Taren Grom

Augmented Reality

An Overlap Between the Virtual and the Real World

Augmented reality can take technology to a new level to improve patient outcomes and the healthcare journey.

Augmented reality, the technology originally popularized as part of simulators and virtual reality games more than a decade ago, is gaining traction today in the pharma space. AR is related to a general concept called mediated reality, in which a view of reality is modified by a computer. AR is a live view of a real-world environment that is supplemented with computer-generated input, such as sound, video, graphics, or GPS data. Getting information from the Internet by wearing a Google Glass or digital contact lenses would be a huge addition to the practice of medicine. The data can also be used to educate patients to advance patient adherence by tracking disease management and fitness management.

The technology functions by enhancing one's current perception of reality. An image is augmented when some visual graphics or texts are superimposed into the actual real-world view to enhance the user experience in the real environment. The extra information that is provided with the help of augmented reality creates an experience for the user to understand the concept better and acquire more information from the same. Computer-generated graphics — 2D and 3D — are merged with the imagery of the real world and this provides a superior experience to the user in the real world.

In its current form, AR can be used as a Web app enhancement to create 3D images off code readings of a two-dimensional surface. With so many people having access to smartphones, iPad-style tablets with a camera and 3G-or-higher Web access, these interactive 3D displays are becoming an interesting mass-market medium.

Experts say applications range from pharmaceutical reps including AR applications on their business cards and in their brochures for the thousands of iPad-equipped doctors to peruse to creating AR applications to help educate consumers about medical procedures and drug treatments during community outreach programs and trade shows to in situ training to help physicians understand the steps of a procedure or treatment more fully. The technology has reached the point where the possibilities are endless.

Although the adoption of AR is still in its infancy, the technology has matured to a point where organizations can use it as a tool to complement and enhance business processes, workflows, and employee training, according to Gartner. Furthermore, Gartner analysts say AR facilitates business innovation by enabling real-time decision making through virtual prototyping and visualization of content.

"Augmented reality is the real-time use of information in the form of text, graphics, audio, and other virtual enhancements integrated with real-world objects," says Tuong Huy Nguyen, principal research analyst at Gartner. "AR leverages and optimizes the use of other technologies such as mobility, location, 3D-content management, and imaging and recognition. It is especially useful in the mobile environment because it enhances the user's senses via digital instruments to allow faster responses or decision-making."

AR services use various device sensors to identify the users' surroundings. Current implementations generally fall into one of two categories: location-based or computer vision. Location-based offerings use a device's motion sensors to provide information based on a user's location. Computer-vision-based services use facial, object, and motion tracking algorithms to identify images and objects. For example, being able to identify a shoe among numerous objects on a table, Google's imaged-based search, or optical character recognition (OCR).

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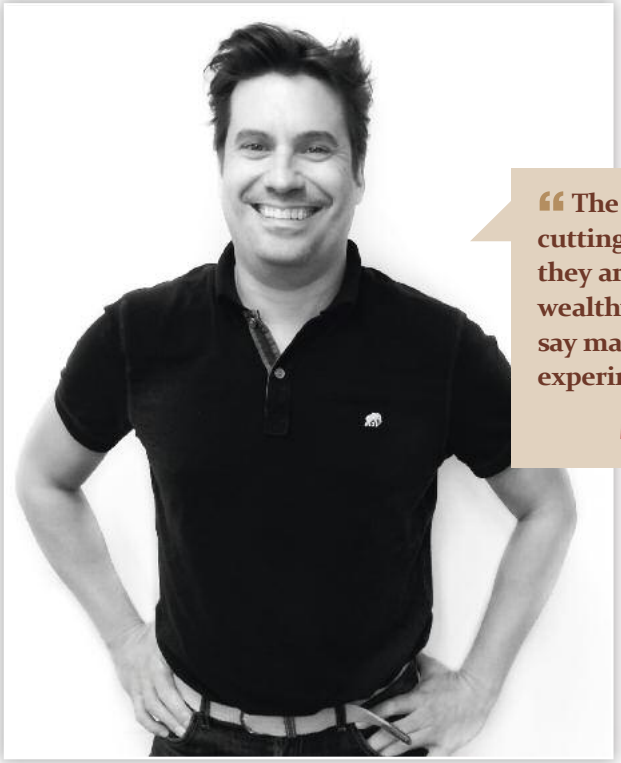
LYNN O'CONNOR VOS / ghg

