,” said Intel's Chris Croteau at the ARiA conference. “It's great to talk about bottom-line advantages but what enterprises really worry about is those people with 30- or 40-years experience retiring.”

HISTORY REPEATS

For these reasons, ARtillery Intelligence projects revenue from AR enterprise deployments to grow to \$26.1 billion in 2022, Scale results from wide applicability in industrial settings and clear ROI. It will follow a similar pattern of enterprise smartphone adoption -- starting slow but reaching a 2020 tipping point.

That inevitability and history-supported adoption cycle should signal enterprises to gain a competitive edge by experimenting with AR today. With historical perspective, ARtillery Intelligence advises industrial enterprises to get started on that process as soon as possible to gain a knowledge position.

\$26.1 Billion

Projected revenue
from AR enterprise
deployments to
grow in 2022.



PASSENGER
AIRCRAFT
A320neo

WING SPAN
35.00 m

OVERALL LENGTH
37.57 m

OVERALL HEIGHT
11.76 m

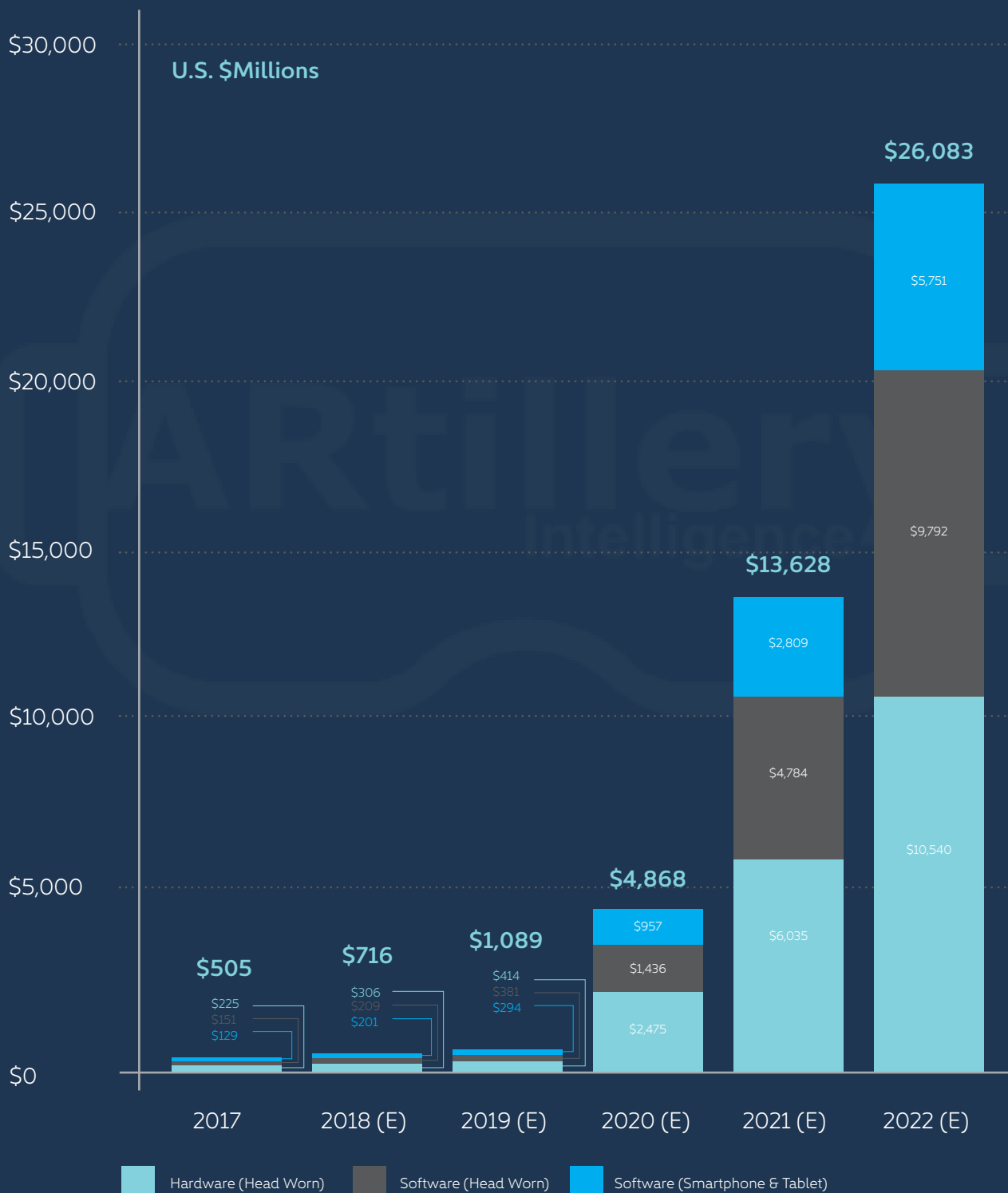
CAPACITY

PAX: Typical seating 165 (2-class)
Max 189
FREIGHT: LD3 capacity underfloor 7
LD3-45W
Max pallet number underfloor 7
Bulk hold volume 5.90 m³
