Cornell Tech: A Case Study on the Changing Trends and Structures of Higher Education

by

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M.S. Thesis

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ABSTRACT

In this research, I examined the unique structures of Cornell Tech. Trends in higher education and among faculty were explored as they related to the creation of this unique center of higher education. This thesis includes both a qualitative and a quantitative study analyzing Cornell Tech. The qualitative nature of this study focuses on assessing the unique policies and procedures of Cornell Tech in light of concerns surrounding academic freedom and the University's mission to aid the common good. The quantitative assessment's goal was to explore the differing opinions of faculty at Cornell Tech compared to Cornell's Ithaca campus. Ultimately, the thesis concludes by synthesizing the results into concrete recommendations for Cornell Tech that are then generalized to be applicable to all centers of higher education.

Keywords: Cornell Tech, Higher Education, Academic Freedom

BIOGRAPHICAL SKETCH

Ryan McCurry graduated with honors from Cornell University's School of Industrial and Labor Relations in 2020 with his B.S.. His undergraduate thesis was a case study of the University California, Berkeley and explored ideas of academic freedom and intellectual property. He then went on to graduate from the School of Industrial and Labor Relations in 2021 with his M.S. degree.

DEDICATION

Lynette & Jerry:

Education is truly the greatest gift any one person can give. I can say without a doubt Cornell University has changed my life; and I owe it all to you both. I am forever thankful for all of the opportunities that you have provided for me. I hope I can make you both proud.

Your Son,

Ryan

Acknowledgement

I would like to thank my advisor, Professor Risa Lieberwitz. Thank you for all of your help and guidance over the years. I had no idea when I walked into that labor law class sophomore year what an impact you would have on my educational journey. Thank you for your inspiration and support.

I would also like to extend a thank you to Professor Emily Zitek. Thank you for all your help this year, I would never have been able to get through the stats without you. I really appreciate you agreeing to serve on my committee.

I would like to thank my family who helped get me through this year and its difficulties. Thank you, Grandma Dianne, for taking my calls, listening to me ramble, and for being such a source of support and strength in my life. Thank you to my Grandfather William for also talking with me about my work, even when it is not that interesting. I would not be where I am today without you both. Thank you to my Grandmother Lucy for always cheering me up and calling me just when I need her too.

Finally, I would like to thank all of my friends for their help and support. Thank you, Matt, for all your help translating when I was overworked and exhausted. Thank you to Ben & Mollie for your unending support when I had to work long nights. Shoutout to Lawrence & Liz for keeping me entertained. Last but not least, thank you Wyndham. I would never have gotten through the last five-years without you. Here's to you kid.

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In December of 2010, the City of New York publicly announced their mission to find a higher education institution willing to expand their applied science and engineering program to the city. The institution chosen was being offered a plethora of support for the proposed expansion including city-owned land, city capital for initial investment, and the complete support of the city administration. Eighteen proposals for expansion were submitted by 27 institutions. ("Cornell Tech About").

The City sent out a Request for Proposals to qualifying institutions, and in October of 2011, they received seven qualifying responses from 17 institutions. New York City was offering the city-owned land for development and up to $100 million to develop the site ("Cornell Tech About").

On December 19, 2011, Mayor Bloomberg announced that Cornell University and Technion University's joint proposal for expansion had been selected. The two universities planned to jointly establish an applied science and engineering campus on Roosevelt Island in New York City. The proposal was selected for multiple reasons, including, the "focus on the consortium on the collaboration between academia and the private sector." Following the announcement, on April 22, 2013, the Founding Chairman and CEO Emeritus of Qualcomm and his wife awarded Cornell Tech a $133 million gift to help establish the new campus ("Cornell Tech About").

Cornell selected Technion University because of the perception of Israel as a "Startup Nation" and the University's proven record of producing technology entrepreneurs — 70% of Israel's founders and managers of high-tech industries are graduates of Technion University ("Cornell Tech About").

The campus began operations in 2012, operating out of the Google building in New York City. Following construction, in the fall of 2017, 30 faculty and 300 graduate students began working from the Roosevelt Island location, as Phase One of the campus construction was completed. The goal was "continuing to conduct groundbreaking research, collaborate extensively with tech-oriented companies and organizations and pursue their own start-ups." When completed, the campus would occupy two-acres with two million square feet of space for approximately 2,000 graduate students and hundreds of faculty and staff ("Cornell Tech About").

This thesis will explore an in-depth case study of Cornell Tech as an institution and reflect upon what it means for academia at large. Following the brief aforementioned history of the institution above, this paper continues on with a literature review that provides the basis for further analysis. The literature review begins by exploring differing trends in academia in the last few decades including the problem of bias in research resulting from the growth of university-industry relations and the commercialization of academic research. The literature review continues on to further examine academic entrepreneurship, the consequences of university and industry relations, and two reported case studies highlighting the negative consequences of industry involvement in academic research. Differing methods to handle these situations are discussed in the subsequent sections concerning conflicts of interest and institutional conflicts of interest. The section concludes by addressing the tensions between university-industry relations and the norms of academic freedom and the public mission of higher education institutions.

The second section of this thesis investigates Cornell Tech. Specifically, the section dives into the unique academic and research goals of the Cornell Tech program. The section also explores the administrative aspects of Cornell Tech, including governance and the physical

campus. The section concludes by exploring the overall intellectual property and conflict of interest policy for all of Cornell University.

Section III delineates the methods utilized in the quantitative part of the study of Cornell Tech. The goal of the quantitative study was to compare the opinions of faculty at Cornell Tech and Cornell's Ithaca campus regarding the University's collaboration with private industry. This section outlines the participants that were involved, the specific research design utilized, and the procedure. Section IV explores the relevancy of the data collected as part of the quantitative review.

Section V contains the majority of the analysis of this thesis. It begins with a qualitative analysis of Cornell Tech and relevant policies. The section continues on to explore the relevancy of the data collected during the quantitative analysis. These findings are then synthesized into recommendations regarding academic freedom, maintaining the public mission, and governance for Cornell Tech. Subsequently, the recommendations are generalized for all universities. Finally, the section concludes by exploring the limitations of this thesis and areas of future research.

I. Literature Review

In many ways, Cornell Tech represents the culmination of changes that have been occurring in academia and higher education for decades. To fully understand these changes, we must examine the evolution of academia and higher education in the United States.

The origins of this evolution can be traced back to the end of World War II. At that time, researcher Vannevar Bush, who had formerly been the head of the U.S. Office of Scientific Research and Development, was working in tandem with industry leaders to persuade the federal government on two main ideas: (1) that tax dollars should be used to support research and

development domestically; and (2) that the peer review process should be utilized to distribute the research funding (Kleinman 1995, Busch 2000). On July 25, 1945, Bush submitted his commissioned report titled *Science: The Endless Frontier* to President Truman. Bush's proposal advocated for the creation of a National Research Foundation that would support basic research with funds from the federal government. Bush's proposal was predicated on the following five principles: "(1) long-range support for research; (2) an administrative agency composed solely of people selected from their 'interest' and 'capacity'; (3) a structure of grants provided directly to researchers outside the government; (4) policy, personnel, and the method and scope of the research left entirely to the grant recipient; (5) foundation (not grantee) accountability to the President and Congress (Bush, 1945; Kellogg, 2006:8). This view propagated a social contract between the public and the private sector, whereby a clear division of labor existed between the public sector's – public and private nonprofit universities — focus on basic research that was typically not readily able to be commercialized and the private sector's – business – focus on more applied research (Glenna et al, 2007).

Bush's bold proposal was ultimately not adopted, but it still deeply impacted the academic community. His idea for utilizing the peer review process to distribute research funds has become the standard for U.S. federal research grants (Geiger, 1992; Wilson, 1983; Mowery, 1997; Kellogg, 2006:9). Additionally, in 1947, the National Institute of Health expanded its grant program. In 1950, the United States government established the National Science Foundation, whose founding principles bore a close resemblance to Bush's ideas (Kellogg, 2006:9).

In 1942, prior to the end of World War II, sociologist Robert Merton wrote "The Normative Structure of Science." In this short essay, Merton attempted to define the "ethos" of science. In 2006, David Kellogg published a close reading of an updated version of the 1942

essay, relating it to the patronage structure of science in the United States during World War II. Kellogg explained that Merton defined the "ethos" of science in four norms: (1) universalism, (2) communism, (3) disinterestedness, and (4) organized skepticism (Kellogg, 2006:4).

In his close reading, Kellogg clarified that universalism meant that scientific claims were not assessed based upon the specific characteristics – "race, nationality, religion, class, and personal qualities" – of the involved researchers (Kellogg, 2006:4). He clarified that Merton does not assert that all claims are universally true, but rather that all claims are judged based upon universal principles of science rather than societal bigotry (Kellogg, 2006:4).

The second norm, communism, refers to the dissemination of scientific knowledge among scientists for the betterment of the field. Kellogg clearly states that Merton believed "… products of science are public property, and so the practice of scientists must affirm the public character of knowledge." Merton's norm of communism rests on the free sharing of knowledge not only about scientific conclusions, but also, results and methods (Kellogg, 2006:4)

The third of Merton's norms is disinterestedness. Disinterestedness refers to the idea that scientists should place the interests of the scientific community and the institution above their own with regard to their research. Kellogg credits this norm with being the reason for such practices as correction and retraction with regard to published results. He goes on to credit this principle to why science is so trusted among the public; science is supposed to reflect public, not private, interests (Kellogg, 2006:4-5).

The fourth norm is organized skepticism. Merton refers to this as both an institution and a methodological norm. Kellogg says that this can be seen in the hypothesis testing and experimental control aspect of scientific experiments. Kellogg also notes that Merton referenced this norm because scientists are supposed to objectively analyze the world around them and not

treat certain societal subjects (e.g., religion) with unquestioning support and acceptance (Kellogg, 2006, 5).

Kellogg also reflected on how Merton's norms are affirmed by typical practices in research. For example, Mertonian norms can be seen in the typical structure of a research article: introduction, methods, results, and discussion (Kellogg, 2006, 5).

Furthermore, from his readings of Merton's work, Kellogg highlights the political undertones that he found to be reflective of World War II events. Kellogg asserted that it was clear in Merton's title – "Science and Democratic Structures" – and throughout his works, that Merton's norms were meant to represent a democratic science; a science to stand in strong contrast against Nazi science, and in later years, Soviet science. Merton's norms seemed to be best supported by countries that favored a more Western view of democracy because these are the societies Kellogg says that "admit to self-correction, allow the revision of previously sacrosanct ideals, and subordinate personal interests to common pursuits, all the while allowing individuals the freedom to pursue original work unconstrained by demands of authority" (Kellogg, 2006:6-7).

These views on science and higher education began to be challenged in the 1970's with the rise of "market fundamentalism" (Glenna, 2002; Somers and Block, 2005; Glenna et al, 2007). Market fundamentalism is "the idea that society as a whole should be subordinated to a system of self-regulating markets" (Somers and Block, 2005:261). Somers and Block delineate that this was the dominant political rhetoric of the mid- to late-1970's used to explain economic issues. The Bayh-Dole Act and related legislation began to extend this same view to higher education (Somers and Block 2005).

While “market fundamentalism” was making waves in American politics, it was not the only political concern that was driving a push toward the commercialization of university research. During the late 1970’s the United States saw a decrease in their national competitive advantage in manufacturing, particularly because of competition from Japan (Coriat & Orsi, 2002; Florida & Kenny, 1990; Grimaldi et al., 2011:1046). Trying to ride the success of Silicon Valley and Route 128, lawmakers hoped that universities were the key to the United States maintaining its superiority (Branscomb & Brooks, 1993; Grimaldi et al., 2011:1046).

Grimaldi et al., explained that the Bayh-Dole Act of 1980 was an “outcome of and response to” the changing political climate. The Act created a federal agency-wide uniform patent policy, removed restrictions on the licensing of federally funded research, gave property rights to federally funded research patents to universities, and mandated that faculty disclose inventions to the technology licensing offices at the university for federally funded research matters (Berman, 2008; Mowery et al., 2004; Grimaldi et al., 2011:1046).

Prior to the Bayh-Dole Act, the majority of universities did not have technology transfer offices (TTO) and research incentives – unsurprisingly, few academics were patenting research from publicly funded discoveries. At the time, university research that resulted from federal funding was placed in the public domain for free usage whether by the government of the transfer of ownership of the federally funded research to the institution or the researcher. The Bayh-Dole Act requires researchers disclose inventions to their universities and that the universities have ownership to patent and license the research; thus, the increase in need for TTOs (Glenna et al, 2007, 145). However, as Slaughter and Rhoades delineated, the federal government enacted legislation, beginning with the Bayh-Dole Act, with the intent to facilitate the transfer of research from university scientists to private sector actors for the purpose of

commercialization (2004). Companies could now license the use of university patents on federally funded research discoveries (McSherry, 2001:6; Glenna, 2007:145). According to Sommer and Block, these policies are reflective of the new view of "market fundamentalism," as it only values public research to the level that it can be utilized by the private sector for commercial purposes (2005).

Concurrently, to explain how universities began to adopt the rational of "market fundamentalism" that was sweeping the country at the time, Glenna et al. cited Hackett observing that "increased resource dependence and other transactions with government agencies will cause universities to adopt and enforce the rules and formal rationality of government bureaucracies" (Glenna et al., 2007:146; Hackett, 2001:7) Glenna et al. further explained the evolution by citing Weick's (1995) idea of "sensemaking" – sensemaking is "a useful approach for exploring how agents participate in such origination change, not only by interpreting that change, but also by creating meaning to justify their position" (Glenna et al., 2007: 146). Weick's idea of "sensemaking" includes the assumption of intersubjectivity – "people create their environments as those environments create them" (Weick, 1995: 34).

Glenna et al., cited the comments of Derek Bork (2003), a former university president, to showcase a common example of universities being drawn to commercial activities in hopes of making enviable profits that seem very tangible, while making subtle concessions to work with private industry that they do not realize will lead to drastic changes to the university in the long run. Much of these issues deal with the converging of the goals of the university and private industry. Citing Lacy (2001), they differentiated the goals of private industry research – "generate trade secrets, patent, and exclusive licensing for commercial use" – from those of the

university – "… generally expected to advance knowledge and address broad social problems" (Glenna et al., 2007: 147).

To further understand the decision-making of universities, Glenna et al., interviewed administrators to better understand this new wave of academic capitalism and how it was impacting the university (Glenna et al., 2007: 148). In their study, Glenna et al., found several new trends among academic administrators. When asked to define "the public good and how their relationships with state governments reinforce those definitions," the administrators' responses were very telling. While a few still espoused traditional views about the university and the public good, a majority emphasized their belief that it was important for universities to have active relationships with the private sector. These administrators tied the public good of the university to the ability to commercialize innovations from the university in order to promote economic growth (Glenna et al., 2007:154).

Furthermore, Glenna et al., found that the administrators tend to mimic rhetoric of the Bayh-Dole Act to explain the limited impact of basic and nonproprietary research. These administrators tended to favor the commercialization of university research as the university's contribution to the public good. Administrators reported that the Bayh-Dole Act was further reinforced by the state governments. At a time when funding from state governments is decreasing, universities feel pressure to promote the goals of the state governments: "promote economic growth, to establish [University Industry Relationships], and commercialize research" (Glenna et al., 155). Administrators also mentioned the opposite; they feared that if their university somehow negatively impacted the state economically, the state would decrease and/or end their future funding. Both of these ideas reflect a common theme that administrators worry

about ways to show state governments that they promote economic growth in order to receive more funding or avoid funding cuts (Glenna et al., 2007:156).

Glenna et al., also cited the fact that administrators worried about the government's view of their industry relations. One administrator noted the power private industry has on government to influence federal and state research funding – stating that universities were rewarded by funding bodies for their contribution to economic growth through these partnerships with industry. Glenna et al., explains that this means universities are being coerced into making industry alliances to gain access to more public research funding. Thus, funding is going toward university research aimed at working with industry to produce intellectual property, which benefits private industry with economic gains, which in turn will increase university research funding (Glenna et al., 2007: 156-157).

Finally, Glenna et al., highlighted the administrators' feelings of having to adjust their advocacy to the dominant rhetoric of the moment. In utilizing the current dominant rhetoric, administrators feel they are better able to procure research funding from the state. According to Glenna et al., the dominant rhetoric that is adopted is market fundamentalism.

These changes in administrators' behaviors and opinions are reflective of the new form of knowledge creation that John Ziman referred to as "post-academic science" (Ziman, 2000). As Kellogg explains, post-academic science is illustrative of the fact that this science does not follow either the pure academic or industrial models. Post-academic science allows for the possibility that technological changes may spur basic research, as opposed to the traditional academic view that basic discoveries are made at the university and are then used by private industry in applied research (Gibbons et al., 1994; Kellogg, 2006:13-14).

Kellogg explains that this phenomenon is not entirely new as the United States military has historically "blurred the lines between science and technology, between research and industry, and between academia, industry, and the government" (Geiger, 1992; Kellogg, 2006:14). These ideas are now just being spread to other areas of scientific inquiry, which Slaughter & Rhoades (2005) interpreted to be a sign of a fundamental change in the interaction between science and society.

