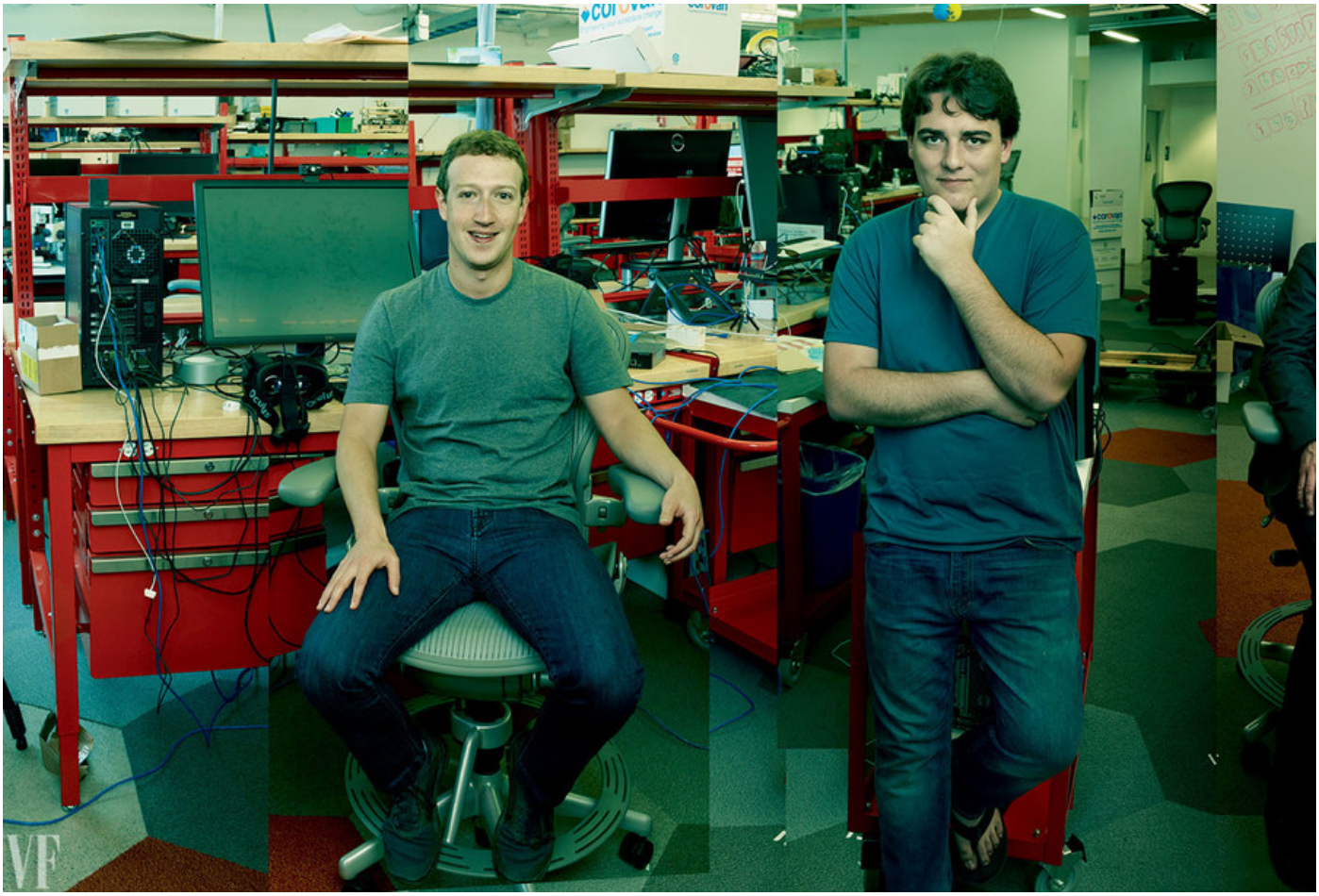
Why Facebook's $2 Billion Bet on Oculus Rift Might One Day Connect Everyone on Earth