Total volume (Bulk loading) 37.40 m³

ENTERPRISE AR DRILL DOWN

ENTERPRISE AR HARDWARE, SOFTWARE & ADVERTISING SPEND

Excludes mobile network data & hardware revenue (smartphone Shipment)



PART 2: THE CHALLENGE

Though the factors outlined above indicate exciting opportunities and transformation, there are also challenges. Like many technologies before it, AR will experience adoption friction. For example, inter-departmental conflict can result as change agents champion AR while other stakeholders resist it.

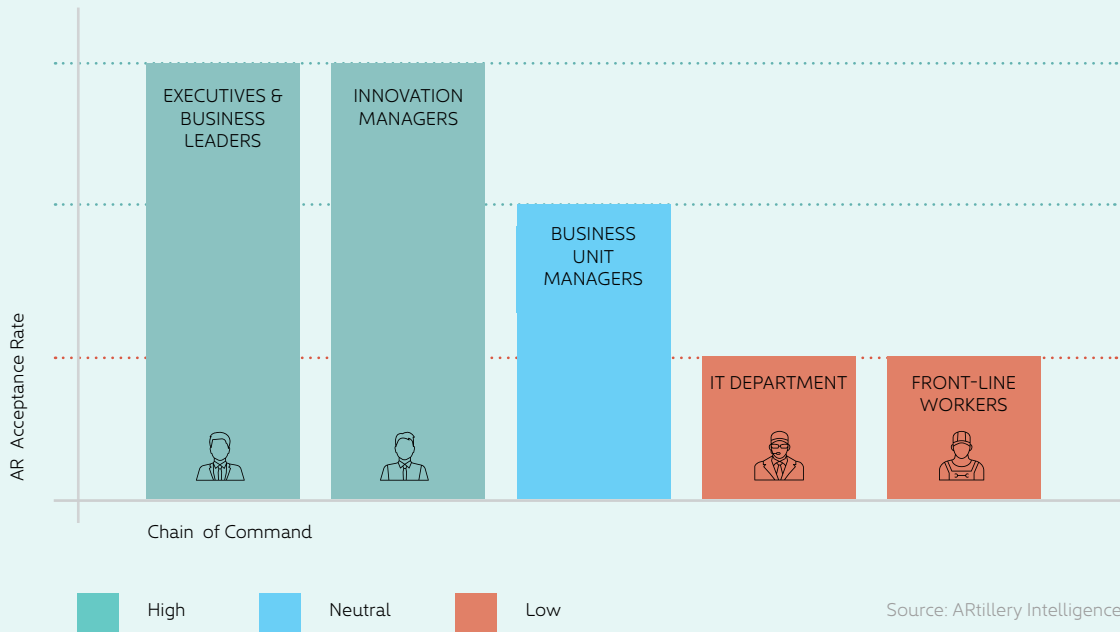
This principle is at the heart of enterprise AR's dreaded 'Pilot Purgatory.' This is when AR is adopted at the pilot stage, but never progresses to full deployment. It happens when AR fails to gain traction due to suboptimal planning and implementation.

These failures usually orbit the Three P's: *People, Product and Process*. Let's examine those one-by-one.

Failure primarily involves the 3Ps:

People
Products
Processes

AR ACCEPTANCE RATE IN AN ORGANISATION



PEOPLE

Starting with the first 'P', who are the people that represent organizational points of resistance? Here is a sample of enterprise personas and their typical resistance levels to AR.

