Analysis: How Mature is the VR Simulation Market?

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"VR is transforming education in health care, but the change is disruptive to the traditional ways health care is taught and practiced. *Even though* medicine *is slow to innovate, we should continue to push the limits of this technology and set the bar high in the interest of our patients."*

Dr. Danny Goel

In medical training there is a huge gap between absorbing an enormous body of knowledge and practicing medicine on real patients. Virtual Reality (including AR/XR) could be the ultimate bridge for this gap through authentic, replicable, and testable training. The evidence is growing that VR is more efficient and memorable than traditional instruction - fifteen minutes of VR equals an hour lecture. So, VR seems like a perfect fit for med sims and off we go, right?

If we judge the maturity of the VR industry to meet the demands of medicine only from social media success stories, it's easy to assume we're already way down the road. But measuring the actual temperature of the VR med sim sector requires a closer look. How ready is the entire venture of VR to meet the demands of medicine at a national - or I dare say - global scale? Are med schools and clinicians ready to adopt? Where the technology falls short, what barriers must we cross to achieve the benefits this innovation has to offer?

To help map the landscape of high points and barriers I turned to a diverse group of thought leaders working at the front line of health simulation research, clinical practice, and business. Each provided a unique piece of the puzzle along with insightful visions of where VR should be heading for greatest positive impact.

I structured the discussion around a framework of **Four Dimensions of Technology Maturity** that I adapted from NASA's system to evaluate innovations for adoption. Note the key point here is the readiness for a solution to go to scale with wide adoption.

Four Dimensions of Technology Maturity

> 1: Technology: effective software and hardware platform

> 2. Developer: the means to create, deliver, and support the solution at scale

> 3. Programmatic: a clearly identified user with the implementation and financial models to build and sustain the enterprise

> 4. Customer: adopters who want the solution and have the means to get and use it easily

Here are the highlights of what the simulation experts told me.

Where are we today? "Still early"

The unanimous verdict from the front lines in all sectors is VR is still in the early-adopter phase of diffusion. Why? Because VR today is still treated like an adjunct for training and the practice of medicine, less than 2% of core medical training curriculum So viewed as a whole, VR is nowhere near technologically ready or programmatically accepted to realize its full potential impact on tens of thousands of trainees

However, the experts also pointed to notable bright spots in niches where VR is making major headway:

- **Foundational knowledge:** learning and rehearsal of basic skills, decision making, procedural practice

- **3D Anatomy:** Anatomy is easier to understand in 3D and proven more effective than book learning. VR isn't going to replace cadavers, but it can save valuable time and make cadaver work more useful. Cadavers are also not for everyone, so VR expands anatomy training to more people.
- **Surgical Planning:** Surgeons are readily adopting VR tools to create a 3D personalized simulation for an individual patient before they enter the operating room. The payback for hospitals comes from lower error rates and shorter surgery times. Based on these benefits, insurance companies are on the verge of issuing a billing code to pay for the costs.

The stories behind the story

Technology

No denying VR tech has come a long way in recent years. VR headset quality is way up, costs are way down. Wireless headsets and high-quality VR on a laptop PC have helped the industry reach the high bar for training in the areas noted above. But is it enough?

Immersive technology needs to deliver authentic practice and strong superiority over 2D training to justify its added cost. The inability for current technology to deliver good haptic feedback and high-precision tracking of hands and limbs were mentioned repeatedly as major deficits. VR today is judged by many as not realistic enough for most medical training which is hands-on and small details can be critical. Negative teaching from low-fidelity systems is a common concern.

Adoption also hinges on the ability to deliver complete pedagogy and validated assessment in VR. Practitioners are frustrated by the lack of text and data input to do a basic quiz or survey inside the headset.

Finally, a list of small and very solvable problems spawned by hardware/software manufacturers' implementation decisions still make it unnecessarily difficult to provision and deliver a VR system to a customer that works easily out of the box. A rural hospital should not require a tech expert to run a VR medical sim. Tech companies, this needs to be plug-and-play.

Developers

Content: Developers are constantly improving the quality and breadth of VR sim content they offer. Yet I found widespread frustration from sim center experts at seeing too many sim products that are narrowly focused and lack strong pedagogy. Their medical instructors want sims that are flexible to open-ended learning scenarios and easily customized to their needs and teaching style.

The dream of VR for many in the sim world will only be fully realized when instructors can create their own VR content. A crop of new tools attempts to make VR development easier for the layperson, but the learning curve is still too high for all but the most intrepid. In the meantime, anything we can do to shorten the gap between developers and those who teach medicine will help move us all forward.

Meeting the Market: The Covid pandemic has accelerated interest and dollars flowing to VR solutions. Developers are reporting up-ticks in customer interest, reduced time to closing agreements, and larger scale implementations.

Meanwhile, the biggest barrier to greater sales success continues to be selling to an uninformed market. Most doctors have never tried VR or know how to implement it in their teaching. As Taylor Freeman of Axon Park puts it: "If they don't have the gear, they don't have the model."