The first time Mark Zuckerberg put on the awkward headset he knew. *This is ready,* he thought. *This is the future.*

On the outside, the Oculus Rift didn't look like much: a matte-black box, roughly the size of a brick, that hung from his face like giant ski goggles, a tangle of cords running from the back of his head to the back of a small desktop computer. It looked futuristic, but not pretty—the kind of thing a teenager might create to approximate his vision of the future, which, in fact, is exactly how this particular device had come into being. The Rift's creator, Palmer Luckey, was a 17-year-old sci-fi geek when he started building the prototype in his parents' garage, in Long Beach, California. He took it to the crowd-funding platform Kickstarter, where he raised an astonishing $2.4 million, and then to Silicon Valley, and now, just four years later, here it was sitting on the face of the most powerful man in the technology world.

Zuckerberg was in the Menlo Park Facebook headquarters, in the office of C.O.O. Sheryl Sandberg, with his deputies, chief product officer Chris Cox and chief technology officer

Mike Schroepfer. They'd picked Sandberg's office because it had blinds, unlike the glass rectangle where Zuckerberg works. Zuckerberg's fishbowl office makes sense for a man who has dedicated his career to helping people share aspects of their lives, but the sight of the Facebook C.E.O. with a screen on his face was at that point best kept a secret.

In a sense Zuckerberg was not in Sandberg's office anyway. He was in another universe entirely. His attention was on a ruined mountainside castle as gleaming snowflakes fell all around him. Wherever he looked, the scene moved as his head did. Suddenly he was standing face-to-face with a giant stone gargoyle spouting lava.

"Wow," Zuckerberg said, removing the headset. "That was pretty awesome."

It was January 2014, and the Facebook C.E.O. was preparing to celebrate two milestones: Facebook's 10-year anniversary and his own 30th birthday. For years, Zuckerberg had pushed, almost single-mindedly, for growth. With Sandberg's help he had transformed Facebook into a communications platform that hundreds of millions of people essentially keep open on their phones all the time. "When you get started as a college student you limit your scope," he says. At first, "it's like, 'I'm going to build this thing for the community around me.' Then it's 'I'm going to build this service for people on the Internet.' But at some point you get to a scale where you decide we can actually solve these bigger problems that will shape the world over the next decade."

Lately he'd been thinking about what should come next. What, he'd been asking, is the next great computation platform? What comes after the smartphone? Zuckerberg believed that the answer was headsets that provide "immersive 3-D experiences"—movies and television, naturally, but also games, lectures, and business meetings. These headsets would eventually scan our brains, then transmit our thoughts to our friends the way we share baby pictures on Facebook today. "Eventually I think we're going to have technology where we can communicate our full sensory experience and emotions to someone through thought," he told me in an interview in his office. Then he added, helpfully, "There's a lot of interesting research into that, where people have some band on their head.... You can look into it if you're interested."

It sounded a little bit insane, but Zuckerberg wasn't joking. "There are certain things in the future that you know will happen," he continued. "The real challenge is figuring out what's possible now and how exactly do you make it."

And now here it was: the Oculus Rift, which Facebook will begin shipping to customers early next year. It isn't the first virtual-reality (V.R.) headset to hit the market, but at around $1,500 for the device and the computer you need to run it, it will be the first that is

both sophisticated and relatively inexpensive. (Oculus helped create a much cruder $200 face mask to be used with Samsung cell phones.) It's also the first headset that doesn't give users motion sickness.

In March 2014, Zuckerberg announced that he would buy Oculus VR for more than $2 billion, and suddenly the question of what is possible now was not so hard to predict. The top two manufacturers of video-game consoles—Sony and Microsoft—are both preparing to release their own headsets in the next year. And just months after the Oculus acquisition was announced, Facebook's chief competitor, Google, unveiled a virtual-reality-on-the-cheap offering, Google Cardboard, which involves slipping a smartphone into a headset made of a few dollars' worth of corrugated paper. The press called it "Oculus Thrift."