Kellogg went on to identify several key trends of post-academic science. One trend he found was that "post-academic science multiplies the sites of knowledge production." He pointed to examples such as virtual labs between scientists who had never met. Kellogg also spoke of the potential of university projects to now include collaboration with consultants, technicians, and industry or government researchers. Conversely, he also cited that projects that began with private industry researchers being allowed to enlist the assistance of university researchers (Kellogg, 2006:15).

Another important trend that Kellogg highlighted was that "post-academic science privatizes academic knowledge." He noted the trend of knowledge concentration in specific sites that are controlled by private industry. That means that public access by other researchers and the public to the relevant data, data analysis tools, and materials may be limited, but still accessible to the private agents for development. In noting this shift, Kellogg also commented on the increase in TTOs because of the increase in industry and university partnerships. This has, in turn, led to universities increasingly seeing basic research findings as protectable intellectual property and engaging in the patenting and licensing processes to increase research-based income for the university (Kellogg, 2006:17).

In his 2006 article, Kellogg also noted the trend that "post-academic science facilitates interdisciplinary inquiry." Specifically, that the increase of knowledge sites, the increase of relationships with private industry, access to technology, and increased visibility of data is the cause for the increase in new "hybrid forms of interdisciplinary inquiry" (Kellogg, 2006:17-18).

Finally, another trend Kellogg highlighted was that "post-academic science strengthens the bond between science and social need" (Kellogg, 2006:19). He noted that post-academic science funding is dispensed by parties that are interested in applied science, technology development, and commercialization (i.e., licensing). According to Kellogg, this means that projects without a clear application are not favored, thus encouraging application to be a primary goal that is clearly apparent at the onset of projects. Putting it bluntly, Kellogg stated: "The investigator in a post-academic context is never far from having to justify a scientific project's worth and value to people who are not themselves scientists" (Kellogg, 2006:19). This could clearly have an impact on the academic freedom of the university researchers involved, which will be elaborated upon later in this thesis.

Continuing on the path of the aforementioned macro trends in academia, the next section explores trends among academics at a more individual level.

Trends Among Academics

In the previous section, this literature review set forth changing trends in academia at a macro level. It explored how outside forces have impacted university and administrators' decision making. The following section highlights how these changes and outside influences have impacted the opinions of faculty members in higher education.

Lee (1996) conducted a study to assess the changing trends in academia concerning relationships with private industry. He cited Dooris' (1989) resource-dependence theory to explain that academics have started to accept funding from private industry in order to complete their research because these sources of funding were beginning to increase as research funding from the government was decreasing (Lee, 1996:846). Lee surveyed academics on their opinions of university and industry collaborations to assess its growing acceptance, noting Slaughter's (1993) findings that post-World War II applied research was not as valued in tenure and promotion considerations at the university. To see if trends like these had changed, he surveyed academics, asking them to compare their current opinions to their opinion in the 1980's.

Contrary to the findings published in Slaughter's earlier work, Lee found that academics were becoming more accepting of applied research. Lee found that between the 1980's and 1990's, there was a 13% increase (from 58% to more than 70%) in the consensus of academics that valued "research credits to patentable inventions either 'greater than or equal to a prestigious refereed journal article' or 'at least equal to a refereed journal article.'" Furthermore, Lee found that 17% more academics (an increase from 55% in the 1980's to 72% in the 1990's) viewed applied research as appropriate for the university setting. Lee credits this shift to multiple factors, including the decrease in funding for basic research from the government and the view that universities are now accountable for economic growth (Lee, 1996:849).

Lee's study also found that 64% of faculty surveyed supported the idea that the university should be developing infrastructure that supports the commercialization of faculty research. Similarly, 56% of the faculty agreed that universities should implement policies that encourage faculty members to work as consultants with private industry. This majority support for private industry relationships dwindles with deeper relationships – only 27% of faculty support

universities financially investing in startups based in university research (Lee, 1996: 850). This may perhaps be reflective of another trend that Lee found to be prevalent among academics: faculty tended to be "hesitant to support policy toward the privatization of academic research" (Lee, 1996: 851).

Important to note, Lee does articulate certain factors that may be indicative of faculty's opinion concerning working with private industry. For example, Lee found that engineering and basic sciences faculty tended to be the most supportive of transfer policies. Specifically, highlighting the differences in support: 83.4% of engineering faculty, 73% of basic sciences, and only 42% of social science faculty believed that applied research was appropriate for the university. This pattern is extended to the premise of tenure credit for patents; 73% of engineering and basic sciences faculty were in support of this practice, compared to only 56% of the social science faculty surveyed. A similar pattern was found for faculty support of research commercialization and faculty consulting – engineering faculty were the most supportive, followed by basic science, and social science faculty were again the least supportive. Only 36.3% of social science faculty surveyed believed universities should encourage consulting (Lee, 1996:851). The same pattern was found for university support for start-up assistance and equity investment. It should be noted the only category that all three unanimously and strongly supported was that universities should aid in regional economic development (Lee, 1996:852).

Lee also found other factors that influenced faculty opinions. For instance, faculty at universities that exerted more pressure on faculty to seek external research money were more likely to favor university technology transfer policies. The strongest relationship was found with regard to the appropriateness of applied research. Faculty at universities that pressured them to

seek external research funds were more likely (77%) than their counterparts at universities without such pressure (48%) to view applied research as appropriate (Lee, 2006: 854-855).

Furthermore, Lee asked the surveyed faculty to rank their preferred sources of funding. Overwhelmingly, faculty still preferred federal research funds and private foundation funds over other external sources, with the National Science Foundation being the most preferred source. However, the survey did find that private industry is now the "most preferred non-traditional source of funding." State funds and research funding from the university were overwhelmingly the least desirable sources of funding because they were seen as too financially limited and subject to micromanagement. The results evidently show that for at least some of the faculty surveyed that the source was irrelevant to them, as they were under such pressure to accept external funds for research (Lee, 2006:855).

Another condition that Lee found to be determinant of faculty's view of working with private industry is their level of fear surrounding the possible consequences of the relationship. In the survey, 89% of faculty that believed "close [University-Industry] cooperation is unlikely to interfere with the academic mission" supported applied research being conducted at the university, compared to only 50% of faculty that believed "close [University-Industry] cooperation is likely to interfere with the academic mission" supported applied research. Lee found a similar pattern across of beliefs around the danger of industry cooperation interfering with the university mission and support of different transfer-oriented institutional policy, regardless of discipline differences (Lee, 1996:857).

Synthesizing these results, Lee formulated an equation that predicts with 78% certainty the responses of faculty toward the appropriateness of applied research. The equation rests on three variables: "whether the respondent is from a basic, applied, or social science discipline;

whether his/her institution encourages industrial contract research; and whether a close [University-Industry] cooperating is perceived as a threat to academic values." The strongest influence was found to be fear perception – faculty that did not believe it would interfere were eight times more likely than their counterparts to support applied research at the university (Lee, 2006:859).

Following Lee's research, Slaughter et al., (2004) conducted a study analyzing interviews of faculty members that were involved in industry relationships. Based upon these interviews, Slaughter et al., was able to articulate several current common trends in academia. For example, they found that federal grants used to be viewed as more desirable than industry funds. This older view extended into other areas, including the idea that research was a better use of faculty's time than consulting. These trends were notably changing in the interviews, especially in light of the marked decrease in availability of federal research funds and the concurrent increase in available private industry funding (Slaughter et al., 2004: 134-135). They credited this trend to a push-pull phenomenon; faculty were pushed toward industry funds because of the decrease in government funds and those private industry funds pulled faculty to be involved in more commercial research. Faculty did note they still preferred to have a few long-term projects to work on, but these were not the type of projects that tended to be favored by private industry (Slaughter et al., 2004: 136).

Slaughter et al., found that this trend had a large impact on the basic versus applied research at the university debate. Professors noted that they were no longer necessarily going out to find funders of their basic research projects. Instead, they have to be more pragmatic and look for funding opportunities for "interesting" problems, regardless of the basic or applied nature of the work. Others even claimed that the once clear boundary was now obscured as basic research

may now become viewed as applied because of its newly discovered importance to a specific industry (Slaughter et al., 2004: 137). Though faculty still agreed long-term research was best, the definition of acceptable research at the university was clearly shaped more by ideas surrounding the research being "interesting," dissertation quality, and publishable in a "well-regarded, peer-reviewed journals" (Slaughter et al., 2004: 138).

The study also noted a change in the opinions of academics concerning publishing versus patenting. In the United States, when information is published it becomes part of the public domain and is no longer able to be patented. The patent approval process takes on average twelve to eighteen months to complete – thus, the study found that this process may interfere with and delay publication of university research. Nearly all of the faculty members that were surveyed said that they valued publishing more than they valued patenting their research. Despite this fact, 60% of the faculty surveyed stated that they currently held patents from their research. Most of the faculty surveyed said that they did not pay close attention to their universities' intellectual property policies, as they viewed patents as a bonus to their work and understood how unlikely any one patent was to be a great financial success (Slaughter et al., 2004:140-141).

For many of the faculty interviewed, delays in publication were not of great concern. These professors spoke of "sequencing" their research agenda so that it conformed with the corporate funder's needs concerning patenting and would then subsequently publish the article – this was not an issue for the professors that mentioned it as they were senior faculty and did not feel the same time pressure to publish their work. Many of these professors alluded to private industry having a "legitimate interest" in patenting and have "naturalized sequencing" to the point that they felt that there was "no conflict between patenting and the free flow information" (Slaughter et al., 2004: 142). Slaughter et al. also highlighted from their data that it was

universities, and not only private industry, who were starting to pursue patents, thus limiting the free flow of knowledge inherent in the norms of academic freedom (Slaughter et al., 2004: 143).

Similarly, Slaughter et al., also highlighted the changes in the debate around the dissemination of university research. Faculty highlighted that patenting was utilized by private industry to inhibit the flow of knowledge, not to promote discovery and free competition. Faculty also saw patents as a way to stake claim to future avenues of research and prevent others from investing funds to research said areas. This effect is especially worrisome as patents may be taken out on innovations vital to the research process, and thus prevent whole fields of discovery from being advanced because of the privatization of knowledge (Slaughter et al., 2004: 143-144).

Slaughter et al., found that it was not only patents, but also the private industry actors that were interfering with the dissemination of research. For example, the study found that faculty members that work as consultants with private industry are often required to sign nondisclosure agreements, industry's data management conditions, and submit their work for prepublication review by the private industry partner. Faculty also mentioned instances of corporate censorship of their data and complete banning of the presentation of the data (Slaughter et al., 2004: 145-147). Another faculty member spoke of his willingness to not have proprietary information released to him, so he would not have to walk the line of confidentiality – despite this meaning that others would not be able to simply read his work and replicate the results. This situation was similar to other professors who spoke of "sanitizing" their data to appease private industry, without noting the impact that such omission may have on their research's integrity and the ability to replicate it (Slaughter et al., 2004: 149).

These trends are important to note as they underlie much of the analysis of this thesis' study of Cornell Tech. This section serves as the basis of comparison for the qualitative and quantitative study analyzed in the Discussion and Conclusion Section of this thesis.

Bias in Research

While this thesis is focused on exploring potential biases that arise from private industry involvement in the university, it is important to note that there are other existing forms of bias present in academic research. Perhaps no study better illustrates this that Simmons, Belson, and Simonsohn's study proving that "it is unacceptably easy to publish 'statistically significant' evidence consistent with *any* hypothesis" (Simmons, Nelson, & Simonsohn, 2011: 1359). The study found that data could easily be manipulated because of "researchers' degrees of freedom." To be clear, the study did not attribute this manipulation to bad faith, but rather to "ambiguity in how best to make decisions" and "the researcher's desire to find a statically significant result" (Simmons, Nelson, & Simonsohn, 2011: 1359).

Evidently, a great amount of ambiguity does exist in researchers' degrees of freedom. Take sample size for example – a survey from one study found that 70% of behavioral scientists admitted to stopping data collection based upon the results of interim data analysis (John, Lowenstein, & Prelec, 2011). This becomes a significant issue, given the findings of this study that significance in a small sample will not always equate to significance in a greater sampler size. Errors like this in researcher's judgment open up the possibility of bias in research.

The Simmons et al. study focused on four specific degrees of freedom: (1) choice of independent variable. (2) sample size, (3) covariates, and (4) reporting subsets of the experiment condition results. It is supported by the literature that people tend to favor their own self-interest

when presented with ambiguous situations, which often leads people to form justifiable conclusions that concur with their previous biases (Simmons, Nelson, & Simonsohn, 2011; Babcock & Loewenstein, 1977; Dawson, Gilovich, & Regan, 2002; Gilovich, 1983; Hastorf & Cantril, 1954; Kunda, 1990; Zuckerman, 1979).

Ultimately, examining those four degrees of freedom the study found that researchers were able to influence their data to the point of proving a "false positive, the incorrect rejection of the null hypothesis" (Simmons, Nelson, & Simonsohn, 2011: 1359). To combat this Simmons, Nelson, and Simonsohn articulated the following guidelines for authors:

1. Authors must decide the rule for terminating data collection before data collection begins and report this rule in the article.
2. Authors must collect at least 20 observations per cell or else provide a compelling cost-of-data collection justification.
3. Authors must list all variables collected in the study.
4. Authors must report all experimental conditions including failed manipulation.
5. If observations are eliminated, authors must also report what the statistical results are if those observations are included.
6. If an analysis includes a covariate, authors must report the statistical results of the analysis without the covariate.

Furthermore, they also included guidelines for reviewers to follow. While this thesis does not focus on the review process of journals or equivalent bodies, there are two recommendations of note: (1) "reviewers should require authors to demonstrate that their results do not hinge on arbitrary analytical decisions" and "if justifications of data collection or analysis are not compelling, reviews should require the authors to conduct an exact replication" (Simmons, Nelson, & Simonsohn, 2011: 1362-1363). While these review suggestions are not being applied in this thesis, the way Simmons, Nelson, and Simonsohn intended when they delineated them, they serve as good advice for potential norms that will be recommended in subsequent sections.

Now that this section has explored general trends in academia, including biases, the following sections will explore trends in academia in a more applied sense, specifically the increasing prevalence of academic entrepreneurship.

Academic Entrepreneurship

This section will dive into academic entrepreneurship as a construct and how it is manifested in higher education. This is particularly relevant as Cornell Tech explicitly supports academic entrepreneurship in their programs and among faculty. Thus, understanding academic entrepreneurship as a construct is essential to understanding and analyzing Cornell Tech.

Academic entrepreneurship is any activity that's objective is the commercialization of academic research (Grimaldi et al., 2011:1045). This takes many forms including "patenting, licensing, the generation of academic spin-offs, collaborative research, contract research," consulting, ad-hoc advice, and networking with private industry actors (Bonaccorsi & Piccaluga, 1994; Meyer-Krahmer & Schmoch, 1998; D'Este & Patel, 2007; Perkmann & Walsh, 2008; Wright et al., 2008; Grimaldi et al., 2011:1047).

These ideas of academic entrepreneurship have spilled over to other parts of the university setting. Barr et al., (2009) found that universities were increasingly hosting business plan competitions to encourage student involvement in entrepreneurship. Universities are also increasingly offering more entrepreneurship courses and programs, and dedicating specific campus space to service as entrepreneurship centers (Siegel & Wright, 2015). Universities are increasingly creating incubators to support start-ups on campus (Mian 1996; Rothaermel and Thursby, 2005; Grimaldi et al., 2011). Alumni are also increasingly supporting the effort at universities with the establishment of alumni commercialization funds and establishing their own

business competitions (Siegel & Wright, 2015). Grimaldi et al., found this increase in start-up activity at the university to be the result of the Bayh-Dole Act, exacerbated by the growing emphasis of the commercialization of university activity (Grimaldi et al., 2011:1055).

Additionally, universities are beginning to utilize their business school and MBA students to help facilitate technology transfer from innovations at the university (Wright et al., 2009; Grimaldi et al., 2011:1049). The Carey Business School at Johns Hopkins University requires their MBA students take a Discovery to Market Course that partners them with the Hopkins' Technology Transfer Office to aid in the marketing and commercialization of university technology. Some universities have taken it a step further and offer full-time MBA programs focusing on entrepreneurship that are partnered with their technology transfer offices (Siegel & Wright, 2015).

Siegel and Wright identify two phenomena as major sources of motivation for universities to be involved in academic entrepreneurship: (1) competitive pressure because rival or potentially aspirational rival institutions have had great success in this area (e.g., MIT); and (2) private donors increasingly pressuring institutions to generate more revenue. Drawing on these pressures and the increasing occurrence of academic entrepreneurship, there has been a call by some to adopt promotion and tenure requirements that reflect the increasing occurrence of commercial activities at the university. This is a recent, but not an unprecedented move. In 2006, Texas A&M became the first institution in the United States to specifically reward commercialization efforts in promotion and tenure (Seigel & Wright, 2015).

