

The Societal Repercussions of Haste in the American Innovation Model

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On my honor as a University Student, I have neither given nor received
unauthorized aid on this assignment as defined by the Honor Guidelines
for Thesis-Related Assignments

Signature _____ Date _____
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Approved _____ Date _____
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Fable of Tomorrow:

Dear America,

As the wonderful prosperous country that you are, and in all your glory, I would like to express some thoughts. You may hate me for this, but it must be said and heard.

What ever happened to nationalism and patriotism? It seems as though over the years, we have regressed from a collectivist population to one that is super competitive and individualistic. From as early as preschool, we are all taught to value teamwork, but once we get to “the real world”, the tables turn, and we are thrown into the trenches to fend for ourselves. We are our own responsibilities. That is the idea of capitalism, is it not? In this capitalist economy, we earn our keep and those that cannot, no matter the situation, are worth less than their peers. It is becoming more and more beneficial in today’s society, to be creative and innovative, finding ways around things, as opposed to being hardworking. This competitive atmosphere breeds the rush for innovation. Everyone seems to want to be an entrepreneur nowadays, looking to create the next big hit thing that’ll blow up, regardless of the demand or practicality.

It is common for those outside the US to believe in “The American Dream”; the ideal that the equality of opportunity here allows for even the most ambitious dreams to come true. Many may envy the freedom that you provide, and I very much appreciate you for allowing me this level of freedom, but I also envy nations that value the group over the individual, and reward hard work that benefits the group. A nation that works together, strives together. This is one of the ideals that you were built on. However, currently, on your soil, the trend is that the more advanced we become, the more separated we grow, and this only amplifies my fears. The world is even further divided by the different sociotechnical systems in play. China is one of your

fellow leading nations, a country with a different economy, which goes to show that there are multiple systems that work. I bring this to light because China's initiatives and ideals are very much aligned to creating unity, and I believe this is something that you lack. Money is the motive for almost everything within your borders and that concerns me.

As I am in the process of writing this, we are in the midst of a global pandemic, and I have to say; you have done a terrible job of handling the situation thus far. How is it possible that the Coronavirus, COVID-19, a virus that originated in China, is wreaking more havoc in the United States? How is it that a country that prides itself on being pioneers in medical research is facing a healthcare system collapse and a shortage in medical supplies (*Why the U.S. Is Running Out of Medical Supplies—The New York Times*, n.d.)? From the moment that we realized this was a serious threat in other countries, actions should have been taken, but due to our negligence, we have passed all countries in the amount of cases and deaths, and the number is only rising. Our president called the virus a hoax (*Is There Enough Time to Fix Trump's COVID-19 Response? | Time*, n.d.). We failed to act preemptively, even though we should've learned from watching other countries go through it for more than a month, and now we are projected to lose up to 240,000 Americans to the Coronavirus (*Grim Models Project High U.S. Toll—The New York Times*, n.d.); All the while entrepreneurs and corporations are increasing the prices on cleaning and sanitation essentials. As masks, gloves, hand sanitizer, etc. are flying off the shelves, there are corporations that are increasing prices to benefit off the simple demand to want to stay alive, and it's just plain wrong. John F. Kennedy once said, "ask not what your country can do for you, ask what you can do for your country." At this moment, we are essentially competing with each other, while this virus is honing in on our population and killing off

multiple people a day. Kennedy's words have not been resonating with many Americans right now. China, on the other hand, is rumored to have controlled the virus and plateaued the infection rate by acting early, efficiently, and most importantly, together. As a country, they are abiding by guidelines and reducing the spread. The government is not charging for testing and it is readily available. They are providing all necessary accommodations, should someone suspect that they have the virus. Meanwhile in the US, even with health insurance, testing is costly and unobtainable unless you have some sort of status. At a time like this, we should be worrying about keeping people alive, not collecting a check. Where has humanity gone? Individualism, innovation, and profit have become some of your key defining factors, and for that, America, I fear for you.