Perhaps most significantly, Google and others have made a $542 million investment in Magic Leap, a secretive South Florida-based company run by Rony Abovitz, a 44-year-old eccentric genius. The company is likely years away from releasing a product but it seems in some ways more exciting than the Oculus Rift because it promises to employ "augmented reality" (A.R.)—creating realistic holograms superimposed on your field of vision—instead of virtual reality. "A frenzy" is how Thomas Tull, the C.E.O. of Legendary Entertainment, describes the enthusiasm on the part of Magic Leap's investors, who include, in addition to Google and himself, such heavyweight technology investors as Andreessen Horowitz. "Those [Magic Leap] guys have, like, alien technology," says Tull.

Tull is also a proud investor in Oculus and believes that the impact of virtual reality, no matter who wins, will be much more significant than past breakthroughs such as HDTV and 3-D movies. "Once you see virtual reality done well," he says, "you take off the headset and say, 'There's really a chance here to do something completely different.' " Will consumers, who just a year ago failed to embrace Google Glass, buy these new face-mounted displays? Hollywood and Silicon Valley seem to think it isn't even a question anymore. The race is on.

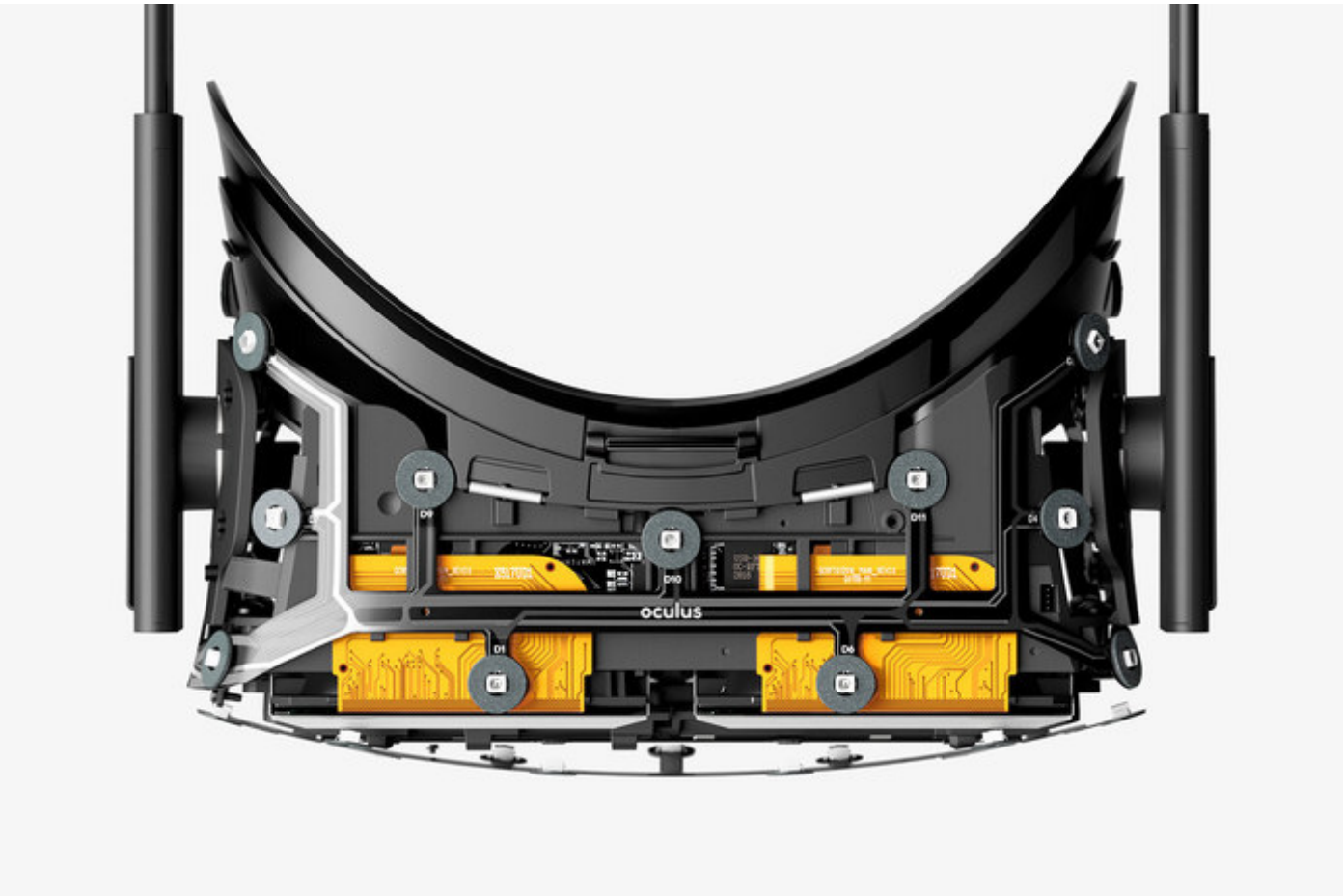
It was a few days before Independence Day, and I was inside Palmer Luckey's video game, standing in a sparsely furnished room at a table covered with slingshots, balls, remote-control cars, and Ping-Pong paddles. On the other side of the table was Luckey—or rather a bluish head and a pair of hands that floated in space, and from which his boyish voice emanated. "Have you seen *The Matrix*?" he asked, referring to the 1999 science-fiction movie. He snapped his blue video-game fingers, making several dozen M-80 firecrackers appear on the table. "We call this Roman Candle Space Party."