Others push back against the idea, arguing that academic entrepreneurship should not be the focus of university activities. Richard Levin, the former President of Yale University, made his position clear in speaking about the Bayh-Dole Act, noting that "Congress did not intend to

give us the right to maximize profits … it gave us private property rights for a public purpose: to ensure that the benefits of research are widely shared" (Seigel & Wright, 2015: 591).

Currently, there is little information analysis concerning the success of university methods to accelerate technology commercialization of innovations made by students and faculty (Seigel & Wright, 2015).

Now that this thesis has explored academic entrepreneurship as a construct, the following section will discuss the possible consequences of such actions and other complications resulting from partnering with private industry.

Consequences of University and Industry Relationships

In 1986, Blumenthal et al., found that while academics involved in private industry tend to be more productive in generating research, the scientists often experience pressure to alter research agendas and withhold or delay research from publication because of private industry interests. Similar delays in publications and gag orders were found by both Rahm (1994) and Cohen et al. (1994).

Lee's survey revealed that faculty agree that industry collaboration will likely affect long-term basic research as private industry tends to favor short-term research. However, the faculty were divided on how this would impact academic freedom and the potential consequences of resulting conflicts of interests from these collaborations (Lee, 1996: 857).

Another noted consequence of industry relationships can come in the form of start-ups. Professors complained of being pushed out of the company and losing the ability to control the representation of the data, which could potentially lead to ethical questions as private industry actors manipulate the presented data (Slaughter et al., 2004:158).

Further exploring the implications of academic commercialization, Lieberwitz explored and categorized the consequences into three categories: (1) local level consequences; (2) national consequences; and (3) global implications. Speaking on the first topic of local level consequences, Lieberwitz notes how licensing practices surrounding university-owned patents has restricted the public domain. This becomes of issue because university research often involves "upstream" research, so the restrictive impact of university-owned patents is greater. Upstream patents are commonly criticized for being overly broad which can impede future research, can be limiting because of exclusive licensing, and in cases of nonexclusive licensing, upstream patents are burdensome and costly (Lieberwitz, 2005). This issue has been compounded as the U.S. Patent Office has loosened its criteria and now upstream patents (e.g., gene sequencing) are impeding future research because innovations are being patented that were meant to aid in future research, not be an invention with an identifiable utility (Lieberwitz, 2005; Cripps, 2004). Another local consequence has been the shift in the relationship between private industry and academia. Through large scale funding agreements (e.g., Strategic Corporate Alliances), private companies have been able to break down the separation between industry and academic research, have infringed on academic independence and autonomy, become involved in granting research funds, installed corporate representatives on campus, and implemented prepublication agreements that stall the publication of results in order to grant the private industry partner with the time to review and apply for patent protections on university research (Lieberwitz, 2005).

The second category was the national consequences of private industry and university relations. In particular, almost all universities are either public or nonprofit corporations, and thus, receive public subsidies to aid their effort to provide education in the public interest

(Lieberwitz, 2005; Weisbrod, 1988). For example, this includes public funding and tax exemptions at both the federal and state levels. These special privileges are granted with the understanding that universities will work toward their mission of furthering the public interest (Lieberwitz, 2005; Salamon, 1992). Prior to the passage of the Bayh-Dole Act, most publicly funded academic research became part of the public domain; however, the Act changed this by encouraging private ownership and patenting of university research, which restricts research from being utilized in the public domain. This becomes of particular issue with exclusive licensing, which grants one company control of university research. Lieberwitz characterizes this phenomenon as a quid pro quo issue, as corporate funding is exchanged for the exclusive licensing of university-owned patents (2005). Patenting and licensing not only limit the public domain, but also effectively promote the financial interests of the university and the licensee above that of the public mission. Furthering the point, Lieberwitz cited *Madey v. Duke University,* in which the Federal Circuit Court refused to apply the common law patent "experimental use exception" to Duke University because of the University's actions – pursuing patent protections and licensing agreements to generate revenue from utilizing laser technology – as evidence that the university was pursuing for-profit activities akin to that of a corporation and thus subject to similar restrictions (2005).

Finally, patenting and licensing can also have global implications. Establishing intellectual property as the goal has shifted the focus to the commercial potential of research, thus narrowing avenues of research (Lieberwitz, 2005; *Access to Essential Medicines and University Research: Building Best Practices 4*, 2004). This has encouraged the production of drugs that aid ailments common in industrialized nations even though there are already similar drugs on the market, instead of promoting medical research into diseases commonly affecting

developing countries. Developing countries are also affected as global trade agreements have encouraged them to adopt laws similar to U.S. intellectual property laws, which has further restricted their access to essential pharmaceuticals (Lieberwitz, 2005; Sell, 2002).

Lieberwitz concludes by urging faculty members to confront the social implications of their work – including the larger societal mission of the work and the university as an institution. Particularly, she urges faculty to confront the changes in academia, the impact of commercialization on the public interest, and the global effect of the university granting exclusive licenses. To address these issues, Lieberwitz recommends faculty engage in collective action to reassert academic freedom and promote faculty independence and autonomy to further their contribution to the public good. For example, the faculty could collectively pressure the institution to only allow private industry agreements that do not allow corporate involvement in faculty research agendas or limit the granting of exclusive licenses to industry for university-owned patents (Lieberwitz, 2005).

Clearly, there are a plethora of consequences to academics' involvement with private industry that need to be discussed. The following section will continue to explore these challenges by highlighting real world situations where university-industry partnerships soured and produced negative outcomes.

The Dark Side of Academic Entrepreneurship

This section of the thesis describes two case studies that illustrate just how extreme the consequences can be when unmonitored university-industry relationships lead to negative outcomes. While both cases occurred in the context of medical research, they shed light on the implications for university-industry relationships more broadly, and the need for policies that

guard against biased research, conflicts of interest, and the loss of academic researchers' independence.

Case #1

The first example of negative outcomes of university-industry relationships deals with Brown University seemingly abandoning a faculty member when they were challenged by private industry. In 1984, David Kern was teaching at Brown University's medical school and practicing at the affiliated hospital. Dr. Kern's work as Director of the Environmental and Occupational-Health clinic in the mid-1990s put him in contact with two patients who presented a rare lung condition (Washburn, 2011).

Both patients worked at Microfibers, a nylon-flock fabric manufacturer in Rhode Island. Dr. Kern received permission to perform air quality tests in the plant, but the tests were inconclusive. In March of 1996, Microfibers hired Dr. Kern to serve as a consultant to continue his exploration into the possible health problems that were arising among workers – 10 out of the 165 manufacturing employees was presenting with symptoms of a rare, interstitial lung disease. Coincidentally, Microfiber was owned by an individual who had two relatives serving on Brown University's Board of Trustees at the time (Washburn, 2011).

Upon further investigation, Dr. Kern found a similar epicenter of cases in a Canadian nylon-flock factory. Believing he had discovered a new lung disease, Dr. Kern notified Microfiber that he would be presenting his findings at the Thoracic Society meeting in May of 1997. That is when the situation began to take a turn for Dr. Kern – Microfiber informed him that if he released his findings, they would sue him for breach of contract because he had signed a confidentiality agreement in 1995 prior to the initial air testing at the factory (Washburn, 2011).

Believing that Brown University would support him, Dr. Kern reached out to the associate Dean of Medicine and Research. Much to Dr. Kern's surprise, the Dean informed him that he was indeed bound by that agreement and was required to withdraw his findings from the conference. However, Dr. Kern believed that Brown University had a medical and moral duty to disseminate his findings, to ensure that these workers were able to protect themselves (Washburn, 2011).

Subsequently, Dr. Kern faced a series of setbacks at the hands of Brown University. His occupational-health program was shut down and he was notified to immediately withdraw his research from the conference and cease any attempts at publication. This decision was made by the Hospital's president and supported by the Dean of Brown University's Medical School (Washburn, 2011).

Undeterred, Dr. Kern attended and presented his findings at the Thoracic Society conference. Following the May conference, Dr. Kern was informed that summer that he no longer held teaching or research privileges at Brown University. He also could not conduct research at the hospital, but they would allow him to practice for the rest of his contract. Later that fall, the Center for Disease Control and Prevention publicly recognized flock worker's lung as a new respiratory disease effecting the lungs (Washburn, 2011).

This case study is of particular relevance to this thesis as it focuses on how the university as a whole can be negatively influenced by conflicts of interest, including the interest in preserving relationships with private industry. Cornell Tech has a wide variety of relationships with private industry, with some even residing on campus. This thesis make recommendations about ensuring that potential conflicts of interest do not lead to the negative experiences noted above.

Case #2

For no other reason than sheer coincidence, the second case study also involves a faculty member at Brown University. However, instead of working in the Medical School, Martin Keller chaired the Psychiatry Department and fundraised millions of dollars for Brown University to support research. Keller raised over $8.7 million for the University, all from private pharmaceutical companies including Smith, Kline and Beecham, which became Glaxo Smith Klein (GSK) (Washburn, 2011).

GSK produced the popular antidepressant drug, Paxil, for adults. GSK funded *Study 329,* which Martin Keller headed, exploring the potential of Paxil to treat depression in adolescents. At the time, the Food Drug Administration had not cleared Paxil for use in younger populations. That changed with the publication of *Study 329*, which found that Paxil was well-tolerated and effective in treating adolescence with depression. The findings were published in the *Journal of American Academy of Children and Adolescent Psychiatry* in 2001. After publication, the study became regularly cited in advocating for the use of antidepressants in adolescents. GSK's investment in the study seemed to pay off as they saw their sales of Paxil increase (Washburn, 2011).

However, it was not long before issues with the study arouse. In 2004, GSK settled out of court, without admitting guilt, to charges from the Attorney General for the State of New York Eliot Spitzer that the Food and Drug Administration's investigation into *Study 329* proved that the company had repeatedly engaged in fraud. Subsequently, in 2008, researchers at the University of Adelaide published an independent analysis of *Study 329*, finding that there was "no significant difference" between Paxil and the placebo in treating depression in adolescence.

The study revealed that Keller had engaged in a practice known as data dredging – when no desirable results were found, Keller began to test for new outcomes that may be favorable to GSK and Paxil. Perhaps even more alarming, Keller intentionally hid the most extreme side effects. While Keller and his team noted that patients commonly suffered from headaches while taking Paxil, they did not disclose that eleven patients suffered from extreme side effects while on Paxil. Of the eleven patients, eight suffered from suicidal thoughts and/or behaviors (Washburn, 2011).

Following this revelation, GSK was sued by patients. It was then discovered that Keller did not solely author *Study 329* – GSK had hired a ghost writer. Involving ghost writers in academic studies violates ethical standards of "academic authorship" and "independent scholarship." Furthermore, documentation revealed a rather damning email from a GSK executive dated October 14, 1998: "The results of the [Paxil] studies were disappointing. The possibility of obtaining a safety statement from [these] data was considered but rejected. The best which could have been achieved was a statement that although safety data [were] reassuring efficacy has not been demonstrated." This certainly seems like a far cry from the published findings that Paxil was: "generally well tolerated and effective for major depression in adolescence" (Washburn, 2011).

Martin Keller continued to work at Brown University until he retired in 2012, despite other faculty and students' organizations calling for investigations into his conduct (Washburn, 2011; "Martin B Keller").

These examples illustrate how the interests of private industry superseded the public mission of higher education. To be clear, these instances involved actors engaging in specific unethical conduct as a consequence of institutional or individual conflicts of interest. Such

behavior is not the inevitable result of university research collaboration with private industry. However, these types of relationships open the door to such consequences, and it is the obligation of universities across the nation to monitor for this type of unethical behavior.

Now that we have discussed multiple potential negative consequences, including examples of two case studies concerning private industry and universities partnerships, this thesis will explore ways to mitigate these risks. The following section explores conflicts of interest management at the university.

Conflict of Interest

Conflicts of interest may arise from a plethora of nuanced facets in the interactions between the university and industry. Conflicts of interest are defined as "situations in which primary and secondary interests coexist …" (Cho et al., 2000: 2203; Thompson, 1993). Conflicts of interest are of particular concern to the university because of the potential impact it has on "… the quality, outcome, and dissemination of research, as well as their effects on the public's perception of and trust in researchers and universities" (Cho et al., 2000: 2203; Bodenheimer, 2000). Aside from conflicts of interest arising from financial ties, there are also concerns about conflicts of interest arising from the intrinsic desires of researchers for professional recognition and the awarding of research funds (Bekelman et al., 2003; Levinsky, 2002).

These concerns have been justified by several study findings. In 1992, Krimsky et al. examined articles from the leading fourteen journals concerning biology and medicine and found that 34% of the articles had at least one lead author that had financial ties to companies related to the published research – almost none of these financial interests were disclosed in the relevant journals or articles (Cho et al., 2000; Krimsky et al., 1996).

Aside from these findings, an array of other studies sparks related concerns. Bekelman et al.'s analysis of 37 articles found that eleven studies have reported that research sponsored by private industry tends to find results that are positive for industry (Bekelman et al., 2003; Davidson, 1986; Yaphe et al., 2001; Djulbegovic et al., 2000; Cho & Bero, 1996; Turner & Spilich, 1997; Friedberg et al., 1999; Swaen & Meijerd, 1988; Rochon et al., 1994A; Stelfox et al., 1998; Barnes & Bero, 1998; Kjaergard & Als-Nielsen, 2002). These pro-industry results have been found in a multitude of areas, including in research pertaining to the pharmaceutical industry and second-hand smoking studies (Stelfox et al., 1998; Barnes & Bero, 1998; Bekelman et al., 2003). Other studies have reported that faculty who are involved with private sponsors are more likely to conduct lower quality research than their peers (Cho et al., 2000; Bero & Rennie, 1996; Rochon et al., 1994B). For example, Bekelman et al.'s analysis highlighted research conducted regarding oral fluconazole for systemic fungal infections that was funded by private industry – the private sponsor's drug was favored from the onset of the experiment because it was compared to an oral drug that was not able to be as effectively absorbed (Bekelman et al., 2003; Johansen & Gotzsche, 1999).

Ultimately, based upon 1140 studies, Bekelman et al.'s analysis found that research sponsored by private industry was significantly more likely to find results that were favorable to the private industry sponsor. They noted in their commentary that it is possible that these findings were the result of private industry being very discerning in funding only projects with a high likelihood of success; however, Bekelman et al. credited these findings to four studies showing empirically that private industry tended to sponsor projects with trial designs that favored positive outcomes (Bekelman et al., 2003; Djulbegovic et al., 2000).

It should be noted that Bekelman et al.'s analysis of 37 conflicts of interest studies did find 5 studies that showed that research sponsored by private industry was "of comparable quality" to industry not sponsored by industry (Bekelman et al., 2003; Djulbegovic et al., 2000; Cho & Bero, 1996; 50-52).

Another considerable finding of Bekelman et al.'s analysis was that several studies suggest that there may be an association between faculty research that is sponsored by private industry and those favorable results being published multiple times (Bekelman et al., 2003; Johansen & Gotzsche, 1999; Rennie, 1999).

Furthermore, several studies have found that faculty involved with private industry are less likely than their peers to circulate their relevant findings to peers in their academic community (Cho et al., 2000; Blumenthal et al., 1997; Rennie, 1997).

While some studies have found largely negative outcomes, others have provided a more positive outlook on university industry relations. One study found that faculty that had industry support were more likely than their non-sponsored peers to publish. However, it should be noted that the study found that faculty who received more than two-thirds of their support from private industry were publishing at lower rates than their counterparts with less industry sponsored support (Cho et al., 2000; Blumenthal et al., 1996A).

Cho et al. performed a content analysis of 97 U.S. universities' conflict of interest policies for the research institutions that had the highest levels of funding from the National Institute of Health in 1998 (Cho et al., 2000). The study explored several facets of conflicts of interest policy.

One facet explored was the disclosure and review process for conflicts of interest. Cho et al. found that only 55% of universities investigated required financial disclosures from all faculty

– the other 45% of institutions only required disclosures for faculty involved in research or serving as a primary investigator. Professional activities, including research and teaching, were required to be disclosed by 70% of the policies. Some institutions asked for less, with 24% of the institutions requiring disclosure only for interests that concerned their research or sponsored research – in contrast, only two policies asked for complete financial disclosures. Of the disclosure policies, 84% required that faculty disclose financial interests annually or as they arose in the course of their work with the university – 6.7% of the policies only required disclosure when it became relevant to a potential conflict of interest pertaining to external research funding (Cho et al., 2000).

Cho et al.'s content analysis found a variety of ways to deal with potential conflicts of interest (2000). One relatively common method was disclosure both to the university and the public. Disclosure to the public was required in all public presentations and publications of the faculty's work. Other frequent methods mentioned in the conflicts of interest policies were oversight of the relevant research activity and required removal or dissolution of financial ties that could cause conflict (Cho et al., 2000).

Typically, disclosures were handled by a university-level committee that reviewed and made recommendations on the situation, referring the final decision to a designated institutional official. Of the 97 institutions, 37% instead had institutional committees, comprised almost entirely of faculty, to review and make relevant decisions concerning conflicts of interest (Cho et al., 2000).

Other ideas presented by some of the policies included replacing the lead investigator on the project or suggesting that the relevant faculty member take leave from the university for the period that the conflict exists (Cho et al., 2000).