Sincerely, A concerned youth

Intro/Research Questions:

In the present undergraduate engineering curriculum, American students are taught that they should strive to be innovators; always be asking questions and trying to push the envelope of engineering. This ideology, that we, as engineers, should always be looking for ways to improve a process, is definitely a valid one. However, it's important to ask how much further we can actually push the boundaries of technology and if society could ever suffer from said innovation. To better answer this question, we must first introduce the different forms of innovation. "Innovation has two forms. First, there is the best-known and rightly celebrated novel-product/technology innovation... Novel-product innovation is the act [of] coming up with new products, such as the iPad or the first word processor... [The] second category of innovation

[is] incremental and process innovation. I&P innovation encompasses the improvements in how goods and services are designed, produced, distributed, and serviced. It is here... that the major impact on economic growth occurs” (Breznitz & Cowhey, 2012). As a society, we live and die for innovation. Anything that makes any function in life even slightly easier, more efficient, or more enjoyable, will be desired and eventually developed to fit that need, often with a price tag attached.

This applies to every and all aspects of life, and we can observe acceleration in all aspects of life. German sociologist Hartmut Rosa talks about the theory of dromology, or the science or logic of speed when he answers the question “What is social acceleration?” He notes that there are three types of acceleration that we see in Western societies; technological acceleration, acceleration of social change, and acceleration of the pace of life (Rosa, 2003).

Technology has continued to advance at a rapid pace. These days, it is not uncommon for kids to be smarter or more tech savvy than adults. Take the computer for example; It is a technology that my colleagues and I use on the daily and have become proficient at using; while a great deal of our parents have difficulties simply searching the web. This separation in society poses problems. This excerpt taken from Forbes explains a problem within the generational gap. “One example is the change to having mobile devices at meetings where there used to be nothing but a pencil and legal pad. Millennials see this as an advantage and use the Internet, email and Twitter during meetings to capture notes, find information that may be helpful to the conversation, and more. Gen X’ers, who aren’t used to this technology, may perceive these actions as rude” (Savitz, n.d.). In this instance, technological advancements have caused a substantial generational divide in society.

French culture theorist and philosopher Paul Virilio coined the term “dromology.” He believes that history progresses at the speed of its weapons systems. In many ways, the theory of dromology can be related to the speed of innovation. Just as technology advances, society itself advances, not in lock step, but at unknown, differing rates. With one innovation, Henry Ford and the Model T shaped transportation and shifted society as a whole. The use of the assembly line created the mass-production process that we see today, ultimately bringing about the “machine age”. The car itself, being so affordable and efficient, brought mobility and prosperity to many who could only before dream of such liberties. In 1908, Ford had a novel-product innovation on his hands; an affordable personal vehicle that would go on to influence every automobile in production to this day. Not every new technology will make leaps and bounds like the Model T or Elon Musk’s Tesla, but with innovation comes change; change that will influence the three forms of acceleration that Rosa outlines. Progress in society can be attributed to innovation, based on these theories (Virilio & Polizzotti, 2006). “The effects of technological acceleration on social reality are certainly tremendous” (Rosa, 2003, p. 6).

After noting the types of acceleration in Western societies, to understand the model of innovation in America, it is important to ask what social, political, and cultural factors influence American innovation today. Not only do we focus on the wrong fields to harbor innovation, but we, as a nation, see innovation as a profit as opposed to progress. Ever since the start of the industrial revolution, we have continued to innovate and have evolved into a superpower of a country, with the power to produce almost anything. A new technology is either; created to meet a need, or created to improve a function. In today’s American society, I find that we are running out of new needs or functions to be addressed, and this leads to the main gripe with innovation in

the US. “The idea is that in highly industrialized nations, the long-term growth of businesses stems from their ability to continually develop and produce innovative products and services” (Blok, 2018). While highly industrialized countries do make a lot of money off of creating and selling products, there are other ways to profit, as other countries have shown. Trying to force out innovation is never the way; as we cannot consciously set the speed for innovation or life; it is the way that we handle the speed that can pose a problem. Rosa describes the three types of acceleration and they are all connected (Rosa, 2003). As one type of acceleration is changed, the others change, proportionally or inversely. As we stand, America can and probably will go without another groundbreaking novel-product innovation, barring ideas in medical research, for a decently long time. That just goes to show how far we’ve come and how much we have advanced as a society, but it also says that acceleration in technology is slowing down and that we should also reevaluate our model of innovation as a result.