The prototype he was showing me was called Toybox, the name being a nod to the slingshots and firecrackers and maybe also to the fact that virtual reality itself, despite the hype and the billions of dollars at stake, is still in a juvenile state. “The goal is to have two people [in different locales] feel—really feel—like they’re in the same place together,” said Luckey. How does it work? A sensor is trained on each player, who wears a headset with a microphone, and two handheld controllers to sense the arm movements. All of this is transmitted as a ghostly blue avatar into the other player’s headset.

Call to mind a realistic computer-animated movie and most people will imagine an absurd degree of verisimilitude: for instance, the flowing, wild locks of the main character in Disney’s *Brave,* where every strand of red hair seems distinct. By this standard, Toybox doesn’t even rate. The firecrackers Luckey conjured looked geometric; the table was not wood or metal or glass—it was simply gray. And yet there was something about seeing even this crude animation all around me, no matter where I looked, that made it feel more real than any animation I’d ever seen.

I forgot, in a matter of seconds, that Luckey and I were standing in separate soundproofed rooms in Oculus’s new headquarters on the Facebook campus. I forgot that the Luckey I saw was but a computer-generated avatar, not the man himself, who was lining up M-80 firecrackers and instructing me to pick up the cigarette lighter on the table. “Now light as many as fast as you can,” he said, laughing maniacally. It was fake, and yet as the fuses burned down and the explosions started, I actually did flinch. V.R. enthusiasts call this sensation “presence,” and it is a kind of realism that wasn’t really possible until Luckey started putting the Rift together, six years ago.





LOOKING GLASS

The virtual-reality headset Oculus Rift, which will ship to consumers in early 2016.

Photograph courtesy of Oculus.

Red Pill, Blue Pill

Before I met them, I'd assumed that Zuckerberg and Luckey would have much in common. They're both hackers who started valuable companies before they turned 20, but the similarities pretty much end there. Whereas Zuckerberg has long since shed the flip-flops and the roguish persona, Luckey, now 22, still looks and acts his age. He's worth more than $500 million, according to *Forbes,* and yet he still wears flip-flops, lives in a party house with six roommates, and becomes most animated when the conversation turns to fast food. ("I love Pei Wei," he told me at one point, referring to a chain of fast-food noodle shops. "It's the best Asian-inspired diner in the world!")