EXECUTIVES AND BUSINESS LEADERS

Business leaders seek operational efficiencies and bottom line impact, so AR's ROI metrics resonate.

INNOVATION MANAGERS

Innovation managers are tasked with bringing in new technology, so AR likewise resonates.

BUSINESS UNIT MANAGERS

Business unit managers oversee front-line workers. They are open to AR if it improves their departmental productivity.

IT DEPARTMENT

IT professionals are risk-averse, as their job mandates. They don't want to be responsible for data breaches and aren't motivated to bring in new technology.

FRONT-LINE WORKERS

Front-line workers are AR's end-users and biggest resistors, stemming from fear of technology, job security and other factors explored further below.

PRODUCTS

Beyond the people that represent barriers to AR success, there's also the product itself. Its success factors hinge on two main factors.

Product/Market Fit: Enterprise technology adoption is a microcosm of open market dynamics. So just as 'product/market fit' is a key success factor in consumer technology products, it can make or break successful enterprise deployments. This means that the way that the AR solution is designed should directly address real operational pain points, rather than being a 'solution in search of a problem.' The analogy here is Uber: its success is due mostly to the convenience advantages over the incumbent solution (taxis) as well as price competition. Translated to enterprise AR, products will fail if they don't address explicit problems and pain points.

Misguided UX: User experience (UX) and interface are also critical. For example, there are sliding scales of simplicity versus complexity in user interfaces for any product. Not customizing the right 'sweet spot' for the application and the specific users (e.g. industrial front-line workers' need for simplicity) will cause any enterprise AR product to fail.



PROCESSES

Flowing directly from the product success factors are procedural errors. Like with products, we'll highlight two common tactical missteps.

Top-Down Innovation: In order to hit the marks for product success true department-level pain points must be understood. And that usually doesn't happen because AR solutions developers within an organization fail to get the direct input and perspectives of front-line workers and business unit managers. Often, the innovation happens in a top-down manner from innovation leaders that work with AR vendors. But without the direct involvement of departmental entities, these creators are 'flying blind,' in their quest to solve real problems. The result is a mismatch in product/market fit, UX and ultimately a product that won't get used.

Sidestepping IT: Many AR champions and business leaders within organizations make the mistake of sidestepping IT involvement. They figure that it's more prudent to first prove the technology's value, then worry about IT. But IT managers are influential gatekeepers and will often push against technology if they are brought in too late, due to feelings of offense or ambivalence.



PART 3: THE RESOLUTION

Because people, products and processes cause AR deployment challenges, they're naturally where resolutions should focus. Let's take them one at a time.

The resolutions should focus on the 3P's:

People
Products
Processes

PEOPLE: SOLVING HUMAN PROBLEMS

Starting with the people challenges introduced above, resolutions are all about communication. Often the same value propositions — company benefits and ROI metrics — are made to all stakeholders. However, they all have different needs and goals. So messaging should be customized and optimized accordingly.

“Because organizations are people, new technology shouldn’t be sold as solving business problems, but people problems,” said RE'FLEKT CEO & Founder, Wolfgang Stelzle. “The often-ignored reality is that people within organizations adopt technologies that benefit them individually, rather than to help the company.”

Metrics about AR’s operational efficiencies are not only misaligned with front-line worker’s goals but sometimes even counterproductive. For example, if a new tool proposes to do a job 2x faster, does that mean a worker has a 50 percent chance of keeping his or her job? This is the message they can infer.

To illustrate this principle further, earlier we examined the benefits AR can bring organizations in the form of reducing the loss of institutional knowledge. But that same benefit can be flipped or spun in a different way to underscore its impact on front-line workers personally.

For example, in physically draining fields like energy and construction, the best and most experienced workers are doing the hardest jobs, such as climbing poles and fixing turbines. And the viability of that work decreases quickly with age. But AR can breed comfort and flexibility by empowering them as SMEs.

The bottom line is that targeted communication and education are key factors in enterprise AR success. And that communication is more about marketing than technology. Communication and education to proposed AR end-users should therefore follow the tactics and best-practices of marketing.