For a country that prides itself on its culture of innovation, particularly in medical research, we have surely dropped the ball when it comes to COVID-19. In a period that lasted over a month, we observed China shut down a whole city because of the virus, and we continued to neglect it, until it showed up on our doorstep. President Trump refused to acknowledge the virus and even called it a hoax (*Is There Enough Time to Fix Trump’s COVID-19 Response?* | *Time*, n.d.). Now we are leading the world in cases and deaths. It seems as though this nation cares more about producing fast flashy products. America’s model of innovation seems to focus on efficiency, individual profit, and/or privatization of said innovations. We’re always making cool technology like new cars and drones, instead of creating things that are effective and safe for society; where do our priorities lie? As a structural engineering student, it concerns me that

we continue to implement new faster ways to do construction when we have little to no information on these processes, and we've literally been following the same old processes for decades with little failure.

In an attempt to answer these research questions, I plan to use the Florida International University (FIU) pedestrian bridge collapse as a case study. I plan to use Chinese bridge construction projects as counter examples, while touching on the differences in how these two nations handle construction projects (speed, efficiency, etc) while acknowledging the differences and similarities of both cultures and societies. I also want to use the FIU bridge case to introduce the argument of progress vs consequence. **In writing this thesis, I hope to bring awareness to the balance that must be held between the speed of innovation and the preservation of society.** The current US model of innovation is detrimental and I plan to elaborate, while also giving suggestions and comparisons to different innovation philosophies to explain why we should be focusing our resources on things that really matter right now like the Coronavirus crisis going on right now.

Literature Review: Ever accelerating hype by David Edgerton:

In the "Ever accelerating hype", David Edgerton writes that there is very little evidence that we are "living in an age of ever accelerating change" (*Ever accelerating hype* | *Prospect Magazine*, n.d.). In the article, he calls the idea a cliché, claiming that "The 'ever accelerating change' cliché is so easily inserted in [an]... opinion piece that it has become part of our mental furniture". By this, Edgerton is questioning the validity of the idea. He references patenting data to validate the claim. "But have the outputs been greater? Patenting levels in the US have

remained the same since the 1970s despite the increase in R&D spending.” While this is in the article, and serves as a counter argument, the data does not take into account the amount of patents that have already been filed, and the fact that these are all new patents being filed. Statistics from the US Patent and trademark office confirm Edgerton’s findings. They indicate that the rate at which Americans are filing for patents is steadily increasing each year, at right about the same rate as the population is growing (*U.S. Patent Statistics Summary Table, Calendar Years 1963 to 2018, 04/2019 update*, n.d.). Somehow, somehow, people are still finding ways to come up with new technology, but it’s important to note that patents are super specific. Just because the number of patents continues to rise, does not necessarily mean that every patent is a brand new thing; it could just go to show that Americans are continuing to make desperate cash grabs with products that may or may not even be practical. (*Ever accelerating hype | Prospect Magazine*, n.d.).

STS Framework: From Innovation to Use: Ten Eclectic Theses on the Historiography of Technology by David Edgerton:

In this article, Davide Edgerton compiles 10 theses to shed light on the history of technology and the very fine line, as he describes, that exists between technology and innovation. By pulling on some of his ideals from each thesis, several theses that push the agenda were chosen to expand upon:

I. (In response to Thesis II)

“The histories of innovation and and of technology-in-use are remarkably different, in terms of geography, chronology, and, sociology” (Edgerton, 1999)

When it comes to world innovation, the US reigned supreme for much of the time period after 1945, but while being number one in innovation, the US was responsible for a smaller share of world output; implying that America creates more new technology, but does not produce it, which makes complete sense. Many business owners in the US outsource production of their product to China and other countries in order to lower manufacturing costs.

In the process of innovation, the societal implications and the amount of work it will take to introduce a technology are often overlooked. “Shifting from innovation to use often involves a massive shift in social class, social status, gender and race of people involved with technology” (Edgerton, 1999). Any novel-product innovation will ask a lot from society and will have to put up with a lot from society as well. Take the Zimbabwe Bush Pump as an example: The bush pump is deemed a “fluid technology” because of how it seamlessly integrates itself into the Zimbabwean communities and becomes a community building apparatus in each village. The natives had to be taught how to use the pump, but over time, they would take over the maintenance of the pump and it would become a gathering spot as well as a source for drinking water. Villages that had a pump were seen as higher class and social status was enforced around the pumps to determine order (de Laet & Mol, 2000).

