The Singularity and Me
Reflections on My Recent Class at Singularity University
By
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November 18, 2018

I spent the past week at Singularity University, in Moffett Field, CA, on the NASA Research Park campus, sitting among more than 90 company executives from 34 different countries, listening to lectures from industry experts about Artificial Intelligence, virtual reality, rewriting DNA, the microbiome, brain implants, autonomous cars, and other innovative technologies that are already radically altering our world. I admit, it was an unusual environment for a minister to invest his time and resources in. Silicon Valley isn't exactly Mecca, but it called to me as sure as the Comino de Santiago, Stonehenge, or Machu Picchu calls to other sojourners.

When other participants expressed friendly curiosity about my presence, most of whom were from other countries and had never heard of Unitarian Universalism before, it was a challenge to dismantle their misconceptions about what being a "minister" means to begin with, to introduce a little about how Unitarianism differs from other religions, and to explain my reasons for being there in just a few introductory comments. "My faith embraces science and reason as a source of inspiration," I'd say, "and, in my studies, I've long understood evolution to be a process of convergence through which everything is moving towards unification and greater states of consciousness." This is the whole point of Brahmanism, the 3000-year-old Hindu myth of Brahman—Absolute Reality—asleep, dreaming about a Universe containing a myriad of things that will end when the drowsy deity finally awakens to realize everything is One. It's also what the Jesuit Priest and paleontologist, Pierre Teilhard de Chardin, who helped discover the Peking Man, more directly meant early in the 20th century when he said, "Life moves toward unification."[1]

So, if anything, the founders of Singularity University, Peter Diamandis, of the X-Prize Foundation, and inventor/futurist, Ray Kurzweil, both bestselling authors, first encroached upon my professional turf—Diamandis with his inspirational message of hope for the near future, and Kurzweil by sometimes using theological language to describe how technology will enable the Universe to "wake up" and become "sublimely intelligent." "That's about as close to God as I can imagine,"[2] he says.

I first heard about Singularity University several years ago, upon reading Diamandis' book, *Abundance: The Future is Better than You Think.* "Each year," he explains, "the graduate students are challenged to develop a company, product, or organization that will positively affect the lives of a billion people within ten years."[3] This challenge, I learned this week, is referred to as a student's 10x Vision. My vision, it may not surprise you, is to create

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[1] de Chardin, Pierre Teilhard, *The Future of Man*, Harper & Row, New York, NY, 1959, 1964, p. 72.
[2] Kurzweil, Ray, *The Singularity is Near*, Viking Press, New York, NY, 2005, p. 389.
[3] Diamandis, Peter H., & Kotler, Steven, *Abundance: The Future is Better than You Think*, Free Press, New York, NY, 2012, p. 73.

something that harnesses exponential technologies to help bring the global human family together. I envision, for example, a platform that allows people all over the world to have a voice and vote on the issues impacting us all, or using Virtual and Augmented reality to help some of the poorest or most isolated people anywhere, behind a wall in Gaza, impoverished in Sub-Saharan Africa, locked away in prison, to find employment anywhere on the planet without leaving where they're at, and using AI to help us all instantly transcend our language barriers. If this sounds like an impossible dream, keep in mind the technologies for making it happen already exist.

But I don't want to get ahead of myself. Let me back up by talking about the meaning of the terms, *exponential* and *the Singularity*. In 2001, Ray Kurzweil wrote an essay entitled "The Law of Accelerating Returns," in which he distinguishes between "intuitive linear" and the "historical exponential" views of technological progress. In brief, he explains, people "intuitively assume that the current rate of progress will continue for future periods,"[4] that things will evolve at the same rate we're experiencing now, but, from the broader historical view, he says, "Exponential growth is a feature of any evolutionary process, of which technology is a primary example."[5] Computational power, for example, doubles every year. Its evolution isn't a steady linear line upward, but a line that sharply bends from a straight horizontal incline to a sudden vertical line going straight up. I won't go any further into the theory here. All we need to do is look at the technological advancements wrought during the past hundred years, which have especially accelerated during the last few decades, any you'll understand the meaning of exponential change.

