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The Fourth Industrial Revolution

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Good morning. It is a pleasure to be here with you. I am not going to tell you that the world is changing. I will not tell you how technology has impacted humanity. However, I do want to point to a startling pattern. About three million years ago, early humans picked up the first stones to crack open nuts. These stone tools, called the Oldowan were the first technology. One million years later, we found fire. One million years later, we have rough axes made of stone and wood. Half a million years after that, we have the birth of language.

Then every hundred thousand years, there is a leap in technology: the wheel, bread, agriculture, paper, navigation. Things start speeding up—every one hundred years we have a new disruptive technology: woodblock printing, wind power, gunpowder. Just 250 years ago, the first Industrial revolution began with manufacturing and the steam engine. Less than fifty years after it ended, the second industrial revolution shook the world with the inventions of electricity, petroleum, steel, and railroads. The third industrial revolution started in the 1980s -- ushered in by the computer, the cell phone, the internet. While change itself is as old as the universe itself, the speed of change is accelerating very, very quickly. The time in between huge shifts is quickly narrowing. The human civilization is rushing faster and faster toward the next, the new, the disruptive. While the early homo erectus had hundreds of thousands of years to adapt to each big leap, the average modern person will live through multiple revolutions in their lifetime. What used to be a linear rate of change is now exponential. Two years ago, Professor Klaus Schwab, Founder and Chairman of the World Economic Forum, described the 4th Industrial Revolution: New technologies are fusing the physical, digital, and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human.

Let's think about what this really means. All the things we and generations before us have experienced—normal things like cooking, working, going to a show, getting chicken pox, buying groceries, falling in love, getting our first job, graduating (not chronological obviously) are changing. The way we move through our homes and our lives is being transformed. My grandmother went through such a different set of experiences in life that my life sounds alien to her and hers sounds alien to me. I regularly sleep in strangers' homes, ride in strangers' cars, see the doctor without actually seeing her, have tea with friends in three different countries at the same time. Here is the second trait of this revolution—scope. The 4th Industrial Revolution is disrupting almost every industry in every country, bringing changes to life that are unpredictable at an unprecedented speed.

Professor Klaus Schwab adds that, “The changes are so profound that, from the perspective of human history, there has never been a time of greater promise or potential peril. My concern,

however, is that decision-makers are too often caught in traditional, linear (and non-disruptive) thinking or too absorbed by immediate concerns to think strategically about the forces of disruption and innovation shaping our future." ¹

At every point of disruption is an opportunity to reinvent. Whether it's a 3D printed liver or an AR hotel stay, these are completely new experiences. In every one of these experiences, there exists a massive opportunity for artists and designers to influence, even define, the human experience.

I won't get too distracted in describing the new technologies, but I want to describe the impact of these technologies on the workforce. When I say the workforce, I mean the general category of people who either work for a living or contribute to society. This includes entrepreneurs, independent artists, freelancers, and employees. My focus is on the workforce because it is the same force that both draws your students into higher education and pulls them out of school and into employment situations.

The face of the workforce is changing rapidly and non-linearly. Automation, robotics, machine intelligence are already phasing out the need for factory workers all over the world. AI is impacting white collar jobs as well, requiring people to focus on more decision making and creative thinking functions while machines take over the routine, repetitive tasks. Here is an opportunity for art and design schools to offer training that sharpens these critical thinking, creative problem-solving skills.

While the machines are taking on more work, intimate relationships with millions of people are possible. Social platforms offer pathways into wide and deep communities of audiences and individuals—creatives, entrepreneurs, not corporations—are able to cultivate real friendships. Corporations that have traditionally sold their products at wholesale to intermediary shops and distributors are being disrupted and are scrambling to develop direct relationships with customers. Here again, artists and designers have the opportunity to participate in the daily narratives, conversations between people, brands, and ideas.

We are also seeing a shift in the way people are making a living. The rise of the gig economy and portfolio careers is turning individuals into an army of solo entrepreneurs with a variety of diverse revenue streams that give them both flexibility and stability in this environment. The Bureau of Labor Statistics recently gave its first official report; 11% of workers (16.5M Americans) have already made this shift. NASDAQ estimates that 43% of all American workers will be freelancers by 2020. Artists and designers are natural fits for thriving in this type of workforce.

Never before in the history of humankind have artists faced the opportunity to define and redefine the global human experience in the ways we live, work, and play. Never before in the

¹ Schwab, Klaus. The Fourth Industrial Revolution. London: Portfolio Penguin, 2017.

history of humankind has an individual person had the chance to share her work with billions of people around the world. Never before in the history of humankind have we had adapt to adapt quickly and strategically to stay relevant. The 4th revolution isn't coming, it is here.