Mr. Nguyen says AR provides the highest benefit to efficiency. It has the potential to improve productivity, provide hands-on experience, simplify current processes, increase available information, provide real-time access to data, offer new ways to visualize problems and



> **"The inconvenient truth about cutting-edge technologies is that they are typically used by the wealthy and well. This is not to say marketers shouldn't be experimenting with them."**
>
> **MATTHEW HOWES** / Palio+Ignite

solutions, and enhance collaboration. IT organizations can use AR to bridge the digital and physical world. AR is an opportunity for IT to provide leadership to enhance the enterprise's interaction with its internal user base.

Timmy Garde, managing partner and chief operating officer at Calcium, also believes AR can improve efficiency in a few ways, some more obvious than others.

"When patients can more easily track their fitness level, overall health, and symptom indicators such as sugar levels or blood pressure, they become more aware of their diet and activities," he says. "With more knowledge and information readily accessible via AR, patients will understand their health more completely and become more active participants in their own care, which will improve outcomes and adherence. AR improves the knowledge and connectivity of everyone in the health system by opening avenues for interaction and sharing that were previously unavailable."

AR Adoption

Adam Hanina, CEO of AiCure, says augmented reality is already merging with other fields such as artificial intelligence (AI) and sensors.

"In fact it is moving beyond wearable devices into the environment," he says. "Adoption of these platforms will be fueled by the economics of software, and by the fact that accurate data will allow health systems to know much more quickly whether a drug is working effectively at the patient level in real-time. Providers will also be able to identify high-risk patients due to behavioral and physiological markers and use the data to automatically trigger appropriate care pathways. The largest impact will be when augmented reality and AI allow for scalable monitoring of large patient populations where early detection of data can be used to prioritize R&D needs or concentrate resources in a particular area."

AR has the power to drive significant change in healthcare, says Lynn O'Connor Vos, CEO of ghg.

"It can not only help save lives, it can also help healthcare organizations make their exist-

ing processes more precise and efficient, by reducing overheads, facilitating smoother management, and reducing the chance of human error," she says. "Imagine the possibilities — an app that helps a patient with chronic allergies pre-emptively identify high levels of allergens every morning. Or imagine arriving to your doctor's appointment with your check-in complete, files pulled, and the nurse ready to take your vitals, all triggered by your car entering the parking lot. Augmented reality has the potential to put timely, relevant information in front of patients and healthcare professionals when they need it. And that can disrupt healthcare for the better."

Michael Russo, senior director, corporate digital strategy and innovation, Acorda Therapeutics, agrees that augmented reality has the potential to increase efficiencies and change the physician/patient experience, however, the technology is still evolving and isn't mature enough yet to be used in a meaningful way in the majority of physician office settings.

"In the relatively near future, say five or 10 years, wearable technology, such as Google Glass to identify a patient through facial recognition, pull up the patient's medical record, and display critical information could be standard practice," he says. "Before augmented reality can become an everyday reality for physicians and patients though, facial recognition technology and electronic medical records need to be perfected, and issues such as patient privacy need to be carefully considered."

Mr. Garde says there will come a time, or perhaps it has already come, when patients' expectations of freely flowing health information will clash with the traditionally closed health systems.

"Patient privacy is closely protected in the real world, and extending that level of protection to AR is more easily said than done," he says. "Accessing information via AR is a benefit that will come with a privacy risk; it is the price you pay for more information. However, more interactive PBMs means patients know when they need their medication and are more likely to use that medication correctly, thereby maximizing outcomes."

AR adoption risks do apply to the current environment, as with other technologies that are new and unproven. However, Gartner believes that these risks will decrease over time as implementations and use cases mature.

