For the last seven years, I have worked alongside filmmakers in Hollywood, exploring the vast imaginative potential of digital creation. The advances have been amazing. Virtual production tools, pioneered nearly six years ago by James Cameron in Avatar, are remaking the nature of work in film. Digital creation, once fiercely removed from the day-to-day creative process, is now part of the hands-on workflow of directors, designers, and actors. Artists across the industry now step inside fully rendered virtual environments to plan and imagine their films. Actors perform as virtual characters and are finally and truly unbound from the limitations of their physical forms. Directors on set can see their stories’ physical and digital elements as they’re captured, and the familiar refrain of “we’ll fix it in post” is being replaced with “let’s try that again.”

**DIGITAL WORLDS**

Fully realized digital assets and responsive, rule-driven digital environments are upending how we plan and create everything from buildings and airplanes to cities and worksites. The tools used to create digital worlds and characters evolve to better meet the needs of the artists who use them. These tools, such as DreamWorks’ Apollo (www.screendaily.com/home/blogs/dreamworks-animation-unveils-apollo/5072353.article) or Disney’s Camera Capture System (www.awn.com/vfxworld/all-world-s-virtual-stage-disney-s-new-camera-capture-system) are achieving the kind of computational power needed to work fluidly and at the pace of the imagination of the person wielding them. Intel and the University of Southern California have been leveraging such tools, evolving virtual reality (VR) and augmented reality (AR) technologies to build digital worlds and explore new narrative experiences (see Figure 1). As these tools advance, the number of artists seeking and mastering them is growing exponentially.

The modern motion picture camera is an example of digital creation. Its magic isn’t its reality, but its extra-reality. With it, artists, scientists, and advocates can easily express their ideas in genuinely new ways: A man can become a dragon. We can see 10 years of growth unfold in a city in seconds. New construction materials can be tested without breaking ground. Soldiers can develop their combat skills without risking their lives.

Any sufficiently advanced technology is indistinguishable from magic or evil.
–adapted from Arthur C. Clarke
WHO’S AFRAID OF VR?
So why is there so much drama around virtual reality? Alongside skepticism about the viability of VR technology are concerns about the implications of its success. Many of these concerns emerge from the conflation of VR and artificial or machine intelligence. The concept of the Singularity—the existential threat to life on Earth posed by machine intelligence—is often tied to the emergence of robust virtual and augmented realities (www.three.lf/three.lfrdsquare.com//two.lf/zero.lf/one.lf/three.lf//zero.lf/seven.lf/nick-bostrom-on-existential-risk-and.html). This connection goes well beyond the 70,000 people who have watched Nick Bostrom’s “The End of Humanity” TED talk on YouTube (www.youtube.com/watch?v=P/zero.lfNf/three.lfTcMiHo).

For decades, artists have entangled AI with VR, lighting VR with the mythological fates of the likes of Icarus and Dr. Frankenstein. These stories are cautionary tales about the arrogance of human ambition and the danger that can come with trying to transcend natural or divine limitations: Icarus flew too close to the sun. Frankenstein created life. Likewise, crazy AI machines enslaved humanity in the Wachowskis’ 1999 film The Matrix, and the Metaverse in Neal Stephenson’s 1992 novel Snow Crash tempted humanity to turn on, tune in, and drop out of reality. It’s no wonder we don’t trust these tools. I don’t know about you, but I really don’t want to become a human battery.

If we look beyond the trappings of imagined and metaphorical VR, we’ll see a creative tool evolving along a very different path than what Stephenson and the Wachowskis imagined. In fact, instead of marginalizing humans, these new tools empower an entirely new generation of creators. Motion capture isn’t replacing actors—it’s giving them the ability to play roles they never could have imagined. Digital worlds aren’t overtaking our reality—they’re enabling artists to visualize both science and fantasy in entirely new ways.

While making the 2014 film Interstellar, director Chris Nolan called on astrophysicist Kip Thorne to provide guidance to help the special effects company Double Negative create a black hole effect (www.wired.com//two.lf/zero.lf/one.lf/four.lf//one.lf/zero.lf/astrophysics-interstellar-black-hole). After a year of work, a rewritten render engine, and hundreds of terabytes of data, they created “a simulation of unprecedented accuracy” that surprised artists and scientists alike. The computational power that Double Negative threw into that black hole didn’t override the final effect: it was simply a tool shared by artists and scientists that, like so many tools before it, utterly remade how we see the world.

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Figure 1. Intel and the University of Southern California’s Leviathan Project, inspired by Scott Westerfeld’s novels, invited attendees of the 2014 International Consumer Electronics Show (CES) to step into a world where virtual whales fly through human environments (http://vimeo.com/86141926).