The Power of Immersion

How **Walmart Academies** show annual savings by reduced training time and travel cost with **XR** pp.49

Doug McMillon
President and CEO,
Walmart Inc.

Image courtesy of https://corporate.walmart.com/about/leadership/doug-mcmillon

BETTER OUTCOMES WITH VISUALIZATION

Employee On-boarding by Extending Reality

Metrics | Resource List | Citations | Industry Use Cases | Leadership Introduction

VOLUME 1 A PUBLICATION OF THE VR/AR ASSOCIATION ENTERPRISE COMMITTEE 2024 ISSUE 1

Walmart, Saudi Aramco, Amazon, Exxon Mobil, Apple, Shell, United Health Group, CVS Health

8 out of 10 FORTUNE Global top 5 largest companies by consolidated revenue excluding Asia for FY 2022 & 2023 invested in XR (extended reality).

75% across the board Fortune 500 reported 2023 committed to XR initiative(s).

The past ten years have witnessed significant growth in XR technologies, triggering investment into a market sized to an estimated $64.5 billion USD as of 2022, with major growth forecast to 2028.

XR on-boarding in retail operations will lead to significant cost savings. Walmart can calculate inferred annual savings of over $38M by reducing training time and travel costs.

In healthcare operations, XR training for surgeons improved efficiency by 70%, unlocking $16.9M+ in potential annual benefits for hospital systems.

Executive Abstract

What is XR and its Benefits?

XR refers to **Extended Reality**, a term that encompasses Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), or Spatial Computing which are visualization technologies providing innovative solutions for business and manufacturing processes when coupled with AI (Artificial Intelligence) for measurable ROI. XR enhanced learning, healthcare, retail, remote work, product design, entertainment, and cultural experiences are just some of the categories impacted by this technology.

Visualization with XR Delivers Impressive Metrics

XR visualization technology applied to immersive training by retail giant Walmart calculates an inferred annual savings of over $38M by reducing training time and travel costs (HTC VIVE 2024). Walmart also reported consolidated revenue of $611M in 2023. If implementation of the training program was less than $1.5M then **ROI** would be at least **96%**. Turn to the worksheet and study guide to see how to calculate savings for ROI.

Content

Executive Overview

What is XR and its Benefits?

As stated earlier, XR is a term that encompasses Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), which are immersive technologies that offer transformational solutions for many business processes. XR can provide enhanced learning, healthcare, retail, remote work, product design, entertainment, and cultural experiences.

XR Use Cases and Examples

XR technology can be applied to various industries, sectors, and scenarios, such as automotive, energy, ESG, virtual offices, immersive training, retail, and corporate marketing. Some examples of XR applications include VR engineering or product design studios, AR safety apps, digital twin systems for manufacturing, virtual flagship automotive dealerships, virtual deescalation training or other soft skills training, and AR retail and fashion experiences.

Criteria for a Great User or New Hire Experience (UX) with XR On-boarding

To provide a great user experience for the on-boarding process with XR applications, it is essential to ensure user-centric design, interactivity,

accessibility, technical performance, security and privacy, continuous learning improvement, and skill building. These considerations can help users effectively learn and interact with the XR environment, thus improving on-boarding outcomes.

XR On-boarding Companies

There are many companies that provide XR on-boarding products and services, such as Accenture, Apple, Cornerstone (fka Talespin), EON Reality, Google, HTC VIVE, Immerse, Microsoft, Nvidia, Taqtile, Unity, and VRdirect. These companies aim to enable organizations to effectively integrate immersive technologies into their business and on-boarding processes. Thus, they have each made significant capital investments towards that end.

XR On-boarding Metrics

XR on-boarding metrics are indicators that measure the effectiveness, efficiency, and user satisfaction of the on-boarding process for XR applications. Some of the metrics include completion rate, time to completion, drop-off points, user satisfaction, retention rate, error rate, standard engagement metrics, conversion rate, feedback analysis, performance metrics, behavioral changes, support requests, learning curve, post on-boarding performance, and contribution to improving outcomes. Each of these must have a well-developed baseline measurement for any meaningful data to be collected, resulting in an audit-able Return on Investment (ROI) report generation.

Conclusions

Effective XR on-boarding is essential for improving business processes and outcomes, as well as increasing user/new hire productivity, proficiency, satisfaction, and engagement, so the organization is better positioned to meaningfully improve internal operations, perform for customers, and advance other new business opportunities. For example, Bank of America reported 100% of learners performing intended on-the-job behavior after XR training, highlighting the effectiveness of immersive experiences.

XR on-boarding in retail operations led to significant cost savings, Walmart can calculate inferred annual savings of over $38M through reduced training time and travel costs.

In healthcare operations, XR training for surgeons improved efficiency by 70%, unlocking $16.9M+ in potential annual benefits for hospital systems.

(HTC VIVE, 2024, STRIVR 2024)

Leadership Introduction to XR

Extended Reality (XR) is the oldest new technology on the market prior to Artificial Intelligence (AI). It is comprised of both hardware and software solutions that immerse a user in an experiential way to bridge real-world and digital-world data beyond a flat screen. The category encompasses virtual reality, augmented reality, and mixed reality.

The past ten years have witnessed significant growth in XR technologies, triggering significant investment into a market sized to an estimated $64.5 billion USD as of 2022, with growth percentages as high as 43.5% per year at least until 2028.

43.5%

Market growth

[https://www.imarcgroup.com/extended-reality-market]

The history of XR dates to at least the 1960s, with a very clear early example from engineers at Philco who created a VR headset designed for military use, which included motion tracking technology. Another well-known military example of XR is exhibited in the use of military and then later commercial flight simulators. The current iteration of XR came into the public eye in 2010 when Palmer Luckey (18 yrs. old at the time) created a prototype of the Oculus Rift VR headset. His Kickstarter campaign raised an estimated $2.4M USD. The company was acquired in 2014 by Facebook (now Meta) for roughly $2 billion USD.

On-boarding both new and experienced hires into any organization is well known to be the first step in a long series of training events required to leverage the skills and competencies of people and the organization (Noe et. al, 2022).

Yet, a recent article in the Harvard Business Review citing a 2022 survey reveals that "only about half of new hires are satisfied with their on-boarding experience," resulting in an approximate loss of one-third of employees in the first 90 days of employment (Phelan, 2024) (Tsipursky, 2023).

This clearly represents a significant need and opportunity.

Many companies have determined that the use of XR in on-boarding practices can remediate some portion of the survey-cited loss. When enterprises provide XR capabilities with immersive experiences to their personnel, customers, partners, etc., with simulated environments having impressive visuals and intelligence, this can result in:

- Reduced training/competency development time and cost
- Improved operational efficiencies
- Better managing change, making innovation more rewarding, and mitigating business risk
- A more satisfying on-boarding experience that is engaging and resonates with the user
- The delivery of meaningful benefits to employees, customers, partners, and the organization.
- Improved organizational competitiveness, responsiveness, etc. – To benefit more from change.
- Ability to better attract and retain top talent.
  Plus, decrease the approximate 1/3 (one-third) loss in the 90-day window for new employees

("What a 'Business Innovation Facilitator'," 2024)

Conclusion to the Overview

XR is a strategically enabling technology to expand enterprise digital and human capabilities that meaningfully improve outcomes with a much better user experience and on-boarding process to:

- Facilitate people developing new skills and competencies
- Better position the organization to achieve corporate objectives
- Create significant value
- Be better at hiring and retaining top talent
- Be more sophisticated in managing the changing nature of risk

To go forward with strength, it is imperative that leadership have a vision and drive technology advancements, prior to ROI key indicators emplacement. 'If you wait to invest until after your competitors have proven ROI, then you will always lag market value' Michael Hotaling, Operations Excellence Digital Manager, Exxon Mobil, MLC conference, 2023. Leadership must commit to being better at innovation with the timely delivery of new digital capabilities, services and products that matter – or incur the risk of becoming less relevant over time.

What follows in the next section titled "XR Use Cases" is a broad overview exhibiting executive leadership decisions to invest in XR as evidence of the above citation. Those use cases go well beyond on-boarding.

