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BURNER TIPS

WHAT EXACTLY IS 'XR,' AND WHY SHOULD WE CARE?

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Mosaic is a national workforce consulting and training firm that focuses exclusively on the energy and utility industry.

Extended reality offers tremendous opportunities for organizations to expand their capacity to provide highly engaging, relevant and multifaceted learning experiences for their workforces.

Just as we have started to familiarize ourselves with terms like "VR" (virtual reality) and "AR" (augmented reality)—and perhaps even begun the process of exploring and implementing these advanced technologies for training purposes—along comes a new abbreviation to figure out: "XR," or extended reality.

SERIOUS GAMES, BIG OPPORTUNITIES

"Serious games" was a term created in the 1970s to describe the use of gaming techniques in designing engaging training solutions. By the mid-2000s, this phrase was redefined to encapsulate a new trend, which focused on applying the advanced technologies used in the computer gaming industry for entertainment purposes to instead develop highly interactive and meaningful learning experiences.

Similarly, while coined in the 1960s to describe advanced filming technologies, XR has been repurposed over recent years as a unifying umbrella that encompasses all the technologies and delivery methods utilized to create various forms of experiential, augmented and immersive experiences.

As 360-degree video; Web Graphics Library, or WebGL; AR; VR; and mixed reality, or MR, technologies have continued to evolve, they have become more accessible, cost-efficient and easier to implement. This increased ease of use presents tremendous opportunities for organizations to expand their capacity to provide highly engaging, relevant and multifaceted learning experiences for their workforces.

Perhaps the most significant value immersive XR technologies offer is their unique ability to dramatically increase:

- **Accessibility:** Delivering relevant, engaging and valuable information when, where and how employees need it.
- **Knowledge capture:** Providing actual and simulated real-world training experiences that employees can instinctively relate to, remember and utilize more consistently.
- **Skill retention and application:** Enabling the safe and repeated practice of relevant tasks and scenario simulations to increase skill retention, knowledge application and procedural adoption.
- **Data tracking:** Tracking detailed data from multiple sources to evaluate and validate each employee's progression in and sustainment of knowledge, skills and competency over time.

XR USE CASES FOR THE NATURAL GAS INDUSTRY

Some of the more common XR technologies and delivery methods natural gas companies are exploring and implementing for learning purposes include:

360-DEGREE VIDEO

360-degree video experiences familiarize learners with specific environments, while allowing them to control their viewing perspectives and confirming their knowledge of elements within a training scenario through simple "touch-and-tag" interactivities.

Like other video-training solutions, 360-degree videos are accessible from a wide variety of devices, including desktop/laptop computers, smartphones, tablets or VR headsets for a more interactive and immersive experience.

While 360-degree videos can be used to enhance nearly any learning experience, they are especially effective as a source of support for new or transitioning employees becoming acquainted with restricted or hazardous work environments. These videos can provide engaging and interactive experiences to improve employees' understanding and recall of critical procedures, equipment and safety protocols.

WEB GRAPHICS LIBRARY

The WebGL platform uses common technologies available within computer and mobile web browsers to deliver highly interactive and experiential web-based training solutions without requiring individual learners to download plug-in apps on their devices.

WebGL offers the opportunity to create learning solutions that combine text, images, 2D animations and interactive 3D simulations, which can include lifelike avatars, handheld objects, modes of transportation, large equipment and even entire environments. Learners can explore and perform specific tasks similar to experiences found within popular computer games.

WebGL Example: *Interactive "Regulator Swap Procedures" 3D Scenario Simulation Environment.*
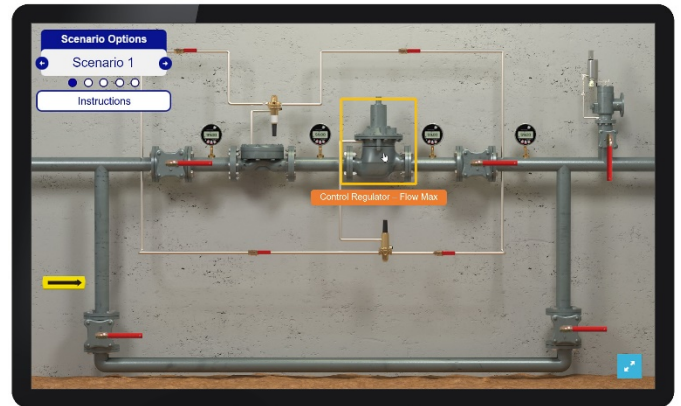
WebGL is an effective way to provide post-training practice scenarios on essential procedures and conduct objective assessments that capture data on a wide variety of designated decision and performance activities. Digitizing the assessment process enables organizations to capture and evaluate unlimited data points and provide targeted feedback on procedural gaps and future considerations.

