STUDENT ENTREPRENEURSHIP AT CORNELL UNIVERSITY:
A CASE STUDY

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STUDENT ENTREPRENEURSHIP AT CORNELL UNIVERSITY: A CASE STUDY

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Sociological research on academic entrepreneurship is relatively new and existing literature is limited in scope, focusing only on formal ventures, particularly technology startups. This research project aims to address this gap by investigating student entrepreneurs and university based startups. The dissertation project utilizes iterative long-term data collection, semi-structured interviews, online survey, and descriptive quantitative analysis. The study aims to be the first to provide an in depth sociological examination of entrepreneurship on the university campus at Cornell University, providing deep evidence that the university is taking on a role that incorporates startup execution beyond encouraging and accommodating innovation: a result of the connection between university and student entrepreneurs in an iterative, symbiotic relationship. This project captures an R1 university in its transition into an entrepreneurship generator. The project addresses both the institutional and student aspect of the narrative in rich detail.

BIOGRAPHICAL SKETCH

Yujin Oh graduated from Cornell University with a B.A. in Sociology and minor in Business, Networks, and Institutions in 2011. With a Sage Fellowship, Yujin continued at Cornell Graduate School to acquire a Ph.D. with chair Dr. Victor Nee and committee members Dr. David Strang and Dr. Paromita Sanyal. As a graduate student, Yujin was involved in teaching, researching, and mentoring. Her research interests are in economic sociology, organizations, and entrepreneurship.

I dedicate this dissertation to my precious and beloved sister, who always makes

me strive to be a better person and role model, to my devoted parents, who are my

best cheerleaders, and my dear grandmother who always and selflessly cherishes

me. My dream was possible because of your faith, sacrifice, guidance, and love.

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CHAPTER 1

INTRODUCTION

Introduction to the Study

Traditional Research I universities have evolved into engines of economic growth (Berman, 2012). Scientific research is now application and commercialization oriented, often times creating new industries that enable the United States to compete globally. Thus, literature on university entrepreneurship has garnered much interest. Four major research streams emerge: 1) the entrepreneurial research university, 2) productivity of technology transfer offices, 3) new firm creation, and 4) environmental context including networks of innovation (Rothaermel, et al., 2007). A substantial number of studies focus on the increasing levels of entrepreneurship in universities around the world and the university as a key source of innovation (Von Hippel, 1988). The entrepreneurial boom in Silicon Valley, the resulting growth of industry, and demand for technological innovation in recent decades provides some explanation.

In spite of the rapid expansion of research, formal entrepreneurial studies are less than three decades old and are more fragmented than other established disciplines. However, the young nature of the research field does provide opportunities for interesting and novel investigation. Thus, this research project addresses a

previously unaddressed area of inquiry: student founders and how they interact with their entrepreneurial, university environment. The project limits its scope to a case study of Cornell University in Ithaca, NY.

Purpose of the Study

Many research projects focus on very specific aspects of the startup process, such as team building or the origins of the ideation process. This project; however, intends to highlight qualitative insights of the startup experience often difficult to capture in purely quantitative surveys – thus the focus is very much on "experience" rather than simply charting the courses of startups, which has often been the aim of previous projects.

This study is therefore applicable and approachable by both academics with intellectual interest and entrepreneurs themselves who, when looking for how to address or resolve very social, human, and often non-business issues that arise in the startup experience, may not find the answers to these questions simply on Wall Street Journal, a Google search, or even with their VCs and advisors. Much of being a successful entrepreneur is not accomplished through bookish means, and therefore, the sharing of critical, learned aspects of the startup experience can have heuristic value in research as well as real world impact. The entrepreneurial experiences

recorded in the study are lessons that are highly relevant and transferrable. While in most studies the nitty gritty falls by the wayside, the everyday living of the actual entrepreneurial process is the main focus in this project. Rather than focusing only on the highly visible building blocks, this study aims to tease out the actual driving engine to the startup process. Lastly, the project will touch upon some of the difficulties and challenges student entrepreneurs might encounter in their startup experiences, which literature fails to address in depth.

Theoretical Overview

The primary aim of the study was to develop a holistic understanding of how students engage entrepreneurship at Cornell University, a traditionally Research 1 (R1) University and how the university in response engages student entrepreneurs. The entrepreneurial environment at Cornell has shifted considerably and the project looks at what kinds of institutions, organizations, and resources are now available in addition to how the students are engaging these new shifts.

To investigate entrepreneurship on Cornell's campus requires not only to follow what is happening but to uncover the meaning and relevance within the appropriate context. It means weaving together the complex elements of a student entrepreneur's life, experience, and startup, while contributing to the expansion of

existing literature. Research must take what is known and examine it in the full context of time and place. This allows the project to establish a thick braid of reality which shows a complex reciprocal relationship.

Thus, the focus on student entrepreneurs is to probe the base of entrepreneurial activity. Literature focuses on tensions of academia and industry, misalignment of institutional norms and organizational practices, etc. However many of these research lines focus on only the formal, visible, lines of entrepreneurship: mainly faculty entrepreneurship. If the focus is shifted to student led startups, and this is actually where the innovation activity comes from – the literature is missing a significant area of explanation that this study aims to cover.