In 2005, Kurzweil published a bestselling book entitled, *The Singularity is Near*, referring to the point at which technology allows intelligence to transcend biology, leading to an explosion of rapid changes that will make the advances made during the next 100 years look "more like 20,000 years of progress,"[6] he says, at today's rate. During a lecture this week, Pascal Finette, SU's Chair for Entrepreneurship & Open Innovation, pointed out that if we had a time machine that could bring Jane Austen 200 years into the present, "she'd probably go crazy because of all the changes." But if we brought someone from the 15th century 200 years forward into Jane Austen's time, they would notice few changes, if any. "To get someone to have the same, mind-blowing experience she had visiting us," Finette says, "she'd have to bring someone from 13,000 BC," someone from the Stone Age, before agriculture began. He calls this kind of reaction "disruption," and you can see it on YouTube watching the responses of people who experience virtual reality for the first time; or are sitting in an autonomous car that suddenly speeds up to 75 miles per hour with nobody driving.

In a world of exponential change, amidst a technological singularity, humans will have to live in a world of constant disruption that requires us to continuously learn and adapt—a world, you may not realize, that has already begun. Driverless cars are a good example. On my way to the airport yesterday, I asked my Uber driver what he was going to do when automated cars take over the roads. He responded by saying it won't happen for a very long time and

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[4] http://www.kurzweilai.net/the-law-of-accelerating-returns
[5] Ibid.
[6] Ibid.

isn't something he needs to worry about. Maybe, but consider this, during another lecture, Neil Jacobstein, SU's AI and Robotics Chair, showed a 1904 photo of a busy New York City street filled with horses and only two cars. A 1917 photo of the same busy street shows no horses and all cars. In 1900 there were only 8-thousand cars in the world. Just twenty years later, there were 8-million, and that was at a time technology was advancing very slowly compared to now. General Motors' Chairman, Mary Barra who has predicted the auto industry will change more in the next five years than it has during the past fifty, says automated cars will soon become a "second office," allowing passengers to work while AI does the driving. It also means those who are no longer able to drive themselves don't have to give up their own autonomy. They can still go anywhere they want at any time. The technology is already here. Now it's just a matter of waiting for mass production and regulations to catch up.

Before going into the reasons I think this kind of information is important for all of us, let me take a few moments to talk about what some of the informational highlights of the week were for me. I didn't know, for instance, that between 2015 and 2016, two-legged robots from a variety of engineering groups went from constantly and comically losing their balance and falling over while conducting difficult feats and traversing uneven terrain, to being able to run upstairs and do back flips thanks to advances in Artificial Intelligence—again, in just one year! There are also now robots so small they can stand on the cross section of a human hair, and nano-sized robots powered by electromagnetic fields that can be ganged together, like the individual cells of a muscle, to perform a variety of tasks. Although AI isn't self-aware, just yet, it is now able to make decisions on its own, thanks to deep learning, that is, by collating information from thousands, even millions, of sources in an instant. AI robots are already making decisions on the surface of Mars, beneath artic ice sheets, on our roadways, and, increasingly, in the realms of medicine and criminal law.

Suzanne Gildert, founder and CEO of Sanctuary AI, heads one among many companies working to build embodied AI robots that are indistinguishable from humans. She reasons that if we want AI to have our values, and be able to relate to us, and us to them, they need to learn as humans, with humans, in human environments. She doesn't worry about them being heartless machines. On the contrary, she expects them to obtain hyper-empathy and compassion, and to serve as our companions, therapists, caregivers, nurses, and even our entertainers. Maybe you've seen Sophia, the humanoid robot developed by Hanson Robotics, making the rounds on late night television recently. She's the first robot to have been granted legal citizenship, in this case by Saudi Arabia. Impressive as they are, these AI robots are far from being indistinguishable from human beings, but, given the law of accelerating returns, they're likely to be perfected sooner than imaginable. "We have a demo model out at the university interacting with people," Gildert says. "That doesn't feel like it's moving very fast but compare it to how many Teslas were shipping in 2008 vs today." The answer is, from the time it built its first Roadster in 2008, it delivered 321 cars in 2012 and this year it's delivering more than 80,000. That's 26-thousand percent exponential growth! Again, in 1904, there were only two cars on a street dominated by horses. 13 years later there were no horses on a street congesting with automobiles.