“ Because organizations are people, new technology shouldn’t be sold as solving business problems, but people problems. ”

Wolfgang Stelzle, CEO & Founder
RE'FLEKT GmbH



OBJECTION HANDLING

So how do companies go about this? Like in marketing, companies should standardize AR 'sales pitches' and language to communicate AR's benefits to different stakeholders. Taking lessons from other areas of marketing and sales, the practice of 'objection handling' (OH) can help win over workers.

You may be familiar with this sales practice, as it involves standardized and pre-designed 'counter-arguments' to a list of common objections to a new product or idea. It's particularly fitting to facilitating AR adoption within organizations because there are lots of objections among certain stakeholders.

We'll illustrate that objection handling exercise in the list below. Like in marketing and sales, messaging is most effective when established, internalized and used consistently for maximum impact. That means messaging should be consistent among management and AR champions in any organization. For maximum impact, we'll focus on the two main stakeholders outlined above that have the greatest AR resistance: IT and front-line workers.



OBJECTION HANDLING CHEAT SHEET: IT DEPARTMENT

We have software platforms across departments. System integration will be difficult.

- ✓ AR integrates into legacy systems. It's AR vendors' job to handle that for you.

Content portability will be problematic.

- ✓ You already have 3D data files. AR systems are built to import standard file formats.

These devices have cameras, which is a security risk

- ✓ You already have smartphones and tablets deployed. AR follows the same protocols.

We have unique security needs.

- ✓ AR providers work closely with you to customize security protocols to your unique dynamics.

This will make my job harder? What is the benefit for me?

- ✓ AR is the future of industrial productivity. You can be linked to its success rather than its prevention.

OBJECTION HANDLING CHEAT SHEET: FRONT LINE WORKERS

This seems complicated and a departure from the job that I'm already skilled at. How does it benefit me?

- ✓ On-the-job training, valuable skills, preparation for the industrial work of the future.

I don't see the advantage of AR compared to my traditional manual.

- ✓ Line-of-sight guidance is less strenuous and draining than 'mental mapping' 2d instructions.

If AR is so efficient and productive, does that put my job (or co-workers' jobs) in danger?

- ✓ AR breeds better job security through better capabilities for the next era of industrial work.

I'm going to retire soon anyway, What's the point of learning new tools?

- ✓ With AR, we can empower you as a remote subject matter expert (greater job comfort).

These devices have cameras and sensors, and I don't want to be tracked

- ✓ AR doesn't track productivity on an individual basis... only on a system-wide basis.

PRODUCT: THE RIGHT FIT

As examined earlier, finding the right 'product/market' fit is a key enterprise AR success factor. So what are the strategies to hit the right mark? There are three important ones to remember:

1. Deploy AR only where it works best: AR is not a 'silver bullet' and excels some areas more than others. For example, AR's visualization advantages can be most effective in jobs that require guidance for complex and non-repetitive tasks such as large-equipment maintenance. Conversely, it's less effective in jobs that involve repetitive simple task such as assembly line work. With this type of work, front-line workers are already well-equipped by 'muscle memory.'

2. Use AR to reduce strain: One of AR's biggest benefits is to reduce 'cognitive load.' This is when mental translations are required, such as translating two-dimensional instructions into three-dimensional space. Not only can AR reduce errors in such scenarios (company benefits) but it can reduce strain and make work more comfortable (employee benefits).

3. Keep it simple: Successful AR deployments can happen in stages. And given front-line workers' fears or lack of comfort, slow acclimation can be prudent. Industrial workers have a low tolerance for complexity so start simple. For example, among the AR formats outlined earlier, 'remote assistance' is less tech-involved because it still incorporates a live human guide. This can acclimate front-line workers before graduating to more technology-centric forms of AR such as pre-authored instructions.



PROCESS: BOTTOM-UP INNOVATION

As examined earlier, process is another gating factor to AR's success in the enterprise. What are the strategies to hit the right mark? There are three important ones to remember:

1. Multi-disciplinary Input: Innovation and product design should be bottom-up instead of top-down. The former breeds success by involving front-line workers in product development. That not only pinpoints the right product features but it improves adoption likelihood. Involving front-line workers in product development gives them a sense of ownership and investment in the technology. The same principle applies to business unit-managers "They've made their cake, now they can enjoy it too," said RE'FLEKT CEO & Founder, Wolfgang Stelzle.