"The inconvenient truth about cutting-edge technologies is that they are typically used by the wealthy and well," says Matthew Howes, senior VP, head of strategic services, Palio+Ignite, an inVentiv company. "This is not to say marketers shouldn't be experimenting with them. On the contrary, this is fertile ground for preparing for the next generation of patient engagement. But they need to be approached with an understanding of where, when, and how they will scale. We need to think about broad reaching partnerships with public schools, clinics, and advocacy organizations. We also need to consider targeted use in orphan drug categories and leverage high-profile individuals to bring awareness to these innovative technologies in healthcare."

Adoption and Uptake

In reality, our experts say AR has already been implemented to some extent with certain types of health kits and tracking for patients. But the benefit to HCPs, specifically with education and training, will be enormous, Mr. Garde says.

"Today's and future HCPs will be able to learn, and practice what they learn, without having to risk their patients' health and safety," he says. "It will, in short, allow the HCPs of the future to practice more; and practice makes perfect. The ability to virtually practice also opens up the potential for AR to assist in a patient's physical rehabilitation."

Emily Tower, VP of digital strategy and analytics, AbelsonTaylor, says one example of AR that already is commercially available is the Oculus Rift, acquired by Facebook in March of this year, which is similar in price to an Apple watch at about $350.

"This AR device is already being used with stroke patients to measure their rates of recovery by collecting data on their speed and motor movement," she says. "The promise for Oculus Rift will extend into the area of mental health and provide a valuable tool for patients dealing with conditions such as PTSD, anxiety, depression, and bipolar."

AR as Part of the Patient Journey

David Moore, group director at Ashfield Healthcare Communications, agrees that augmented reality can take the abstract and move it into reality, but says it is a little early to determine where this will really go with healthcare.

"If we are not careful it can become a gimmick, but where it can be great is in use as an educational experience in the patient journey," he says.

One such example of AR as a tool in the patient journey, says Louis Sanquini, executive VP, business development and marketing, QualityHealth, is AstraZeneca's diabetes lifestyle program, Fit2Me.

"Diabetes patients pick a personal diabetes coach — virtual but very real — who customizes a treatment and lifestyle management plan, which is then available on all media devices," he says. "This is a great use of technology to drive patient outcomes and manage adherence issues. Novo Nordisk offers a different, but similarly interesting diabetes support program, Cornerstones4Care, which takes a different yet effective approach with coaching and tools. Subsequent to learning the outcomes data resulting from these programs, payers and providers may use the data to support decisions to cover and prescribe medications associated with the programs."

Another area of development is geo-fencing: using GPS-based location data to deliver alerts to patients based on where they are.

"Think about the possibilities if you can send text messages to patients sitting in a doctor's office, entering a pharmacy or someone with, say heart disease, who happens to need to lose weight and be near a weight loss support group," Mr. Sanquini says. "The targeting technology exists and is available to ignite the potential within dozens of apps developed by pharmaceutical companies.

"Key to many executions within the coaching, adherence, and geo-fencing arenas is finding patients, understanding their health profiles, and gaining permission to contact them," he continues. "The volume and value of patient profiles, gained by patient identification companies, including our company QualityHealth, may contribute significantly to enabling many of the new technologies and services to proliferate."

Companies need to start thinking in terms of augmenting new technologies and services with existing technologies in order to make 1 + 1 equal 5 or 6, Mr. Sanquini says.

"Rather than evaluating new technologies in a vacuum, we must consider cutting-edge ideas and new technologies as pieces to a puzzle, which fit into or leverage the tried-and-true technologies," he says. "Explosive growth within pharmaceuticals will require marketers who function as empowered and accountable orchestra leaders. They will need to pull together a variety of tools and services in an extraordinary fashion. Pharmaceutical marketers must be able to connect the best of today, new and existing technologies, in order to address to embrace challenges of tomorrow."

Mr. Garde says in the current reality everyone has a smartphone, which means that everyone has the starter kit for AR health tools.

