VIRTUALLY THERE
FROM 2D TO 3D TO xR

\ln \left( \frac{W(x)}{W_0} \right) = - \int P(x) \, dx.

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Three engineers—one in the US, one in Germany and one in India—are working together to design a new type of engine. In real time, they are manipulating a shared, 3D virtual image of the engine, making and testing different engine configurations, helping their company dramatically reduce time to market.

New hires for a retail chain are learning their jobs by entering a 3D, immersive rendering of a store, walking the aisles to learn where items are, and greeting “customers” to help them with their shopping, explain products and suggest complementary items for purchase.

These scenarios aren’t as futuristic as they might seem. Technologies that Accenture Strategy calls “xR”—which include virtual reality and augmented reality—have been around for years. (See sidebar, “What is xR?”) But change is in the air. As these technologies grow more sophisticated, they are enabling a broader shift from 2D to 3D—not just for gamers, but also for enterprise-grade solutions. The seismic impact of 3D enterprise solutions will expand far beyond the xR use cases of today.

**WHAT IS xR?**

**AUGMENTED REALITY (AR)**
Technology that superimposes information and images on a user’s natural view of the real world. AR comes in many flavors ranging from technology used to show the first-down line in American football (developed in 1998) to Google Glasses (developed in 2013), to Microsoft’s HoloLens.

**VIRTUAL REALITY (VR)**
Simulates three-dimensional environments that mimic the real world. These experiences can be high fidelity and consumed through sensor-rich, head-mounted displays (HMDs) or lower-fidelity experiences consumed through an inexpensive device such as Google Cardboard combined with a smartphone.

**3D**
At a base level, 3D objects have an X, Y and Z axis, while 2D objects only have an X and Y axis. 3D objects have depth and volume while 2D objects are typically flat. While real-life objects are truly 3D, technology is used to render objects in 3D for users to interact with digitally. 3D objects can be rendered for consumption on 2D services or via VR devices for intuitive, life-like experiences.
The business opportunity of xR technologies is significant as they are translated into 3D solutions—even more significant than some might believe. Investor interest in xR technologies is growing at a record pace. xR funding, for example, increased 140 percent from 2015 to 2016. Deals volume grew 14 percent over the same period.¹

Conventional analysis sizes the xR market at about $137 billion annually.² But according to Accenture Strategy, if one looks across the broader landscape—software, hardware and services that will be affected by the broader shift from 2D to 3D—the 3D opportunity is about six times larger: $895 billion.³

Why such bullish numbers? Gaming is certainly part of the story. But the move from 2D to 3D will initiate a fundamental shift in how people expect to interact with real and digital objects across all digital devices, and that has significant enterprise implications.

For example, over $40 billion is spent annually on web design services that only let people scroll through a 2D website. In a 3D world, people will be able to interact with content just as they do with objects in the real world, even on 2D surfaces. That will require a complete revamping of standard web design.

3D environments will lead to innovations across multiple industries. For example, with its Daydream VR platform, Google is already exploring how VR can change the face of advertising.⁴ Tourist and hospitality companies will be able to reach customers anywhere and everywhere with 3D experiences of locales, hotels, restaurants and more. One analysis claims that 3D advertising has a retention rate almost five times higher than 2D.⁵
xR also has the potential to disrupt the financial services industry. 2D visualization already helps traders make data-driven decisions. When such visualization leverages xR, it can help traders analyze and manipulate data faster using a more intuitive xR interface. For this kind of data analysis, some firms have already tested Facebook’s Oculus Rift, a virtual reality system that completely immerses users inside virtual worlds.

Enterprise productivity is another area ripe for 3D disruption. Over $13 billion is spent annually on office productivity suites. Software that enables 3D creation is already being embedded into core consumer-friendly programs, enabling a faster transition from concept to visualization to presentation.