2. IT is Your Friend: As examined above, many AR champions and business leaders within organizations make the mistake of sidestepping IT involvement or waiting until later stages of deployment. But involving IT sooner makes them less likely to be surprised or offended by late-stage involvement. Sooner involvement also breeds greater understanding and appreciation for the technology, thus more inclination to support it.

3. Device Continuum: Another tactic to lessen IT or front-line resistance is to start with proven hardware when possible. If the use case aligns, consider deploying AR through smartphones and tablets before graduating to headsets like HoloLens. There can be less resistance from risk-averse IT, and comfort-driven front-line workers, when established and trusted hardware is the vessel.

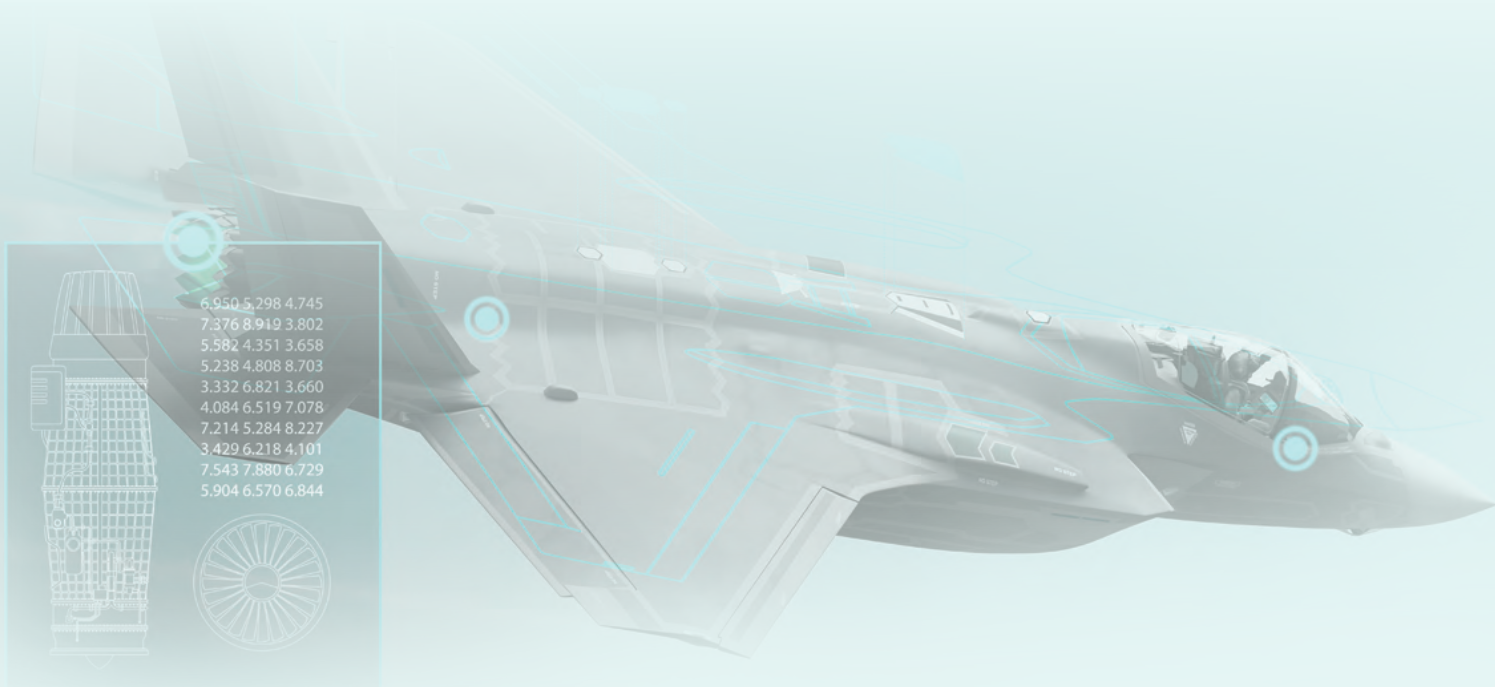
FINAL THOUGHTS: PROTECT YOUR INVESTMENT

The main point in the above exercises is to optimize AR deployments around the factors that will make or break its success.