Additionally, student entrepreneurs, as a unique unit of analysis, is further bolstered by the fact that they are not encumbered by institutional constraints in the way faculty may be. Take for instance, the "publish or perish" norm prevalent at many research universities. Students also have more room to maneuver in terms of establishing the kind of working relationships with industry partners for instance. Lastly, faculty can also be either comfortably tenured or working towards job security, in which case startup ventures would not be the priority focus, even if related to academic research.

Thus, bottom-up institutional change (Tolbert and Zucker, 1983, Carroll and Hannan 1995; Holm 1995, Briscoe and Murphy, 2012) is clearly the basis of Cornell's entrepreneurial boom. The bottom-up process of entrepreneurship in the university setting very much resembles the bottom-up process of entrepreneurship in other places, such as the bottom up emergence of capitalism in China (Nee and Opper, 2012). Meso-level, established social structures enable action in which rules and norms give rise to coordinated individual and collective enterprise. However, rather than in cases noted in literature where innovators move beyond the established boundaries, at Cornell, there was a dedicated, conscious, and agency driven institutional move to not merely accommodate or tolerate entrepreneurship, but to engage, interact, invest in, and direct entrepreneurship itself.

The project also addresses selection biases of most works in literature. This project addresses not only startups that are hard to find or not formally recorded by the university, but also in various stages of starting up. Given that most studies approach entrepreneurship as an input/output system which takes out the interactive and social nature of entrepreneurship, this study shows that entrepreneurship is an iterative process. Thus, it is important to not just look at the end, resulting startup, but the process and execution.

The study leverages intensive, immersive study in the entrepreneurial environment, including prime location at Cornell and extended number of years researched. This approach provides an in-depth analysis of what founders across the entire university community is thinking and doing, not just those that are highly visible, what they're excited about and worried about, and how they see their own startups. The project goes straight to the source for the intangibles that cannot be acquired simply from quantitative means. The study is designed to provide meaningful insight into what it's like to run a startup at Cornell, as it unfolds.

Organization of the Remainder of the Study

To present the insights and findings of this research, the dissertation is organized as follows. Chapter 1 introduces the study, its purpose, and theoretical overview. Chapter 2 will lay out the current state of entrepreneurial literature while explaining in depth the theoretical framework of the study. Chapter 3 outlines the methodology of the project including research design and methodological rigor. Additionally, it provides a detailed report of the data and interview and survey procedures. Chapter 4 presents the findings of the project. Chapter 5 discusses the Cornell NYC Tech Campus. The project concludes with Chapter 6 discussing the overview of the study, summary of the results, limitations of the project, and recommendations for future research.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL ORIENTATION

The Current State of Literature

Some of today's most well-known companies originated as startups on the university campus. Facebook was founded in 2004 by Harvard colleagues Mark Zuckerberg, Dustin Mosckovitz, Eduardo Saverin, Andrew Mccolum and Chris Hughes who created one of the most successful social network platforms. Google was founded in 1998 by Larry Page and Sergey Brin who met for the first time on their campus tour of Stanford University. The pair became friends and developed the world's most powerful and effective search engine while they were PhD students working together on the Stanford Digital Library Project.

Yahoo was founded by Jerry Yang and David Filo, a pair of PhD candidates at Stanford University in 1994. Dropbox was founded by MIT students Arash Ferdowski and Drew Houston in 2007, who were tired of email's inability to send and receive large files. Reddit, founded in 2005, is an information sharing website on which users have the ability to vote on content, and was created by Steve Huffman and Alexis Ohanian, both students at University of Virginia. And Snapchat, a hugely popular app that enables user editing of picture and video content along with duration of availability, was created by two frat brothers Evan Spiegel and Robert Murphy at

Stanford (2011), when Murphy entered Spiegel's room to chat about a photo he regretted sending and how it would be easier if the photo magically disappeared once the recipient viewed it. Increasingly, startups are coming from universities and student founders. Therefore, an in depth analytical investigation on them and their community is crucial.

Much of literature; however, focuses solely on commercialization and performance, and usually on formal channels of entrepreneurship, such as faculty startups. Zucker, Darby, and Armstrong (2002) examine the collaboration between firm and star academic scientists as a means of knowledge transfer and find that such collaboration increase firm performance. Feldman, Feller, Bercovitz, and Burton (2002) focus on analyzing factors leading to increased use of equity stakes for technology commercialization. Lockett, Wright, and Franklin (2003) analyze the practices and qualities associated with high numbers of spin-out companies. Aghion, David, and Foray (2009) discuss major themes of technology policy while Powell and Owen-Smith (1998) overview antecedents and consequences of commercialization. Aghion, Dewatripont, and Stein (2008) highlight control rights as a mechanism distinguishing academic and commercial science.

Literature also focuses on tech transfer offices, which offer readily available and easily accessible pools of data on formal startups, again mostly technology oriented faculty ventures. Colyvas and Powell (2006) track the gradual institutionalization and increase in "taken for grantedness" of commercialization at Stanford through the analysis of the TTO's archives. Other areas of literature discuss the tension between private and public science. Lee (1996) reports the results of a national faculty survey which indicates general approval of university involvement in economic development but skepticism of direct involvement through equity or start-up assistance due to the perceived impact on academic freedom. Nelson (2004) suggests that the scientific commons is under threat and details policies for saving it.