For clarity purposes, many institutions included activities that were and were not allowed under the conflicts of interest policies. Thirty-six percent of the institutions had policies that defined the activities that were allowed and did not present conflicts of interest. These included activities like roles in organizations not related to professional responsibilities, royalties for scholarly works, membership in professional organizations, and providing expert testimony. Some universities also provided explicitly what types of activities constituted conflicts of interest. These activities included excessive consulting, using the university's name or resources for consulting purposes, using confidential information for personal purposes, accepting gifts from private industry partners that work in some capacity with the university, and negotiating with private industry with which faculty has financial ties. Only 19% of the policies specifically mentioned limits on activities as relating to their research and teaching responsibilities with the university – the remaining 81% of policies did not mention which activities related to research were not allowed under the policy. These prohibitions included faculty members receiving research sponsorship from companies they had financial ties to and having students work on projects sponsored by private industry with financial ties to the associated faculty member (Cho et al., 2000).

Some of the policies (12%), mentioned a limit between zero to twelve months for the publication or presentation of research to allow for private industry partners to review the results of and file pertinent patents pertaining to sponsored research. Specifically, 8 of the 11 policies limited the delay period to three months or less (Cho et al., 2000). Publication delays are of particular concern to universities because they conflict with one of university's primary missions: to aid the public good through the dissemination of knowledge, especially given findings that life science faculty that partner with private industry in research are more likely

than their counterparts to experience a delay in publication (Cho et al., 2000; Blumenthal et al., 1997). Cho et al. recommends that all institutions have clearly articulated policies that limit the potential delay of research results being published (2000). This is of particular note as Blumenthal et al. surveyed 210 life science companies and discovered that 58% had required faculty to keep results confidential for more than six months as the company pursued patent protection (Blumenthal et al., 1996; Bekelman et al., 2003).

Perhaps even worse than publication delays are the refusal of private industry sponsors to allow faculty to publish results. Bekelman et al. found that between 12% and 34% of faculty had been barred by their private industry partner from publishing or utilizing their data from the sponsored research (Bekelman et al., 2003; Campbell et al., 2000; Campbell et al., 2002). There is even anecdotal evidence that private industry sponsors may alter, obstruct, or bar the publication of sponsored research that is not favorable to them (Bekelman et al., 2003; Rennie, 1997; Bodenheimer, 2000).

Furthermore, they found studies that discovered a significant association between faculty being barred from publishing data and engaging in commercial activities such as patenting, start-ups, private industry sponsorship, etc. (Bekelman et al., 2003; Blumenthal et al., 1997; Campbell et al., 2002).

Conflicts of interest are not only a problem for specific faculty, but the institution as a whole. Bekelman et al., highlighted this reality in their findings, reporting that two-thirds of academic institutions own equity in "start-up" firms that, in turn, sponsor faculty research at their institution (Bekelman et al., 2003; 32). As they stated, this is of particular concern because unlike simply owning a patent, university ownership requires they act in the interest of that business (Bekelman et al., 2003). These concerns are related to institutional conflicts of interest.

As the first case study clearly illustrated, issues can arise not just with faculty members interactions with private industry, but also the university as an entity and administrators. The above section focused on mitigating faculty's conflict of interests – the following section will focus on mitigating these issues on the institutional level.

Institutional Conflicts of Interest

Institutional conflicts of interest (ICOI) "refers to situation in which research, teaching, or service are compromised because external financial or business relationships held at the institutional level may bring financial gain to units or the institution in form of increased revenues, whether payment or donations, or when external financial relationships have the potential to influence decision making regarding these activities" (Slaughter et al., 2009: 4).

ICOI have become of particular concern following the passage of the Bayh-Dole Act as universities across the nation began to open technology transfer officers. These offices fundamentally changed the university as it shifted them from the role of research and teaching to that of a private industry actor (Slaughter & Rhoades, 2004). ICOI arise as universities must now balance their interests as pseudo private actors and their role in upholding the integrity of research.

Slaughter et al. explored several dimensions of ICOI policy including: "university as firm," "sand and gravel," and quid pro quo arrangements. University as firm issues became more pressing as the result of universities' increasing involvement in commercialization activities – activities including private industry-sponsored research (Slaughter et al., 2009; Krimsky, 2004; Washburn, 2005; Bozeman & Hirsch, 2005; Kavanaugh, 2009). Commercialization activities change the perspective of university administrators as they take the role of economic actors that

prioritize revenue instead of acting as purely academic managers. This means the goals of these administrators may now conflict with the integrity of university research (Slaughter et al., 2009).

University as firm issues also deal with concerns surrounding the academic ideals of openness and sharing of scientific information. This becomes a concern when private industry agreements require faculty to delay or bar them from publishing sponsored results because of intellectual property or other concerns (Slaughter, Archerd and Campbell, 2004). This is also a concern as universities restrict access to their research results in order to pursue intellectual property protections and generate revenue with licensing (Slaughter et al., 2009).

Sand and gravel issues refer to ICOI related to procurement issues. These ICOI issues would allow them to make improper financial gains for themselves, families, or friends (Slaughter et al., 2009).

Quid pro quo ICOI issues "occur when a unit within the university, or the university as a whole, has an exchange relationship with industry brokered by university managers" (Slaughter et al., 2009: 6). This includes relationships between universities and private industry where private industry offers support – including financial support, research equipment, professional journal subscriptions, etc. – to the university in exchange for the ability to gain from the university's name or use of its products. These relationships may be clearly delineated in contractual relationships or less clearly defined interchanges. For example, ICOI may arise because of administrators' relationships with donors – university actors may start to behave in ways to ensure that the donor makes the gift, instead of behaving in ways to promote the public good (Slaugter et al., 2009).

Quid pro quo issues are of particular concern to ICOI policies given their prevalence. A 2006 survey of medical schools and teaching hospitals by Campbell et al. found that two-thirds

of the departments studied were engaged in quid pro quo relationships with private industry actors (Campbell et al., 2006).

In 2009, Slaughter et al. conducted a study of 60 ICOI policies from universities that were members of the American Association of Universities and found several common trends. They located these ICOI polies by researching on the Internet, as the Internet is likely the first avenue faculty would turn to when dealing with ICOI issues – 76% of the public universities and 69% of the private university studies had a publicly accessible ICOI policy on their respective websites. Private universities also tended to have shorter ICOI policies than their public counterpart – private university ICOI policies were mostly less than one full page compared to public universities whose policies averaged eleven pages. One possible explanation for the length difference in policies may have been that public universities more so tend to delineate activities that are barred, including purchasing, the acceptance of gifts and misuse of confidential information (Slaughter et al., 2009).

Slaughter et al., found many ICOI policies that mitigated university as firm issues concerning financial interests related to faculty research. The different ICOI policies included provisions such as:

- "Technology transfer officers were prohibited from engaging in licensing agreements when the institution was a partner in a venture fund
- Universities were prohibited from investing in firms in which faculty were managers
- Universities were prohibited from being the lead investor or syndicating agent if faculty research was involved
- Universities were prohibited from holding more than 10% of equity in a faculty startup company
- University officers were prohibited from being company officers or from holding equity prior to an IPO
- Officers and managers were prohibited from investments in companies if they supervised faculty members who started such companies" (Slaughter et al., 2009: 9-10).

Many of these policies covered decisions of technology investment and issues related to upstream patenting (Slaughter et al., 2009).

One of the most common techniques mentioned in ICOI policies involved disclosure of relevant interests. The study found that 84% of the policies reviewed required actors to disclose financial interests, either annually or as the conflicts arise, which could create a conflict of interest at the university. The policies typically not only required the disclosure of personal financial interests but also the financial interests of immediate family pertaining to private organizations that contract with the university. Financial interests according to ICOI policies may be related to ownership of equity, a managerial position, or trusteeship (Slaughter et al., 2009).

Two policies organized institutional committees or conflict of interest staff to actively monitor potential issues that create ICOI issues and require disclosure. Both policies were from public universities. These boards and staff monitor activities including "corporate gifts, donations, and research funding, technology transfer activity, and research involving human subjects to determine whether universities and/or faculty were investing based on university-owned/faculty-discovered intellectual property, or if corporations were funding research in areas in which the institution or faculty had commercial activity or were conducting research on human subjects" (Slaughter et al., 2009: 10).

Typically, under the ICOI policies, disclosures had to be made to a senior university official or the Board of Trustees. Of the policies examined, 72% gave the final authority to make decisions surrounding ICOI disclosures to the highest oversight board (i.e., Board of Trustees, Board of Regents). However, a few of the policies did establish a ICOI committee which reviewed all disclosures of potential conflicts of interest (Slaughter et al., 2009).

The policies mentioned various management tools for dealing with ICOI disclosures. However, a majority of the universities' policies studied called for disclosure but did not

elaborate on any mechanisms for dealing with the issue after the initial disclosure. Of the management tools mentioned by the various policies, recusal was by far the most common. Another mechanism that was mentioned by 14% of the universities was the creation of a firewall between the people involved in university investment activities and people involved in technology transfer in the university. Additionally, a number of private institutions utilized independent external review committees to deal with potential ICOI issues (Slaughter et al., 2009).

Only one policy covered issues related to student employment and sponsored projects. This public institution required that management plans be made concerning the employment of graduate students on sponsored projects. The idea of the plans was to ensure that students were being treated as students with various educational endeavors, instead of simply workers laboring for the benefit of the university (Slaughter et al., 2009).

One glaring omission in all the policies was continuing education surrounding potential areas for conflicts of interest within the university. Given the rapidly change commercial environment that actors within the university find themselves, continuing education is important. Similar to medical or legal continuing education, Slaughter et al. posits that this could be done with online modules or prerecorded tapes (2009).

After compiling the various universities policies, Slaughter et al. synthesized their findings into several concrete recommendations for ICOI policies:

- "Disclosing to equity review committees, ICOI committees, external review committees, and to the public, professional associations, scientific journals, and human subjects;
- Options other than individual initiation of disclosure;
- Close regulation of officers and managers when investments were made in faculty intellectual property;
- Management tools that went beyond recusal, including creating "arms-length" distance between, managers engaged in activities such as technology transfer, fund-raising, investment, and other financial decisions through firewalls, vacating, divesting, resisting, sequestering,

> freezing institutional involvement, creating independent external review committees when human subjects participated in clinical trials, and reviewing adverse events (Slaughter et al., 2009: 13).

These recommendations help form the basis of a thorough ICOI policy. The importance of a strong ICOI policy is highlighted by a Campbell et al. study that found that 19.4% of IRB board members surveyed had voted on a protocol involving a sponsor in which they either had a relationship with that sponsor or that sponsor's competitor (2007; Slaughter et al., 2009).

Ultimately Slaughter et al. states that an ICOI policy on its own is not enough, and that to truly combat ICOI issues there must be a strong organizational culture attuned to these issues. To do this, Slaughter et al. delineated a few best practices of universities. The first recommendation concerned transparency. All information surrounding university investments should be released to decrease the possibility or appearance of ICOI. This is especially important because often the advisory board of universities are made up of people that were selected because of their ties with private industry actors or personal wealth. This transparency could come in the form of annual reports that show the universities holdings, investments, and intellectual property. Any potential conflicts could then be turned over to ICOI committees that would review them (Slaughter et al., 2009).

Slaughter et al. did note that some universities may push back against this recommendation claiming that it could have a negative impact on the relationship between private industry and the university. In response, they suggest moving the burden to find and report potential ICOI issues from individuals to the institution. The university could have staff actively scanning university investments, donations, sponsored research funding, technology transfer, institutional equity investments, etc. to ensure that all relevant conflicts are identified and referred to the ICOI committee for review (Slaughter et al., 2009).

Another best practice recommended was the separation of functions and duties. They noted that the best policies typically separated the managers involvement with investments and those that handle the technology transfer activity at the university – some universities accomplished this by utilizing external means to manage their investments. Short of utilizing external actors, Slaughter et al. recommends creating a firewall between investment managers and those who handle technology transfer to ensure that information surrounding university technology transfer or other insider information is not utilized for the financial betterment of the university (Slaughter et al., 2009).

Slaughter et al. also emphasized the importance of trigger points in their recommended best practices. The best policies were those that clearly delineated potential triggers for the ICOI policy including: "… university taking equity positions in faculty/institutional companies; universities allowing financial or other interests to influence which technologies are selected for commercialization, who receives licenses, or the structure of licenses; universities accenting corporate sponsorship or gifts for research in areas in which the institution has made an investment or in which the institution partners with the corporation" (Slaughter et al., 2009: 17). One university policy recommended that following a trigger, an external ICOI committee comprised of individuals with an affinity for the institution, but whose financial interests are independent of the university, should review and decide on ICOI issues (Slaughter et al., 2009).

Following the review of ICOI literature, this thesis will now focus on two important concepts for review in the analysis: academic freedom and the public good. The subsequent section will explore the development of academic freedom in the U.S. and what the term means.

Academic Freedom

In 1915, the American Association of University Professors was founded and the Association established a committee to explore academic freedom. The committee drafted and the Association endorsed the *1915 Declaration of Principles,* that set forth the principles of academic freedom and academic tenure. The AAUP advocated that academic freedom is essential "to promote inquiry and advance the sum of human knowledge; to provide general instruction to the students; and to develop experts for various branches of public service." Academic freedom established protections in 3 areas: (1) freedom in inquiry and research; (2) teaching; (3) and freedom of extramural speech and action ("1915 Declaration of Principles on Academic Freedom and Tenure").

Furthermore, the AAUP clearly articulated boundaries in the relationship between faculty and the Board of Trustees. The Board's relationship with faculty was compared to that of the relationship between the U.S. President and federal judges – the Board is tasked with appointing faculty, but faculty operate free of oversight and do not have to answer to the Board about their work ("1915 Declaration of Principles on Academic Freedom and Tenure").

The committee emphasized the importance of academic freedom because faculty often challenge the status quo in society. Similar to anyone challenging the status quo, faculty's opinions may often be met with suspicion and challenges. Faculty must have the freedom to explore topics without fear of reprisal – particularly because of their duty to help students learn how to critically think and not just provide them with views to parrot. ("1915 Declaration of Principles on Academic Freedom and Tenure")

In 1940, the American Association of University Professors and the Association of American Colleges released a restatement of the principles from the 1915 Statement, entitled the *1940 Statement of Principles of Academic Freedom and Tenure* ("1940 Statement of Principles

on Academic Freedom and Tenure"). The 1940 Statement stated that academic freedom must be preserved to ensure the "rights of teachers in teaching and of the student to freedom in learning." The statement expanded this right to all faculty ("1940 Statement of Principles on Academic Freedom and Tenure with 1970 Interpretive Comments").

In 1969, a joint committee of the two associations met to reevaluate the policy and consider comments from faculty. This joint committee drafted interpretive comments that were endorsed and serve as footnotes to the 1940 Statement ("1940 Statement of Principles on Academic Freedom and Tenure").

According to the 1940 Statement of Principles on Academic Freedom and Tenure, academic freedom is essential to both research and teaching, as the free search for truth is integral for the common good. These points are clearly articulated in the first two points on academic freedom:

> 1. "Teachers are entitled to full freedom in research and in the publication of the results, subject to the adequate performance of their other academic duties; but research for pecuniary return should be based upon an understanding with the authorities of the institution.
> 2. Teachers are entitled to freedom in classroom in discussing their subject, but they should be careful not to introduce into their teaching controversial matter which has no relation to their subject …" ("1940 Statement of Principles on Academic Freedom and Tenure").

The 1940 Statement of Principles also gives faculty the responsibility to be factually accurate in their speech, respect the opinions of others, exercise appropriate restraint, and make every effort to clarify their opinion as their own and not representative of the university ("1940 Statement of Principles on Academic Freedom and Tenure with 1970 interpretive comments"). For some time, academic freedom was only a professional norm. In *Sweezy v New Hampshire,* the U.S. Supreme Court recognized academic freedom in 1957, when they overturned a contempt citation for a faculty member who had refused to disclose the content of his lecture partially on the basis it violated his First Amendment rights to academic

freedom (Vile, 2009). Again in 1967, the Supreme Court ruled that academic freedom was a right protected by the First Amendment in *Keyishian v. Board of Regents.*

Academic freedom is clearly essential to higher education institutions. Further, intertwined with academic freedom in these institutions is the mission to advance the public good. The following section will explore the idea of the public good in higher education and present differing views about how to achieve this outcome.

Public Good

A large part of this thesis examines the University's continued dedication to the public good and what that means. While this thesis takes one view of how the University should promote the public good – through the open access to and broad dissemination of academic knowledge – others disagree.

Writing about public goods, Joseph Stiglitz defined it in two basic concepts: (1) 'nonrivalrousness' and (2) 'nonexcludability.' 'Nonrivalrousness means that there is no additional marginal cost to the spreading of the benefits of the good. Nonexcludability means that no one can be excluded from the enjoyment of the good – thus, "it means knowledge cannot be shared provided privately" (Stzglitz, 1999: 309).