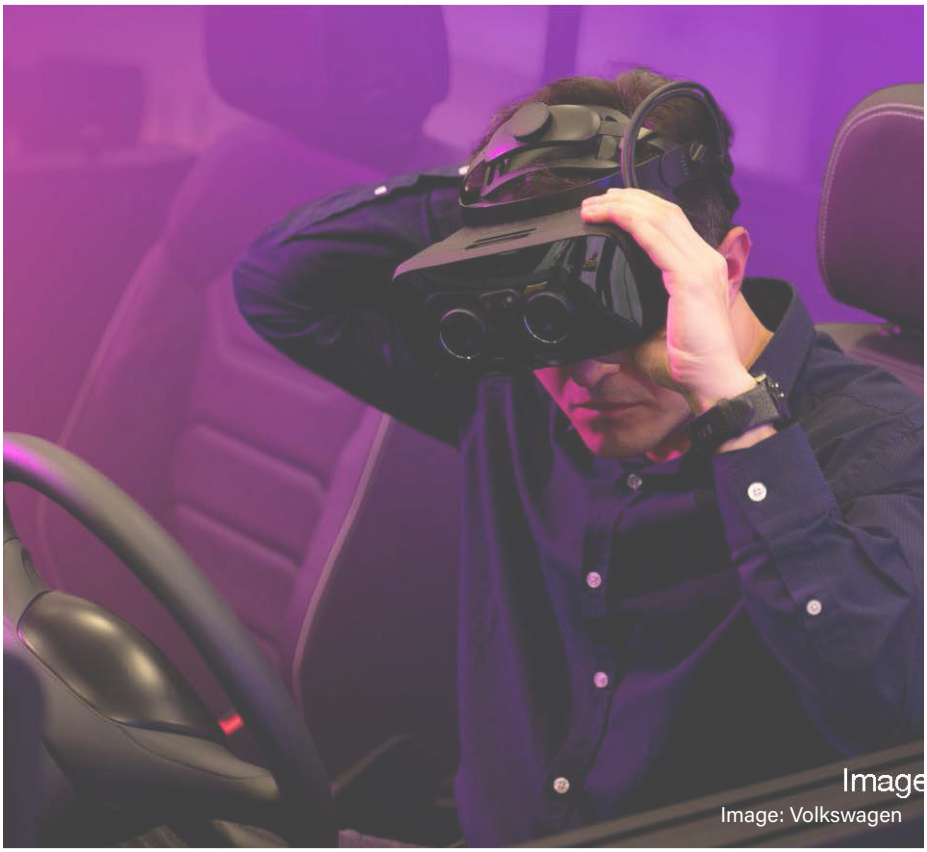
Image: STRIVR

Image: STRIVR

XR Use Cases

In conjunction with innovation initiatives to expand opportunities as well as to increase relevance and revenue, organizations continue to expand their XR capabilities and use cases to realize the significant benefits with a rich learning environment based on immersive experiences with impressive visualization as follows.

XR Use Cases
Automotive



FORD

Ford Motor Company has been using virtual reality for decades in its design process to decrease development time and reduce prototype waste (Lingeman, 2023).

GM

General Motors is using virtual reality and wooden models to speed up the design of its electric fleet (Shaw, 2023).

HONDA

Honda is using virtual reality to fast track the development of new Honda vehicles ("New Honda Design Video," 2023).

VOLKSWAGEN

Volkswagen is using virtual reality to ease collaboration and increase efficiency in technical development, assembly planning, and factory logistics ("Development Using VR Glasses," 2022).


Image: Porsche

PORSCHE

Porsche North America switched to the HoloLens 2 to continue providing next-level remote support and training to dealer technicians ("Porsche Cars North America," 2023).

BMW

BMW started a global roll out of Nvidia's Omniverse platform using digital twins for factory planning with a new plant to open in 2025 for optimizing layouts, robotics, and logistics systems before production starts. BMW also uses Hololight Space on HoloLens 2 at its Munich headquarters to speed up testing of concept vehicles and verification of assembly processes (Takahashi, 2023).

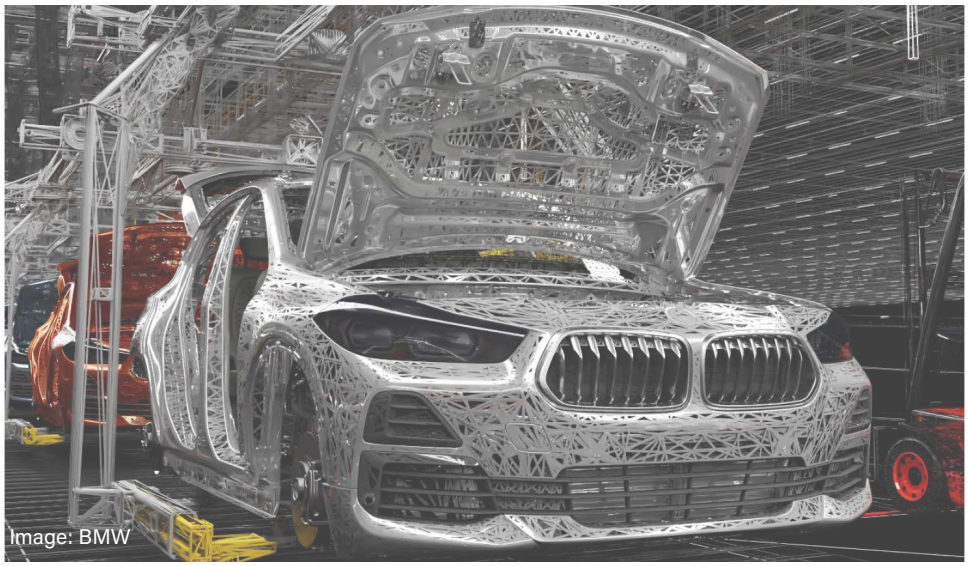


Image: BMW


Image: Adobe AI

FIAT

Fiat added ChatGPT to the Fiat Metaverse Store, a virtual car showroom where visitors interact with a GenAI-powered Fiat Genius ("Fiat at CES," 2023).

TOYOTA

Toyota launched an AR view-in-yourspace experience to support the 2023 Crown (Wood, 2023).

FORD

Ford Motor Company is rolling out 3000 assisted reality headsets to reduce repair times ("Why Ford Rolled Out 3000 RealWear," 2022).

Image: RealWear

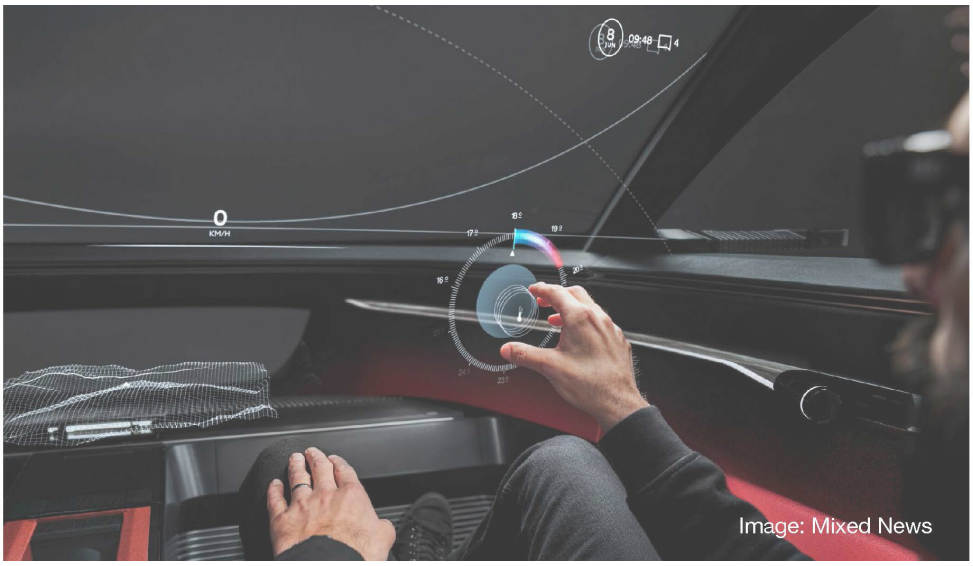


Image: Mixed News

Image: Audi

VOLVO

Volvo launched an AR safety app designed to support first responders in an emergency involving one of its electric trucks ("Volvo Trucks Launches World-First," 2023).