We are not prepared for the speed, scope, or impact of change. Our financial systems, our laws, our governments, our critical infrastructure, our relationships, our ways of working, getting and keeping a job are unprepared. Our traditional educational systems are unprepared. To repeat Professor Schwab's words of warning, "Decision-makers are too often caught in traditional, linear (and non-disruptive) thinking or too absorbed by immediate concerns to think strategically about the forces of disruption and innovation shaping our future."²

One challenge is the gap between what the workforce requires and what higher education produces is increasing. The current model of higher education was developed to prepare people for the real world as it was 100 years ago. We've had two industrial revolutions just in the last fifty years and our schools haven't kept up pace.

Sixty-five percent of children entering elementary school this year will be employed in jobs that do not exist today. The 2018 Job Outlook Survey says that 90% of new graduates versus 40% employers believe they have all the proficient skills and capabilities to succeed in their jobs. The gap is becoming obvious.

We often casually describe the high school experience as preparation for college, to prepare students and to get them ready for the real world. In college we are still preparing, now young adults...for the "real world." For the entirety of human history until the 4th revolution, this "real world" was relatively the same "real world" before, during, and after a student's educational experience. For the first time in human history, experts predict that most of what the class of 2022 is learning in college will be out of date by the time they graduate.

How could we ever expect current schools (let alone arts schools) to close this gap when the target is changing every single day? This gap doesn't exist only for new graduates. Established professionals are facing serious pressures to catch up, stay relevant, or retire. Even students graduating with STEM degrees are facing challenges. While their career prospects are strong in the short term, upon graduation they are lacking the skills needed for long-term success. The speed of change doesn't show any favoritism.

Large corporations are also unprepared. Within the next ten years, 75% of companies who are on the S&P 500 list today will be gone.

How can art and design students be successfully prepared for a world that no one has ever seen? How could our arts institutions adapt themselves and help their students adapt for the 4th revolution?

² Schwab, Klaus. The Fourth Industrial Revolution. London: Portfolio Penguin, 2017.

The workplace's needs are changing at an exponential rate; thinking of this gap as a linear period of time that occurs after graduation and before becoming a valuable contributor won't work. Instead of "bridging this gap," what if we eliminated the gap from day one? What would it mean to blur the lines between student and professional? What if students were always connected to the workforce and professionals were always connected to the schools? If students never graduate and professionals never "began" or "ended" their careers? What if students regularly returned as faculty and then became students again in cycles that never ended?

Adaptation means that people can move fluidly from one role to the next, gracefully meeting the needs of blurring transforming industries, from one gig to the next. Could we design a curriculum that built the core skills for adapting—a curriculum that would be relevant and valuable regardless of the disruptions in the workforce? What might be these core skills?

1. Communication to a wide variety of audiences—transferable skills and case studies;
2. Entrepreneurship and sales
3. Networking
4. How to transition from industry to industry, role to role
5. Creative problem solving

What are hard and soft skills that are in high demand for the industries that your graduates could aim for? How do you get this information? Do you have a robust network of relationships with a diverse range of industries sufficient to help inform and shape educational experiences in ways that meet workforce needs? How might alumni play a key role in helping students embrace the "real world" sooner?

To sustain these new experiments, how and where will the arts institution drive enrollment? The opportunity might lie within the threat. Working professionals too need more education to re-skill, adapt, and stay relevant. What if art and design schools looked beyond the two and four year cycles toward lifelong learning? What would new paths into education at your school look like for professionals in the workforce, entrepreneurs, faculty, alumni? What are other business models that fit the lives of these non-traditional students? Most professionals and entrepreneurs don't have the finances or the time for multiple rounds of full-time four-year or two-year programs. What if people paid an annual subscription fee to access education for life?

The 4th revolution was built on the backs on every single innovation, failed experiment, risky project that humans have undertaken for the past 3 million years. The world is shifting so quickly because it is easier and cheaper to take risks, and to place bets on the new and disruptive. Creative risk taking is at the heart of this movement, and is at the heart of all arts education. Every one of your institutions is uniquely positioned to wield this strength to your advantage. You may wish to use the inherent creativity on your teams to take smart risks, to place smart bets on new ideas. The spirit of entrepreneurship comes naturally to artists and designers. This spirit can be cultivated in academic institutions to methodically:

1. Build new partnerships and extend the network
2. Experiment with new business models
3. Learn from failure
4. Develop new services and offerings with alumni and network partners
5. Repeat quickly over and over again

Well and good, but isn't the 4th revolution really about technology? Technology eats the world they said. What about STEAM? While it does acknowledge a place for arts within the constructs of technology, it cannot be relegated to an existence in "service" of technology. This would be completely backwards. Art and design must stand on their own. Technology and science must be used in service of art and design—which in turn exist to give meaning to life itself. Pablo Picasso famously said, "Computers are useless. They can only give you answers."³ Could STEAM produce people who ask the hard questions the way that artists and designers do?