Despite these views, Stiglitz, like many, advocates for academic patenting and believes that it benefits the public good. Stiglitz claims that the patents allow innovators to temporarily enjoy the fruits of their labors while giving back to the public good because patenting involves the disclosure of knowledge that eventually enters the public domain.

Stiglitz states that the government walks a thin line with intellectual property because they need to allow innovators to reap the rewards of their labor but also promote the basic tenet

that knowledge has no marginal cost of usage. He further claims that "the gain in dynamic efficiency from the greater innovative activity is intended to balance out the loses from static inefficiency from the underutilization of the knowledge or from the underproduction of the good protected by the patent" (Stiglitz, 1999: 311).

Stiglitz's argument is like others who claim that commercializing academic knowledge actually supports the public good because it allows for the transfer of academic knowledge to the public. Both these views support the use of intellectual property protections that limit the public's access, even if for a short time, to university research. It certainly increases the marginal cost of the knowledge being spread.

Both arguments also call for intellectual property protections because they promote innovation by rewarding outcomes. While this extrinsic source of motivation may be important, and perhaps the basis of future studies, it is not as applicable to the university setting. Faculty already have the extrinsic motivation to research and innovate – faculty aim to be awarded tenure, which requires publication, and is, moreover, a duty of the job. Perhaps this argument holds more weight in nonacademic arenas, but there seems to be no credence to claims or implications that faculty are motivated to research because of the potential economic or intellectual property benefits.

The above literature review in its totality serves as the basis of analysis for much of this thesis. The following section will now explore different aspects of Cornell Tech to provide the reader with context about the institution that will be the focus of the remaining analysis of this thesis.

II. Cornell Tech

This section will present information concerning the activities and policies of Cornell Tech that are relevant to this thesis.

Academics

Cornell Tech offers many graduate programs in a diverse set of fields. Online, the university characterizes its graduate education as: "A Cornell Tech education fosters the innovation, collaboration and builder mindset demanded of tech leaders in today's environment. To generate innovation and innovative leaders, we had to rethink graduate tech education itself. So our programs reflect the flexibility, technical depth and cross-fertilization of ideas and disciplines the digital age demands" ("Cornell Tech Academics"). These programs include: Jacobs Technion-Cornell Dual Master of Science Degrees with a Concentration in Connective Media; Jacobs Technion-Cornell Dual Master of Science Degrees with a Concentration in Health Tech; Jacobs Technion-Cornell Dual Master of Science Degrees with a Concentration in Urban Tech; Master of Engineering in Computer Science; Master of Engineering in Computer Engineering, Johnson Cornell Tech MBA; Master in Operations Research and Information Engineering; Master of Laws (LLM) in Law, Technology, and Entrepreneurship; PhD in Applied Math; PhD in Computer Science; PhD in Electrical and Computer Engineering; PhD in Information Science; PhD in Operations Research; PhD in Operations, Technology, and Information Management; PhD in Statistical Science; and Runway Startup Postdocs ("Cornell Tech Academics"; "Cornell Tech PhD Studies").

The Runway Startup Postdocs is "part business school, part research institution, and part startup incubator." The program is supposed to assist recent PhD graduates with shifting their mindset to be less academic and more entrepreneurial. The program recruits Postdocs who have an idea, to participate in the program from one to two years as they develop their start-up and

work in conjunction with academic and business mentors. The Postdoc package was estimated to be valued at $175,000 the first year and $102,000 the second year – these prices include the allotted salary, research budget, housing allowance, space, etc. Additionally, the startups receive corporate support from industry partners ("Cornell Tech Runway Startup Postdocs"). The corporate support and benefits are valued at over $400,000 and include resources such as cloud hosting, software, legal support, and finance services ("Cornell Tech Corporate Support"). Since 2014, Runway companies have filed more than 21 patent applications – 6 have been granted – raised more than $66.6 million in angel and venture capital funding and employed more than 144 people globally ("Cornell Tech Runway Startups").

Additionally, another unique aspect to the Cornell Tech curriculum is the Studio program. Studio is a required part of all the Master's degree programs offered at Cornell Tech. The program is advertised as a "series of intensely immersive courses, you'll develop tech solutions for leading startups, companies, and organizations in NYC." All Master's students are required to take Product Studio in their first fall semester. Subsequently, students are required to enroll in Startup Studio, BigCo Studio, or PiTech Studio in the last spring semester of their program. Students also can take studio electives while enrolled at Cornell Tech. Studio classes bring together engineering, computer science, law, business, and information systems students together into a team, referred to as the "DreamTeam," to face challenges issued by companies. Cornell Tech has developed an algorithm for this matching, the "DreamTeam algorithm" ("Cornell Tech Studio").

The Cornell Tech Studio curriculum is said to maximize "your opportunities to develop and implement new product and business ideas, collaborate with classmates from across the Cornell Tech campus, and interact with innovators and thought leaders through New York City's

thriving technology and startup communities" ("Cornell Tech Studio Curriculum"). The Cornell Tech Studio curriculum is comprised of four core courses – Product Studio, Startup Studio, BigCo Studio, and PiTech Studio – and two elective courses – Startup Ideas and Product Management ("Cornell Tech Studio Curriculum").

Product Studio is the class required for Master's students during their first fall semester. In this course, students are put into teams to help develop a new tech product or service to meet the needs of a company. The course begins with companies issuing challenges for the students to help them solve a specific problem (e.g., Google asked "How might we encourage people to get a balanced view on controversial topics such as gun control regardless of their (political) leanings?"). Teams are then comprised of students from all different academic backgrounds at Cornell Tech and are supported by a Company Advisor. The course culminates with students presenting their product or service to key stakeholders to demonstrate how they have solved the company's challenge. The companies that issue these challenges are often large, multi-national corporations such as Amazon, E-bay, Google, IBM Watson, and more ("Cornell Tech Product Studio").

Startup Studio is one of the options for the required second Studio course for Master's degrees. The course involves students from different academic backgrounds partnering together to create a start-up. During this course students present to leaders in the New York start-up community. Students will participate in scrum, crit, and Studio sprints with entrepreneurs, product owners, and technical managers, who will provide feedback. The primary goal is to "provide you with skills and experience that you can apply to the rest of your degree and new ventures after graduation," but Cornell Tech does note that many teams turn their start-up into a

real business. Cornell Tech provides Startup Awards in the form of an investment and a year of access to co-working space to assist these teams ("Cornell Tech Startup Studio").

BigCo Studio brands itself as providing students with the ability to "learn how to build products in a complex environment at scale and navigate business development, M&A, and other corporate activities to drive strategic initiatives within large companies." The course is taught by two leading industry experts: Chad Dickerson, the former CEO of Etsy, and Bradley Horowitz, the VP of Product at Google. Describing the course, Dickerson said:

> BigCos and their products and platforms now drive the world economy. For instance, you're probably reading this sentence via a BigCo product (such as your browser, your device, or your operating system). There is a vibrant ecosystem of blogs, books, and information about the startup world but very little practical guidance out there about life in BigCos. In this course, we'll be sharing the dark arts of life in a BigCo that we spent the bulk of our careers learning the hard way.

Students self-organize into teams of four to eight; teams are then matched with companies using Cornell Tech's DreamTeam algorithm. Teams work with a company advisor – someone at the C-Suite or VP level – to research, speak with stakeholders, and ultimately formulate a solution for the company. Similar to Startup Studio, teams will participate in scrum, crit, and Studio sprints with the help of company stakeholders. At the end of the semester, teams will present their demo to the company advisor and stakeholders. The primary goal of the course is "to provide you with skills and experience to build products at a big company" ("Cornell Tech BigCo Studio").

Companies are recruited to participate in BigCo Studio through an application process online. The class is marketed to companies as the "opportunity to connect with talented students to explore solutions to challenges that are relevant to their business or represent new focus areas they are looking to explore." Dickerson and Horowitz are advertised as "accomplished practitioners who have experience in a variety of companies and industries" and their respective

private industry titles are advertised. Companies must apply and be selected by the Studio team to participate in the course ("Cornell Tech Become a BigCo Partner").

BigCo Studio states that the opportunity is limited to "established global companies," which it defines as having at least 500 employees and generating at least $100,000,000 in revenue per year. Companies are informed on the website that there is a suggested $8,000 donation to help with deferring the costs of the course ("Cornell Tech Become a BigCo Partner").

Companies that choose to participate are informed that the primary purpose of this course is education, and as such all intellectual property created by students will become part of the public domain and will be openly shared for the public benefit. All other intellectual property related matters are handled by the Cornell Standard Project Agreement, which will be subsequently discussed ("Cornell Tech Become a BigCo Partner").

PiTech Studio stands for Public Interest Tech Studio. In the course, students from different disciplines team up to develop a new product or start-up idea to aid the common good – the course description notes that ideas are often aimed at benefiting under-resourced communities. Students work with entrepreneurs to refine their startup ideas that are aimed at achieving positive societal outcome ("Cornell Tech PiTech Studio").

Cornell Tech advertises the results of their studio classes, highlighting alumni outcomes: Cornell Tech alumni, since 2014, have founded more than 60 start-ups, raised more than $78.8 million, and employed more than 250 people at their startups ("Cornell Tech Alumni").

It is evident that Cornell Tech has many unique aspects to their curriculum and differing programs. While many seem to serve their purpose of commercialization and entrepreneurship, they also raise questions about academic freedom and the public interest mission of the

university. The subsequent section will explore unique aspects in how they portray their research to further explore above trends.

Research

Cornell Tech advertises their research labs and initiatives as:

> Cornell Tech's labs and initiatives are highly collaborative environments where faculty and students pursue new lines of inquiry across theoretical and applied areas of technology. In addition to generating world-class academic work, our labs and initiatives engage deeply with external communities, organizations, and industry to address real-world problems and contexts that amplify the direct societal and commercial impact of our research. Explore the research projects and partnerships underway right now in our labs and initiatives ("Cornell Tech Research Labs & Initiatives").

Cornell Tech faculty are described as "active leaders in their fields" that frequently publish, patent, and are cited. Faculty are regular recipients of the highest awards from the National Science Foundation, the Institute of Electrical and Electronics Engineers, the MacArthur Foundation, and others ("Cornell Tech Research").

Similar to themes discussed in the academics section, it is clear from their statements concerning research that Cornell Tech encourages commercialization. The subsequent section will explore what this phenomenon looks like in relation to university governance.

Governance

Cornell Tech is primarily governed by a subsidiary of the Cornell University Board of Trustees, the Cornell Tech Council. The Council is said to "provide advice and counsel to the Dean and Senior Leadership and serves as active champions and supporters of Cornell Tech" ("Cornell Tech People"). The Council is currently chaired by David Siegel of Two Sigma. The

council is comprised of 16 members, 13 of whom are involved in private industry – including companies like Google and Sigma that are involved in the BigCo Studio courses ("Cornell Tech Council").

Private industry clearly has a dominating presence on the Council. Private industry also seems to have a stronghold over parts of the physical campus. The following section explores how Cornell Tech has integrated private industry actors on campus.

Campus

Cornell Tech advertises its campus as providing students with unprecedented access to interact with peers, faculty, experts, employers, and tech giants ("Cornell Tech Campus"). Cornell Tech campus is home to the Tata Innovation Center, a building that houses both Cornell Tech academic teams and private companies. Approximately one-third of the building is related to academics, laboratory, and research space, while the rest is private offices for tech companies, start-ups, and venture capitalists. Cornell Tech describes the Tata Innovation Center as "where academia and industry collide." Current tenants of the building include Citigroup, Tata Consultancy Services, and Two Sigma. Master's students spend a significant amount of time in the Tata center while working in Studio courses, hackathons, demo days, and collaborating with companies on challenges. Students also use the space to launch new projects with feedback from private industry actors ("Cornell Tata Innovation Center").

The above subsections exploring Cornell Tech have focused on the unique elements of the institution on Roosevelt Island. However, Cornell Tech is still part of the greater Cornell University. The next two subsections explore the intellectual property policy and the conflict of interest policy that govern all of Cornell University.

Intellectual Property

Cornell Tech has a standard agreement, the Cornell Standard Project (CSP) agreements that are aimed at easing cooperation between students and organizations for student projects for academic credit. The agreement is characterized as "nimble, versatile, and fair" and said to be akin to the standard model of engagement between students from many schools and a variety of organizations ("Cornell Tech CSP Agreement").

The standard CSP utilized by students contains several noteworthy clauses. For example, Cornell has no right to the intellectual property of the research. All intellectual property produced will be publishable and made freely available to the public. Furthermore, all relevant results are allowed to be published and presented by the students, barring the disclosure any confidential information. The companies, however, do have the right to review the results in advance to their publication or presentation, though this must occur during the duration of the project ("Cornell Standard Project Agreement for External Collaborations (CSP-EC).

Recall the case studies highlighted in the literature review section. Both instances involved issues concerning intellectual property and conflicts of interest management. Clearly, this are both essential matters if universities decide to engage with private industry. The next subsection will complete the background review of Cornell Tech by exploring the conflict of interest policy that governs the institution.

Conflict of Interest

Cornell Tech is governed by the university-wide guidelines for Cornell concerning conflicts of interest. Cornell has six overarching principles that govern its conflicts of interest

policies: (1) “Support faculty entrepreneurship, support industry engagement”; (2) “meet sponsor, public, regulatory, and legal requirements”, (3) “preserve research integrity”; (4) “protect academic freedom”; (5) “protect human participants”; (6) and “protect interests of students and staff.” Cornell defines a financial conflict of interest as:

> A financial conflict of interest related to research exists when a financial interest – or other opportunity for personal financial gain – is likely to compromise or influence—or *appear* to compromise or influence—the objective design, conduct, reporting, or direct administration of research. Conflicts are a set of intersecting relationships; they are not inherently bad, but they must be properly managed to protect the integrity of Cornell research.

Under the policy, faculty must submit annual disclosures online for conflicts of interest and there are sanctions for non-compliance (“Cornell Research Conflict of Interest”). Furthermore, students and faculty are required to submit conflict of interest information concerning licensing of universities technologies to industry partners with which they are involved financially (“Cornell Research COI Considerations for Startups and Licensing”).

Cornell Tech’s governing of conflict of interests for faculty startups are governed by a university-wide policy. The policy is described as encouraging and supporting faculty as they work to disseminate intellectual property created at Cornell by creating startups. The policy requires that faculty and staff:

> - Separate and clearly distinguish the focus of ongoing University research and educational responsibilities from involvement in any effort being conducted for the company.
> - Limit the time they spend on behalf of the company to the maximum allowed by University and college policy (up to the equivalent of one day per week for faculty).
> - Take an unpaid leave of absence if serving in a company management role, or if the effort with the company will exceed that allowable for faculty, or consume time from a staff member’s normal working hours or otherwise preclude the staff from meeting their job responsibilities (“Cornell Research COI Guidance on Appropriate Involvement in Start-ups”).

The policy forbids faculty and staff in startups from engaging in the following activities:

> - Negotiate with the University on behalf of the company
> - Involve company personnel in Cornell research.
> - Involve Cornell students under their direct academic supervision, or staff under their management supervision, in company activities. Any other students or staff may be engaged only if approved by the FCOI committee and under the conditions described in a conflict management plan.
> - Assume managerial or executive roles (e.g., CEO, CTO, CSO) in a start-up unless specifically allowed under the circumstances described in a Conflict Management Plan (CMP), serve as PI/protocol director for human participant or other research that is related to the company's business activities or objectives, or supervise faculty, staff, or students who are in similar roles, unless specifically approved by the FCOIC in a conflict management plan, and, when applicable, by all other cognizant University boards, including the IRB and IACUC ("Cornell Research COI Guidance on Appropriate Involvement in Start-ups")

The policy also restricts student involvement with private companies to which their advisors have financial ties. Cornell does allow this relationship for postdocs but requires that the faculty member and the postdoc make a conflict management plan and disclose the nature of the relationship and financial ties. Additionally, the postdoc's appointment to Cornell must be reduced by at least 10% and the postdoc may only belong to the faculty member's research group for a maximum of one year ("Cornell Research COI Guidance on Appropriate Involvement in Start-ups").

The policy also has strong limitations governing faculty and staff's use of university resources for their start-ups: senior faculty should not involve early career faculty in their company activities; they may not use university facilities, services, tax exempt status, or purchasing discounts for activities related to their start-ups; faculty's company employees are not allowed to be awarded visiting, courtesy, or adjunct appointments at Cornell; the University name, logos, trademarks, and insignias may not be used in such a way as to "suggest or imply" university support; and, faculty's support staff, either research or administrative, may not be

utilized to conduct business for the company ("Cornell Research COI Guidance on Appropriate Involvement in Start-ups").

At Cornell, the Financial Conflict of Interest Committee reviews faculty and staff financial disclosures. The Committee is tasked with managing all the relevant real and perceived financial conflicts of interest – the Committee reviews disclosures, identifies conflicts, and then develops a conflict management plan. Decisions by the committee may be appealed to the Vice President for Research and Innovation. The VP will review the case and make a recommendation to the Committee before they make a final decision. Additionally, the Committee investigates alleged incidents of noncompliance with conflict management plans. The Committee is composed of fourteen members – seven voting and seven nonvoting – all selected by, and including, the VP for Research and Innovation. At any time, the Committee must have a minimum of seven voting members from the Ithaca faculty ("Cornell Research Financial Conflict of Interest Committee").