II. (In response to Thesis III)

“The conflation of innovation and technology is especially apparent in national histories. But the nation-state is not the whole as in miniature” (Edgerton, 1999)

Once again we can draw upon the Bush Pump. While the bush pump was a great innovation and it became a staple in Zimbabwe, there is no telling that it would actually work the same way in other countries. Often, technologies are designed for a specific setting or situation, and removing it from that setting can turn the technology from a hero to a zero.

In response to this thesis, Edgerton highlights the fact that technologies may not behave and function the same when put in different settings. This is for a multitude of reasons and I will use actor-network theory to explain.

For a certain technology, it is understood that there is a certain audience. The consumer is one actor. Then comes the manufacturer, the maintenance worker, etc. You also have actants, which would be inanimate things that play a role in the “success” of a technology, because we cannot simply define a technology’s success. Examples of actants would be anything that accomplishes or undergoes an act, inanimate or alive. For the bush pump, one example of an actant was the fact that the kids would throw rocks into the pump which would cause it to malfunction and require maintenance. The villagers took it upon themselves and repaired it as best as they could with makeshift parts, proving to be very resourceful. This also alludes to the pump’s fluidity because of how it was still able to be used while the pump itself was not as designed. (de Laet & Mol, 2000).

In this same response, Edgerton brings up “ the strongly expressed feeling that ‘other countries do it better’ and more specifically that ‘another country does it best’.” In the same fashion, I have expressed that China is doing things better in their country than we are over here in regards to handling innovation and societal awareness. We have seen the Chinese drastically change their state of affairs during the last month or so. By working together, we are forcefully

flattening the curve on this virus. Another ideal that I resonate with in China is their collectivist society. There is a slight kinship in China that you don't get in many places. A group first mentality in America is actually starting to look like a possibility, which brings me to my next point.

III. (In response to Thesis V)

“‘Technological determinism’ is the thesis that a society is determined by the technologies in use. Nevertheless it is usually defined and attacked as the absurd thesis that technical innovation determines social change” (Edgerton, 1999)

It was discovered that “Americans are more likely to associate socialism with 'equality' than 'government ownership or control', as they did in the 40s” This is truly a shift in times. In this article, Jesse Sharkey, the leader of the Chicago Teachers’ Union explains the shift in opinion. “It’s about humane capitalism – having social control over the harshest features of capitalism like healthcare and pensions.” There are a ton of Americans that would prefer a more socialist nation. “Three-quarters of Democrats believe the country would be “better off” if it were more socialist” (*Socialism used to be a dirty word. Is America now ready to embrace it?* | *US news* | *The Guardian*, n.d.). The truth is, American’s are tired of the inequality and competition that is harbored through capitalism. Those that live in America and contribute to society in some way should have health care, as those in China do; This is the attitude of many who are pro-socialism. Sarah Innamorata presents the idea of socialism in the form of an ultimatum. “The way I translated it to people was: you shouldn’t have to choose between paying for prescriptions and paying for groceries”. Believe it or not, this is the reality for many

Americans and change is certainly likely in the near future. That being said, it's hard to believe that technological determinism is even real. There is a reason it is seen as absurd. While there may have been technology that came before its time, society is usually the defining factor for innovation and technology.

Cases:

Florida International University Bridge Collapse:

Accelerated Bridge Construction is still a fairly new practice in construction. It has really only been introduced in the last couple decades and is rapidly gaining attention. ABC, until this incident, had been glorified to both the public and the engineering world. Not only does it save time by avoiding traffic impeding work zones and allowing a more contained work space; it substantially cuts construction costs due to how fast the process is. There are also several engineering specific reasons why ABC is beneficial, including improved constructability. (“EDC-2: Accelerated Bridge Construction (ABC) | Federal Highway Administration,” n.d.). With that being said, it should be safe to say that ABC should be the preference when building bridges.

For the most part, the Departments of Transportation have seen much success, but it only takes one mistake in the engineering world to be put under the scope. On March 15, 2018, a pedestrian bridge built using ABC collapsed at the Florida International University in Miami, killing multiple people. Just as construction is different for this type of project, as opposed to traditional processes, inspection for the bridge must also be done differently. With limited knowledge on the design of bridges, I can say that there are several different joints, connections,

and other parts that are used when simply placing a prefabricated bridge in place, parts that may not replicate those found in traditional design. In this particular instance, it is not wrong to also question the training and knowledge that these engineers must have and implement to avoid these sorts of things.