Additionally, research has tended to focus heavily on bottom-up, characteristic of the emergence of entrepreneurship (Saxenian, 1994). For instance, Louis, et al., (1989) shows that the overall increase in entrepreneurial activity on the university campus was in fact fostered by local group norms that play a critical role in predicting active involvement in commercialization. Consequent research indicates that university policies and structures moved towards accommodative stances in acknowledgment of growing entrepreneurial activity. Argyres and Liebeskind (1998) analyze universities' attempts to adapt their policies and organizational

arrangements in order to accommodate the commercialization of university biotechnology research. However, though universities moved towards accommodation of entrepreneurship, Thursby and Kemp (2002) find substantial evidence of inefficiencies due to university preference or specialization in outputs unrelated to entrepreneurial activity (such as basic research and teaching).

The question remained, to what extent is innovative activity due to a shift of resources away from basic research to more commercializable research? Thursby and Thursby (2002) address this question directly to determine whether or not the growth of innovative activity is spurred by a change in the nature of university research. Their results indicate that increased entrepreneurial activity is due primarily to an increased willingness of faculty and administrators to license and increased business reliance on external R&D, rather than a shift in faculty research.

The issue at hand turns on a critical concept – commercial activities are secondary to academic responsibilities, institutional rules and organizational practices are unclear, and resource usage is inefficient. Entrepreneurial activity exists *peripherally* to the core academic function; education (Mars & Aguilar, 2010). This is innovation discussed and framed within certain perspectives and structures but not a direct look at entrepreneurship in its true context. The university and industry are

taken as distinct parts and as a means to entrepreneurship but literature does not address the actual, internal changes and growth of the university generating entrepreneurship in a unique manner.

Concerning students, most entrepreneurial research focuses on the impact of education on entrepreneurial chances of students after graduation (Marques and Moreira, 2010), student intent to become entrepreneurs and their views on being an entrepreneur (Sanchez Canizares and Fuentes Garcia, 2013; Watchravesringkan et al., 2013), or understanding personal characteristics and contextual factors that predict college students' intentions to pursue entrepreneurial careers (Geldhof, et al., 2013).

Other researchers focus on the individual, their personality type, beliefs, values, and behavior (Muller and Gappisch, 2005; Champan, 2000), range of psychological attributes (Diaz and Rodriguez, 2003), and personality dimensions (Zhao and Seibert, 2006). To date, no sociological research directly investigates student entrepreneurs and student-based startups, in spite of academic, and real world relevance. Summarily, the focus remains on faculty or formal ventures, peripheral ventures, or inadequate attempts at assessing institutional success at creating

startups. Yet more ventures are started by students and literature remains sparse on this area of inquiry.

Theoretical Orientation of the Study

Literature often limits institutional engagement to accommodation, a very passive stance. This dissertation shows how the institution moves with agency - interacting and growing with the entrepreneurs. The most important aspect is that the institution *reacts* to the needs of the startups and provides the most effective resources, if not getting involved itself. This active and agentic stance is a nuanced one atypical of the general entrepreneurial narrative.   The relationship that emerges between institution and actor is reciprocal and self-reifying.

This is an interesting new kind of innovation or combination of services, marketing strategies, processes, and resources driving innovation with Cornell (Schumpeter, 1934). This innovation has led to a partnership between institution and actor based on "...recognition of opportunities for profitable change and the pursuit of those opportunities all the way through…" (Nee and Opper, 2010) and is seen as a systematic feature of the underlying competitive dynamics of market capitalism (Nee and Opper, 2010).

Innovation emerges from competitive pressures, such as Cornell's desire to compete with Stanford and MIT as entrepreneurial research universities. Thus, the innovation that occurs is a social one involving repeated cooperation, mutual learning, and interaction. The institutional framework is flexible, bending and changing to suit the underlying current of entrepreneurship. What is at stake is the *stickiness* of startups - a notion that is immensely difficult to quantify, beyond the simple and descriptive "success" connotations. This dissertation attempts to tease out this concept through deep qualitative analyses.

Traditional literature also views entrepreneurs as innovators. In reality, entrepreneurs are both innovators and more importantly *executors*. Entrepreneurs must have both creative and execution skills. Often, the strategy has been that skill sets in one area lead to a partner who has skills in the other. The strategy that emerges at Cornell is similar, while also educating and developing both sets of skills in all founders. Innovation is a process, not a natural gift. It requires spending a great deal of time in the field with customers seeing how they respond to products, competitors' products, evaluating existing solutions, etc. Design and delivery research are also important innovation tasks. Innovation is therefore a learned process.

On the other hand, execution is all about setting and achieving goals that are critical to growing the startup business. Successful entrepreneurs set weekly, monthly and quarterly goals. The first step is to establish the critical goals that must be achieved to move the startup business forward. The second step is to define the activities required to achieve each goal. In sum, the ability to innovate and the ability to execute are both important to building a successful business. This is a keen insight that has emerged from the university psyche and the institution aims to develop both skill sets. To do this, the institution is going beyond teaching courses and delving into interactive network connections and resource building. The university takes on the responsibility of development *and* maintenance of skill sets.