The VP for Research and Innovation appoints one voting member to serve as Chair of the Committee. The Chair is responsible for ensuring that the Committee upholds university policies and guidelines that govern conflict of interest management and promote effective communication to manage conflicts of interest ("Cornell Research Financial Conflict of Interest Committee").

The Committee is supported by a team of administrators who support the Committee by serving as subject matter experts on relevant policies and regulations, providing continuing education to members about conflicts of interest and management, and giving administrative support ("Cornell Research Financial Conflict of Interest Committee").

This section has served to provide information that will be the basis of the qualitative analysis and provide context for the discussion of Cornell Tech. The following section will explain the quantitative study that was conducted to supplement the qualitative findings.

I. Methods

While previous sections have explored the literature and information concerning Cornell Tech, this section will outline the quantitative analysis conducted. Faculty from both the Cornell Tech campus and the Ithaca campus were surveyed to explore possible differences in their collective views. It was hypothesized that: Academics that work in an academic setting that promotes private industry collaboration (Cornell Tech) would be more pro-collaboration with private industry than their standard academic counterparts. It should be noted that only 26 participants responded to the survey – the small number of respondents means that the following results are underpowered and thus most likely non-generalizable or replicable. However, the following section will outline the procedures and methods utilized in the process. The subsequent section will explore the results of the survey.

Participants

Participants for the study were faculty at Cornell University working at the Ithaca Campus of the Cornell Tech Campus in spring of 2021. Faculty includes all members employed at the institution in 2021, regardless of tenure status – visiting faculty were excluded. Of the 592 participants solicited, 26 responded to at least part of the survey (6 from Cornell Tech, and 20 from the Ithaca Campus). Participants were selected based upon their participation with Cornell Tech or with a similar department at the Ithaca campus – Johnson (Business School), engineering, law, statistics, and communications. Similar departments were determined based upon those offering similar degrees to the degrees offered at Cornell Tech in the spring of 2021.

Specific demographic information was not solicited to protect the identities of the participants involved because of the limited nature of the departments participating.

Research Design

This study was a survey design with one quasi-independent variable. The independent variable was whether the faculty member worked at Cornell Tech: the control group were faculty that worked in similar departments at Cornell's Ithaca Campus. The faculty from the Ithaca Campus were selected to represent the opinions of faculty at a more traditional higher education institution. The dependent variables being measured were faculty's perception of private industry and their willingness to have private industry actors involved in higher education.

Procedure

Participants were recruited via email to participate in the survey. Participants elected to fill out a survey highlighting their experience and opinions concerning private industry involvement in higher education. Participant responses were organized by whether or not the faculty member worked at the Cornell Tech campus in New York City, or the Ithaca campus. Participants were asked to answer a series of questions concerning private industry's involvement with universities on a 1-7 scale (1 = Very Inappropriate, 7 = Very Appropriate) – including ideas surrounding appropriateness and willingness to be involved with private industry. For example participants were asked: "How appropriate is it for private industry to be involved/invested in university research? (e.g., through funding, data, providing resources, active collaboration)." Participants were also asked to answer free response questions that elicited new information or explanations pertaining to the scale questions. For example, the survey asked: "Is there any reason to encourage private industry involvement in university research?". The full survey can be found in the Appendix.

IV. Results

Recall the hypothesis being tested was: Academics that work in an academic setting that promotes private industry collaboration (Cornell Tech) would be more pro-collaboration with private industry than their standard academic counterparts. The influence was analyzed by using an Independent Samples *t* Test, with an alpha level of 0.05. For a chart of the following results please see Appendix B.

There was a marginally significant difference in faculty members view on the of private industry actors being involved in decision-making by administrators at the college or university level, such as the decision to create a new research center or the decision to hire faculty members within certain disciplinary areas between faculty members who worked at Cornell Tech ($M = 2$, $SD = 1.26491$) as compared to the faculty at the Ithaca campus ($M = 3.5$, $SD = 1.87785$), $t(26) = -1.823$, $p = 0.081$.

There was no significant difference in how appropriate faculty viewed private industry influence concerning the type, content, or structure of courses taught between faculty members who worked at Cornell Tech ($M = 2.8333$, $SD = 1.72240$) as compared to the faculty at the Ithaca campus ($M = 3.8947$, $SD = 1.76052$), $t(23) = -1.293$, $p = 0.209$.

There was no significant difference in how willing faculty members were to collaborate with private industry concerning the courses they teach, the content of the courses, or methodology between faculty members who worked at Cornell Tech ($M = 3.6667$, $SD = 1.86190$) as compared to the faculty at the Ithaca campus ($M = 4.5789$, $SD = 2.19382$), $t(23) = -0.916$, $p = 0.369$.

There was no significant difference in how appropriate faculty members viewed private industry involvement in degree granting activities between faculty members who worked at Cornell Tech (M = 3.8333, SD = 1.83485) as compared to the faculty at the Ithaca campus (M = 3.6842, SD = 1.66842), $t(23) = 0.187$, $p = 0.845$.

There was a marginally significant difference in faculty members support of the prioritization of basic research between faculty members who worked at Cornell Tech (M = 5.3333, SD = 1.50555) as compared to the faculty at the Ithaca campus (M = 3.9474, SD = 1.71509), $t(23) = 1.77$, $p = 0.090$.

There was no significant difference in faculty members support of the prioritization of applied research between faculty members who worked at Cornell Tech (M = 3.1667, SD = 1.94079) as compared to the faculty at the Ithaca campus (M = 3.4211, SD = 1.30451), $t(23) = -.370$, $p = 0.714$.

There was no significant difference in faculty members view on how appropriate it is for private industry to be involved in university research between faculty members who worked at Cornell Tech (M = 5.6667, SD = 1.03280) as compared to the faculty at the Ithaca campus (M = 5.7895, SD = 1.31567), $t(23) = -.208$, $p = 0.837$.

There was no significant difference in faculty member's view on whether university research must be able to be quickly be commercialized between faculty members who worked at Cornell Tech (M = 4.5, SD = 1.76068) as compared to the faculty at the Ithaca campus (M = 3.7895, SD = 2.22558), $t(23) = 0.34$, $p = 0.484$.

There was no significant difference in faculty members view on whether research that is easily commercialized should be prioritized at the university between faculty members who

worked at Cornell Tech (M = 2.0, SD = 0.63246) as compared to the faculty at the Ithaca campus (M = 2.7895, SD = 1.31567), $t(23) = -1.404$, $p = 0.174$.

There was no significant difference in faculty members' willingness to collaborate with private industry while conducting research between faculty members who worked at Cornell Tech (M = 5.8333, SD = 1.16905) as compared to the faculty at the Ithaca campus (M = 5.9474, SD = 1.12909), $t(23) = -0.214$, $p = 0.832$.

A Pearson correlation was run against the different dependent variables, using an alpha of 0.05, and produced the following results:

There was a significant, positive correlation between faculty supporting private industry actors be involved in governance and faculty supporting private industry influence in the type content and structure of courses taught at the university, $r(25) = 0.562$, $p = 0.003$.

There was a marginally significant, positive correlation between the faculty supporting private industry involvement in governance of the university and faculty being willing to collaborate with private industry concerning the type, content, and methodology of the courses they teach, $r(25) = 0.370$, $p = 0.069$.

There was a marginally significant, negative correlation between the faculty supporting private industry involvement in governance and faculty supporting the prioritization of basic research , $r(25) = -0.337$, $p = 0.099$.

There was a significant, positive correlation between faculty members' supporting private industry involvement in the type, content, and structure of courses taught at the university and faculty's willingness to collaborate with private industry concerning the type, content, and methodology of the courses they teach, $r(25) = 0.800$, $p < 0.001$.

There was a significant, positive correlation between faculty members' supporting private industry involvement in the type, content, and structure of courses taught at the university and faculty support of private industry being involved in university research, $r(25) = 0.453$, $p = 0.023$.

There was a significant, positive correlation between faculty's willingness to collaborate with private industry concerning the type, content, and methodology of the courses they teach and faculty's support of private industry being involved in degree granting activities, $r(25) = 0.383$.

There was a significant, positive correlation between faculty's willingness to collaborate with private industry concerning the type, content, and methodology of the courses they teach and faculty support of private industry being involved in university research, $r(25) = 0.401$, $p = 0.047$.

There was a significant, positive correlation between the faculty's support of private industry being involved in degree granting activities and faculty being willing to engage with private industry in research, $r(25) = 0.412$, $p = 0.041$.

There was a significant, positive correlation between the faculty's support of private industry being involved in degree granting activities and faculty support of private industry being involved in university research, $r(25) = 0.491$, $p = 0.013$.

There was a significant, positive correlation between the faculty's support prioritizing applied research and faculty's support of prioritizing easily commercialized research, $r(25) = 0.416$, $p = 0.039$.

There was a significant, positive correlation between the faculty's support of the importance of university research being easily commercialized and faculty's support of prioritizing easily commercialized research, $r(25) = 0.445$, $p = 0.026$.

There was a significant, positive correlation between the faculty's willingness to collaborate with private industry in their research and faculty and faculty's support of private industry being involved in university research, $r(25) = 0.591$, $p = 0.002$.

A chi-squared test was utilized to assess the differences in who faculty believed should be the primary benefactor of university research, at Cornell Tech and the Ithaca campus, with an alpha level of 0.05. Participants were not more significantly likely to respond they felt like the public was more intended to be the benefactor of university reach at Cornell Tech (100%) than if they worked at the Ithaca campus (94.4%), $\chi^2(1, N = 23) = 0.290$, $p = .590$. However, it is worth noting that 22 of the 23 respondents wrote that the public, or some iteration, should be the primary benefactors of university research.

While the limited nature of the participation impacts the generalizability of these results, there were some clear trends in the findings. The faculty surveyed clearly were becoming more comfortable with private industry involvement with the university. Though it was clear that there were still concerns regarding the level of involvement. The correlations showed that faculty who tended to approve of private industry involvement in one facet of the university tended to be open to the collaboration in a plethora of circumstances. Finally, the chi-squared test revealed nearly universal support still exists for the university serving the interest of the public first and foremost.

V. Discussion and Conclusion

This discussion section will begin with a qualitative review of Cornell Tech's policies and functions. Next, a quantitative analysis of Cornell University, Ithaca campus, and Cornell Tech's faculty will assess academic trends at Cornell Tech. Finally, this discussion will conclude with recommendations for Cornell Tech and university governance at large.

Qualitative Analysis

The private industry mindset of Cornell Tech seems to have begun at the very outset of the project. After all, Cornell partnered with Technion University because of the success of its graduates in technology entrepreneurship. New York City selected the proposal specifically because of its focus on collaboration between academics and private industry ("Cornell Tech About"). Cornell Tech began operations at one of major, multinational company, Google.

The unique nature of Cornell Tech is ever-present in almost all aspects of the educational experience. Cornell Tech offers a Runway Startup Postdoc that is aimed at helping PhD's transition from an academic mindset to an entrepreneurial mindset. A large component of the program is the startup incubator elements and the plethora of support offered.

Such a program seems interesting for a university that is tasked with adding to the public good. While academia has traditionally valued the public dissemination of scientific knowledge (Kellogg, 2006: 4), private industry's activities run antithetical to this principle. The emphasis on privatization of knowledge, especially through patenting and licensing, limits the dissemination of knowledge among the community. Interesting then that such a Postdoc program exists, as it seems to emphasize training academics to act and think like private actors, instead of agents benefitting the public good. It would also seem that the Postdoc program propagates the view that academic knowledge be marketable as the goal of the program is to start a company.

The Postdoc program outcomes seemed to have materialized as 21 patent applications have resulted from this program and $66.6 million in agent and venture capital funding – six patents have been granted. The program benefits include corporate support in the form of cloud hosting, software, legal, and financial support as well as support from the University in the form of the Runway award – which includes a salary and research funding – space, equipment, and a business education. This funding makes the University the "first investor" in the startup and gives the University up to a 6% equity in the company. Clearly, research and ideas coming out of the program are commercializable and steps are being taken to limit their dissemination ("Cornell Tech – Runway Startup Postdocs").

Currently, the program is valued for each student at almost $300,000 for the two years in addition to the industry partner support. This is a substantial amount of University resources being diverted to a start-up program, especially considering that in one survey, only 27% of faculty supported universities investing in start-ups based on university research.

Perhaps the most unique nature of the Cornell Tech curriculum are the Studio classes that are required for all Master's students. All students must enroll in the basic Studio class their first semester ("Cornell Tech Studio"). In this course students will develop solution for start-ups, companies, and other organizations in New York City.

The required nature of this course seems problematic especially in the face of certain issues. For one, it seems a stretch to tout solving private industry's problems as a way to advance the public good. If anything, this seems to be a way to promote the "private industry good," as they are quite literally the recipients of the help. Furthermore, it raises interesting institutional conflict of interest questions. Under Cornell's conflict of interest policy, Cornell faculty may not involve students under their academic supervision or staff to be involved with their company

activities. All other students must be approved by the FCOIC committee. It is evident that these procedures exist so that faculty do not take advantage of students. But what happens if Cornell takes advantage of students? Cornell is offering up their students' expertise in a mandatory class, and presumably, for many of those large companies that participate (e.g., Google), Cornell has a vested interest in keeping happy in order to help solicit donations or other forms of aid.

While some may assert that MBA programs have been solving the issues of private industry at the university for decades, there are some important key differences. For one, MBAs are professional degrees, so there is more of an expectation of job-like training in the classes. At Cornell Tech, research degree students are working on solving private industry problems. Additionally, it is one matter for MBA students to study business dealings, famous failures, and organizational case studies; however, it is an entirely different matter to have them solving current problems for private industry. Studying Enron and its problems is not the same as a private company using students as free consultants to solve their internal issues. In the latter case private industry is the chief benefactor and control over courses is being relinquished to them.

In many ways, these studio classes seem to be a continuation of post academic science that has been on the rise in academia. The work in these classes is neither fully academic, nor is it fully industrial. Similarly, it also has expanded the sites of knowledge production, as now each studio class serves as a center for knowledge creation with private industry actors, Cornell Tech faculty and students working in tandem. Kellogg (2006) also noted the trend of post-academic knowledge being privatized, which is happening as studios have produced more than 60 start-ups. Cornell Tech has seemed to morph from the academic nature of Cornell University into a hybrid academic-industrial training program meant to prepare students to work in private industry. Cornell Tech has seemed to reject the idea of education forming the full person, instead

embracing education to form the full employee already experienced with working with and solving issues for private industry.

In Studio classes, students from a diverse array of academic backgrounds are gathered to help find creative solutions. In some ways, Cornell Tech almost builds businesses with their own Cornell business team filled with different actors that all bring different expertise to the table. For example, MBA students at Cornell Tech are included in Studio classes for their business knowledge. Cornell Tech is not the first institution to use their MBA students in classes to facilitate entrepreneurship. The Carey School at Johns Hopkins mandates a Discovery to Market Course that partners students with the School's TTO. However, this does seem a step farther as Cornell Tech is "loaning" their MBA students' expertise to businesses to solve their problems.

In addition to the mandated studio classes, there are four options for advanced studio classes that students must select between. The Startup Studio is akin to a start-up incubator, but for a class. Students are given course credit to come up with and develop start-up ideas. Once again, Cornell Tech has placed the emphasis on commercialization and privatization, instead of advancing the public good. Perhaps the most striking part of the scenario is that this is not just impacting MBA students, but also students in research degree programs. Students are being taught to value commercialization above all else.

Students in this course, like many of the studio courses, participate in scrum, crit, and Studio sprints which are entrepreneurial competitions and exercises. This seems in line with prior studies that found an increased prevalence in university-hosted business plan competitions to encourage entrepreneurship (Barr et al., 2009) and an increase in entrepreneurship courses and programs (Siegel & Wright, 2015).

Another one of the advanced courses is BigCo Studio. For this specific course, companies get to apply to participate and receive advice from students. This offer, however, is limited to companies with at least 500 employees and generating at least $100,000,000 in revenue per year. Surely, supporting such companies is not the mission of a University dedicated to helping the public good. Solving problems for large companies such as these has no direct benefit to society, other than the company's shareholders. There is a recommended $8,000 donation to defer costs.

The course is advertised as being taught by Chad Dickerson, the former CEO of Etsy, and Bradley Horowitz, the VP of Product at Google. Clearly their private industry background distinguishes them from their more academically experienced peers. However, they were chosen for this specific reason – the website advertising to companies speaks of the instructors' private industry experience, knowledge, and connections. Dickerson himself spoke of the course as shedding light to the "dark arts of life in a BigCo" ("Cornell Tech Become a BigCo Partner"). Clearly, the goal of this class is to produce executives for big companies, the same big companies making donations for this class. It seems hard-pressed to say that being the breeding ground for corporate America is a sure way for the University to directly benefit the public welfare – instead, it seems to indicate some sort of catering to private industry demands or wants.