Of course, I am a serious supporter of STEM education. I deeply believe in the long-term positive impact STEM can make on our future economies. However, it doesn't fully cover the needs of the present and workforce. We need art and design education in equal strength, an educational movement that is centered on Communication, Art, Design, Entrepreneurship, and Technology—CADET. While this word might be an acronym which calls to mind some military images, it is inspired by two things: my limited acronym making skills, and Kandinsky's timeless words:

There work is going on which boldly attacks those pillars which men have setup. There we find other professional men of learning who test matter again and again, who tremble before no problem, and who finally cast doubt on that very matter which was yesterday the foundation of everything, so that the whole universe is shaken. Every day another scientific theory finds bold discoverers who overstep the boundaries of prophecy and, forgetful of themselves, join the other soldiers in the conquest of some new summit and in the hopeless attack on some stubborn fortress. But "there is no fortress that man cannot overcome."⁴

These soldiers fighting for our future, in my mind, are creatives who will embody in the highest possible fashion the skills to which CADET refers, standing strong—along with those indicated by STEM/STEAM initiatives.

Technologists, too, need to adapt: They cannot rise in their professions or be competitive without real depth. This depth can come in the way they work with other people, the way they

³Garson. "Computers Are Useless. They Can Only Give You Answers." Quote Investigator. Accessed December 03, 2018. <https://quoteinvestigator.com/2011/11/05/computers-useless/>.

⁴"Concerning the Spiritual in Art." Google Books. Accessed December 03, 2018. <https://books.google.com/books?id=URvGFXf2vXgC&lpg=PA12&ots=xR7rMEJ3kw&dq>; Page 12

can communicate their ideas, their ability to empathize with their customers. It could come from entrepreneurship or creativity thinking. Consider the volume of STEM (even STEAM) graduates who can gain depth through study in art and design disciplines.

Seven years ago, Marc Andreessen famously wrote that “software is eating the world,”⁵ describing how increasingly reliant the world and US economies will be on software. Today we can confidently say that “software is eating itself.” The barrier to entry for into the software developer profession has never been lower. While there are of course highly paid software developers in the world, a freelance developer residing outside of the US could be hired for five dollars an hour. We are also beginning to see AI software that writes software. The coder who has been at the top of the professional food chain is quickly becoming a commodity. Technologists too need to develop adaptive skills that have staying power. They cannot rise in their professions or be competitive without adding real depth to their knowledge base and skills. This depth can come in the way they work with other people, the way they can communicate their ideas, their ability to empathize with their customers. It could come from entrepreneurship or creativity and problem solving experiences. Consider the volume of STEM graduates—even STEAM graduates—who could gain the depth they lack at art and design schools.

All this to say is that in some ways “tech” is outsmarting itself in the best possible ways. It means that it is forcing us to look at the world as people first by automating the routine, the technical. It is also freeing us from traditional labels that often limit our professional potential. I can bring all parts of myself—teacher, student, engineer, musician, entrepreneur, painter, gardener, chef—to my work. It offers us a chance to present ourselves as a whole dynamic person with rich and complicated passions.

My most recent startup, New Knowledge, uses machine intelligence to identify real human threats in virtual networks, namely threats involving the spread of disinformation. I co-founded it with two partners, one with roots in political science who serves as our Chief Data Scientist, and the other, a theater major who served as our Chief Engineer and CEO. As the only founder with a degree in computer science and engineering, I led marketing and growth for the company. The tide is quickly turning. The future is in the hands of the creatives, not the technologists.

It won't just be handed over, of course. Arts educators and administrators must seize the opportunity to put art and design at the center of this revolution, not in the peripheries. You do have one not-so-secret weapon—the artist and designer. With the courage it takes to commit to their path, aligned with their creative and independent thinking abilities, their curiosity, their carefully-formed questions, and their depth of empathy, these individuals have the raw skills needed to lead this revolution. From the Oldowan to modern Artificial Intelligence, the single

⁵Andreessen, Marc, Ben Horowitz, Scott Kupor, Sonal Chokshi, and Balaji Srinivasan. "Why Software Is Eating the World." Andreessen Horowitz. May 20, 2017. Accessed December 03, 2018. <https://a16z.com/2016/08/20/why-software-is-eating-the-world/>.

biggest source of transformation is not in technology, but in the underlying human forces of creativity and our search for meaning. With artists and designers at the helm welding science and technology to create the next frontier of the human experience, I know they will be the ones to guide us into the 5th Industrial Revolution.

In the words of Wassily Kandinsky, "That which belongs to the spirit of the future can only be realized in feeling, and to this feeling the talent of the artist is the only road."⁶

Thank you.

⁶"Concerning the Spiritual in Art." Google Books. Accessed December 03, 2018.
<https://books.google.com/books?id=URvGFXf2vXgC&lpg=PA12&ots=xR7rMEJ3kw&dq>; Page 41