Thus, the potential heuristic value of the dissertation project lies in the fact that unlike Stanford which has Silicon Valley and MIT which has the bio-industry in Boston, Cornell in Ithaca lacks a metropolitan location that would enable the kind of network and resource spillover experienced and critical at Stanford and MIT. As early adopters, Stanford and MIT benefited from spillover. Padgett and Powell (2012) show that "...novelty in new organizational form emerges through spillover across multiple, intertwined social networks". However, without such a spillover network for Cornell, more than accommodation was needed for entrepreneurial

growth. Without spillover effects critical to entrepreneurial boom, Cornell's baseline of bottom up entrepreneurial activity was nascent.

Counterintuitively, Ithaca's isolated location and percolating entrepreneurial activity also provided the mechanism for engagement beyond accommodation. The environment was ripe for innovation and without the benefit of a proximity industry to rely on, the institution itself had to bring to market the entire entrepreneurial process: bringing in financial, social, and cultural capital, incorporating more industry resources and programs, folding into the curriculum business courses, and tapping into entrepreneurial networks in New York City. The embedding of such explicit practices, along with a mechanism of normalization of the existing entrepreneurial strategies and norms, reinforces the entrepreneurial environment beyond just an encouraging stance.

Of course, effectiveness of a purely top-down approach is suspect. Thus, the analysis cannot be on evaluating institutional effectiveness at generating entrepreneurial activity but rather should focus on the relationship between institution and actors that result beyond institutional accommodation. A most interesting type of cooperation emerges, resulting in a long term, dynamic, adaptive, and bidirectional relationship. More effective and efficient allocation and utilization

of resources, financial and more importantly otherwise, reduces risk and operating costs. This kind of relationship works towards an optimization of interaction, resulting in a streamlined system for growing entrepreneurship. Thus, any kind of institutional movement in this instance is a two way street: it is, unlike in traditional instances, planned and the result of unique cooperation between institution and actors.

This type of interaction is not necessarily a new form, but an extended evolution of the accommodating university model - one not only of support but deep investment that ties the success of the institution with the success of the relationship between institution and entrepreneurial actor. The interaction, rather than an exogenous shock mechanism, was the impetus needed to reap the benefits of university based entrepreneurship. Indeed, as a later adopter to the entrepreneurial university structure, risk and uncertainty were reduced and an entrepreneurial environment was created without the need for spillover. This reduced uncertainty and risk environment engenders new network ties and norms of reciprocity (Nee and Opper, 2015).

Operational boundaries were further enlarged and more formally codified based on a feedback loop of information. This new framework of cooperation has enabled increased trust as well (Nee and Opper, 2015). The formalization and

institutionalization of informal norms provided a concrete safety net for students to explore and innovate. It instilled a confidence in institutional backing previously unseen with supporting evidence seen in the level of engagement that emerges. Accommodation has previously been an alignment of norms and expectations. This operates at a macro level; however, with the evaluation of Cornell, the dissertation project shows that university interaction has proceeded to meso and micro level involvement as well. This is a most unique form of social structure and the aim of this dissertation project is to investigate this activity.

Furthermore, in literature the entrepreneurial process is generally viewed as categorical and sequential. In the traditional view of entrepreneurship, startups occur in a series of phases in which one phase connects to or follows smoothly to the next in a handoff type arrangement. In theory, entrepreneurs do a type of analysis or research at the beginning which completed, then move onto the design, coding, integration, etc.

This approach allows for easy investigation and analysis; however, reality is much messier and more importantly given that no entrepreneur has access to perfect information, mistakes can occur and "phases" in the traditional sense, overlap, mix, and repeat. Particularly since many ventures are complex ones that rarely have perfect knowledge at the beginning, in fact entrepreneurs know the least about their

ventures at this point than any other in the future, this type of setup forces the entrepreneur to make the most important decisions when he or she has the least information. Waterfall projects eventually descend into chaotic disorganization when the venture progresses towards maturity causing severe issues with team management, progress towards product definition, bring to market issues, and many more.

Current research conducts evaluations that look at end results only. This end of the line approach unfortunately has selected out several different varieties of startups given that most often technology startups are the only ones that have easy to follow paths and quantitatively analyzable characteristics. Food, animal, or service startups are often left out of the investigation pools. Selection is therefore extremely skewed and biased, thus, claiming general conclusions on these evaluations are inconclusive and incomplete. Thus, to say what the role of a university is or whether or not it is succeeding or failing to accommodate entrepreneurship within this current context, can only reveal a slice of reality and an inaccurate portrayal. Conclusively, of academic literature and research attempt to use this traditional idea of entrepreneurship to describe an entirely new type of process, approach, and innovation.

On the ground; however, startups are significantly messier and often look like several projects nestled into one another. There are multiple releases, cycles, iterations, deployments, etc. In the research of this dissertation, entrepreneurs often talked of doing more than a handful of things at the same time, such as logo design along with branding development, and repeated over different time periods, such as market or competition research. The actual entrepreneurial process doesn't allow the team to focus on supposed "stages" to bring to completion their products or services and moving onto the next "stage". These supposed "stages" in fact are fluid contexts which overlap and within which the entrepreneurs move back and forth resulting in a fluid process. Summarily, literature and previous research have used too linear a perspective in approaching entrepreneurial research, whether it is a narrow focus, or constraining of reality for easier investigative analysis.