Perhaps, the saving grace of the class is the requirement that all the intellectual property produced from the class be open available in the public domain for the public good – though it would seem unrealistic that many people could benefit from learning how a large company like Google is going to deal with an issue.

The only studio class seemingly in line with the public mission of the University is the PiTech Studio, where students work to refine startup ideas that benefit the common good. This is

more of an example of how Cornell Tech should aim to operate. Students not only gain relevant knowledge in their relevant field and entrepreneurship, but also the University is able to uphold its dedication to advancing the public good.

The nature of the studio classes raises an interesting question concerning governance. Similar to Cornell University as a whole and other institutions, Cornell Tech has several private industry actors on the Cornell Tech Council – in fact 13 of the 16 members on the Council are private industry actors. This creates a complicated issue, for example, when David Siegel is the Chair of the Council and also the head of Two Sigma. Two Sigma is one of the companies that have been involved and benefitted from their relationship with Cornell Tech Studio classes. This creates an interesting conflict of interest where private industry actors on the Board have an underlying incentive to receive benefits from Cornell Tech's programs instead of simply focusing on governance. This could lead to a situation where instead of Cornell Tech working to advance the public good, it becomes akin to a clinical program utilized by influential private industry actors to solve their business issues. Helping large companies solve their problems at a low cost does not advance the public good mission of the university nor does it add to the dissemination of knowledge. Cornell Tech must be careful not to turn their student body and curriculum into a cheap consulting service for hire.

It is not only the curriculum that is reflective of the changes in academia, but also in the approach to research at Cornell Tech. Cornell Tech is said to "engage deeply with external communities, organizations, and industry to address real-world problems and contexts that amplify the direct societal and commercial impact of our research" ("Cornell Tech Research Labs & Initiatives"). Engaging with private industry in research leads to the privatization of

academic knowledge through patenting and licensing. Not to mention, it could lead to a plethora of academic freedom issues, which will be subsequently discussed.

The quotation also exemplifies the emphasis that Cornell Tech places on applied research. This seems to be a natural progression of the trend that Lee found concerning the increased view of applied research being equivalent to basic research in academia, especially among engineers and the hard sciences. It is also possible that this is influenced by the large proportion of engineers and applied scientists that are among the faculty at Cornell Tech.

It is important to clarify that applied research is not less valuable than basic research and not antithetical to the mission of the University. Applied research can and often does serve the public good. The actual tensions being examined here have to do with research that supports the public good versus private industry.

Underlying much of these critiques are questions surrounding academic freedom at the University. It would seem that Studio classes have a curriculum largely dictated by private industry actors, as they present the questions. This would seem to leave very little room for instructors to shape the course. This problem is further compounded by the presence of private industry actors on the Council taking advantage of the Studio courses for their own companies. This in turn creates a system where faculty become akin to camp counselors just in charge of monitoring the students' progress as they work through the issues of private industry. This violates the basic tenets of academic freedom that empower faculty to have autonomy over their teaching methodology and content.

This issue of academic freedom also extends to research at the University. Faculty should have the ability to set their own research agendas. Research at Cornell Tech is said to be working with industry to address real-world problems. Faculty are encouraged to partner with the private

industry actors on campus in research and entrepreneurism, including even taking leaves of absence to work together. This can be problematic as studies have shown that private industry often has differing agendas from those of faculty members. For example, private industry tends to favor short-term applied research, as opposed to the long-term basic projects that were favored by faculty (Lee, 1996). Allowing private industry to shape research agendas can encroach on the faculty's academic freedom. Involving private industry in research can also lead to conflicts of interest, which will be discussed later in the discussion.

The trends of post-academic science have not only impacted the intellectual academic activities of Cornell Tech, but also the physical layout of the campus. Cornell Tech on Roosevelt Island is home to the Tata Innovation Center, which houses academics, labs, research space, and private offices to tech companies, start-ups, and venture capitalists. Students spend time in the Tata Center for their Studio courses and the entrepreneurship competitions (i.e., hackathons, demo days, etc.). Cornell Tech has created not only classroom settings and research that creates new centers of knowledge creation, but also a building that symbolizes such a center. It is a place that students go to receive feedback and work in tandem with private industry actors.

The presence of venture capitalists on campus shows the University's great desire to capitalize on their research. The University has quite literally moved private industry funders in to assist facilitating commercialization. Venture capitalists are on campus to shop academic knowledge for their own benefit. Surely, this level of interaction crosses the boundary from partnership to outright support of private actors over the public good.

The issues such as those above have underlying conflict of interest concerns. Cornell Tech is governed by the same conflict of interest policy as all of Cornell's other campuses. Similar to most higher education institutions (Cho et al., 2000), Cornell Tech requires annual

disclosures of financial interest from faculty. Typical of most universities (Cho et al., 2000), Cornell Tech requires disclosure to a third party, in this case a Financial Conflict of Interest Committee – it is important to note that conflict of interest committees are far less common, with one study only finding them in 37% of institutions surveyed (Cho et al., 2000).

Cornell's conflict of interest policy is more thorough than most, as it lists activities that are not allowed, similar to 36% of institutions (Cho et al., 2000). However, similar to the majority, 81% (Cho et al., 2000), Cornell's policy does not specifically state what behavior is not allowed in research with regard to conflicts of interest.

Furthermore, intellectual property also becomes of importance given the complicated relationships between students and private industry at Cornell Tech. These relationships are governed by the Cornell Standard Project (CSP) agreement that ensures that all relevant results and findings enter the public domain. It also ensures that while companies have the right to review the results before they are publicly disseminated, it limits that time to the duration of the projects. While these policies seem to aid in the public mission and ensure that students results are not silenced by or appropriated by private industry, certain aspects of the agreement prove more problematic, notably the vagueness of what constitutes confidential information.

One last point to note in the qualitative study is the existing presence of bias, even without the involvement in private industry. Recall Simmons, Nelson and Simonsohn's study concerning false positives in studies due to researchers' degrees of freedom. The study proved that data can be unintentionally manipulated by researchers in ways that affect the research validity. This is not to say that researchers are intentionally skewing results but instead that bias is a natural part of life. Many professors seemed to rebuke the idea of private industry involvement in anyway affecting their research. This is not a rational position to take because we

know bias exists even without industry involvement. Thus, it is only logical that having another party involved (i.e., private industry) that is providing resources adds another layer of pressure for academics that can influence their research findings.

Truly, this is mainly an issue for administration. Faculty will always feel pressure, but it is the administration's job to protect them from this undue influence. Take for example the case of Dr. Kern, where Brown University clearly failed him. It is essential that universities notice that these influences and pressure exist and that policy be crafted to protect faculty. Cases of blatant malintent may be rare, but pressure is not. Universities must take this issue seriously.

Quantitative Analysis

This study set out to analyze empirically if academics that work in academic settings that promote private industry collaboration (Cornell Tech) would be more pro-collaboration with private industry than their traditional academic counterparts. The results paint an inconclusive picture. In many areas, faculty from the two campuses were in general agreement. As previously noted, this is likely the result of the study being underpowered from limited participation by faculty members.

For example, faculty's views on private industry being involved in administration and university-wide decision making was universally opposed by both sides. This is not completely surprising given the autonomous nature of faculty employment. Involved in faculty's right to academic freedom is the right to participate in self-governance, so it is no surprise that all the faculty would oppose another voice being allowed to join the conversation, especially one outside the realm of academia. As a Cornell Tech professor wrote frankly, "… private industry

should ordinarily have no role in making hiring decisions or even in setting priorities of disciplinary areas."

It should be noted that a marginally significant difference was found between the two groups with regards to their view on governance. While the Cornell Ithaca campus faculty did not agree with private industry being involved in such decisions, they were more favorable toward it than Cornell Tech. Ultimately, this is an inconclusive finding of little value given the limited nature of the quantitative data.

Furthermore, no relationship was found between the two groups when examining their view on the appropriateness of private industry being involved in the type, content, or structure of courses taught. No significant difference was found between the two groups concerning their willingness to collaborate with private industry regarding the courses that they teach, the content of those courses, or methodology. Ultimately, these results could be explained by a plethora of causes, including the range of activity that could fall into industry representatives participation in courses. For example, many respondents answered that they incorporate guest speakers from private industry into their curriculum to come and speak to the class. For example, one professor from the Ithaca campus noted on the subject: "I often have guest lecturers from industry come and speak to my class. It's not a collaboration of course, but I think students benefit from hearing from industry experts."

Another possible explanation for these findings is a shift in the understanding of higher education amongst academics. Several respondents spoke of the importance of training students for the workforce, one Ithaca campus professor even going as far to write: "Ultimately it is the professor and unit who must decide on course content. But relevance is important[,] and we need our students to emerge as experts on the subject, as it is really used in practice. We can't

get that kind of perspective without engagement with the important industry leaders. So[,] consultation with industry is imperative if we are to offer cutting edge, impactful training to our students." This idea of "training" sets a clear tone for the goal of the university: produce individuals that can meet the needs of private industry – this view takes universities away from a holistic view of development towards a boot camp-like setting meant to create "private industry soldiers."

However, this view is hardly universal in the results. Another Ithaca faculty member made specific mention of just the opposite: "My fear would be that in a worst-case scenario, the course becomes a training program run for the purpose of the industry." Clearly, not all faculty are in agreement concerning their view on the goals of higher education at a university.

One interesting thing of note was that Cornell Tech faculty had a mean of 3.6667 for the question concerning their willingness to collaborate with private industry regarding the courses they teach, the content of the courses, or methodology between faculty members. That mean indicates that a majority of faculty answered on the inappropriate end of the scale. Yet, Studio is a required part of the Cornell Tech Master's education. Studio is seemingly driven entirely by private industry. Private industry competes for a chance to present a challenge to a team of students who work to come up with possible solutions. Clearly, this is collaboration with private industry on the type, content, and methodology of the course. Studio is not just one course but multiple, including required courses and electives.

There was also no relationship found between working at Cornell Tech and faculty's view on the appropriateness of private industry involvement in degree granting activities. Multiple faculty members mentioned academic freedom as a concern in their responses. Like in many aspects of their job, faculty enjoy a great deal of autonomy in degree granting activities.

Naturally, they would not be running to share this authority. However, it is important to note that for some it would seem that the issue is deeper than just autonomy. As one Ithaca campus professor highlighted: “I don’t think we're training students to get jobs, we are teaching them to think critically, breakdown problems and become independent thinkers. We are [training] them to be future leaders in a world which is always evolving. I would be fearful that if we collaborated too much on teaching, we would shift to more of a vocational training, which is not what we do.” This whole person idea that the professor is preaching for is far cry from the “training” mentioned by others. Naturally, this view of autonomy would carry over to degree granting.

The study did find a significant relationship between working at Cornell Tech and supporting the prioritization of basic research. Cornell Tech faculty were significantly more likely to support the prioritization of basic research than the Ithaca campus faculty. This seems counterintuitive as Cornell Tech promotes applied research and commercialization – ultimately, this is also likely a result of the limit sample size obscuring the findings.

The study also did not find a relationship between working at Cornell Tech and the prioritization of applied research by faculty. Both parties took a somewhat negative stance regarding the prioritization of applied research. This should come as no surprise as it is largely consistent with the findings of Lee’s study showing that while more faculty members were beginning to see applied research as appropriate for the university, the support is not universal. After all, basic research was a key tenet of the Vannevar Bush model.

These results are further supported by the marginally significant negative correlation that was found between faculty’s opinion concerning the appropriateness of private industry involvement in governance matters and the prioritization of basic research. Essentially, faculty

who did not support private industry involvement in governance tended to favor basic research. This fits with the aforementioned trends of autonomy and an emphasis on basic research in academia.

The trend of faculty favoring autonomy continued while examining faculty members' view of the appropriateness surrounding private industry involvement with curriculum and governance. Faculty who tended to be against private industry involvement in one, were also against it in the other situation. This seems reasonable, as faculty have always stressed autonomy – a large part of which involves the self-governance and ability to decide on matters of teaching included in the norm of academic freedom. These ideas are further reinforced by the positive trend found between appropriateness of private industry involvement in course curriculums and offerings and faculty's view on the appropriateness of private industry involvement in faculty research.

The trend is further enforced by the positive correlation that was present between faculty's view on the appropriateness of private industry involvement in university research and degree granting activities.

With regards to faculty's view on private industry involvement in faculty research, there was also no significant difference between the two groups. There were some familiar critiques for working with private industry, take one professor who wrote: "I don[']t think we're training students to get jobs, we are teaching them to think critically, break down problems and become independent thinkers. We are training them to be future leaders in a world which is always evolving. I would be fearful that if we collaborated too much on teaching, we would shift to more of a vocational training, which is not what we do." Another Ithaca campus professor raised a similar point when articulating why private industry actors should not be involved in degree

granting activities, “Industry could force a student to focus on something for its own benefit, or try to suppress investigation or publication in certain areas or with certain findings.” This professor is echoing the findings of Blumenthal et al., when they found that academics who are involved with private industry in the generation of research are more likely to experience pressure to delay publication to serve the desires of private industry. Similar studies find that private industry sometimes place gag orders on academics to prevent the publishing of unfavorable results (Rahm, 1994; Cohen et al., 1994).

With the negative experiences surrounding publication when working with private industry and the overall trend seen in the data that faculty tended to view it as at least slightly inappropriate at times, it may not seem clear why faculty do choose to engage with private industry. Perhaps even more curious, while no relationship was found between faculty’s willingness to collaborate with private industry in research and working at Cornell Tech, both groups indicated that they were willing to engage in such relationships. One Ithaca campus participant summed this answer up rather succinctly: “Funding is funding - if they are interested in something that overlaps with the faculty's interest and are able to share funds (or even just additional data), then if the faculty member is comfortable with any data latency restrictions, I can't see a problem.” “Funding is funding” – these words reign true especially in academia as faculty are under pressure to publish to achieve tenure, but publishing does not appear out of thin air. Research requires funds, data, resources, etc., and after all “funding is funding.”

The was no significant difference found between the two groups concerning their view on whether university research must be able to be commercialized quickly Again this likely a limitation of the study given the limited sample size.

While the chi-squared test concerning the difference in who the faculty believed should be the primary benefactor of higher education research and working at Cornell Tech did not present a significant relationship, it was interesting to note that all but one professor indicated the primary benefactor should be the general public. This presents a quandary as many faculty members were vocally in support of working with private industry in some circumstances. There is a disconnect among faculty about how to benefit the public good. The traditional views of the public benefitting from the basic research produced at the university and the public domain of knowledge is not a unanimous view by any means. Clearly, based upon the overwhelming declaration that faculty's work goes toward benefiting the public, there are some faculty who believe that partnering with private industry and engaging in research that is easily commercializable benefits the public. Perhaps, this is a result of the view that private industry supports society by bringing university innovations to the market to benefit the public good.

Recommendations

Following the case study of Cornell Tech and the above analysis, this section presents recommendations based upon the findings of this thesis. The first set of recommendations are specific to Cornell Tech. The subsequent recommendations are ideas generated from this thesis that are universally applicable to all institutions of higher learning.

1. **Cornell Tech should overhaul their studio course curriculum**.

Cornell Tech's current studio courses seem to offer up the student body as consultants for hire. For the small price of $8,000, a corporation can get a Cornell Tech "Dream Team" of their own. Students are essentially being utilized as outside consultants to solve issues for private industry at low costs. Interestingly, while the university regulates students being involved in faculty's

outside work, including consulting, they have no problem with the students engaging in such conduct at the request of the University. Furthermore, allowing private industry actors to present problems that students must solve while monitoring their progress is a direct attack on faculty's academic freedom. Faculty who teach these courses are not getting to decide the content or methodology for the course. At some point, faculty become akin to babysitters just checking the students in for private industry to utilize. Finally, courses that partner students exclusively with big business certainly do not go to support the University's mission to the public good – it supports capitalists' money-making endeavors. The University should be using its resources to benefit the public good – if these courses are so essential to the curriculum, why not have more courses like PiTech that partner students with the community for the greater good or start a studio for local small businesses that enrich the community?

2. **Cornell University should adopt a strong ICOI policy to govern the University and administrators' dealings with private industry.**

Clearly, as shown in the case study of academic entrepreneurship involving Dr. Kern and Brown University's lack of support, an ICOI policy is crucial. Brown University is another Ivy League institution and substantially similar to Cornell University. Cornell Tech has formed very complicated relationships with private industry, even moving them onto campus. If these relationships must exist, it is essential that they have clear boundaries. The lack of clear boundaries, pressures of the job, and undue influence from partnering with industry have led to negative consequences. If Cornell is to fulfill its public interest mission, then it is essential that there not only be no impropriety in research, but also no appearance of impropriety. University research has long been held above the rest because of its attempt to approach issues without bias – after all, there is a reason why industry scientists' opinions are viewed with a grain of salt. In

order to keep benefitting the public and continuing their mission, Cornell must have policies like ICOI that work to proactively mitigate both real sources of and the perception of undue influence by private actors.

