

VIRTUAL REALITY IN HEALTHCARE

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INTRODUCTION

Imagine you are in Santorini on a sandy beach surrounded by turquoise water and enjoying the quiet while you relax in a hammock, however, in reality, you are sitting at the office and using technology to simulate this experience. Virtual reality (VR) creates the perception of 'being there' even though you are not physically present. It can create the sense of smell, sound, taste, and visuals. This type of technology holds tremendous potential to impact the future for a variety of fields ranging from medicine, business, marketing to architecture. In this Tech Insight, we present an overview of VR, key benefits of VR, how VR is changing healthcare, and the impact it is having at the Department of Veterans Affairs (VA).

WHAT IS A VIRTUAL REALITY?

VR, also known as immersive multimedia or computer-simulated reality, is a computer technology that replicates an environment, real or imagined. It simulates a user's physical presence in that environment in a way that allows the user to interact with it. We are taught from adolescence that humans possess the five sense organs: taste, touch, smell, sight, and hearing. However, we have many more senses, such as balance and hunger that we can draw upon to create our experiences. The way we experience reality is a mix of sensory data and our brain's sense-making mechanisms for that stimulus. It makes sense then, that if you present your senses with fabricated information, your awareness of reality would likewise change in return. Thus, you would have a sense of presence, but, from your point of view it would feel very much real. This is virtual reality.

Unlike any other innovation, VR is immersive, placing clients amidst the activity, making them dynamic members as opposed to disengaged watchers. And because VR feels like a real experience, connecting the space between users and their devices, initial research proposes that VR has a more profound and long-lasting mental effect than other advanced technology, such as mobile applications.

BENEFITS OF VIRTUAL REALITY

There is a powerful mental effect to achieving goals and seeing yourself being successful, which are strong confidence boosters. As such, VR is a useful tool that allows you to no longer need to envision yourself accomplishing a goal. You can visually see and experience the reality of it. As VR becomes more common in practice, many are finding that VR offers several benefits including coping strategies, pain management, and as a conduit for physical therapy.

Coping strategies: VR gives patients a chance to hone new coping techniques in circumstances that cause anxiety. In one research study conducted by a team of psychologists and scientists at University College London (UCL), researchers [revealed that VR treatment](#) helped patients battle anxiety and depression. The treatment increased their confidence, self-compassion, and acceptance of themselves while decreasing their self-criticism. The study allowed patients to comfort a virtual crying child. Afterwards, they took the child's place, benefitting from their own words and actions. Furthermore, VR therapy has been successful in treating [post-traumatic stress disorder \(PTSD\)](#), [paranoia](#), drug addiction, and an assortment of phobias, including spiders, flying, and public speaking.

Managing pain: VR has an analgesic effect; most likely due to the significant distraction it provides. A [virtual reality system developed](#) in the Human Interface Technology Laboratory works by making a patient forget that they have pain. It has displayed its effectiveness in improving the pain of cancer patients and burn victims receiving treatment and care. There is a direct correlation between decreasing pain levels in patients and increasing survival rates. Therefore, this analgesic effect may be an essential component that VR can provide.

Physical therapy: This technology can be used to record movements of the body, enabling patients to utilize the movements of their therapy exercises as interactions in a VR game. For instance, patients who have anxiety about walking, providers can make it look like they are [moving at a slower rate](#) by controlling their virtual condition. When this occurs, they naturally walk faster but do not realize how fast they are walking. Due to this virtual placebo effect, patients do not feel pain.

HOW IS VIRTUAL REALITY CHANGING HEALTHCARE?

Medical VR is an area with captivating possibilities. From a healthcare perspective, VR is not a new field since researchers have been investigating various ways to create three dimensional (3D) models of patients' organs since the 1990s. It has not only captured the imagination of science-fiction fans, but also clinical researchers and real life medical practitioners. VR has tapped into the creative side of the brain with not only science-fiction lovers, but also

healthcare professionals and clinical researchers. It has already made a significant change in the healthcare industry, by making a place for itself by using video gaming and virtual environments to transform health education.