This dissertation aims to address these issues by presenting the student entrepreneurial process as it actually unfolds at Cornell University. The dissertation project looks at the entirety of the entrepreneurial journey and from a progress framework rather than an input/output system. In this way, the interactive and social nature of creating a venture can be accurately captured. Additionally, the project investigates all parties involved: the student entrepreneurs, the numerous institutional resources, organizations, etc. used, and other advisors, mentors, and

industry consultants. Cornell has shifted from an accommodating role to one that, in providing very specific and well-funded resources, not only helps startups get off the ground, but find funding, find important entrepreneurial and industry network connections, and most importantly focus on a bring to market attitude.

The university has taken on not only a supportive role for innovation to emerge, but also a relationship in which to execute on that innovation. Summarily, the university institute is a foundation for relationships to emerge from the use of different resources, organizations, programs, etc., and a community to form on top of it. Furthermore, the approach used in this study also enables the utilization of the New Institutional Economic Sociology approach (Nee, 2003) which allows the researcher to address multiple levels of the environment including the norms, networks, and institutions, the levels of actors involved, a multi-level analysis of institutional, organizational, and individual actors, and a unique case in which execution is achieved through communal collaboration, even across startups. The important focus of the dissertation project is to get at the porousness and fluidity of the roles and relationships established. Interestingly, entrepreneurs take on almost a chameleon-like role, continuously filling different aspects and roles of the venture, all along helped by the institution and its resources.

Bottom up entrepreneurial activity (Nee and Opper, 2012) exists but the critical difference is that the student entrepreneurs already occupy an entrepreneurship friendly environment, rather than literature's approach to a bubbling up of entrepreneurial activity that the university institution then tries to accommodate top down. As such, instead of a strictly top down or bottom up story, this dissertation provides significant evidence that entrepreneurship occurs within a community comprised of interacting institutional and organizational actors.

While the role of the institution is important in encouraging the bottom-up process of entrepreneurship (Nee and Opper, 2012), at Cornell, the institution goes beyond the role of an accommodating bystander and purposefully seeks a symbiotic, evolving, flexible, interactive, and engaged *relationship* with student entrepreneurs. The end result is a *community* that emerges as organic and iterative, and defined as a group of people who constantly want and need to share information. To take it one step further, the reality of startups at Cornell show that an intermingling system results in key interdependent and mutually beneficial relationships. The institutional environment provides resources and is absolutely critical to the startup process. However, it is important to understand that it alone is not the driving force behind entrepreneurship.   Idea generation for example, comes from individual entrepreneurs, but within the framework and context of a structured institutional and

entrepreneurial environment. And the environment is responsible for enabling entrepreneurs to execute on their ideas.

Thus the view of this particular ecosystem as a community is critical. Entrepreneurs use the institutional environment but also learn from it, as does the institution. There is a clear iterative, symbiotic, and fluid relationship that enables startups to more successfully achieve bring to market stages. The role of the institution is beyond accommodating. The institution is malleable and adaptive to the entrepreneurial scene, playing incubator, accelerator, advisor, mentor, investor, etc. whenever and whatever the startups need. This inevitably enables a more efficient and "follow-through" entrepreneurial process. The nature of the relationship that emerges also engenders a complex web of information on which all parties, institutional and individual, rely on. The following sections cover the design, methodology, and data collection strategies used in this dissertation. Confidentiality is also addressed, in addition to rigor and credibility. Findings are discussed and the dissertation concludes with discussion.

CHAPTER 3

RESEARCH METHODOLOGY

Rationale and Research Design

According to Strauss and Corbin (1990), "qualitative methods can give the intricate details of phenomena that are difficult to convey with quantitative methods". It was from this perspective that research into this area was addressed through a multi-methodology type of inquiry used to explore essential characteristics of social or human phenomena (Corbin and Strauss, 2008; Creswell, 1998, 2007, 2009; Denzin and Lincoln 2009; Strauss and Corbin, 1990; 1998). The use of multiple methodologies or triangulation shows an attempt to secure an in-depth understanding of the phenomenon under study (Denzin and Lincoln, 2009). Charmaz (2006) and Creswell (1998) also stated that a qualitative method of inquiry involved discovery, through experience, into the phenomenon under study.

The researcher spent copious amounts of time discovering down to the smallest detail all aspects of the entrepreneurial environment at Cornell to understand the entire student startup experience. Summarily, the intricate details of the environment, process, etc., were explored through qualitative inquiry to extract rich content description, while analytical aspects were investigated through descriptive quantitative means. As such, this research utilized a mixed methods methodological

approach with an exploratory and descriptive qualitative inquiry design and quantitative data analysis confirmation. This design allowed the researcher to focus on the characteristics of the phenomena being investigated based on in-depth, qualitative interviews which were also the foundation for the survey which in turn allowed for descriptive quantitative analysis. From this line of investigation, "…you learn something…then you try to make sense out of it…then you go back and see if the interpretation makes sense in light of new experience…then you refine your interpretation and so on. The process is dialectic, not linear" (Agar, 1980). This method of cycling back to investigative stages in the research project was particularly illuminating and allowed for "...analysis and data collection [to] run concurrently for most of the time expended on the project…" (Lofland and Lofland, 1984).