AUGMENTED REALITY

AR learning experiences involve the display of 2D and 3D content presented in real-time as static, animated or even linked interactive elements that overlay live environments.

An environment or object can be tagged by location coordinates or by using physically applied markers, such as QR codes. Specific information about that environment or equipment can be graphically displayed over a live scene when viewed through the cameras of any smart device using AR-compatible apps or web browsers.

AR experiences allow employees to instantly access 3D images of specific equipment, step-by-step animations of components, or annotated instructions for various operations and maintenance tasks during the flow of work.

VIRTUAL REALITY

VR represents an entirely immersive learning experience in which participants have the perception of being wholly within a highly interactive, virtual 3D environment.

VR enables learners to safely and repeatedly perform any variety and number of tasks to complete assigned scenario simulations. VR solutions also allow for extensive data tracking that can provide insights into individual users' knowledge of procedures, situational awareness and responses to abnormal operating conditions.

VR Example: *Immersive "Compressed Natural Gas Substation - Leak Inspection" 3D Scenario Simulation Environment.*

Even beyond our current ability to replicate nearly any visual and functional aspect of real-world environments with incredible detail, VR offers the capacity to allow individual or multiple students and instructors to collaborate simultaneously within a virtual experience from any location in the world.

Unlike some other XR experiences, VR requires learners to wear a headset and use handheld controllers or advanced motion-sensory devices to move about and fully engage with all the interactive elements available in the virtual environment.

MIXED REALITY

MR is a hybrid of VR and AR methods, and it provides learners the ability to access nearly any form of 2D and 3D digital media during live, real-world experiences. MR allows virtual headsets to simultaneously display and manipulate multiple forms of information, instructions and interactions while the employee performs tasks.

Advanced MR solutions offer the capacity for operations employees to view diagrams, step-by-step instructions and 3D animations of components, as well as to engage with advisers in live web meetings while actively performing troubleshooting or maintenance procedures in the field.

IT MAY SOUND DAUNTING, BUT IT'S NOT

Implementing new technologies and addressing the changing needs and expectations of an evolving workforce can be a disruptive challenge. The operations and training leaders charged with exploring opportunities to utilize immersive XR learning experiences often ask, "How do we get started?"

The first step is to identify a procedure that would benefit significantly from an employee's ability to safely and repeatedly practice critical tasks within enhanced and simulated real-world scenarios. Utilizing XR enables leaders to track detailed data on individual training progression, objectively evaluate performance, and identify gaps and refresher training needs.

Once the appropriate procedure and training requirements are defined, the process of determining the right XR experience(s) to address these objectives is fairly straightforward. That process can be limited to testing the concept in the form of an initial pilot program to expose employees to the technologies, validate outcomes, and consider opportunities for evolving and expanding these methods going forward.
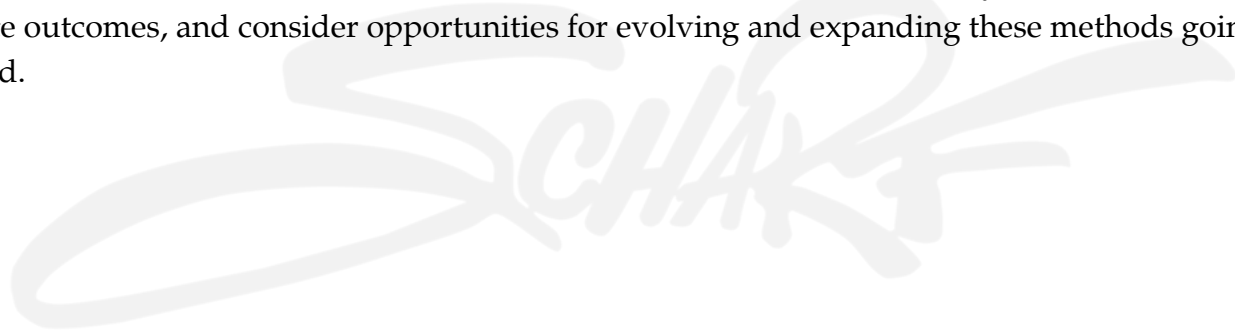
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