Digital Reality: Is health care ready?

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00:12–01:11 **Heidi:** What if a patient could put aside pamphlets and actually see the impact a diet would have on his or her state of health? What if impaired-mobility patients could experience brain- and coordination-building activities in complete safety? Immersive digital reality tools such as augmented reality and virtual reality are making these scenarios increasingly realistic. So what if a surgeon could prepare for a complex procedure by simulating it first in a 360-degree 3D simulation? What would the impact be on life sciences and health care? Welcome to Ta-les of Transformation.

Today I have Dr. Shaun Rangappa and Michael Montalto, both Managing Directors with Deloitte Consulting LLP Life Sciences and Health Care Practice, with me to discuss the trans-formative potential of AR and VR in life sciences and health care. Welcome gentlemen.

01:11–01:13 **Shaun:** Thanks for having me, Heidi.

01:13–01:14 **Michael:** It's a pleasure to be here, Heidi.

01:14–01:22 **Heidi:** Let's start by defining the terms: virtual reality and augmented reality. What are they and how are they different?

01:22–02:19 **Shaun:** The way I like to describe virtual reality is that it's an experience wherein everything you are seeing is computer generated. And augmented reality in contrast as an experience where you're seeing the real world, but in addition to that real-world view are additional over-laid things that are computer generated. For example, in augmented reality or in AR, your rear-facing backup camera on cars today show you white, yellow, green, and red lines. They don't really exist in the real world, but they certainly help you navigate into a parking space or avoid hitting the curb, as an example. Another example of AR is the yellow line seen in tele-vised football games, which helps you visualize where the first-down marker is. That addi-tional information can enhance your viewing experience of the football game because it gives you additional information.

02:19–02:26 **Heidi:** It seems that many businesses are launching into VR and AR. Michael, what are some of those examples?

02:26–03:03 **Michael:** Heidi, when we look at where they're jumping into some of these are-as, it's around some preparation for surgery and being able to enhance a workplace with in-formation that's needed to work effectively. Considerations for the patient outcomes, we see this especially with our plan clients, is how can I use these tools to incent people to do some-thing that will improve their outcome or make them healthier? We can see that with some of the postoperative care as well as with incenting people to do things like take care of them-selves through an exercise regimen or achieve a goal on a diet.

03:03–03:10 **Heidi:** What are the implications and considerations where balance of patient outcome is weighted against an immersive experience?

03:10–03:47 **Shaun:** When you use VR and AR in therapeutic ways, you may have physical world, real-world challenges in terms of making sure stability is maintained in frail patients or in children, but also basic motion sickness. Some of the unintended consequences of the visual stimulation you see with VR and with AR can contribute to some neurologic conditions that we've got to be mindful about, and frankly the data is still sparse. So we don't know ex-actly what kinds of things we may see as adoption becomes more widespread.

03:47–04:03 **Heidi:** Shaun, coming from your background as a clinician, we're always want-ing to look at technology that is going to benefit patient outcome; going to benefit the clinician experience, right? So that the technology is something that is added value versus complicat-ing the problem.

04:03–06:09 **Shaun:** We've seen demonstrations of AR and VR be powerfully effective in the surgical environment. For example, at Lucile Packard Children's Hospital in California we along with others have worked to help create an ability to take two-dimensional imaging data and turn that into three-dimensional information for use within the OR to improve patient care. There is significant promise for this term "clinical choreography" across the provider land-scape. Hospitals and health care organizations and providers specifically are beginning to see real clinical utility with VR and AR, and I like to think about that utility across a number of different categories. One is for the physician or clinician experience. That includes things where the administrative burden of being a clinician or being a physician is reduced. We see companies now working on applications of AR and VR where direct interfaces into the elec-tronic health record can occur. The second category is with the emergence of new treatments that provider organizations are getting very excited about. This includes things like interven-tions for PTSD or phantom limb treatment or opioid addiction therapy. A third category is re-lated to the patient experience, where we can unlock new patient-centric care with ability to educate patients and their families on how to make sure that existing treatments are most ef-fectively applied, or creating new avenues to educate patients to use, for example, their asthma spacer when they use an inhaler to treat asthma. Another one relates to education, across a number of subcategories of educational applications. VR and AR can really be tre-mendously assistive. Undergraduate medical education, graduate medical education, and then continuing medical education are categories where we're seeing more and more prom-ise for the use of AR and VR.