AUDI

Audi and Mercedes-Benz partnered with Magic Leap on concept cars with AR user interfaces ("Audi Design Used Magic Leap 2," 2023; "The Audi Activesphere Concept," 2023; Milevo, 2023).

HONDA

Honda showed off its VR Design Studios in L.A. using XR to fast-track the development of new vehicles ("New Honda Design Video," 2023).

KIA

Kia Germany opened the company's first virtual flagship dealership (Sprigg, 2023).

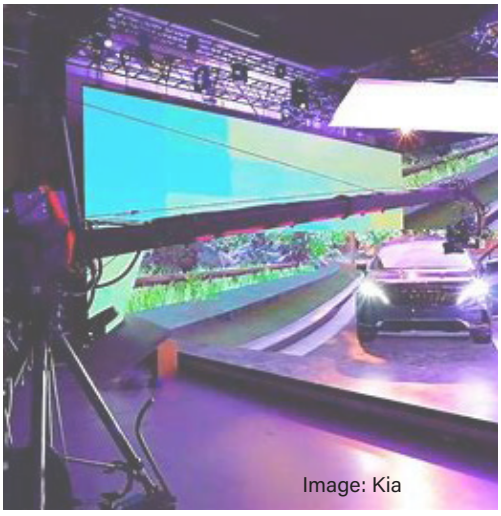


Image: Kia

XR Use Cases
Energy

DUKE

Duke – internal XR training group "Virtual Crew" develops in-house XR training modules and now sells those externally as well as co-develops or partners with other companies in order to improve safe work outcomes. From the website, "We are an award-winner lab building first class software for safe and effective training" (Duke Energy, n.d.).

REN

Portuguese energy company REN introduced AR with real-time location on tablets to help substation teams avoid unsafe areas and reduce accidents (Jones, J. S., 2023).

SIEMENS

Siemens Energy is using Microsoft Teams and HoloLens 2 to simplify acceptance testing by creating " virtual test beds " where customers can inspect and approve orders before shipping ("Virtual Inspections Optimize Carbon Footprint," 2023).

BP

BP deployed Aize's digital twin solution in the North Sea region to support maintenance, inspection, and equipment modifications, plus consolidate engineering and operational data into a common digital view of BP's physical assets (Cavcic, 2023).

HALLIBURTON

Halliburton announced it's developing a digital twin system for Petrobras in Brazil to " reduce capital expenditure, accelerate production times, and improve crude oil recovery rate " (Palmigiani, 2023).

XR Use Case ESG

VANCOUVER

Vancouver Airport Authority worked with Unity to deploy large-scale digital twins to " meet environmental, social, and corporate governance goals ". (Greener, 2023).

Image: Unity

XR Use Cases Office & Workspace

ACCENTURE

Accenture uses XR with Nth floor (its virtual / spatial computing / metaverse campus) for on-boarding new personnel (Warnke et al., 2022).

COTY

Beauty company Coty utilizes flexible workspaces and gamifies training in XR to boost relationship building and collaboration among personnel with virtual meeting rooms, dedicated desks, call zones, etc. (Zweiglinska, 2023).

BBVA

Spanish bank BBVA opened a virtual environment to extend presence of the Madrid headquarters in the Lendaryum metaverse ("BBVA," 2023).

XR Use Cases
Training

NESTLE

Nestlé rolled out VR at a Nescafé factory in Northern Spain to educate employees about traffic rules on company premises and safety instructions on the production floor (“Effective VR,” 2023).

UPS

UPS is using VR to prepare delivery drivers for various traffic and road situations to improve safety (Schwarz, 2023).

ASK

ASK Chemicals is using AR for field support as part of an effort to capture the knowledge of soon-to-retire experts (“ASK Chemicals,” 2023).

BANK OF AMERICA

New hires at Bank of America are able to tour a virtual bank branch with VR and AI to learn about - company benefits, processes, managing a challenging situation / an angry customer, etc. (Doherty, 2023).

AA

AA, the UK version of AAA in Michigan, reduced time-to-competence and overall required training for mobile mechanics with VR (Greener, 2023).

WOOLWORTH

Woolworth's, Australian supermarket giant, provides virtual deescalation training (Esposito, 2023).

AXA

Insurance firm AXA introduced VR in the form of a 3D factory model to train risk managers, facilities and plant managers, and site operators (Lontayao, 2023).

FIVE GUYS

Five Guys fast food chain announced plans to roll out VR headsets to fast-track learning by immersing crew members in a virtual store during training. ("What's Cooking with Five Guys," 2023).

XR Use Cases Healthcare

UNIVERSITY

University of Michigan Improved Training Efficiency: XR training increased surgeon efficiency by 70%, that could save $16.9M annually for the hospital (VIVE, May 2024).

STRIVR

STRIVR's immersive training modules for procedural sedation increased confidence among nurses, with 87% feeling more confident in administering medication and 88% improvement in assessing patient conditions, (STRIVR 2024).

Image: Unity

XR Use Cases Retail

NESTLE

Nestlé Purina Petcare partnered with Blue Yonder and 3DVR Solutions to enable associates to collaborate remotely with retail partners as avatars in designing and planning shelves. (Kerwin, 2023).

HERSHEY

Hershey tapped into AR and image recognition to help retailers better position merchandise in their stores to increase sales. (Dominguez, 2023).

WALMART

Walmart's VR-based training program cut instruction time from 8 hours to 15 minutes and eliminated the need for on-site coaches, leading to substantial inferred annual savings of $38M (STRIVR, 2024).

SPROUT

Sprouts Farmers Market reduced on-boarding time from 4 hours to 45 minutes and improved knowledge retention across 56,000 team members. (STRIVR, 2024).

XR Use Cases Marketing

LUXURY

Luxury brands Cartier and Tiffany & Co. Launched AR virtual tryon campaigns targeting Gen Z shoppers. (Basu, 2023).

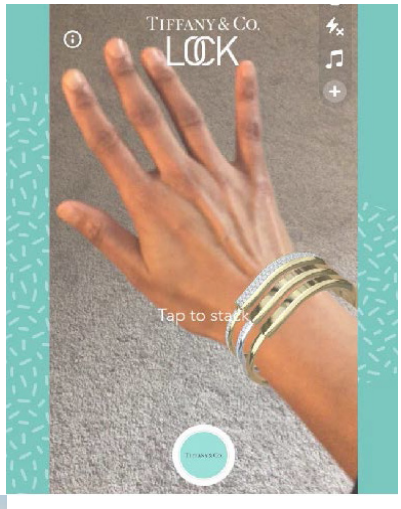
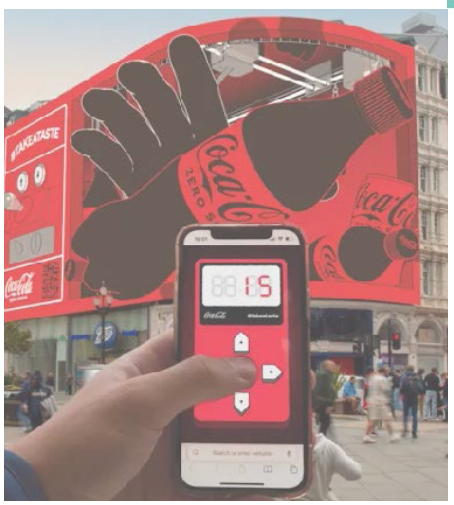


Image: Tiffany & Co.



COKE

Coca-Cola launched an AR giveaway and nationwide campaign with Tesco for Coke Zero ("Coca Cola Zero Sugar," 2023).

AMERICAN EXPRESS

American Express created an AR mall highlighting 10 small businesses for its "Door to Shop Small" campaign. (Shaul, 2023a).

COSMETIC

Dermavant and Botox Cosmetic chose AR (Snapchat Lenses) to educate consumers about their FDAapproved Psoriasis products (Shaul, 2023b).

TRAVEL

Royal Caribbean revealed the massive Icon of the Seas cruise ship on Fortnite (Sutcliffe, 2023).

RETAIL

LVMH teamed up with Epic Games to create new immersive customer experiences and add new 3D tools to its design pipeline. (Richford, 2023).

COSMETIC

Dermavant and Botox Cosmetic chose AR (Snapchat Lenses) to educate consumers about their FDAapproved Psoriasis products (Shaul, 2023b).