Programmatic

VR sims have made the biggest programmatic inroads where strong research evidence aligns with a ground-burning need. Every voice I spoke with says more detailed research into how and where VR works is essential. Sim products need to be independently evaluated according to common standards. That said, it's going to take more than just more research results to move programmatic acceptance and adoption ahead to achieve scale.

The sim experts shared many reasons administrators are slow to adopt VR. There's a culture of individualism in medicine where everybody likes to do things their own way and resists the "over-standardization" of VR sims. They are skeptical the "false world" inside VR is not authentic enough, especially if it is heavily gamified. It's too expensive and not that much better than 2D training or a book.

> *"If you don't have a solution, it's hard to see the problem. The brain shuts down. Most people are stuck with their box of rocks, not really trying to transform the box." Dr. John Vozenilek*

At a structural level, the US lacks a professional or government body to make the assessment on what works or not and to move the proven things forward. Even for certain uses of VR that have great proven outcomes, such as central line training, there is no requirement for schools or instructors to use it. A professional society stepping in to fill this role would go a long way to bringing clarity and confidence to this market.

Customer

At the heart of the customer story is a clash of cultures between world views and generations.

Medicine is a culture of tradition. The ones who control decisions today cling to the belief that the way they learned medicine is the best way to learn. The mean age of a doctor or nurse in the US is 51 - not digital natives but they are very comfortable with standard Internet technologies. For them there is more interest in VR, but few will choose this big mid-career leap.

Technology brings a culture of disruption that values efficiency and newness. Developers have lots of ideas and show endless creativity to put teams and money together and make things happen. But as Phillip Wortham of CAMLS puts it, "The creative world is building stuff and trying to sell it to a non-creative world. There is a disconnect; we need to bridge the gap."

The current generation of medical students are digital natives, very comfortable with new technologies and ready to do whatever works. On one hand they generally embrace VR because it fits their worldview and they are hungry for practice in any modality. On the other hand, they are single-mindedly focused on passing the tests which are still in paper-and-pencil, so VR can feel like a luxury distraction.

The attitudes of up-and-coming students and competition among med schools to attract them are putting pressure on decision makers to adopt more simulation and digital. Eventually the guard will change, new generations will take charge and the world may look very different.

What we wish people knew

- I don't think you can tell people about VR - they need to actually try it. I wish more people had the chance to experience VR/AR. Dr. Haru Okuda

- People who were disappointed with previous generations of bad VR experiences need to update their perception to see modern VR. Dr. John Vozenilek

- VR could fill the urban-rural gap in healthcare. Phillip Wortham

- Most people have not used immersive tech at all. We want those people to understand the capabilities. It's not all gaming or 3D rendered simulation. Most people don't know, but it's coming. Shannon Bailey

Future Vision

- High quality VR sims will be affordable and accessible to all. Gauthier Dubruel

- VR will reveal unpredicted insights into human nature that will lead to new forms of learning and therapy we have yet to discover. Taylor Freeman

- The killer app will be easy text entry in VR. Shannon Bailey

- VR enables people to become lifelong, problem-based learners. Dr. Matthew Bramlet

- Backed by neuroscience, VR is an effective and efficient scalable educational tool that will span geographies. It's an exciting time to be a physician and a patient. Dr. Danny Goel

- People will strive to maintain human connection as technology shifts the mode and control of care between doctors and patients. Dr. John Vozenilek

- Locally appropriate uses of VR training reach low-resource countries and help close gaps in care Dr. Karim Qayumi

- The tech of today will definitely help care givers of tomorrow and drive patient safety. If we do this as a team with healthcare it's unstoppable.   Phillip Wortham

Conclusion

In terms of a technology, VR has more potential to do good in the world than many others. VR is powerful because it is both subtle and complex. The value we get will depend on how we choose to use it. "Rather than using VR to replicate what is currently being done well, go after areas that we're still trying to figure out. Diversity/Inclusion and communication are good examples where we're not doing very well. VR can level the playing field." (Dr. Haru Okuda)

References Interviewed for this Article

- Lance Baily, Founder & CEO: HealthySimulation.com
- Dr. Shannon Bailey: Lead Researcher, Human Factors Scientist, Immertec
- Dr. Matthew Bramlett: Jump Simulation, CEO at Enduvo
- Gauthier Dubruel: Business Director & Co-founder of UbiSim
- Taylor Freeman: CEO of Axon Park
- Dr. Danny Goel: Orthopedic Surgeon and CEO – PrecisionOS
- Jonathan Muddle: Director of Simulation and Education, Center for Immersive and Simulation-based Learning, Stanford
- Dr. Haru Okuda: Executive Director, Center for Advanced Medical Learning and Simulation (CAMLS), University of South Florida Health
- Dr. Karim Qayumi: Founder of UBC Centre of Excellence for Simulation Education and Innovation (CESEI) , CEO Interactive Health International (IHI)
- Dr. John Vozenilek: CMO, Innovation & Digital Health at OSF HealthCare
- Phillip Wortham: Director of Operations and Technology, Center for Advanced Medical Learning and Simulation (CAMLS), University of South Florida Health