06:09–06:12 **Heidi:** And Michael, how do you see this playing out in health plans?

06:12–07:04 **Michael:** Well Heidi, within the health plan, anytime we can drive an outcome by getting people to participate actively in their own care, it's a very critical and important step. Virtual and augmented reality have huge potential in order to do that. They remove sev-eral roadblocks. I may not need to get up and go to an office to participate in my physical therapy. I may not need to get up and see a particular doctor, if I can take care of the exercise at home or I can take care of my care plan at home, or prepare and learn at home with the content. So from a health plan perspective, it's an extremely valuable tool that removes a very large barrier. It allows people to fit their care regimen into their lives at their convenience and has fantastic potential to help improve our outcomes overall.

07:04–07:11 **Heidi:** Michael, I want to follow up on that. How do you see the interactions then change with the price point of AR/VR dropping?

07:11–07:47 **Michael:** It makes it much more practical to have a home device and to be able to do this within the home. If you think about the price point of the smartphone and the new technology that we've seen in the past, as this comes down devices are already in consum-ers' hands that will be able to support this. Google cardboard is an excellent example to bring virtual reality with an existing device on the smartphone. The real challenge, and I think what starts to build up the tipping point, is the cost of producing content as well as the ability to de-liver that content with network bandwidth increasing and 5G coming to homes.

07:47–07:59 **Heidi:** That's an excellent point. We're going to need Spectrum. We're going to need 5G as it relates to health care delivery that I think is going to continue to excite us but to challenge us. Shaun, what do you see as the interactions change with price point?

07:59– 08:25 **Shaun:** The hardware price support ability's always going to be a prime con-cern to health care CIOs and other leaders, but as Michael emphasized, the price and avail-ability of the content for AR and VR modalities is going to be key since that's going to be a focus and variable across multiple subspecialties within our health care ecosystem, so the phrase "content is key," is key in my mind.

08:25–08:29 **Heidi:** Michael, what do you see as the main challenges and barriers, specific to this industry?

08:29–09:26 **Michael:** Being able to produce enough content that's readily accessible is one of the barriers, but for one of the use cases that we mentioned up in the beginning of the in-troduction, being able to envision yourself after a diet or after exercise measurement. There are companies that can do that today. They can actually create a three-dimensional avatar of you, but in order to create that, it's a rather extensive eight-hour process that requires over 130 cameras. It is quite cost prohibitive. So that content has to be able to be produced quick-ly, cheaply, and effectively, and has to be out there for people to pick and choose from. I also think that the interface, as Shaun said earlier, we're just now learning about the impacts of the interface, but how do we build an effective interface that is taking advantage of sight, depth, touch, to drive a result or to allow us to interface with the computer, is still a work in progress.

09:26–09:46 **Heidi:** If you think about any complicated therapeutic regimen whereby pain or chronic pain is something that can be transformative, this is an area could be very exciting but the interface is going to be critical. Shaun, what do you see from a clinician's point of view that still resonates as challenges and barriers in this space?