TRAVEL

Royal Caribbean revealed the massive Icon of the Seas cruise ship on Fortnite (Sutcliffe, 2023).

RETAIL

LVMH teamed up with Epic Games to create new immersive customer experiences and add new 3D tools to its design pipeline. (Richford, 2023).

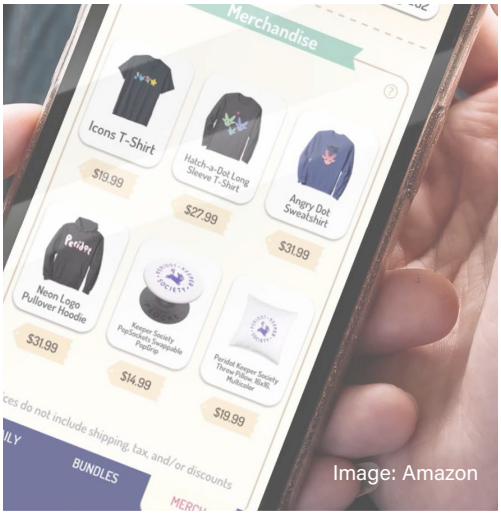


Image: Amazon

There are many more examples not included in this list. New XR initiatives are being reported at an ever growing pace and should be taken as evidence of the importance of XR as a strategic enabler for competitive advantage.

Image: LVMH

XR On-boarding Strategic Imperatives

XR is typically applied to improve the on-boarding experience into two categories by “Theme” and “Function”. The “Theme” addresses traditionally understood categories within on-boarding in general and the “Function” addresses specific role-based functional needs such as team building or collaboration.

By "Theme"

Orientation and Familiarization

Begin with an orientation session where users are introduced to XR concepts, devices, and terminology for a better understanding of the difference between VR, AR, and MR, as well as the hardware/software requirements for each.

Interactive Demos and Tutorials

Provide interactive demos or tutorials to familiarize users with XR interfaces and controls to guide experiences and introduce users to basic interactions such as navigation, selection, and manipulation of virtual objects.

Progressive Learning Paths

Implement a progressive learning path that starts with simple tasks and gradually introduces more complex scenarios to enable users build confidence and proficiency in using XR technology over time.

Peer Learning and Support

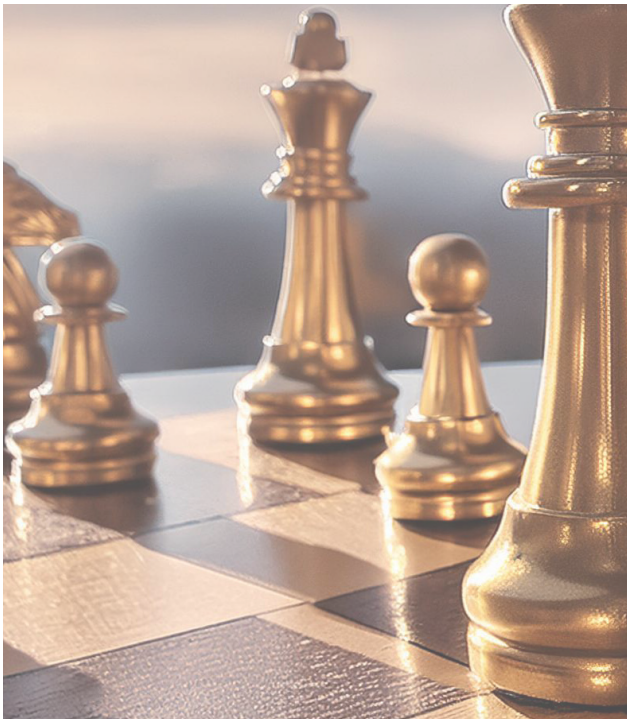
Foster a community of learners where users can share experiences, tips, and best practices for using XR technology with peer support for troubleshooting issues and discovering new ways to leverage XR capabilities.

Scenario-based Training

Develop scenario-based training modules that simulate real-world situations where XR technology can be applied that include training simulations for tasks such as equipment maintenance, medical procedures, or architectural design.

"A lifetime of training for just ten seconds", Jesse Owens

Training is a strategy. Not a burden.



Feedback and Assessment

Provide feedback and assessment mechanisms to track user progress and identify areas for improvement that includes quizzes, surveys, or performance evaluations based on predefined criteria.

Continuous Learning Resources

Curate a repository of resources such as tutorials, documentation, video guides, and online forums to support continuous learning beyond the initial on-boarding phase - and make these resources easily accessible for users to reference whenever needed.

Training leads to profit. Not loss.

Hands-on Practice

Offer hands-on practice sessions where users can experiment with XR devices and applications in a controlled environment that encourages exploration and experimentation to facilitate learning through experience.

Tailored Content for Different Roles

Customize on-boarding content to cater to the specific needs and roles of different users. For example, developers may require technical documentation and SDKs, while end-users may need user-friendly guides and troubleshooting tips.

Regular Updates and Refreshers

Since XR technology is rapidly evolving and improving, ensure people are aware of advancements with updates on new features, best practices, etc.

"The purpose of training is to tighten up the slack..."
Morihei Useshiba.

XR On-boarding Strategic Imperatives

Themes and functions enable organizations to create a comprehensive XR on-boarding program that effectively equips users with the knowledge and skills needed to develop new skills and leverage their competencies with immersive technologies to realize the significant benefits with XR, increase their value, and better position the enterprise to meaningfully improve outcomes.

By "Function"

Faster Learning

Companies create VR/AR/MR modules to familiarize employees with the technology and the applications with various scenarios such as safety protocols, equipment operation, customer interactions, etc. - to fast-track understanding, providing education, handling objections, performing tasks, etc.

More Effective Guided Tours

For new hires or visitors provide interactive experiences to explore the workplace or manufacturing facilities with AR overlays providing information about different departments, equipment, safety procedures, etc. – to facilitate people learning and performing tasks by navigating through the physical space.

More Engaging Team Building Exercises

Use XR technology to create collaborative virtual environments, games, or simulations where team members work together to solve challenges or accomplish tasks – to foster communication and teamwork.

Simulation-Based Learning

XR technology enables the creation of realistic simulations for on-boarding purposes. For instance, healthcare professionals can do training in virtual medical environments where they practice operating procedures or to become familiar with handling different patient scenarios - without real-world risk.

Improved Product Training

Companies use MR headsets to deliver product training sessions. For instance, employees in manufacturing industries can receive hands-on training by interacting with virtual representations of machinery and equipment overlaid onto the real-world environment – for a better learning experience and to avoid issues.

XR Employee Handbook

Instead of traditional employee handbooks, organizations are creating material with interactive sessions that people can access through XR-enabled devices. This immersive handbook frequently includes 3D models, videos, and interactive guides to explain company policies, procedures, and resources in a more engaging and effective manner.

More Effective Remote Mentorship

New employees can benefit from mentorship programs conducted in XR environments by interacting with experienced people, receive guidance, and ask questions in real-time, regardless of their physical location. This fosters a sense of support and community as well as to benefit from the knowledge, wisdom, insights, and experiences of others.

Better Collaboration in Meetings

Use XR to facilitate on-boarding for remote employees by providing them with immersive experiences during virtual meetings with VR headsets. This enables people to participate in on-boarding sessions with colleagues, interact with virtual avatars, and explore virtual office spaces to fast track them feeling more integrated into the company and familiar with the culture.

EXAMPLES

The following two examples demonstrate how XR technology is enhancing the on-boarding process by providing immersive, interactive, and engaging experiences with a rich learning environment to improve personnel and organization performance. Note, on-boarding with XR also involves introducing people to the XR environment, tools, and practices. While this is the first bullet point under “Themes”, the irony of the need to on-board users into on-boarding is not lost on the authors.

The first example of effective on-boarding regarding themes and functions comes from UPS. Several years ago the XR technology lead at UPS created a basic pick-and-sort "game" for use in a VR headset. Among its many activities was included a aim-and-toss function to engage active learning. It is both simple and highly effective. Moreover, since the XR training has been in use a very long time, this suggests the efficacy of even a small investment paying back dividends to a training program.

Images: Eastman

The second example of the effectiveness of a small XR investment into on-boarding in recruiting and public relations comes from Eastman Chemical.