Following the collapse, engineers were hesitant to adapt ABC methods. This bridge had been built, in part, off site, with some of the span being cast in place onto/along the transported segment. Based on the official investigation from the Occupational Safety and Health Administration's, the bridge was inspected by engineers hours before it happened, but they somehow neglected several problems with the structure; details that would have saved lives. "The concrete truss had developed numerous wide and deep structural cracks jeopardizing the integrity of the bridge. The EOR (engineer on record) should have immediately instructed that the bridge be shored..." (Ayub, 2018, p.109). One employee and 5 motorists were killed, along with another permanently disabled. To expose an example of the inexperience displayed, the engineers selection team at FIGG Bridge Engineers "was swayed by the graphics and rendering of the bridge and did not consider the non-redundancy of the structure" (Ayub, 2018, p.109). The report states that the multiple engineers had failed to realize that the bridge was in danger of collapsing, even after inspecting it once two days prior, and once more a few hours before the collapse. It would be hard to convince someone that several licensed engineers simply failed to notice simple cracks in a bridge. Some of the blame must fall on the process. I would like to draw on this example of acceleration, and bring forth, again, the issue of haste in engineering. Innovation in engineering poses risks because of how powerful construction machines are. One mishap could mean death, or many more. Had more traditional methods been used or proper

procedures been made and upheld for dealing with new technologies, this accident could have been avoided. ABC is very much a sociotechnical system, in that it is a form of process innovation with the potential for societal impact, good and bad as I've laid out. It is out of this reasoning, and others similar to it, that it can be asked if innovation is moving too fast, against the good of society.

It is in situations like this one where we question our ambition in the world of Engineering. New practices come with challenges. Had a traffic zone been in place to prohibit traffic as per traditional bridge construction, it is very likely that there would be fewer casualties on that day. Innovation that is too rapid/uncontrolled can be a danger to safety or society. Innovation is meant to be taken slowly and gradually, while taking the time to make sure that said innovation is worthwhile. We do it in engineering all the time. Products are tested numerous times, with the aim to work out all the kinks before it gets in the hands of consumers. Without the proper knowledge present, innovation is water that should be treaded lightly. The Slow Science Manifesto, a document written by The Slow Science Academy shares the same ideal. "Science needs time to think... slow science was pretty much the only science conceivable for hundreds of years; today, we argue, it deserves revival and needs protection" ("SLOW-SCIENCE.org—Bear with us, while we think.," n.d.).

China's One Belt One Road Initiative:

China has been the front runner in connectivity ever since they built their fifty five kilometer Hong Kong-Zhuhai-Macao bridge, spanning over the pacific ocean (*World's longest cross-sea bridge: Hong Kong-Zhuhai-Macao bridge—Xinhua | English.news.cn*, n.d.). To put it

in perspective, fifty five kilometers is equivalent to about six hundred football fields. The most amazing feature here is that it took engineers in China only six years of preparation and eight years to build. By building this bridge, they were able to cut travel time from three hours to just thirty minutes, nothing short of amazing.

It wouldn't be out of the ordinary to sit and ponder on how they possibly built such a long bridge over the ocean. Engineering is truly an amazing field. Using their bridge-building machine SLJ900/32, locally nicknamed the "Iron Monster", (*The mega-machines helping China link the world—BBC News*, n.d.) the Chinese have invented multiple machines that will make their expansion efforts easier than ever before. Along with the Iron Monster, they also have a huge 15.3 meter diameter drill used to dig tunnels with ease and another sizable track laying machine with wheels.