09:46–11:56 **Shaun:** I like to think about these challenges and barriers across a number of categories. One is what I'll call the CMO versus CFO dynamic, the chief medical officer versus the chief financial officer dynamic, where new tools for better care meet the speed bump of needing to demonstrate an ROI in a very trim-margin environment. So being able to under-stand the needs of the clinicians and the desires of the clinicians to have tools at their finger-tips that can enhance the patient and the provider experience versus the challenge with find-ing budgetary resources to get those tools is a challenge and an ongoing point of dialogue. The second challenge is the need that we have to show clinical outcomes—that we as we continue to move along our value-based care journey, this is going to be a constant issue and talking point because being able to demonstrate the value of the tools that we're introducing into our health care environment, be that in provider organizations or at home, are going to need to be demonstrated and measured. A third category of challenges and what I will just call de-sign and utility because health care can be an unforgiving environment, and technical stabil-ity, sterile process adherence in environments like the OR, these are things that I think are going to need much more attention than in the traditional consumer environment. So being able to work with as we have done with vendor partners that understand the kinds of activities that go on in the OR environment, as an example, is something that's going to need to be much more mindfully thought through. And then finally, Michael alluded to this a little bit al-ready, interoperability in addition to just interfaces with the devices is going to be key. The EHRs will need to accommodate the advances that AR and VR will be bringing, and interop-erability in general is a real challenge in our current-day environment. It's going to continue to be something that we're going to have to address with the introduction of AR/VR and other tools.

11:56–12:05 **Heidi:** Shaun, we don't want to forget the life sciences because this is another huge area. What do you think the rationale or potential use case for considering augmented or virtual reality is in this space?

12:05–13:21 **Shaun:** In life sciences, there's significant opportunity to ensure consistency in standard operating procedures, as well as impact across the manufacturing line inclusive of training plant personnel to make sure that we've got adherence to the quality output that we know we need from life sciences organizations. In addition to that, there's a significant body of work that's been going on related to training and being able to train across the ecosystem of life sciences. AR/VR modalities enable us to be able to track virtual training in ways that we only dreamed of years ago. And then new emerging technologies like with chimeric antigen receptor or T-cell therapies or Car T therapies—we've been seeing a lot of activity in the mar-ketplace where companies involved in these therapeutics are looking to AR and VR as po-tential enhancements for a number of different areas that they're operating in. Medtech de-vices also are able to prototype devices and collaborate across design teams for rapid de-sign cycles. So there's significant opportunity as I see it across life sciences.

13:21–13:31 **Heidi:** We are coming to the close of our show. Michael, is this the year of AR/VR? Are we talking about a tipping point that will scale broader adoption?

13:31–13:56 **Michael:** I think so. I think we're looking at this year being a very pivotal year that begins our tipping point. It may take us a longer duration. It may be a point over the next two years until we see the broad adoption, as we talked about content and bandwidth and spectrum being available. But most certainly this is the year when augmented and virtual re-ality become useful tools that are part of our everyday lives.

13:56–13:58 **Heidi:** Shaun, what do you think, tipping point?

13:58–14:53 **Shaun:** I'll resort to some clinical nomenclature and say I think we're in the peri-od of gestation for AR and VR. I'm not convinced that we're at the exact tipping point yet for a number of reasons. One is clear, prices are dropping and two, end user acceptance and adoption is indeed increasing, and then third, there is that convergence of external support like 5G technology and increasing content. But we have seen a softening in the actual sales of headsets in the 2017 year and although we see potential uptick across 2018 and beyond, I think that there's still going to be some speed bumps in the road but I think we're very close, and I agree with Michael that I think we have a lot of elements in place to make this be the year where we'll at least get closer and closer to a birth of AR and VR as a true force across health care.

14:53–15:04 **Michael**: Sounds like we agree, Shaun, and I think one thing for certain, there's no longer the stuff of science fiction, but it's now science reality. This is something that we're working into and we'll start to see grow.

15:06–15:42 **Heidi:** As Michael shared, this is no longer the world of science fiction. Aug-mented and virtual reality carry with it tremendous opportunity, from improving health care processes to engaging a patient early and consistently throughout their care. The choreogra-phy of care will take precedence as to how any of these technologies improve patient out-come and help to add value to a clinician's practice and allow hospitals ability to deliver ex-ceptional care.

I want to thank my guests, Dr. Shaun Rangappa and Michael Montalto, for joining me today on Tales of Transformation. Thank you, gentlemen.

15:42–15:43 **Michael:** Our pleasure.

15:43–15:44 **Shaun:** Thank you, Heidi.

15:45–15:53 **Heidi:** Next up. How could blockchain transform the life sciences and health care industries? And are we ready?