Eastman, a global specialty materials company, made a significant impact at Career Quest TN, 2024, by using interactive virtual reality (VR) technology. With nearly 5,000 students participating, Eastman showcased engaging activities that provided insights into diverse career paths within the company. The innovative VR experience offered students a unique glimpse into the crucial role of electrical safety in manufacturing.

By integrating VR into their exhibit, Eastman captured students' attention and encouraged active participation. The interactive simulation allowed students to visualize and understand the significance of electrical safety in a manufacturing environment.

The VR experience enabled students to explore various scenarios where electrical safety played a vital role. They learned about safety protocols, witnessed potential hazards, and gained knowledge about components and materials in a substation. This hands-on approach instilled a deep appreciation for workplace safety and responsible decision-making.

Career Quest TN serves as a bridge between education and industry, providing valuable exposure to potential career paths. Eastman's active participation, along with immersive VR technology, aimed to inspire and educate students about the diverse opportunities available within the company. By showcasing the critical role of electrical safety, Eastman emphasized its commitment to fostering a safe and thriving work environment.

Eastman's engagement at Career Quest TN aligns with its objective of promoting STEM education and career development. By introducing real-world applications of STEM principles, Eastman encourages students to pursue careers in engineering, chemistry, and technology. The VR experience not only highlighted the significance of electrical safety but also emphasized the interdisciplinary nature of careers in manufacturing.

These initiatives contribute to attracting talent as well as the development of a skilled workforce and reinforce an organization's leadership position in their industry.

XR Metrics
A Leadership View

A Leadership view of Metrics

Extending on the insights in the previous section, it triggers the question "How does one measure impact and efficacy?". XR on-boarding metrics include looking at various key performance indicators (KPIs) to measure the effectiveness, efficiency, and user satisfaction of the on-boarding process for XR applications (Kirkpatrick 2010; Kirkpatrick 2016; Paramoure 2014).

The on-boarding process in XR is crucial because it not only introduces users to the technology but also guides them in understanding how to interact with a new immersive digital environment to gain confidence in their abilities and contribute to improving outcomes (Kirkpatrick 2010; Kirkpatrick 2016; Paramoure 2014). While recognizing there are many variables, important XR on-boarding metrics include:

Completion Rate

The percentage of users who complete the on-boarding process. A high completion rate may indicate that the on-boarding experience is engaging and not overly complicated.

Time to Complete On-boarding

How long it takes for a user to go through the on-boarding process. This metric helps understand if the on-boarding is efficiently designed.

Drop-off Points

Identifying at what stages users are abandoning the on-boarding process. This can highlight areas that are confusing, uninteresting, or too complex.

User Satisfaction

Through surveys or feedback mechanisms post-on-boarding, measuring how satisfied users are with the process. Satisfaction can be related to how informative, enjoyable, and easy to navigate the on-boarding was.

Adoption Rate

The percentage of users who continue to use the application after completing the on-boarding process. A good on-boarding process should correlate with a high adoption rate.

Error Rate

The number of errors or issues encountered by users during the on-boarding process. A lower error rate signifies a smoother on-boarding experience.

Engagement Metrics

These include interactions with on-boarding content, such as completing tasks or exploring additional resources. High engagement levels can indicate a compelling on-boarding experience.

Conversion Rate

For applications that require some form of sign-up or subscription post-on-boarding, the conversion rate measures how many users take this step.

Feedback Analysis

Qualitative feedback from users about their on-boarding experience can provide insights into what works well and what doesn't.

Performance Metrics

In the context of XR, it's also important to measure the performance of the application during on-boarding, including load times, frame rates, and any technical glitches. Poor performance can significantly impact the user experience.

Knowledge Retention

In educational or training contexts, pre- and post-on-boarding assessments can measure how well users retain the information or skills taught during the on-boarding. Improved performance post on-boarding indicates effective teaching methods within the XR environment.

Behavioral Changes

In certain applications, such as healthcare or therapeutic uses, changes in user behavior or improvements in treatment outcomes can serve as metrics for successful on-boarding.

> ***"First, measure the right things, and then, measure them right."***
> ***- Pearl Zhu***

Learning Curve

Assesses how quickly users become proficient with the XR interface and controls. A steep learning curve may indicate that the on-boarding process needs to be simplified or enhanced with more tutorials and guidance.

Post-On-boarding Performance

Evaluates how well users perform in the XR environment after completing on-boarding. This can include metrics like task completion time, accuracy in completing tasks, and overall comfort with XR.

97%

Retail associates reported preparation for high-stakes situations, based on high satisfaction and retention rates achieved with XR on-boarding. (STRIVR, 2024)

$12.5M

Annual Savings

Vive,2024. Error reduction report, XR hospital training.

Support Requests

The number of help or support requests made by users after on-boarding can indicate how well they understand the XR environment and its controls. Fewer requests suggest clearer and more intuitive on-boarding processes.

Well-founded on-boarding processes should be measuring many of these indicators already. If that is not the case, then leadership must establish success metrics prior to implementation of any change regardless of the future use of XR in on-boarding (Kirkpatrick 2010; Kirkpatrick 2016; Paramoure 2014).

Once a baseline is known or established, calculating any 'before and after' delta is simple math and simple ROI calculation.

Baseline data should also be audit-able in some way, shape, or form (Kirkpatrick 2010; Kirkpatrick 2016; Paramoure 2014). This too must be commissioned by leadership prior to implementation else the proof of ROI monetary value falls strictly into the category of productivity which is a nebulous category at best and easily cut during market downturn (Kirkpatrick, 2010; Kirkpatrick 2016; Paramoure, 2014).

KPIs and ROI should prove contribution to the following outcomes for competitive advantage:

1. New-hire/experienced-hire retention rate improvement (quantitative)
2. Attracting desired (as defined by the hiring organization) new hire applicants (qualitative)
3. Evolving the training model (impacts the business model and is aimed at behavior qualitative)
4. Increasing profit(s) and/or improving capital allocation (quantitative)
5. Adding business value to the training organization and/or human resources organization (qualitative and quantitative)
6. Impact on sales - by growing current and new revenue streams with existing and new products and/or services because of improvements in sales force on-boarding (quantitative)

Images: STRIVR

Leadership Toolkit

Practical steps for leadership:

Introduction of an evaluation framework for VR/AR solutions focused on user engagement, effectiveness in meeting strategic objectives, and contribution to innovation and competitive advantage for organizations new to XR is best addressed in partnership with a proven vendor solution company of size. Said vendor would ideally have an almost independent internal customer solution consultant dedicated to your organization or at least readily accessed.

Popular Providers for XR Include:

Academy of International Extended Reality (AIXR) -AIXR is a membership organization that promotes excellence in the XR industry with training and certification programs including on-boarding resources.

Accenture - offers extended reality services aimed at delivering innovative XR experiences on a larger scale supporting various industry-specific strategies and managed services.

Apple - supports spatial computing initiatives with AR headsets, Apps, and ARKit (an AR application development toolkit).

AppliedVR - specializes in using VR for healthcare applications including patient education and clinician training. They offer VR-based on-boarding solutions for healthcare professionals to familiarize them with new procedures, equipment, and protocols.

Avantis Education - offers VR and AR capabilities with educational contexts that can be utilized for on-boarding and training.

Digitalnauts - provides immersive technology solutions including a management platform for XR experiences suitable for businesses seeking to innovate their on-boarding processes.

Cornerstone (fka, Talespin) - offers an VR, AR, and AI platform for creating interactive product simulations to help new hires learn how to use complex products/ equipment.

CXR. Agency, CitrusBits, Groove Jones, Iflexion, Next/Now, **and** 4Experience - provide custom XR development and services catering to a variety of sectors including retail, manufacturing, construction, healthcare, marketing, and education.

EON Reality - provides VR and AR solutions for education, training, and workforce development with customizable on-boarding programs that leverage immersive technologies to enhance learning.

Google - has several VR and AR products and platforms, including ARCore for Android devices, which can be utilized for creating engaging on-boarding experiences.

HTC VIVE - produces high-quality VR experiences to improve internal workflows and customer interactions.

XR Popular Providers Cont. :

Immerse - specializes in VR training and simulation solutions for enterprise clients with a platform for creating and deploying immersive training content, including on-boarding programs tailored to specific industries and use cases.

Intellezy - provides a comprehensive suite of VR and AR training solutions, including on-boarding, for the creation of custom training content and to track employee progress.