Luckey does not come from money, nor did he have access to the prep-school, Ivy League fast track that Zuckerberg and so many of Silicon Valley's young masters started on. Luckey grew up the oldest of four children, in a small duplex in Long Beach, where he was home-schooled by his mother. His father, a car salesman and an amateur mechanic, taught him to tinker in a garage full of tools. Luckey started small, building his own computers, and then moved on to wilder pursuits. For a time, he got really into lasers and accidentally burned a small blind spot into one of his retinas. "It's not a huge deal," Luckey says. "We have blind spots all over the place in our eyes, but our brains compensate for them."

Luckey funded his hobbies by buying broken iPhones on eBay and repairing and reselling them, and he sought out fellow tinkerers on Internet forums. "Even if you only have a couple of people per town who are interested in something, in aggregate over the entire world you can create a community of hundreds or thousands of people who are interested in this tiny hobby," he says. Luckey got into V.R. by way of computer games, which he was obsessed with for a time. After building what he recalls as a "beautiful six-monitor setup," for extreme visual saturation, he wondered, Why not just put a small screen directly on your face? He wrote about his ambitions on a forum and then updated his virtual friends as he made progress.

In April 2012, at the age of 19, he announced that he'd finished his first V.R. device and that he planned to offer it as a do-it-yourself kit on Kickstarter, so that anyone could make his or her own rudimentary system. "I won't make a penny of profit off this project," he wrote. "The goal is to pay for the costs of parts, manufacturing, shipping, and credit card/Kickstarter fees with about $10 left over for a celebratory pizza and beer." He

planned to call the device Oculus (Latin for *eye,* a "supercool word") Rift (a reference to the way that virtual reality "creates a rift between the real world and the virtual world").

Luckey sent his prototype to a rock-star video-game developer, John Carmack, who showed it to journalists at E3 (Electronic Entertainment Expo), the annual video-game conference in Los Angeles, declaring it "the best VR demo probably the world has ever seen." Luckey was suddenly beset by requests from excited video-game reporters. Sony offered to hire him to run a virtual-reality lab in Santa Monica, which sounded like a huge improvement over his parents' garage. "It was pretty crazy," he says, recalling that time. "It was just me."

As Luckey cast about for advice, a forum acquaintance introduced him to Brendan Iribe, a gaming entrepreneur who, at 32, was a relative veteran. Iribe had trouble tracking Luckey down—at the time Luckey was worried about government surveillance and he refused to use a cell phone—but they eventually connected and arranged for a dinner at STK, a steak house in Westwood. Luckey showed up late, wearing sandals and an Atari T-shirt, and began talking at a full sprint. "O.K.," Iribe recalls thinking, "this is going to be fun."

Iribe and three of his friends who had worked with him at two video-game software companies—Nate Mitchell, Michael Antonov, and Andrew Reisse (who died a year later in a hit-and-run accident)—offered to help. Iribe told Luckey he would lend Oculus a few hundred thousand dollars and help him create a promotional video for a Kickstarter campaign. As an act of good faith he wrote a $5,000 check, no strings attached. Luckey moved out of his parents' house and hired another teenage techie, and the two boys set up shop in a two-star flophouse motel in Long Beach. They pushed the beds to the corners and used every available electrical outlet, turning the room into a crash pad and a laboratory. "It was a little bit shady," Luckey admits with a devilish grin.

Luckey and Iribe had initially planned on asking backers for a total of $500,000 to complete the prototype, but at the last minute Luckey got spooked and cut the goal in half. Multi-million-dollar Kickstarter projects were a rarity at the time, and Luckey worried that if the campaign failed to attract sufficient support that would be it for his idea.

Instead, they hit their goal in a matter of hours; by the time the campaign ended, the following month, Luckey had raised $2.4 million from nearly 10,000 people. He moved out of the motel.