"Society in general is still struggling with the best way to integrate interactive technology into our everyday lives, but we seem to understand well how AR can improve healthcare and patient outcomes," he says. "Long story short, AR is already affordable and manageable, and should continue to be. If The Jetsons taught us anything it's that in the future even a working-class Joe like George Jetson can afford cutting-edge technologies. But Rosie, his robot, also taught us that those technologies are hard to manage." PV

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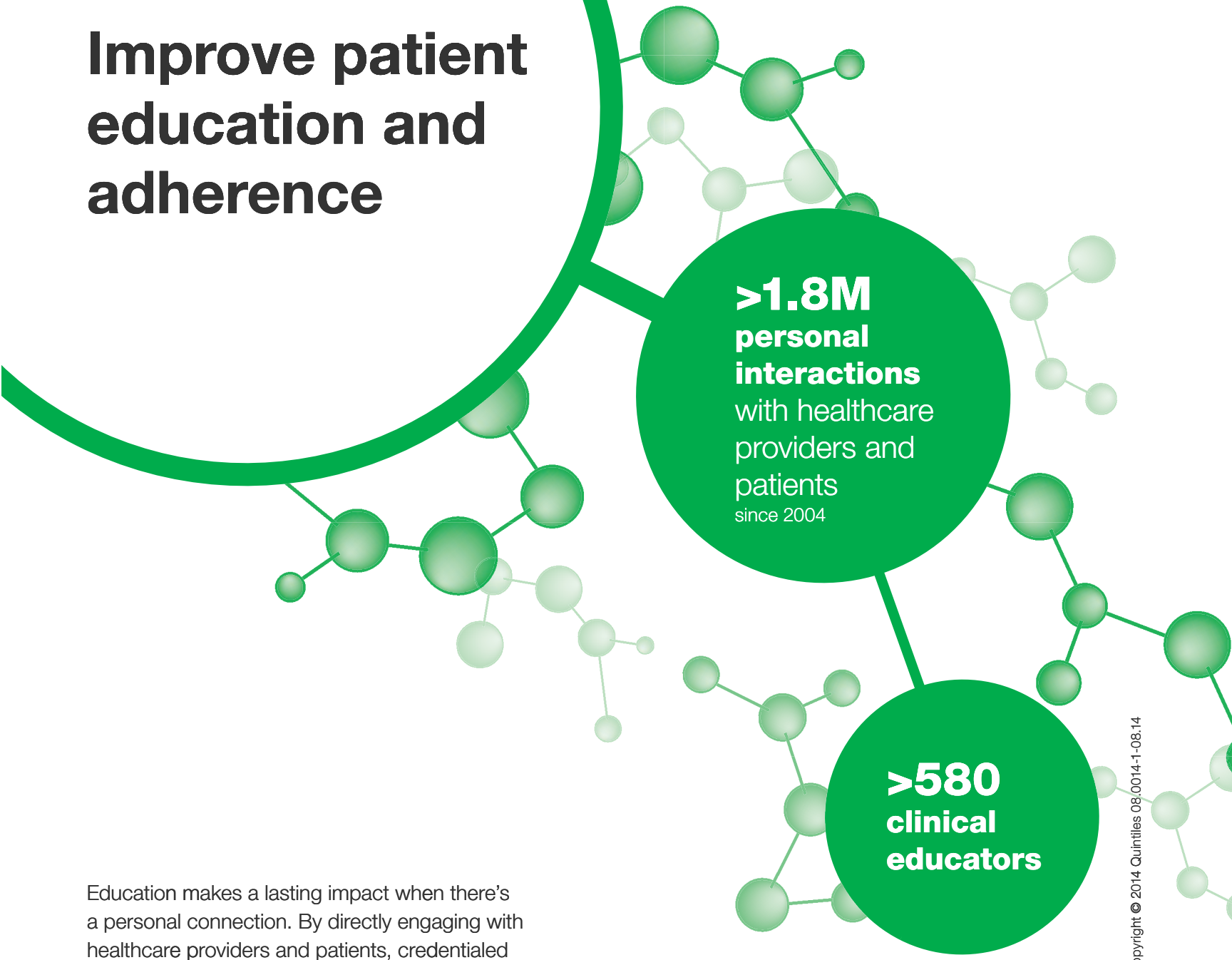

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