MadXR - produces pre-built VR training modules based on IOGP life-saving rules, custom XR development, and turn-key dev team professionals eliminating the need for in-house expertise.

MetaVRse - provides comprehensive on-boarding experiences including product showcases and real-time collaboration.

Microsoft - provides mixed reality capabilities for immersive training and collaborative experiences through HoloLens to blend virtual and real-world elements for enhanced customer and employee interactions.

Motive.io - provides interactive and immersive training applications for enterprise. Their Motive Training Platform makes it easy to create and deploy AR and VR content for training at scale.

Murison - focuses on using VR for soft skills training and simulation-based learning with branching narratives and virtual actors. They offer VR simulations for on-boarding new employees and facilitate people improving their interpersonal communication, and leadership, etc.

Nvidia - Omniverse platform uses powerful hardware and software technologies for creating and customizing virtual worlds with immersive on-boarding experiences.

Riseuplabs and Aequilibrium - are recognized for their expertise in creating custom XR experiences with applications in virtual training and engagement.

STRIVR - focuses on enterprise-grade VR solutions for training and development, including on-boarding, that enables organizations to create immersive simulations to help new hires learn complex procedures and soft skills in a safe and engaging environment.

SynergyXR - focuses on on-boarding employees using VR to communicate complex technical product and service details more effectively and 4x faster than traditional training methods.

XR Popular Providers Cont. :

Taqtile - provides enterprise AR solutions including on-boarding and training applications built on their Manifest platform. Their solutions are designed to enhance workforce productivity and knowledge transfer through immersive AR experiences.

Unity - facilitates the development of immersive VR and AR experiences with tools and software solutions across the development life cycle, which can be adapted for on-boarding.

Unreal - from Epic Games, also facilitates the development of immersive VR and AR experiences with tools and software solutions across the development life cycle, which can be adapted for on-boarding.

VRdirect - offers a cloud-based VR platform that can be used for training applications, including on-boarding, that is easy to use and does not require any special hardware.

VR Vision - provides turnkey solutions for virtual reality.

Image: Jacqueline Yang

Conclusion

Embracing XR on-boarding for Innovation and Business Development is a tool for leadership to:

Better enable the organization to leverage their current abilities with immersive technology to fast-track developing new competencies, increasing relevance, growing revenue, attracting talent, etc.

By closely monitoring key performance indicators such as completion rates, user satisfaction, engagement metrics, and retention rates, you can identify areas for improvement and have a better on-boarding process. This it important to improve the user experience and maximize the opportunity with XR solutions to meaningfully improve outcomes.

A Call to Action

Effective XR On-boarding is essential for meaningfully improving internal operations and better position the organization to perform for Customers, Shareholders, and Stakeholders.

This is important for exploring new opportunities and creating new value as key drivers for growth, customer engagement, and competitive advantage.

For "It is the responsibility of leadership to work intelligently with what is given..."
Marcus Aurelius, Emperor of Rome,
161 to 180 AD.

Author Biographies

Damon Bryan Shackelford

Is an Individual contributor and 28+ yr. veteran at Eastman Chemical Company where he has served in many roles and on many projects, is named on several technical patents, and is most recently serving to on board extended reality capabilities withing manufacturing and engineering organizations. He is a sought-after speaker as well as co-chair for the VRARA enterprise committee.

Gene Feldman

Is a member of the Center for Functional Excellence within Nestle Purina Pet Care supporting training innovation through the use of technology. Gene currently holds a Master's in Education and has been is in field of education/training and development for the past 25+ years. Over the past 8 years, Gene has been identified as a leading VR/ AR integration expert for immersive training solutions and functional use case implementation.

Ron Thompson

Is CEO of CAIL, a company with software and innovation services for enterprises as well as investing in young technology companies with products that meaningfully improve outcomes in enterprises.

Cindy Mallory

Is an eclectic technologist who focuses on frontier technologies forming the paradigm shift to spatial computing. Cindy is the NYC Chapter President for the VR/AR Association, heads up Emerging Tech Strategy at American Technology Services, and serves as a board advisor for SXSW. A former video game studio executive, Cindy champions data-driven design and is passionate about building community along with user bases for new technologies.

Mark Gröb

Head of Immersive Tech for UPS; developing Innovations to solve Enterprise problems for UPS and Partners. Leading XR practices in highly cross-matrix teams to explore and develop IP (patents and business methods) for UPS. XR Subject Matter Expert on SAR Counsel for UPS. Training and developing Federated SMEs in all Global wide Business Groups. Mark is also a public speaker and co-chair of the VRARA enterprise committee. Over 15 years' Experience in Vizsim industries and Defense.

Author Biographies Cont.

Emily A. Middleton Valdes

Is the Associate Counsel at Knollwood Investment Advisory, where she owns the legal-deal pipeline for venture capital investments across several key verticals, including technology. Emily holds a Juris Doctor in Business Law and has published legal research on Platform Immunity and Digital Privacy. She is a repeat-presenter at academic conferences, with research interests in U.S. Law and Virtual Worlds. In addition to her work with the VRARA, she also volunteers as a Technical Writer and Researcher for X Reality Safety Intelligence (XRSI), a non-profit Standards Developing Organization, most recently, producing scholarship on the intersection of AI, XR, and Cognitive Infrastructure.

Randy Nunez

Is Managing Principal of Nunez Consulting, LLC. Randy has over 20 years of experience investigating emerging technologies. Randy formerly led the Extended Reality Tech Trend team for Ford Motor Company focused on researching XR trends and technologies, performing proofs of concepts for technology prove-out, writing technical briefs, and delivering presentations to various audiences. Randy has been a speaker and an advisory board member for several technical conferences.

Lucky Lance Gobindram

Is the Co-founder and General Manager of CXR.Agency, an award-winning, full-cycle software development and IT consulting company. CXR. Agency delivers groundbreaking experiences through web, mobile, XR, AI, and block-chain technologies. With over 15 years of experience in the digital industry, Lucky designs and builds comprehensive solutions using the latest technologies. He has a proven track record of successfully deploying emerging technologies into commercial successes across diverse platforms, industries, and markets. As a futurist and lecturer, Lucky is often invited to speak on topics related to the change in social capital, practical applications of XR, and the next app gold rush.

Appendices

Glossary of XR, VR, AR, and leadership terminology:

XR (Extended Reality)

XR Spectrum: The entire range of immersive experiences that blend the physical and digital worlds. This includes VR, AR, MR, and future technologies.

VR (Virtual Reality)

Immersion: The feeling of being completely transported to a virtual world.

VR Headset: A head-mounted device with screens that display the virtual environment.

Degrees of Freedom (DOF): The number of ways a user can move within a virtual environment (typically 3DOF for head movement and 6DOF for head and body movement).

Latency: The delay between user input and the response in the virtual world.

Haptics: Technology that simulates touch sensations within VR.

AR (Augmented Reality)

Augmentation: The overlay of digital information, objects, or graphics onto the real world.

Marker-based AR: Requires physical markers that the AR device recognizes to activate the augmentation.

Markerless AR: Doesn't require physical markers and uses natural features of the environment for augmentation.

Field of View (FOV): The area that the user can see through the AR device.

ARKit/ARCore: Software development frameworks for building AR experiences on Apple or Android devices, respectively.

Glossary of terminology Cont.:

MR (Mixed Reality)

Combines VR and AR: Overlays virtual objects onto the real world while allowing interaction with both.

Anchors: Virtual objects are fixed in space relative to the real world, allowing for deeper interaction.

Leadership Terminology

Vision: A clear and inspiring idea of the future state of the organization.

Change Management: The process of guiding individuals and teams through organizational change.

Employee Engagement: The level of commitment and enthusiasm employees have towards their work.

Agile Leadership: An adaptable and responsive leadership style that embraces change.

Transformational Leadership: A leadership style that inspires and motivates employees to achieve their full potential.

Bonus Terms

Metaverse: A persistent shared virtual world that users can access and interact with.

On-boarding: The process of integrating new employees into an organization.

Best Practices: Established methods for achieving optimal results in a specific context.

Spatial Computing: A concept that describes the interaction between humans, machines, objects, and environments in virtual space. A term used heavily by Apple in marketing copy.