The Kickstarter campaign got the attention of Chris Dixon, in Silicon Valley. "It always seemed inevitable to me that we'll all just put on headsets and plug directly into our brains," says Dixon, a serial entrepreneur who had just joined Andreessen Horowitz. One

of his first meetings was with Oculus. Dixon was skeptical. Microsoft was supposedly working on its own headset, the HoloLens, that was, as he heard it, way ahead of anything Luckey had done. ("It turned out that was bad intel," Dixon now says.) In addition, though the Rift responded to head movements accurately, showing you a picture of the sky if you looked up, or a steep drop if you shifted your gaze downward, there was a noticeable time lag that made most people—including Iribe himself—seasick. Conventional wisdom among scientists was that feelings of nausea would persist unless the lag could be reduced to 20 milliseconds or less. "This thing was duct-taped together, and it was 80 milliseconds with the duct tape," Dixon recalls. He was impressed but not enough to invest.

Iribe finally landed a $16 million funding round led by two Boston-based venture capitalists, allowing Luckey to hire Carmack, who became chief technology officer. By the fall of 2013, the time lag had been cut in half, and Iribe could use the device without getting motion sickness, which he announced triumphantly at a conference in October. Shortly after, he received an e-mail from Marc Andreessen. "We are fully converted believers," Andreessen wrote. "We sometimes take a while but we tend to get there!"

Andreessen and Dixon traveled to Oculus's headquarters, in Irvine, California, where Iribe and Luckey showed off a version of the Rift that is similar to the one that is about to go on sale. "You realize, Wow, this is it," Dixon says. "You feel like you've teleported." They began hammering out the terms of a $75 million deal. Andreessen, who is also a Facebook board member, had previously been skeptical of funding a virtual-reality company; now he was so hot for the deal that he suggested Iribe talk to Mark Zuckerberg, as a reference.

The first call between Zuckerberg and Iribe lasted 10 minutes. Zuckerberg sang the praises of Andreessen, and then he turned the discussion to Oculus. "What do you see as the biggest market for this?" Zuckerberg asked. "Is it just about gaming?"

When Iribe said, Yeah, it's pretty much just about gaming, at least for now, Zuckerberg seemed to lose interest. Facebook was not a video-game company and over the years had moved to make games a smaller part of what users saw when they logged on. But a few weeks after the Andreessen investment closed, Iribe wrote Zuckerberg an e-mail suggesting that the Facebook founder see Luckey's headset for himself.

Zuckerberg may not have cared much about Oculus's video-game ambitions, but his company's recent billion-user milestone had put him in a reflective mood. "A billion people," Zuckerberg mused to me. "That's crazy. But then, when you get there, you

realize a billion is sort of an arbitrary number. Our mission isn't to connect a billion people, it's to connect everyone in the world." Facebook had missed out on the chance to control mobile phones, which went mainstream at about the same time Zuckerberg was hacking away in his Harvard dorm. V.R., he decided, was about to have a similar moment. "These big computing platforms come around every 10 years," he says. "I think it's time to start working on the next one." He invited Iribe to show him a prototype at Facebook's headquarters.

The demo in Sandberg's office went spectacularly well. "We were running around high-fiving," says Cory Ondrejka, a Facebook engineer who was helping to lead Zuckerberg's V.R. search.

Iribe told Zuckerberg that if he thought that was cool he'd better come to Irvine and see a more advanced version. When Zuckerberg arrived, Luckey introduced himself and then quickly walked away. "I'm a big fan," he said, "but I actually have to get back to work." Luckey figured he had more than $90 million in the bank already. "If Mark had been like, This is stupid, I don't get it at all, we would have said, Yeah, well, screw Mark anyway. What does he know?"

Zuckerberg seemed taken aback by Luckey's brusqueness but also charmed. "They definitely have the hacker culture that we have," he says. "Those shared values were what attracted us to each other and made us comfortable." Discussions ensued over the next few weeks, during which Facebook offered roughly $1 billion, which Iribe considered low. The deal seemed to peter out until late February, after news of the WhatsApp deal hit: Facebook had agreed to pay $19 billion for the messaging service. That got Iribe's attention. "Hey Mark," he wrote in an e-mail, "we should talk."