China's infrastructure and construction efforts are unmatched. In 2018, "a total of 88 buildings measuring 200 meters (656 feet) or above were completed in cities across China this year. The figure sets a new benchmark for annual skyscraper construction in a single country, and is almost seven times higher than the 13 completions recorded in the US, which ranked a distant second" (*China built more skyscrapers in 2018 than ever before—CNN Style*, n.d.). Their efficiency is unrivaled. If this wasn't enough, China is aiming to build a bridge; the One Belt One Road, that would literally connect China to the UK and parts of Africa, somewhere around 8,000 kilometers in distance (*The mega-machines helping China link the world—BBC News*, n.d.). This ambition can be compared to the moment railroad tracks were first laid down, in that this project is of that scale. This is a game changer for not only China, but also the countries that will be connected to this new trade route. Economies can improve and relations can strengthen

over this massive bridge. It would be hard to see any pushback against China to innovate in this capacity, because they have shown that they can take on projects like this one, but there are some that claim that China is allegedly trying to get more control over the globe, to eventually pass the US as the dominant power, or attempting creating a Thucydides trap. While the US has consistently outranked other countries in innovation, China is being revolutionary with this project, and, whether it be through a Thucydides trap or from natural power transitions, I would not be surprised if China does pass the US someday.

Data Collection:

I was able to conduct a survey I created on the Chinese students at Zhejiang University (n=17). In this survey, I asked them questions about innovation in China, and tried to gauge what Chinese students value more; hard work or creativity. In doing so, I could get a direct juxtaposition of how those in America and those in China think directly on the topic of innovation and creating new novel-product innovations. The knowledge amassed was very useful in my writing. Based on this survey, I was able to retrieve the following data:

- When asked “how much of a role does technology play in your life and in your society?”:
 - 17/17 replied that tech is essential in their day to day lives and society’
- When asked “Is it an engineer’s job to innovate/create new technologies?”:
 - 15/17 replied “yes”
- When asked “is creativity more important than hard work?”:
 - 11/17 replied “yes”

- When asked “is innovation good or bad for society?”:
 - 15/17 replied “yes”
- When asked, “Do you believe that China, as a nation, works together for the good of society?”:
 - 17/17 replied “yes”
- When asked “The Chinese are considered more disciplined than Americans, do you agree? Why or why not?”:
 - 14/17 replied “yes” and the general consensus entailed that America allows too much freedom, causing Americans to become lazy, and that the Chinese are more of a disciplined union

I was also in contact with a Chinese student, WuLin, from Zhejiang University for the duration of my last semester. I found great insight in some of the ideas he shared with me and the conversations that we had. His input over the months has definitely helped this thesis.

Discussion:

China and America are two very different countries with two very different economic ideals. China, a country with a socialist economy and a collectivist society; as opposed to the United States of America, a country with a capitalist economy and an individualistic society. While the societies are very much different, they are both heavily influential nations on the map and both have their own perks.

While the US has led the way in innovation, it seems to me that China has been making the biggest strides over the past couple of years. I can attribute this to the differences in economies and societies. In a capitalist economy, anyone and everyone can be an entrepreneur. It is not the amount of innovations that matters and I hope that I have expressed that throughout this thesis. What matters is the results and possible outcomes of said innovations. While China works together in their collectivism, Americans will stay as individualists. American innovation focuses on efficiency, individual profit and privatization while China seems to value efficiency, connectivity, and unity.

China's "One Belt One Road" initiative in tandem with what I have on the bridge collapse in Florida is remarkable as a whole. While these are not two bridges that can be directly compared, they are both two innovative feats that America and China have implemented (or are in the works of implementing). The FIU bridge was innovative, on the fact that accelerated bridge construction is still a new technology and the Belt Road initiative is innovative on the fact that China plans to connect basically the whole Eastern part of the globe through multiple bridge connections. Bridges are not just infrastructure for travel. They are connections for the world, beacons of unity, and most importantly, they are economic catalysts.

Conclusion:

In no way do I mean to neglect progress made up to this day; we have truly evolved to a point in life where we can afford to implement "slow science" and take our time in most of our technological endeavors.

In the end, if we shy away from innovation, we will never achieve further progress, as we have been doing for so long as the human race. Innovation is not the enemy here; it is the speed and purpose of innovation that is in question. America's current innovation model is lacking reform. Accelerated bridge construction is just one instance of innovation that carries risk with the potential for great utility. While technology has continued to change our society, for better or worse, it should be understood that "Science develops unsteadily, with jerky moves and unpredictable leaps forward—at the same time, however, it creeps about on a very slow time scale, for which there must be room and to which justice must be done" ("SLOW-SCIENCE.org—Bear with us, while we think.," n.d.). Henry Ford once said "Failure is simply the opportunity to begin again. This time more intelligently" (Ford and Crowther, 1923, p. 19), and innovation should be viewed in this fashion.