Exploratory and descriptive qualitative inquiry was an appropriate methodological choice, as it involved the systematic collection, organization, and interpretation of documented material. This methodology investigates the meaning behind a specific social phenomenon, in this case university based startups, as the participants themselves experienced it. As the objective of this study was to investigate those factors involved in the startup of companies by students at university, exploratory

inquiry allowed for a rich examination of an individual's personal experience, resulting in a holistic descriptive project.

Delving more specifically, the selected technique for the present study was a qualitative grounded theory methodology employing the Strauss and Corbin (1990, 1998; Leedy and Ormrod, 2010) approach. Just as qualitative inquiry was appropriate for the present study, so was grounded theory appropriate since grounded theory methodology allowed for explanation. The goal of a grounded theory study is to discover "what's going on?" and to conceptualize what is going on by using empirical research resulting in accurate description. The aim is to generate concepts that explain the way that people resolve central concerns. Consequently, grounded theory is a general method that can use any kind of data, though in this case, mainly qualitative data is used (Glaser, 2001, 2003).

Charmaz (2006) and Creswell (1998, 2007, 2009) stated that a grounded theory design was a procedure that systematically and qualitatively generated a theory that explained broadly a process, an action, or interaction about the phenomena under study. Barney Glaser and Anselm Strauss were the original developers of theory in the 1960s (Strauss and Corbin, 1990; Warburton, 2005). They had wanted to bring out the verisimilitude or reality of social and human phenomena through rich

detailing so they decided to develop a research method that could describe such intricacies since this was impossible with quantitative inquiry (Lowe, 2004; Mills, Bonner and Francis, 2006b). Charmaz (2006) further defined grounded theory methodologies as a set of flexible analytic guidelines that allowed the researcher to focus their data collection and build middle-range theories or propositions inductively through successive levels of data analysis and conceptual development. That is, theory is inductively derived, discovered, developed, and provisionally verified through a systematic method of comparison back and forth from the data collected, the analysis, and the theory as they stand reciprocally related to each other (Corbin and Strauss, 2008; Strauss and Corbin, 1990, 1998).

Grounded theory does not test a hypothesis but rather sets out to discover what theory is implicit in the data. Thus, the purpose of the grounded theory approach for this study was to build a theory that faithfully represented the reality. Given the developing or evolving nature of this type of research, the emphasis is on induction or emergence. The proposal seeks to supply strong evidence for the truth of the conclusion moving from progression of particular/individual instances to broader generalization. Rather than being valid or invalid, inductive arguments are either strong or weak, which describes how probable it is the conclusion is true. Ultimately, the aim is to make meaning explicit and to move away from static

analysis. The emphasis is on what leads to understanding of multiple layers of reality and meaning of actions.

Furthermore, a case study approach was chosen due to a variety of time, resource, and other constraints. According to Yin (2003) a case study design should be considered when (a) the focus of the study is to answer "how" and "why" questions; (b) you cannot manipulate the behavior of those involved in the study; (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study. Yin (2003) also states that "the distinctive need for case studies arises out of the desire to understand complex social phenomena" because "the case study method allows investigators to retain the holistic and meaningful characteristics of real-life events", such as organizational and managerial processes, for example. Becker (1970), falls along similar lines stating that "one can properly acquire knowledge of the phenomenon from intensive exploration of a single case".

The case study, therefore, aims to arrive at a comprehensive understanding of an event but at the same time to develop more general theoretical ideas of the observed event. Thus, for this dissertation, a case study approach was chosen and utilized explanation building, in which the researcher analyzes the case study data by building an explanation around it, content analysis of broad motivations,

movements, trends, and social understandings, and latent analysis, discovering the meaning underlying physical data within the context. The researcher also chose a case study approach due to the level of familiarity afforded by the researcher being stationed at Cornell. The research spent four years as an undergraduate at the university and an additional five and a half years as a graduate student, and studied the entrepreneurial environment for six.

One of the most critical aspects of the study was to maintain maximum objectivity in capturing the organic nature of the entrepreneurial process. Gathering information and analyzing it in a conscientious way, always within context, took time; however, allowed for a natural pattern to emerge on its own to tell a rich narrative. The distinguishing characteristic of this dissertation is the first-hand contact with the world under study, the student entrepreneurs, their ventures, and their institutional environment, and the gathering of significant proportions of data in qualitative form (Lofland, 1971).

The researcher took an immensely careful approach to research design ensuring its flexibility as it evolved over time and allowed the data gathering and analysis to be determined by the subject matter. Content analysis was also employed to research and examine patterns of meaning. The goal was to gain insight and understanding

of the texts from interviews and surveys. This process required complete immersion in the data and text until larger themes and concepts emerged. Summarily, the design took the following steps: first, the subject matter was determined. The case was then selected, Cornell University, and data gathering and analysis techniques were determined. Then the researcher collected data, evaluated it, and analyzed it.