They agreed to meet. "Come up and see me," Zuckerberg said, according to Iribe. "I'm not going to waste your time."



REALITY BITES
Brendan Iribe and Nate Mitchell, at Oculus's hardware-engineering desk.

Photograph by Annie Leibovitz.

Iribe met with Zuckerberg for brunch on the patio at Zuckerberg's Palo Alto home on a Sunday, in March. They ordered pizza, and Zuckerberg made a new offer: more than $2 billion in cash and stock. It was rich, considering that Oculus had not yet released a consumer product. Zuckerberg promised that Oculus would operate independently within Facebook, just as Instagram did and WhatsApp would. There would be games, sure, but eventually much more: news, sports, movies and TV, cat videos—everything. "I want to do this, and I want this to be the future of Facebook, long-term," Zuckerberg said, but Iribe would have to act quickly and promise not to shop the deal.

Oculus, by this point, had a board of directors that included four venture capitalists, one of whom was Andreessen. The board would have to approve the deal. Andreessen hated the idea of selling so quickly, without talking to Facebook's competitors. "Don't do this! Don't do this! Don't do this!" Iribe recalls Andreessen saying during a late-night meeting at his house after Zuckerberg's initial offer. (In light of his role on Facebook's board, Andreessen recused himself after Oculus's founders began negotiations with Zuckerberg in earnest.) But the board approved the deal.

It was sealed at Zuckerberg's house just three days after his and Iribe's Sunday meeting, over a dinner featuring mushroom risotto and scallops. The meal, Luckey recalls, was "*so* good." And Facebook was the right fit. "I knew I was going to want to work in V.R. for the rest of my life. Anything that can make the industry big and successful … that's a supercool world that I want to live in." Luckey is on a roll now, rhapsodizing about the future: "Being able to do anything, experience anything, be anyone. What would be a better entertainment technology than perfect virtual reality? There isn't any."

Less than a week after shaking hands on the deal, Zuckerberg announced the acquisition on his Facebook page. He sketched a vision of vast possibilities. "Imagine enjoying a court side seat at a game, studying in a classroom of students and teachers all over the world or consulting with a doctor face-to-face—just by putting on goggles in your home," he wrote. "Virtual reality was once the dream of science fiction. But the internet was also once a dream, and so were computers and smartphones."

Even with its release imminent, the Rift remains imperfect. Despite Iribe's boasts to the contrary, the device can still make you feel queasy if you play for a very long time. Moreover, most techies, including Zuckerberg, see the current Rift as an intermediate technology at best. "I do think it's pretty clear that at some point in the future we're going to have glasses or contact lenses … that can give you some more sense of context of what's going on around you in the world," he says. Zuckerberg believes that Oculus—and its competitors—will eventually build ever smaller headsets until we're all wearing V.R. glasses that can also project virtual objects into the real world. "The stuff that A.R. will be pretty amazing for in the future is like 'All right, let's play chess,' " he says, snapping his fingers and gesturing to the midcentury coffee table in his office. "Here's a chessboard."

One Giant Leap

That won't happen for perhaps 5 or 10 years, according to Zuckerberg, but some are more optimistic. "We are doing some really breakthrough stuff that's not just taking a cell-phone screen and putting it in front of your face," said Rony Abovitz, the founder of Magic

Leap, earlier this year at a conference organized by *M.I.T. Technology Review*. It was a clear dig at designs such as Luckey's. When exactly Magic Leap's product might go on sale is a closely guarded secret, and few outside the company have seen the headset in person. "I'm sure we'll be opening the veil shortly," a spokesman, Andy Fouché, promised me in an e-mail. He declined to explain further, so I e-mailed Abovitz directly. An hour later Fouché wrote me back coldly, "Please don't reach out directly to Rony." But patent filings suggest that Magic Leap's product will be a pair of glasses that uses a digital projector to shine images into your eyes, allowing you to see monsters running around your office or ballerinas dancing on your bed.