REFERENCES:

- Ayub, M. (2018). *Investigation of March 15, 2018 Pedestrian Bridge Collapse at Florida International University, Miami, FL - July 2019*. 115.
- Blok, V. (2018). Philosophy of Innovation: A Research Agenda. *Philosophy of Management*, 17(1), 1–5. <https://doi.org/10.1007/s40926-017-0080-z>
- Bos, W. (2019). Wisconsin Department of Transportation Bridge Manual

Chapter 7: Accelerated Bridge Construction. *Wisconsin Department of Transportation Bridge Manual* (pp. 3–4). Wisconsin Department of Transportation.

Breznitz, D., & Cowhey, P. (2012). America's Two Systems of Innovation: Innovation for Production in Fostering U.S. Growth. *Innovations: Technology, Governance, Globalization*, 7(3), 127–154. https://doi.org/10.1162/INOV_a_00143

China built more skyscrapers in 2018 than ever before—CNN Style. (n.d.). Retrieved April 19, 2020, from <https://www.cnn.com/style/article/skyscraper-china-ctbuh-2018/index.html>

Edgerton, D. (1999). From innovation to use: Ten eclectic theses on the historiography of technology. *History and Technology*, 16(2), 111–136. <https://doi.org/10.1080/07341519908581961>

Ever accelerating hype | Prospect Magazine. (n.d.). Retrieved April 19, 2020, from <https://www.prospectmagazine.co.uk/magazine/everacceleratinghype>

Ford, H. & Crowther, S. (1923). *My Life and Work*. London: W. Heinemann.

Federal Highway Administration (n.d.). EDC-2: Accelerated Bridge Construction (ABC) Retrieved from <https://www.fhwa.dot.gov/innovation/everydaycounts/edc-2/abc.cfm>

Grim Models Project High U.S. Toll—The New York Times. (n.d.). Retrieved April 19, 2020, from <https://www.nytimes.com/2020/03/31/world/coronavirus-live-news-updates.html>

Is There Enough Time to Fix Trump's COVID-19 Response? | Time. (n.d.). Retrieved April 19, 2020, from <https://time.com/5805683/trump-administration-coronavirus/>

- Mol, A. M., & de Laet, M. (2000). The Zimbabwe Bush Pump. *Mechanics of a Fluid Technology. Social studies of science*, 30(1), 225-263.
<https://doi.org/10.1177/030631200030002002>
- Rosa, H. (2003). Social Acceleration: Ethical and Political Consequences of a Desynchronized High-Speed Society. *Constellations*, 10(1), 3–33.
<https://doi.org/10.1111/1467-8675.00309>
- Savitz, E. (n.d.). Generation Gap: How Technology Has Changed How We Talk About Work. Retrieved December 10, 2019, from Forbes website:
<https://www.forbes.com/sites/ciocentral/2012/05/16/generation-gap-how-technology-has-changed-how-we-talk-about-work/>
- Slow Science Academy (2010) (SLOW-SCIENCE.org—Bear with us, while we think. (n.d.). Retrieved from <http://slow-science.org/>
- Socialism used to be a dirty word. Is America now ready to embrace it? | US news | The Guardian.* (n.d.). Retrieved April 19, 2020, from <https://www.theguardian.com/us-news/2019/sep/06/socialism-used-to-be-a-dirty-word-is-america-now-ready-to-embrace-the-ideology>
- The mega-machines helping China link the world—BBC News.* (n.d.). Retrieved April 19, 2020, from <https://www.bbc.com/news/world-asia-china-41206772>
- U.S. Patent Statistics Summary Table, Calendar Years 1963 to 2018, 04/2019 update.* (n.d.). Retrieved April 19, 2020, from https://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm

Vassolo, M. (2019, March 15). 'I came today to say goodbye': Families of FIU bridge collapse victims observe anniversary. Retrieved from <https://www.miamiherald.com/news/local/education/article227793379.html>.

Virilio, P., & Polizzotti, M. (2006). *Speed and politics: an essay on dromology*. Los Angeles, CA: Semiotext(e).

Why the U.S. Is Running Out of Medical Supplies—The New York Times. (n.d.). Retrieved April 19, 2020, from <https://www.nytimes.com/2020/03/31/podcasts/the-daily/coronavirus-medical-supplies-shortages.html?>