Personally, I think companies like Sanctuary AI will succeed in creating humanoid robots sooner than most of us imagine, but I also think they will be obsolete before they get here. They'll be an unnecessary novelty due to the much more rapid advancement of Extended Reality, meaning virtual and augmented reality. Virtual reality, which hit the consumer market less than three years ago is already capable of transporting us anywhere in the Universe, to a precise replication of Mars, for instance, developed by NASA, based on Rover and other lander photos. For the first time topographers can walk on virtual simulations of Mars to accurately maps its surface. We can visit with others from around the world in virtual social spaces and meeting rooms. We can go into a virtual submarine and explore the sunken Titanic, visit museums, climb Mt. Everest, fly to other planets, relax on the beach, base jump, rock climb, go to a large screen theatre in the comfort of your own home, and so much more. Even more importantly, virtual reality is helping us rewire human brains to bypass damaged bodies where certain connections have been lost. Paraplegics are regaining the ability to move their legs by learning to walk in VR. Burn victims living in chronic pain alleviate their anguish by going into a frozen VR environment and throwing snowballs at virtual penguins. It's already being used to train athletes in professional sports, to take schoolkids on virtual field trips, to train employees at Walmart and Lowe's, and to learn how to operate heavy equipment without worrying about dangerous, expensive accidents.

Augmented reality doesn't create a virtual space, but virtual objects in real space. Instead of owning a physical television, or a computer, or even a cellphone, we can simply put on a pair of glasses and have all these things appear right in front of us, in whatever environment we choose to be in. This is already happening. I experienced it just this week. The dematerialization of stuff is going to save a lot of resources; and being able to go anywhere and be with anyone will reduce the need to travel and burn fossil fuels in the process. Dematerialization will also allow AI to exist anywhere, in whatever form we want, as a person, a talking dog, what have you, or whatever form it chooses for itself. So I don't see any reason for AI to get locked into a physical body. There may be robot bodies any of us, AI or human, can temporarily inhabit and control through a VR headset whenever we need to have a physical presence elsewhere—to do a dangerous job, for example—but I don't see a widespread need for AI to have physical bodies. Since Extended Reality is already so advanced, I just don't see a massive need for embodied AI.

Speaking of going to space, most everyone has heard humans are planning to go to Mars by 2030. The idea is that we will someday inhabit it, as a "Plan B" in case Earth doesn't work out. Even though the trip to Mars is likely to happen and some may eventually live there, it's not considered a viable plan for expanding our presence beyond Earth. I was surprised to learn, upon hearing Gregg Maryniak, an internationally recognized and award-winning NASA scientist, that the idea of constructing cities in space is being taken far more seriously than finding another planet to live on. Plans already exist for space cities the size of Switzerland that would include gravity and shield their inhabitants from cosmic radiation. These cities will dwell in what's called "free space," outside the gravity wells planets are in, escaping from which is the most dangerous part of space travel. In free space, outside the harsh pull of planets, this won't be a problem. Some speculate a trillion of us will eventually live in space cities, far more than inhabit the Earth. Again, these plans are already in the

works, and billions of dollars are being spent by entrepreneurs like Jeff Bezos, to make them happen.

More exciting than space exploration, however, is the positive impact technologies like these are already having on our environment, particularly regarding Global Warming. There are five major sources of carbon emissions—electricity, agriculture, manufacturing, transportation, and buildings, none of which is a main culprit, and all of which are being impacted by emerging technologies. For instance, we are now beginning to use largescale 3-D printers to construct affordable, energy efficient houses, using very few materials, at a cost of about $8,000 each. They are expected to get down to just $4,000 soon. Not only does this save resources, it's how communities like ours can address homelessness and housing, and, perhaps, lead to a world that can afford to guarantee housing as a basic human right. 3-D printing is also being used to combine and make parts for airplanes and automobiles and other products, that are lightweight and use much fewer resources. Agriculture, especially cows, produces about as much CO2 as energy production because of the Methane Gas they make. Today, a variety of companies are producing real meat and leather in laboratories out of stem cells. The process doesn't kill animals, costs less, and uses much less land and water compared to live animal production. Humane meats are expected to be on the market in just a few months. Extended reality, as I mentioned, is also eliminating the need to use material resources, and is going to disrupt our need to travel as much as we do.