The final report was then prepared. This entire process involved "active[ly] looking, improving memory,… and perhaps most importantly, patience" (DeWalt and DeWalt, 2002). In spite of the time commitment, a major advantage of the approach taken in this dissertation project was that the investigator was free to capitalize on unanticipated research opportunities as they presented themselves (Poplin, 1972), such as entrepreneurial conferences and events that came up and new networking connections that were made. A combination of methods and techniques such as direct social interaction, observation, document analysis, self-introspection, and a general flexibility enabled different analytic and interpretive procedures to guide the researcher to discovery.

Several scope conditions were also applied. First, startups created from 2010-2016 (the most recent being October, 2016) in the United States were considered. Cornell issued student email addresses (NetIDs) are kept active up to five academic years

after graduation. This ensures, in addition to company contacts, multiple points of communication. Additionally, given that the nature of the study investigates the birth of startups, the 2010 cutoff is maintained to avoid issues of memory recall. Data shows that many startups begin near the end of degree programs at Cornell and accounting for a two to three year startup phase, the 2010 cutoff should give ample room to capture the right firms.

Lastly, many of the institutions and resources that have emerged as important are fairly recent, thus are only relevant to a certain section of firms. Because Cornell University does not keep formal records of every startup born on the campus, the student-based startup population is a hidden one. Sampling was purposive to inform the investigation and adhere to scope conditions outlined above. To elaborate further, the term "sampling" is problematic for qualitative research, because it implies the purpose of "representing" the population sampled. Quantitative methods typically recognize only two main types of sampling: probability sampling (such as random sampling) and convenience sampling.

In qualitative research; however, the typical selection of settings or individuals is neither probability nor convenience sampling. It falls into a third category, purposeful sampling (Light, et al., 1990; Patton, 1990; LeCompte and Preissle,

1993). Thus, purposeful sampling is a strategy in which particular settings, persons, or activities are selected deliberately in order to provide information that can't be gotten as well from other choices. For example, Weiss (1994) argued that many qualitative interview studies do not use "samples" at all, rather "people who are uniquely able to be informative because they are expert in an area or were privileged witnesses to an event". This is one form of purposeful selection. Selecting those times, settings, and individuals that can provide you with the information that you need in order to investigate your case and is the most important consideration in qualitative selection decisions.

Methodological Rigor

Numerous frameworks have been developed to evaluate rigor, trustworthiness, and quality of qualitative work (Guba, 1981; Lincoln and Guba, 1985). Strategies for establishing credibility, transferability, dependability, and confirmability have also been addressed across fields (Krefting, 1991; Sandelowski, 1986, 1993). General guidelines have also been published (Forchuk and Roberts, 1993; Mays and Pope, 2000). This project aimed to address questions of rigor by ensuring that: (a) the case study purpose is written clearly, (b) the research aims are transparent, (c) the case study design is appropriate for the subject matter, (d) data are collected and managed systematically, and (e) the data are analyzed correctly (Russel, et al., 2005).

There are several advantages of the mixed methods strategy. The strength of qualitative data lies in its richness and depth which allows for the researcher to grasp the general feel for the community, an accurate and holistic picture, and to confirm the insights gained. Field notes, verbatim transcripts from in-depth interviews, institutional analysis, and other qualitative data provide a wealth of information that sets the stage for the study while also providing deep insight.

Importantly, the approach also allows participants to structure the world as they see it, rather than as the researcher does (Hesse-Biber and Leavy, 2004). As a result, the researcher comes to a deep understanding of the subject and case. Furthermore, the mixed methods strategy can achieve representativeness or typicality of the settings, individuals, or activities selected. It can also adequately capture the heterogeneity of the population, which is a key point outlined in the theoretical framework of the dissertation project.

Additionally, a major contribution of grounded theory, used in this dissertation, includes a rigorous procedures for researchers to check, refine, and develop their ideas and intuitions about data. In addition, these methods enable the researcher to make conceptual sense of large amounts of data. A grounded theory analysis starts with data and remains close to the data. Levels of abstraction are built directly upon

the data and are checked and refined by gathering further data (Glaser, 1978; Glaser and Strauss, 1967; Henwood and Pidgeon 1992; Strauss 1987). Thus, grounded theory studies yield dense analysis of empirical problems.

Because case study research relies on subjective understanding, validity, the correctness or credibility of a description, conclusion, explanation, interpretation, or other sort of account (Maxwell, 2005), becomes an issue. The investigator should institute controls to test whether a theme or interpretation is valid. Several methods of validation are suggested by methodological literature. One of the methods recommended by Diesing (1971) compensates for bias in an interpretation by requiring each interpretation to be based on several kinds of evidence.

Interpretations are rechecked and validated through comparisons of different kinds of evidence. This was systematically done through triangulation. Triangulation is the consistency of findings across methods and data sources (Charmaz, 2006; Morrow, 2005). Triangulation was part of the data collection since it involved the use of multiple data sources, methods, and theoretical schemes such as field notes, interviews, site documentation, notes from memoing, and electronic data (Morrow, 2005) to see if everything did fit the way it had been organized and if it was reciprocally related, that is, if all sources of the data related back and forth to each other and tied the information as one (Berg, 1998, 2009; Charmaz, 2006; Schwandt,

1997). Triangulation was also used to support criteria that paralleled validity. Ultimately, triangulation is a strategy that reduces the risk of chance associations and of systematic biases due to a specific method, and allows a better assessment of the generality of the explanations one develops (Maxwell, 2005).