For example, Apple has announced that its iOS 11 operating system (to be shipped with the iPhone 8) will introduce ARKit, a new framework that allows developers to easily create augmented reality experiences for iPhone and iPad. Microsoft is adding support for 3D models in Word, Excel and PowerPoint for the Windows 10 Creators Update. Microsoft says that 3D will help expand the creativity and visual impact people can bring to documents, presentations and reports. Other global enterprises such as Google, HP, Samsung and Qualcomm are also seeking to accelerate their own platforms by making bets on xR through in-house product development, a dedicated xR investment arm or acquisition of smaller companies.
The shift from 2D to 3D will also revolutionize the way we interact, collaborate and learn—whether in the same room or across the world. Today, there are more than 100 million addressable enterprise collaboration users across industries, who primarily communicate via phone, video chat, email or internal chat software. Although video chat has been the most recent 2D advancement, new technologies may soon enable embedding 3D objects in communication channels. Beyond this, the next evolutionary step would then be real-time editing and creation of 3D objects by virtual teams, allowing for a much richer and immersive experience.

ASML, a leading manufacturer of chip-making equipment, has explored having “clean room” engineers receive instructions through smart glasses so they get the right information and support when and where they need it. The technology displays step-by-step procedures and provides over-the-shoulder coaching and interactive updates such as error reporting, video uploads and instruction modifications in real time.11

xR and 3D will also revolutionize education, and some schools are already implementing solutions. In late 2015, Google launched its Pioneer Expeditions which provides thousands of schools with a kit containing everything teachers need to take their class on a virtual trip: ASUS smartphones, a tablet for the teacher to direct the tour, a router that allows Expeditions to run without an Internet connection, a library of more than 100 virtual trips (from the Great Wall of China to Mars) and Google Cardboard viewers or Mattel View Masters that turn smartphones into VR headsets.12
Although the shift from 2D to 3D will be far-reaching in its impact, both for companies and consumers, several barriers need to be overcome.

First, the industry has no standards and no leading platforms on which to develop. There are more than eight different VR/AR platforms that developers work on, with no clear leader in sight and no concerted effort towards standardization. Major platform companies with advanced software, hardware and content capabilities may be able to go it alone—by taking advantage of “winner take most” platform dynamics—but others will need to work together to overcome the lack of standards and to realize the full potential of their investments.

Second, available content is limited because content production is expensive and complex. This means that, for professional developers, it may not be worth their time or budget relative to the installed base. In addition few companies right now know how to make good content. The design language is completely different when the eye isn't targeted to just a small range of viewing, but can rotate 360 degrees. Until some of this dust settles, the most important group of content—user-generated content—cannot take off.

Finally, the hardware is currently bulky and expensive. Most current devices are tethered, heavy and unable to display pictures that are realistic. Software and devices used across industries will have to be optimized for 3D experiences. Headsets will need to become lighter and untethered. Indeed, mobile devices are likely to be the way most people in the future experience 3D. Many mobile phones are already 3D-enabled.
How can your organization take advantage of the move from 2D to 3D? Here are a few things to keep in mind:

• Companies both on the lagging and leading edge of technology should **GET READY FOR THE SHIFT TO 3D** and how it will touch all corners of their business. This means re-imagining consumer experiences in 3D and taking full advantage of xR technologies. CTOs need to prepare for enterprise technology spending that will increasingly be touched by 3D technology and a workforce that will demand the ability to communicate and create in 3D.

• xR market leaders need to create a unified design language and invest in platforms to **ATTRACT CONTENT CREATORS AND CONSUMERS** to the xR ecosystem. Platform dynamics will rule, with winner-take-most dynamics likely. Today’s super platforms are well positioned to build xR ecosystems.

• Companies not at the forefront of xR still need to evaluate how consumer and employee behaviors will shift so that they can **ADAPT THEIR ENGAGEMENT AND BUSINESS MODELS** accordingly. Now is the time to begin this planning as xR is on the cusp of broad adoption. All but a few should avoid going it alone when it comes to building. Partnering with large xR ecosystems and platforms will likely yield the best results for most companies not on the bleeding edge of technology.
The shift from 2D to 3D will have profound enterprise implications. From advertising to collaboration to education and beyond, 3D will change how consumers interact with products, and how workers collaborate both inside and outside corporate boundaries. The market for 3D is heating up and companies need to act now to get out ahead of competitors.
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NOTES
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