3. **Continuing on from the idea of ICOI policies, Cornell Tech should not allow members of its governing Committee to receive benefits from the University.**

This recommendation chiefly applies to private industry actors serving on the committee while also reaping the benefits of the studio course or other perks of partnering with Cornell Tech. For example, it appears to present a conflict of interest that the Chairman of the committee also is the head of Two Sigma, a finance company that benefits from its connection to studio classes. You cannot expect committee members to account for their own biases. Thus, policies should be in place that do not allow this type of interaction because at the very least it gives the appearance that private industry is running the school for their own benefit. Clearly, these interactions cannot be said to benefit the public good.

4. **Cornell Tech should offer more research funding to faculty.**

As one professor put it, "funding is funding." This mentality can lead to a dangerous path of compromises. As the false positive study by Simmons, Nelson, and Simonsohn (2011) showed, researchers can already unknowingly influence their results because of pressure and other outside factors. Making faculty beholden to private industry for research funds, especially on a continuing basis, only further opens the door for bias in research. Furthermore, the University should be actively working to protect academic freedom, which means allowing researchers to make their own decisions about their work. Professors should not feel that they must adjust their projects, as some noted in the literature review, because they need funding from private actors.

5. **Adopt the six recommendations made by Simmons, Nelson, and Simonsohn (2011) in their study concerning false positives in data collection.**

This thesis has spoken at length about the existence of bias in research. These guidelines help to deter any unintentional bias by faculty in reaching their research results. Additionally, these guidelines help the University in their public mission by establishing credibility as the University proactively works to combat bias in research.

6. **Faculty should engage in collective action and embrace Simmons, Nelson, and Simonsohn (2011) recommendations for reviews – specifically (1) "Reviews should require authors to demonstrate that their results do not hinge on arbitrary analytic decisions" and (2) "If justifications of data collection or analysis are not compelling, reviewers should require the authors to conduct an exact replication" – as professional norms.**

Faculty as a whole have long enjoyed a great deal of autonomy in their work and have engaged in collective action. The peer review process is just one example of how the profession monitors itself. This recommendation, while more difficult to achieve, speaks to faculty holding the profession to a high standard. While there is no doubt that the vast majority of faculty work diligently to maintain high ethical standards, the truth remains that bias exists. Having an extra set of eyes for oversight should not be seen as a threat but as a resource. Faculty should collectively hold themselves and their peers to these standards, if for no other reason than to maintain the public's positive perception of the integrity of academic research and the trust in it that is required for the University to fulfill its public mission.

7. **Cornell Tech should form a committee of faculty, administrators, and students tasked with ensuring the University uphold its dedication to academic freedom.**

Clearly, Cornell Tech presents a rather revolutionary model of higher education. With these changes come new challenges in the areas of academic freedom. For example, studio classes seem to be rather antithetical to academic freedom as faculty have limited control over content or structure. This committee should work to review Cornell Tech and all upcoming decisions that may impact the academic freedom of staff and faculty.

8. **Cornell University should update its intellectual property policies to not allow for private industry to retain control over university research in any form.**

This recommendation is specifically speaking to private industry being able to control the flow of academic research. For the University to fulfill their public interest mission and maintain academic freedom norms, they must not allow publications to be delayed or withheld. Faculty at Cornell should not be allowed to engage in any deals that limit the free dissemination of knowledge, in accordance with the public mission.

9. **Cornell Tech should not allow venture capitalists space on campus.**

In an ideal world, an institution of higher education would never allow private industry to rent space on their campus. However, Cornell Tech is a unique institution that was founded for the purpose of marrying private industry and higher education. There are perhaps many plausible reasons that one might support private industry involvement in the University (i.e., funding, access to data, access to machines, etc.). University researchers can even collaborate with private industry actors based upon their expertise. However, there seems to be no great justification for allowing venture capitalists a seat at the table. Venture capitalists do not have such great niche industry knowledge that they can benefit the faculty's work. Instead, having them on campus serves to make an institution of higher learning into a marketplace constantly ready to be raided by venture capitalists determined to make a profit. Surely, allowing venture capitalists to pick

through university research and buy what they like for themselves does not go to aid the expansion of knowledge or the public interest mission of the university.

10. Cornell Tech should establish a public mission committee to ensure the university is maintaining its goals and responsibilities to the public.

Recall that differing ideas of the public interest were previously discussed in this thesis. For the purposes of this recommendation, a pure definition of public interest is being utilized. Patents limit the proliferation of knowledge and increase the marginal cost of sharing knowledge. These two phenomena go directly against the public mission. The committee should work to maintain high standards of dedication to their mission. This includes examining things such as the appropriateness of the University engaging in exclusive licensing. The committee should aim to help the University limit its involvement in activities that work against the open access to and expansion of knowledge.

The above recommendations apply specifically to Cornell Tech based upon this thesis' findings. The following recommendations are more general and apply to all institutions of higher learning.

1. **All universities should have strong ICOI polices.**

All universities share a common goal of benefitting the public good. Thus, it is universally important that academic research remain the highest of quality and avoid even the appearance of impropriety. ICOI policies help manage that as well as assure that things like what happened to Dr. Kern at Brown, do not occur at other universities. Furthermore, these policies can also work to ensure high-level administrators and Board members are not tempted by conflicting interests when they are governing.

2. **Universities should begin to invest more in research funding.**

Like the argument above, it is essential to maintain academic freedom that faculty have autonomy in their research. It is also important to the public mission of the university that faculty not feel undue pressure to "perform" and reach desirable outcomes for private industry, at the expense high quality research.

3. **Universities should all adopt Simmons, Nelson, and Simonsohn's (2011) suggested recommendations for authors.**

Similar to the above argument, these guidelines help ensure that bias is addressed in research. This furthers the public mission of the university, as university research is seen as high quality and the university a proactive participant in maintaining such standards.

4. **In a similar vein to the Cornell recommendation and above recommendation, faculty across the nation should look to Simmons, Nelson, and Simonsohn's (2011) suggested recommendations for authors – notably, (1) "Reviews should require authors to demonstrate that their results do not hinge on arbitrary analytic decisions" and (2) "If justifications of data collection or analysis are not compelling, reviewers should require the authors to conduct an exact replication."**

Faculty engaging in this type of collective action is an opportunity for them to support the public mission by upholding high standards of scholarship and maintaining the public trust.

5. **Universities should enact strong intellectual property policies.**

Specifically, these policies need to ensure protection for the students and faculty. Cornell is a great example with their Cornell Standard Project Agreement for student and industry engagement requiring all knowledge generated be entered into the public domain – thus, furthering the public interest mission. In an ideal world, private industry would not engage with students; but short of that, universities should have protections in place. Universities' IP policies

should also protect faculty from publication delays or withholding. Private industry should not have a say in the publication of academic research. This is essential to ensure the public interest is prioritized and academic freedom is protected.

6. **Universities should have public interest committees including faculty, administrators, and students.**

Today's higher education climate is extremely cluttered with issues that raise conflict of interest concerns. With everything going on, it seems that universities easily leave behind their public interest mission. These committees could help ensure that universities are actually making tangible steps to continuously support their communities and the public at large.

Limitations & Future Research

Many of the limitations of the study deal with the limited sample size of the quantitative work. With a sample size of 6 representing Cornell Tech, it is entirely possible that the sample is not representative of the school as a whole – with only 20 Ithaca campus faculty participating, the same is true for the Ithaca campus. Furthermore, it is possible that because of sampling bias in who responds to questionnaires when solicited, neither population is representative of their group. Recall how the study concerning bias noted the drastic differences that participant size can have on significance.

Moving forward with future research, the investigator should certainly try to replicate the results with a larger sample. Perhaps there is a more enticing way than a Qualtrics survey to get answers that would lead to a larger response rate.

Another possible limitation is that Cornell Tech and Cornell University are one institution. It is possible that the differences in the culture and attitudes may have been assumed

to be more distinct, and that too little attention was paid to the fact that Cornell may have a strong culture that spans multiple campuses.

Moving forward with research, the ideas of this paper should be examined in many different contexts. For example, while Cornell is large, it is not anywhere near the size of some major public schools. Cornell is also much bigger than some small, regional private colleges. Exploring these ideas in light of different academic settings will paint a clearer picture as to which lessons are Cornell-specific and which are generalizable to the higher education community as a whole.

Another limitation was, admittedly, self-imposed with the questions on the survey. From the responses, it seems that some of the questions were too high-level or did not clearly communicate their message in ways that I expected. While the results were still very valuable, more relationships between variables may have been found if the questions were worded more specifically.

Finally, the last limitation is inherent in the very work itself: academics are difficult to study because they themselves do research. It was clear in the overarching tone of their responses that some respondents had a mission, and some even followed up with emails. Certain respondents evidently felt that the study had a negative perception of relationships with private industry, and, due to their relationships with private industry, these respondents felt the need to defend themselves. Perhaps the context of the study could be reframed in a manner that does not put certain respondents on the defense from the outset, making them feel as though they needed to defend their relationship with private actors against the perception that they are somehow compromising themselves.

Conclusion

This thesis set out to serve as a case study of Cornell Tech. The paper examined how changing trends in academia have shaped changes in institutions of higher learning. This thesis focused, in particular, on how private industry has been involved in reshaping academia and the effect that it has had.

Section I of this thesis began by exploring the literature around the changing structures and trends in academia in order to better understand Cornell Tech. The literature review began by exploring the evolution of academic science from post-WWII to the age of post-academic science. The section continued on to discuss the changing trends in academia, including the rise of academic entrepreneurship and the acknowledgement of bias in research. Subsequently, the consequences of this new involvement with private industry and the university were discussed, including two reported case studies. The literature then reviewed trends in COI and ICOI policies as they attempt to curb the aforementioned consequences. Finally, Section I concluded by examining the concept of academic freedom and the public good.

Section II of this thesis was a deep dive into the unique elements of Cornell Tech. The section begins exploring their innovative curriculum for Post Docs and Master's students. The section then explored policies surrounding research and governance at Cornell Tech. The section included a brief overview of relevant campus buildings that highlight the unique structures of the institution. Finally, Section II concluded by exploring Cornell University's IP and COI policies.

Section III and IV were the methods and results sections, respectively, for the quantitative analysis of the paper. Section III outlined the methods that were undertaken to recruit and complete the data collection from Cornell faculty. Section IV analyzed the results for statistical significance.

Finally, Section V was an analysis of the entire paper. The section began by performing a qualitative analysis of Cornell Tech's unique policies and environment. The section then went on to explore the implications of the quantitative analysis, comparing the opinions and beliefs of faculty between the Cornell Ithaca campus and Cornell Tech. These analyses were then synthesized into concrete recommendations specifically for Cornell Tech and then more generalizable recommendations for universities at large. The section concluded by examining the limitations of this study and proposing areas of future research.

Ultimately, these changes in academia are sure to impact other institutions. We have seen it with the growth of private industry partnerships and their impact on universities. It is important to examine these changes and how they impact the function of the university. If universities truly want to fulfill their mission to help the public good, then concrete steps must be taken across the board to combat the influence of private industry.

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Appendix A:

Survey

Start of Block: Demo Questions

Q1 What department are you affiliated with at Cornell?

_____

Q2 Are you affiliated with Cornell Tech?

- ○ Yes (1)
- ○ No (2)

End of Block: Demo Questions

Start of Block: University Governance

Q3 How appropriate is it to have private industry actors involved in decision-making by administrators at the college or university level, such as the decision to create a new research

center or the decision to hire faculty members within certain disciplinary areas? (Note: This question does not refer to decision-making by the Board of Trustees)

- ○ Very Inappropriate (1)
- ○ Inappropriate (2)
- ○ Slightly Inappropriate (3)
- ○ Neutral (4)
- ○ Slightly appropriate (5)
- ○ Appropriate (6)
- ○ Very appropriate (7)

Q4 Is there any reason to limit private industry involvement in decision-making by administrators at the college or university level, such as the decision to create a new research center or the decision to hire faculty members within certain disciplinary areas?

_____

Q5 Is there any reason to encourage private industry involvement in decision-making by administrators at the college or university level, such as the decision to create a new research center or the decision to hire faculty members within certain disciplinary areas?

_____

End of Block: University Governance

Start of Block: Teaching

Q6 How appropriate is it for private industry interests concerning the type, content, or structure of courses taught to influence university curriculum or course offerings?

- ○ Very Inappropriate (1)
- ○ Inappropriate (2)
- ○ Slightly Inappropriate (3)
- ○ Neutral (4)
- ○ Slightly Appropriate (5)
- ○ Appropriate (6)
- ○ Very Appropriate (7)

Q7 Please further explain your answer, if you desire.

_____

Q8 How willing are you to collaborate with private industry surrounding the types of course you teach, the content of your courses, or your method of teaching?

- ○ Very Unwilling (1)
- ○ Unwilling (2)
- ○ Slightly Unwilling (3)
- ○ Neutral (4)
- ○ Slightly Willing (5)
- ○ Willing (6)
- ○ Very Willing (7)

Q9 Please further explain your answer, if you desire.

_____

Q10 Is there any reason to limit private industry involvement in the types of courses taught, the content of the courses, or the method of teaching at the university?

_____

Q11 Is there any reason to encourage private industry involvement in the types of courses taught, the content of the courses, or the method of teaching at the university?

_____

End of Block: Teaching

Start of Block: Degree Granting

Q12 How appropriate is it for private industry actors to be involved in degree granting activities (e.g., being involved in student theses committees)?

- ○ Very Inappropriate (1)
- ○ Inappropriate (2)
- ○ Slightly Inappropriate (3)
- ○ Neutral (4)
- ○ Slightly Appropriate (5)
- ○ Appropriate (6)
- ○ Very Appropriate (7)

Q13 Please further explain your answer, if you desire.

_____

Q14 Is there any reason to limit private industry involvement in degree granting activities at the university?

_____

Q15 Is there any reason to encourage private industry involvement in degree granting activities at the university?

_____

End of Block: Degree Granting

Start of Block: Research

Q16 To what level do you agree with the following statement: "Academics should prioritize basic research."

- ○ Very Much Disagree (1)
- ○ Disagree (2)
- ○ Slightly Disagree (3)
- ○ Neutral (4)
- ○ Slightly Agree (5)
- ○ Agree (6)
- ○ Very Much Agree (7)

Q20 Who should be the chief benefactor of university research?

_____

Q19 How important is it that the research done at the University can be quickly commercialized?

- ○ Extremely important (1)
- ○ Very important (2)
- ○ Moderately important (3)
- ○ Slightly important (4)
- ○ Not at all important (5)

Q17 To what level do you agree with the following statement: "Academics should prioritize applied research."

- ○ Very Much Disagree (1)
- ○ Disagree (2)
- ○ Slightly Disagree (3)
- ○ Neutral (4)
- ○ Slightly Agree (5)
- ○ Agree (6)
- ○ Very Much Agree (7)

Q21 To what level do you agree with the following statement: "Research that is easily commercialized should be prioritized at the university."

- ○ Very Much Disagree (1)
- ○ Disagree (2)
- ○ Slightly Disagree (3)
- ○ Neutral (4)
- ○ Slightly Agree (5)
- ○ Agree (6)
- ○ Very Much Agree (7)

Q18 How appropriate is it for private industry to be involved/invested in university research? (e.g., through funding, data, providing resources, active collaboration)

- ○ Very Inappropriate (1)
- ○ Inappropriate (2)
- ○ Slightly Inappropriate (3)
- ○ Neutral (4)
- ○ Slightly Appropriate (5)
- ○ Appropriate (6)
- ○ Very Appropriate (7)

Q22 Please further explain your answer, if you desire.

_____

Q23 How willing are you to collaborate with private industry when conducting your own research?

- ○ Very Unwilling (1)
- ○ Unwilling (2)
- ○ Slightly Unwilling (3)
- ○ Neutral (4)
- ○ Slightly Willing (5)
- ○ Willing (6)
- ○ Very Willing (7)

Q24 Please further explain your answer, if you desire.

_____

Q25 Is there any reason to limit private industry involvement in university research?

_____

Q26 Is there any reason to encourage private industry involvement in university research?

_____

End of Block: Research

Appendix B:

Results				
Dependent Measure	Cornell Tech *M (SD)*	Cornell Ithaca Campus *M (SD)*	*t*	*p*
Governance Appropriateness	2 (1.26491)	3.5 (1.87785)	-1.823	0.081
Influence in Content, Structure, Course Offerings	2.8333 (1.7224)	3.8947 (1.76052)	-1.293	0.209
Collaboration in Teaching	3.6667 (1.8619)	4.5789 (2.19382)	-0.916	0.369
Involvement in Degree Granting	3.8333 (1.83485)	3.6842 (1.66842)	0.187	0.854
Prioritizing Basic Research	5.3333 (1.50555)	3.9474 (1.71509)	1.77	0.09
Prioritizing Applied Research	3.1667 (1.94079)	3.4211 (1.30451)	-0.37	0.714
Involvement in University Research	5.6667 (1.0328)	5.7895 (1.31567)	-0.208	0.837
Importance of Research Commercialized	4.5 (1.76068)	3.7895 (2.22558)	0.711	0.484
Prioritize Easily Commercialized Work	2 (0.63246)	2.7895 (1.31567)	-1.404	0.174
Willingness to Collaborate in Research	5.8333 (1.16905)	5.9474 (1.12909)	-0.214	0.832