When it comes to substance abuse, [Kognito](#), a simulation game, engages users to role-play with virtual humans. The simulations provide people the opportunity to experience in real life communication that promote better social, emotional, and physical health. "By providing players with hands-on practice in navigating critical health conversations with virtual, fully animated humans, we are able to build their confidence and skills to lead similar conversation in real life," explains Ron Goldman, co-founder and CEO of Kognito.

In virtual robotic surgery, a robot operates on the patient, but is controlled by a surgeon, thereby reducing time and decreasing the risk of complications that are associated with surgeries. In 2016, Shafi Ahmed, an oncology surgeon, [operated on a patient using a virtual reality camera](#) at the Royal London Hospital. VR has the immense potential to advance the teaching and learning environment in healthcare at the next level. In present day, a few medical students and residents are allowed in the operation room (OR) to observe a surgery. With this invention, medical students all over the world will be able to experience being in the OR using their VR goggles.

IMPACT AT VA

The concealed scars of battle can make rejoining the general public as a civilian a difficult passage for many Veterans, especially those diagnosed with a mental disorder. In 2015, Miami VA Healthcare System started providing a [VR treatment option for Veterans with PTSD](#). A post-traumatic stress clinical psychologist, Dr. Pamala Slone-Fama goes into detail about the treatment and states, "By using a recovery model approach, prolonged exposure therapy and virtual reality, most of our patients who complete this treatment don't experience the same level of stress and intensity when faced with painful memories. Prolonged exposure therapy is what makes this approach to PTSD recovery so effective."

A psychologist can control the virtual battle environments, including sounds and smells during a PTSD treatment using VR. This technology works by connecting patients to a VR machine, which is comprised of a headset with goggles, a plastic rifle, a chair, and a remote to control a virtual [High Mobility Multipurpose Wheeled Vehicle \(HMMWV\)](#). "Patients begin the session by recounting their traumatic memories in the present tense, while we document responses, anxiety levels, and memories," states Dr. Slone-Fama. While Veterans are reliving their memories, mental health providers can see on what they are experiencing and try to replicate the combat field, sounds, and smells that Veterans experience.

After the VR treatment, the provider works with the patient step by step to help them understand what occurred and to process the traumatic memory. This form of therapy aids Veterans to reduce the negative connotations associated with those memories, thereby helping them to live a better, safer and healthier life with their loved ones.

CONCLUSION

VA is exploring uses for VR to benefit our Veterans and Servicemembers, notably at some of the Veterans Health Administration (VHA) hospitals. On June 7th, 2017, a technology consulting firm, [IntellecTechs, was awarded a VR contract](#) to provide equipment to support the VA's VR requirements for the Veterans at [Malcolm Randall VA Medical Center](#) in Florida. This is one of the first steps in making VR a known presence at VA. The utilization of VR has led to medical achievements and significant advancements in disease prevention. VR is promising for people who suffer from conditions, such as chronic pain to mental illness, to help manage their pain and distress. Ultimately, VR will become a much more common reality in healthcare.

VR is currently listed as one of Gartner's Top 10 strategic technology trends for 2018, and VA's Office of Information and Technology (OIT) is keeping track of this trend and its potential impact on VA's IT environment through updates of the Enterprise Technology Strategic Plan (ETSP). Standards for VR headsets and applications will be included in VA's "to-be" enterprise architecture. Additionally, VR headsets and applications will benefit from adaptable IT infrastructure provided by secure cloud platforms and Enterprise Shared Services (ESS), as informed by Enterprise Design Patterns (EDP) for Cloud Computing and Enterprise Service-oriented Architecture (SOA). To read more about topics related to VR, check out the [Machine Learning](#) and [Artificial Intelligence in the Workplace](#) Tech Insights.

TS TECH INSIGHT SERIES

The monthly Tech Insight series aims to help readers make better decisions and be more informed customers (of Office of Information and Technology's products and services) by providing them with high-level overviews of technology issues that impact or will impact VA's Information Technology (IT) environment. Tech Insights introduce topics in an easily digestible fashion by presenting background information on the topic, clearly explaining its importance within VA, and providing recommendations for success from TS. View all TS Tech Insights [here](#).

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