Abovitz, whose previous company, Mako Surgical, created robotic devices for knee-replacement surgeries and was sold for nearly $1.7 billion, is a bit on the unconventional side. He writes stream-of-consciousness blog posts, plays in a "wonky pop rock" band called Sparkydog & Friends, and in 2012 gave a talk at a TEDx event in Sarasota, Florida, for which he dressed as an astronaut and re-enacted the 1969 moon landing. Behind him, two furry mascots performed a version of the celebrated monolith-stroking scene from Kubrick's *2001: A Space Odyssey* and then gyrated wildly to punk-rock music while throwing around placards labeled FUDGE. Abovitz was expected to discuss Magic Leap at TED's main event last March, but he canceled the talk without explanation the day before, leading some to ask if Magic Leap will really be able to deliver on its grand promises. "What Magic Leap has built is spectacular," says Legendary Entertainment's Tull. "But you've got to execute on it."

On the other hand, Abovitz is widely believed to be a genius, which means that even his wildest proclamations are taken seriously. Crucially, he has implied that virtual-reality systems, such as the Oculus Rift, could do more to a person's brain than cause seasickness. "The brain is very neuroplastic," Abovitz claimed during a Reddit Ask Me Anything interview. "And there is no doubt that near-eye stereoscopic 3D systems [like the Rift] have the potential to cause neurologic change." What he means is that Oculus's full-screen immersion might cause brain damage, unlike his projections onto the real world. This is partly gamesmanship—there's no independent evidence to suggest that Abovitz's version of a virtual reality will be any better for your brain than Luckey's—and yet his claim may also contain more than a little truth. Some research suggests that both television and the Internet may hamper brain development, and it seems reasonable to think that a more intense, more immediate communications technology would be even worse.

Virtual-reality proponents dismiss these fears. "I've watched more V.R. than most people, and I don't feel like I have brain damage," says Chris Milk, a former music-video director

whose company produces and distributes short, 360-degree movies watched on a headset. Milk believes that whatever health risks the Rift and its competitors might pose will be vastly outweighed by the opportunities for artistry and empathy. “When you let someone try virtual reality for the first time, it’s a transformative experience,” he says.

The name of Milk’s company, Vrse.works, is a reference to a science-fiction concept known as “the metaverse.” The idea, formulated by the writer Neal Stephenson (who now works for Rony Abovitz as Magic Leap’s “chief futurist”), is of a nearly limitless virtual world populated by billions of plugged-in people. They will exchange ideas, buy and sell goods, such as virtual real estate or a new avatar, and have incredibly realistic cybersex. (If nothing else, it seems certain that virtual reality will change porn, and possibly sports, forever.) Luckey and Zuckerberg are also firm believers in the potential of the metaverse. This, Luckey says, is why he sold the company to Facebook. “If you were to look at all the companies in the world and ask which one of them is most likely, 20 years from now, to be running the metaverse? Probably Facebook.”

As the V.R. pioneer turned cultural critic Jaron Lanier says, “The most amazing moment of virtual reality is when you leave it, not when you’re in it”—the appreciation of life’s small moments that one experiences after battling make-believe dinosaurs or flying like Superman. “You have really never seen reality until you’ve just come out of virtual reality,” Lanier has said.

In Luckey’s mind—as well as Zuckerberg’s—the idea that we’ll all one day plug in is so certain it’s banal. “There could be a world where V.R. replaces most real-world interactions,” Luckey told me between bites of peach pie at an outdoor café on Facebook’s campus. “What will happen is for many low-value interactions”—*like this one?,* I can’t help but think—“V.R. will replace a lot of those.”

As the Oculus Rift is about to hit the market, Zuckerberg is cautious. “It’ll ramp up slowly,” he says. “The first smartphones … I don’t know if they sold a million units in the first year. But it kind of doubles and triples each year, and you end up with something that tens of millions of people have. And now it’s a real thing.”