For a full list of XR standard definitions and taxonomies please see "The XRSI Definitions of Extended Reality (XR)" website at: https://xrsi.org/publication/the-xrsi-definitions-of-extended-reality-xr

References

1. HTC VIVE. Inferred Revenue Benefit of XR Deployment. May 2024.
2. 2024 Customer Case Studies External. STRIVR LABS INC.
3. ASK Chemicals Captures Worker Knowledge Using AR. (2023, February 16). Industry Week. [Link](https://www.industryweek.com/technology-and-iiot/ article/21260091/ask-chemicalscaptures-worker-knowledgeusing-ar)
4. Audi Design used Magic Leap 2 to develop a new AR-based driver interface. (2023, January 10). Magic Leap. [Link](https://www.magicleap.com/news/audidesign-used-magic-leap-2-todevelop-a-new-ar-based-driverinterface)
5. The Audi activesphere concept. (2023, January 23). Audi MediaCenter. [Link](https://www. audi-mediacenter.com/en/pressreleases/the-audi-activesphereconcept-15161)
6. Basu T. (2023, March 7). Cartier and Tiffany embrace AR to woo Gen Z. MIT Technology Review. [Link] (https://www.technologyreview.com/2023/03/07/1069414/cartier-tiffany-arluxury-gen-z/?utm campaign=Augmented%20)
7. Doherty, N. (2023). New hires at Bank of America are able to tour a virtual bank branch with VR and AI to learn about company benefits, processes, managing a challenging situation, an angry customer, etc.
8. Dominguez, R. (2023). Hershey tapped into AR and image recognition to help retailers better position merchandise in their stores to increase sales.
9. Esposito, L. (2023). Woolworth's Australian supermarket giant provides virtual de-escalation training.
10. Fiat at CES. (2023).
11. Greener, A. (2023). AA the UK version of Triple A reduced time-to-competence and overall required training for mobile mechanics with VR.
12. Greener, A. (2023). Vancouver Airport Authority worked with Unity to deploy large-scale digital twins to meet environmental social and corporate governance goals.
13. Kirkpatrick, D. L. (2010). Evaluating Training Programs: The Four Levels. Berrett-Koehler Publishers.
14. Kirkpatrick, J. D., & Kirkpatrick, W. K. (2016). Kirkpatrick's Four Levels of Training Evaluation. ATD Press.
15. Lontayao, D. (2023). Insurance firm AXA introduced VR in the form of a 3D factory model to train risk managers, facilities and plant managers, and site operators.
16. Lingeman, R. (2023). Ford Motor Company has been using VR for decades in its design process to decrease development time and reduce prototype waste.
17. Milevo, A. (2023). Audi and Mercedes-Benz partnered with Magic Leap on concept cars with AR user interfaces.
18. Mitchell, S. (2024). Reebok announced plans for digital wearables.
19. New Honda Design Video. (2023).
20. Palmigiani, A. (2023). Halliburton announced it's developing a digital twin system for Petrobras in Brazil to reduce capital expenditure, accelerate production times, and improve crude oil recovery rate.
21. Paramoure, A. (2014). Return on Investment (ROI) Basics. ATD Press.
22. Phelan, D. (2024). Harvard Business Review article on on-boarding satisfaction.
23. Porsche Cars North America. (2023).
24. Richford, R. (2023). LVMH teamed up with Fortnite creator Epic Games to create new immersive customer experiences and add new 3D tools to its design pipeline.
25. Schadler, T. (2023). Leveraging tools for assessing technological readiness.
26. Schwarz, J. (2023). UPS is using VR to prepare delivery drivers for various traffic and road situations to improve safety.

References Cont.

27. Shaw, A. (2023). General Motors is using virtual reality and wooden models to speed up the design of its electric fleet.

28. Sprigg, S. (2023). Kia Germany opened the company's first virtual flagship dealership.

29. Sutcliffe, M. (2023). Royal Caribbean revealed the massive Icon of the Seas cruise ship on Fortnite.

30. Takahashi, D. (2023a). BMW started a global rollout of Nvidia's Omniverse platform using digital twins for factory planning.

31. Takahashi, D. (2023b). Macy's introduced Mstylelab, a metaverse hub for style inspiration and discovery.

32. Tsipursky, G. (2023). Harvard Business Review article on on-boarding experience loss.

33. Virtual Inspections Optimize Carbon Footprint. (2023). Siemens Energy.

34. Volvo Trucks Launches WorldFirst. (2023).

35. Why Ford Rolled Out 3000 RealWear. (2022).

36. Wood, A. (2023). Toyota launched an AR view-in-yourspace experience to support the 2023 Crown.

37. What's Cooking with Five Guys. (2023).

38. You Can Now Buy Physical Products. (2023).

STUDY & WORK

Introduction

Brief overview of Extended Reality (XR) and its significance in enhancing business processes and on-boarding experiences:

XR is a term that encompasses Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), which are immersive spatial computing technologies that offer trans formative solutions for many business processes. XR can enhance learning, healthcare, retail, remote work, product design, entertainment, and cultural experiences.

On-boarding both new and experienced hires into any organization is well known to be the first step in a long series of training events required to leverage the skills and competencies of people and the organization (Noe, et., al., 2022)

STUDY GUIDE for Group or Individual Use

Thought Exercise: Discuss the importance of good on-boarding practices in general and the opportunities to enhance current practice with XR technology.

Section 1: Understanding XR Technologies

Technology Type	*Definition*
VR	Virtual Reality creates immersive digital environments typically via head-mounted device.
AR	Augmented Reality describes the overlay of digital information on the real world.
MR	Mixed Reality blends virtual, augmented, and real-world interactions.

▪ Reflection Question: How have you seen these technologies applied in your industry?

Section 2: Leadership and Change Management for XR

Vision: The importance of a clear vision for implementing XR solutions.

» Change Management: Strategies for successful adoption of XR technologies.

» Employee Engagement: Engaging staff in the transition to XR enhanced processes.

Application Question: What possible challenges might an organization face when adopting XR, and how an organization may be able to overcome them?

Recap Discussion: **Discuss the transformative impact of XR technologies in various industries. Use AI online to enhance your discussion and suggest steps to integrate XR in your own business context.**

Section 3: Measuring Success

» Performance Indicators: Identifying and monitoring key metrics to refine on-boarding processes.

» Continuous Improvement: Using feedback to improve XR on-boarding applications.

Research Question: What metrics are you currently using to measure success of on-boarding in your organization? What metrics would you use to measure the success of on-boarding with XR in your organization? How might an organization utilize these metrics to capture value for return on investment (ROI) calculations?

Conclusion

The main ideas expressed in this white paper are:

1. XR Technology: XR technology encompasses Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), and offers transformational solutions for many business processes.
2. XR On-boarding: Effective XR on-boarding is essential for improving business processes and outcomes, as well as increasing user/new hire productivity, proficiency, satisfaction, and engagement.
3. XR Use Cases: Various industries, sectors, and scenarios, such as automotive, energy, ESG, virtual offices, immersive training, retail, and corporate marketing are currently applying XR technology providing evidence of its value.
4. XR Metrics: Important XR on-boarding metrics include completion rate, time to completion, drop-off points, user satisfaction, retention rate, error rate, engagement metrics, conversion rate, performance metrics, behavioral changes, and post-on-boarding performance. These quantify contribution to improving outcomes.
5. XR Leadership Imperatives: Leadership must leverage tools for assessing technological readiness, select the right partner(s) and platforms to design pilot programs for scalability as well as establish success metrics prior to implementation of any change that leads to increased profit realized from a successful XR campaign.

Worksheet for Interactive Learning

Part 1: Key Terminology

Fill in the Blanks: Complete the sentences with the correct XR terminology.

1. "Blank" Reality creates immersive environments for complex procedure training.
2. "Blank" Reality enhances merchandise positioning through digital overlays.
3. "Blank" Reality blends virtual and real-world interactions for innovative experiences.

Part 2: Industry Applications

Memory Exercise: List XR technology use with its application in industry.

1. Virtual Reality: name two
2. Augmented Reality: name four
3. Mixed Reality: name three

Part 3: Leadership and Change Management

Short Answer Questions:

1. Describe the role of leadership in driving XR adoption within an organization.
2. What are some strategies for successful change management when implementing XR technologies?