The name of the game is to set up any AR deployment to succeed. That happens by winning over the key stakeholders who can share in its victory (people); solving the biggest operational problems (product); and doing all of the above in ways that are methodical, strategic and follow best practices (process).

And the success gained by following these steps will protect your technology investment. After investing time and money in vetting AR, launching pilots and proving its value, that value will only be realized if it's given the chance to succeed. And once it does succeed, there is real bottom-line value to be gained.

Optimize AR deployments around factors that will make or break its success.



BOILING IT DOWN: ENTERPRISE AR CHECKLIST

To summarize the action items in this report, here's a list of the most important things to remember.

AR brings proven operational efficiencies like task-completion time and error reduction.

- ✓ These advantages and ROI can only be realized if AR is implemented correctly.
- ✓ If implementations aren't optimized, AR won't graduate from 'pilot purgatory.'
- ✓ To avoid this, implementation should concentrate on the 3 Ps: *People, Product & Process*.

When it comes to **PEOPLE**, they resist AR if they fear it or don't perceive personal benefit.

- ✓ This makes education and communication key success factors.
- ✓ For front-line workers, emphasize personal benefits rather than company benefits.
- ✓ This includes benefits like more comfortable and enjoyable work.
- ✓ They can benefit from on-the-job training for valuable next-generation technology.
- ✓ Line-of-sight graphics ease mental strain from translating 2D instructions to 3D space.
- ✓ Time and mental load gained from AR can evolve employees into knowledge workers.
- ✓ For IT managers, risk aversion should be tempered by communicating AR's security protocols.
- ✓ Data is transmitted using methods that uphold enterprise security standards.
- ✓ AR vendors work with enterprises to customize security protocols and handle the hard parts.

When it comes to **PRODUCT**, it's important to ensure 'product/market' fit.

- ✓ AR should solve real operational pain points rather than 'a solution in search of a problem.'
- ✓ User experience components like interface should be optimized and customized for target users.
- ✓ Simplicity in interface design is often required for industrial front-line workers.

When it comes to **PROCESS**, product development shouldn't be top-down.

- ✓ Input and involvement from business unit managers and front-line workers is critical.
- ✓ Front-line worker input in planning stages creates a sense of ownership which boosts their adoption.
- ✓ Don't take the lazy route of sidestepping IT.
- ✓ Involve the IT department as early as possible to gain allegiance.
- ✓ Start slow and simple. If it fits the use case, deploy smartphones and tablets before AR glasses.

APPENDIX: REFERENCES & CONTACT

ABOUT RE'FLEKT

RE'FLEKT is a Munich based technology company that enables any business or industry to create their own in-house Augmented and Mixed Reality applications.

By making AR and MR affordable and scalable for business, RE'FLEKT's ground-breaking human-centred platforms empower anyone to simply infuse their industry knowledge into customized AR and MR solutions. With clients including Audi, BASF, BMW, Bosch, Eon, Hyperloop, Hyundai, Leybold, Porsche, Seepex and Thyssen Krupp, the international team delivers technology solutions to a variety of leading global markets.

Since its founding in 2012, RE'FLEKT has grown to a team of over 60 employees in Munich and San Francisco and is recommended by leading analysts including ABI Research and Gartner (Gartner Cool Vendor).

CLIENTS

			 The Chemical Company		
					 TRANSPORTATION TECHNOLOGIES
					
					 Sensor Intelligence
			 Technische Universität München		

ABOUT ARTILLERY INTELLIGENCE

ARtillery Intelligence chronicles the evolution of spatial computing. Through writings and multimedia, it provides deep and analytical views into the industry's biggest players, opportunities and strategies.

Run by analysts and former journalists, coverage is grounded in a disciplined and journalistic approach. It also maintains a business angle: Though there are lots of fun and games in spatial computing such as AR & VR, cultural, technological and financial implications are the primary focus.

Products include the AR Insider publication and the ARtillery PRO research subscription, which together engender a circular flow of knowledge. Research includes monthly narrative reports, market-sizing forecasts, consumer survey data and multi-media. Learn more [here](#).

Disclaimer: ARtillery Intelligence's contribution to this report includes the market-level analysis of opportunities and challenges. It's involvement in this production isn't an endorsement of RE'FLEKT nor any other company, as defined by its disclosure and ethics policy.

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