As far as energy goes, you may have heard, Peabody Coal went from an all-time financial high in 2011 to bankruptcy just two years later. In fact, between 2011 and 2017, 75 percent of coal companies around the world went bankrupt. Natural gas is one reason, but so is the growing renewable energy industry. Since 1980 the cost of wind energy has plummeted and is now selling for a little as 2 cents per kilowatt, the lowest price for energy ever. A big part of this is the growth of wind production driving the cost down, along with exponentially improved wind harnessing technology. Likewise, since 1980, the cost of solar energy has dropped 250 times, from 77 dollars per kilowatt, to just 30 cents. Today, the cheapest coal and oil produced energy is twice that amount. It's predicted solar energy will cost a penny per kilowatt in the 2020s, an industry that has grown 50 times larger in just the past ten years. More solar was installed last year than in all of history. Since wind and solar can be combined, and one is produced better at night and the other during the day, and because of new battery technologies for storing these energies, they are expected to soon cover most the world's energy needs. And, despite his bravado, coal and oil champion Donald Trump hasn't been able to make a dent in any of these green energy trends.

Of course, the damage is already done, the climate has already changed, even if we do dramatically reduce our carbon emissions. This means we need to develop technologies to help reverse its impacts. Fortunately, this is happening too. Technologies now exist that can remove carbon from the air. And drones are being used to go to remote areas where they can impregnate the ground with new trees, nature's way of dealing with the problem. And just this year a team met the Xprise Foundation's challenge to develop a technology that can collect "a minimum of 2,000 liters of water per day from the atmosphere using 100 percent renewable energy, at a cost of no more than 2 cents per liter." Skysource/Skywater Alliance,

the winner of the challenge, is already using this technology to pull fresh water out of thin air in some of the most parched places on the planet.

There are already so many other transformative technologies I heard about this past week that I don't have time to go into, including gene editing that already allows us to turn off those responsible for things like Alzheimer's, HIV, and certain types of cancer, and chips in the head to enhance our memories. Nor do I have time to go into some of the frightening possibilities some of these same technologies present, like AI taking over the world, the weaponization of gen-tech, the takeover of our personnel data, and so much more. As with everything, there are sure to be some unforeseen consequences, but a future without problems is probably the one thing about tomorrow I can guarantee will never happen.

I bring all of this up today, and am personally inspired by it, because it gives me tremendous hope for both today and tomorrow at one of the most dire points in human history. We face some of our biggest problems ever, yet also have some of the most incredible solutions ever, accompanied by some of the most incredible advances in human history that are about to change everything. When Bill Clinton met Peter Diamandis, the author of his favorite book, *Abundance: The Future is Better than You Think*, he asked him, "Why are you so positive? Don't you watch the news?" Diamandis told him "no," but not because he tries to avoid disturbing information. He doesn't watch the news because he doesn't believe its true. During his lecture this week, he pointed out bad news is presented today 10:1, missing all the progress we're making, that things like income, lifespan, and food availability are up, while the costs of energy, transportation, and communication is down. In 1820, 94 percent of people lived in extreme poverty, today its 10 percent; 83 percent had no education, today 86 percent have a basic education; 88 percent were illiterate, today its only 15 percent; only 1 percent lived in democracies, today its 56 percent; 0 percent were vaccinated against common diseases; today its 86 percent; 43 percent of children died before age 5, today its less than 4 percent.

I took my pilgrimage to Silicon Valley, not to have my cup filled, but because I know the cup that's half empty is the same cup that's half full. I took my sojourn to find hope for a future that easily looks dire, but left with faith in the here and now. I left, an American, who sat among nearly a hundred strangers from countries around the globe and found myself part of one human family that transcends nationality. This morning I got a group message from one of my newfound friends in the UK, saying, "I love this photo." It was a picture of a placard stating, "'People have no idea how fast things are changing,' Spread the Gospel."