Part 4: Measuring Success

Practical Exercise: Identify key performance indicators (KPIs) for an XR on-boarding program in your industry.

1. List at least three KPIs that would be relevant.
2. Explain how you would measure each KPI.

Worksheet Cont.

Advanced exercise: Generate a value calculation related to a category in future cash flow (revenue, expense, tax break, or change in working capital) from your top KPI in the previous exercise then calculate the result. Discuss the cumulative impact of XR technology on Discounted Cash Flow (DCF) analysis.

Example: Walmart

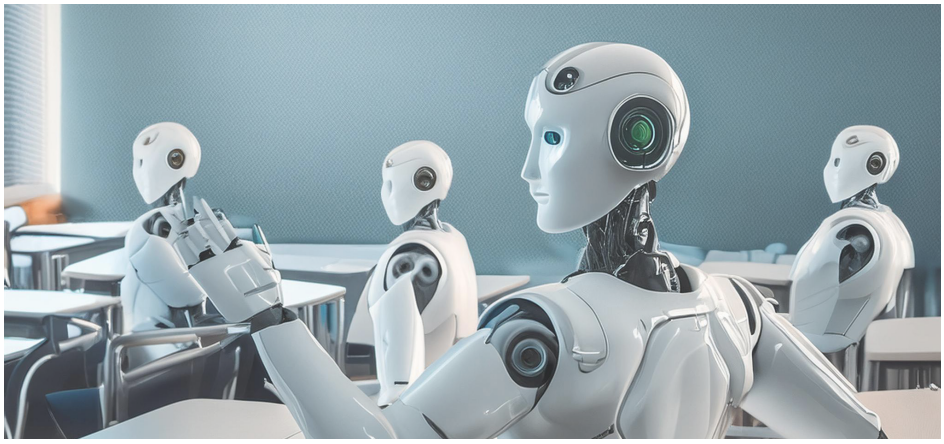
In an article published by SHRM in July 2019 (https://www.shrm.org/topics-tools/news/technology/walmart-revolutionizes-training-virtual-reality) Walmart Academies reports enough information to calculate an inferred savings. The result is useful for considering EBIT impact in the case of budget reduction or cash flow in the cause of reallocating existing budget towards other high value projects/initiatives.

When performing your own value calculation be sure to factor in or estimate the cost of hardware procurement and content development. Keep in mind, the dollar values in this example are for illustrative purposes *only* as this is a HTC VIVE provided example. "Inferred Revenue Benefit of XR Development", 2024 used by permission. Note the use of VIVE products and services is not a factor in this example.

Background from the SHRM article: Walmart implemented a VR-based immersive training program in its retail operations. The program provided simulated scenarios for Black Friday, customer interactions, and technology usage. One specific training module showed a time delta reduction from 8 hours to 15 minutes. As a result of this implemented program, management was able to eliminate the need for on-site launch coaches. Further, measurable knowledge retention also contributed to savings.

Variables and calculations:

1. Travel Cost Savings in 2024 USD
- Average coach travel cost per store: $1,000
- Number of stores with on-site coaches before VR: 1000 (estimated)
- Annual savings from eliminated travel: $1,000,000



Worksheet Cont.

2. Reduced Training Time Savings (Module for vending machine enabling customer pick for on-line order):
» Employee hourly wage: $15
» Time saved per employee: 7.75 hours
» Number of employees trained on pickup towers annually: 200,000 (estimated)
» Annual savings from reduced training time: $23,250,000

3. Knowledge Retention Savings:
» Retraining cost per employee: $100
» Employees needing less retraining due to VR (10% estimated reduction): 140,000
» Annual savings from better knowledge retention: $14,000,000

4. Total Estimated Benefit
» $38,250,000 annually (eliminated travel + reduced training time + reduced retrain cost)

5. Total global ROI (note the use of $ from differing calendar years thus for illustrative purposes only)
» $38M benefit
» $611M consolidated revenue
» $1.5M cost of implementation (0.25% investment)
» Return on investment: 96%

*($38M - $1.5M) / $38M*100 = 96% from a 0.25% global investment out of $611M consolidated revenue USD. Actual Cost was not reported and was likely lower.*

Your own calculations will vary for this advanced exercise. See following page for additional help in calculating ROI.

Part 5: Case Study Analysis

Scenario-Based Questions: Given a brief description of a company's on-boarding challenge, propose an XR solution and outline the expected outcomes.

1. Company A struggles with engaging employees in safety training. How could VR provide possible solutions for this use?

2. Company B wants to improve customer interaction in their retail stores. What AR solutions could be implemented?

Conclusion

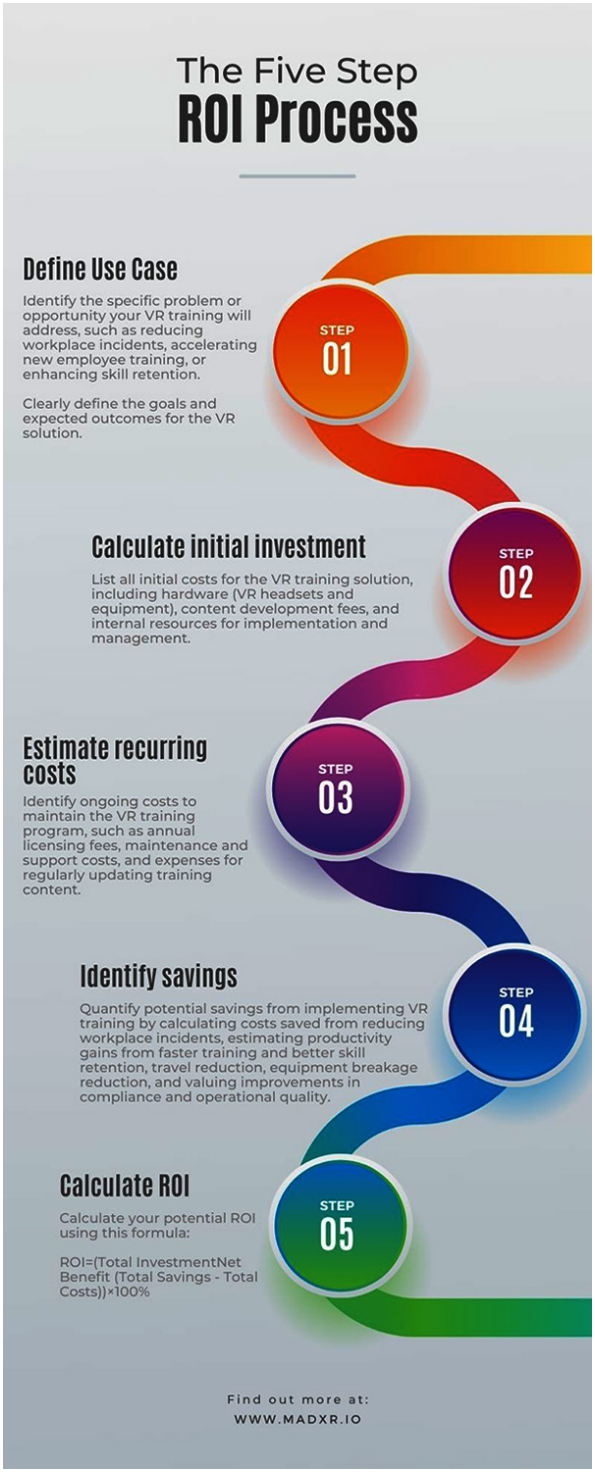
Reflective Questions:

1. How do you envision XR technologies transforming your industry in the next five years?

2. What steps can you take to prepare your organization for the integration of XR?

The Five Step ROI Process

Image courtesy of www.madxr.io



Contact

info@theVRARA.com

Authors

Damon Shackelford
Cindy Mallory
Mark Gröb
Ron Thompson
Emma Valdes
Randy Nunz
Lucky Gobindram
Gene Feldman

Date of second edition

August, 2024

First edition graphic design

Jacqueline Yang

Second edition graphic design

Damon Shackelford

Image sources noted throughout with additional images provided by Adobe text to image, beta, wherever source not noted.

On the cover, Doug McMillon, President and CEO, Walmart Inc. downloaded via public link at https://corporate.walmart.com/about/leadership/doug-mcmillon

VR/AR ASSOCIATION
WHERE XR MEETS REALITY