Consistent findings increase confidence and the validity is enhanced. "When a hypothesis can survive the confrontation of a series of complementary methods of testing, it contains a degree of validity unattainable by one tested within the more constricted framework of a single method" (Webb, Campbell, Schwartz, and Sechrest, 1966). Additionally, intensive, long-term involvement and field research provided more complete and different kinds of data about specific situations and events than any other method (Becker and Geer 1957). Data is also direct and less dependent on inference. This method can help develop a very strong and stable theory over the course of the research. Intensive interviews and the online survey enable the researcher to collect rich data, data that are detailed and varied enough that they provide a full and revealing picture of what is going on (Becker, 1970).

However, reliability, which refers to the extent to which repeated employment of the same research instrument under conditions taken to be constant produces the same result, cannot be claimed in the commonly accepted sense because the study cannot

be repeated under constant conditions: the observer records events as they occur. Though events that recur may be observed again, the conditions under which they recur are never the same. (Fidel, 1984). To strengthen the rigor, field notes were utilized extensively. Field notes in a qualitative inquiry are defined as carefully prepared archives of data and documentation in the form of written notes on observations, particularly immediately after each interview when the information from the interview is still fresh (Charmaz, 2006). The notes allow a record of the research process at the beginning and the end, enabling reflexive analysis and providing the opportunity for monitoring and examining any biases and how these could have an influence on the data collection process.

Furthermore, an audit trail was used and is a "detailed chronology of research activities and processes; influences of the data collection and analysis; emerging themes, categories, or models; and analytic memos" (Morrow, 2005). The information in an audit trail included explanations of concepts or models that were used to make sense of the data (Strauss and Corbin, 1990, 1998; Corbin and Strauss, 2008). In an audit trail, the researcher also documented comments on particular patterns as they developed in the data, revised interview questions, included decision making procedures, audio taped transcripts, wrote personal notes about motivations and experiences with participants, wrote descriptions of any peculiarities,

descriptions of procedures used for recruiting participants, and for generating data and analyzing it, or also wrote notes of interest used to make sense of data (Berg, 1998, 2009; Schwandt, 1997). Audit trails can support the rigor and soundness of a study (Heath, 1997; Lincoln and Guba, 1985).

Credibility is the internal consistency in terms of how rigor was ensured in the research process and how that was communicated (Morrow, 2005). Some ways in which credibility was achieved in this study was through reflexivity, mentioned in the methodological process above, triangulation, which will be discussed in this section, and great immersion in the data by reading and rereading the transcripts and data logs.

Another way to ensure rigor is through memoing. Memoing is a procedure used for writing explanations or how the coded categories developed when analyzing the data was elaborated (Schwandt, 1997). Memos are notes that the researcher privately writes and vary in length. They contained the researcher's elaborated ideas about the data. The researcher included comments on the meanings of coded categories as well as capturing thought processes during the analytical process, exploring the researcher's hunches and then taking them apart so as to search for broader

explanations at work in the process (Corbin and Strauss, 2008; Creswell, 1998, 2007, 2009).

Lastly, generalizability is difficult to claim in a qualitative study. The descriptive, interpretive, and theoretical validity of the conclusions of a case study all depend on their internal generalizability to the case as a whole. This does not mean that qualitative studies are never generalizable beyond the setting or informants studied. There is no obvious reason not to believe that the results apply more broadly and generalizability is usually based on theory development that can be extended to other cases (Becker, 1991; Ragin, 1987; Yin 1994).

Thus, in addressing questions about generalizability I turn to Yin (2009), who suggests two categories: statistical and analytic generalizations. In statistical generalization, generalizability is established by an inference made about a population on the basis of empirical data collected about a sample (Yin, 2003). In analytic generalization, generalizability is established by the process as an existing theory is employed as a framework with which to collate the empirical results of the case study (McCutcheon and Meredith, 1993; Yin 2003). For this case study, analytic generalization is to a theory of the phenomenon being studied (Becker, 1990). This has much wider applicability. In the physical sciences, experiments make no claim to statistical representativeness; however, assume that their results

contribute to a general theory of the phenomenon. Generalizability in other contexts will be answered by complementary future case studies.

Summarily, all of these different strategies and tactics helped maintain awareness of any biases the researcher had for individual preferences, predispositions, or predilections that would have hindered the neutrality and objectivity in the interpretation, analysis, and reporting of outcomes. The importance of adhering to a systematic process of analysis in this research, while at the same time allowing for creativity and detail, made the project an empirical and scientific research methodology with robust results and meaningful insight. The process of analysis in its entirety (including mixed methods) was also supportive of the large amounts of incoming data.

Sources of data and collection

Collecting data includes simultaneous involvement in data collection and analysis that fuels the researcher's emerging analysis. This enables and directs the researcher's efforts and facilitates control of data. The early analytical work leads to subsequent collection of more data around emerging themes and concepts. Thus, the researcher to avoid the pitfall of amassing volumes of general, unfocused data that are both overwhelming and do not lead to anything new. This method forces

the researcher to pay close attention to what happens in the empirical world and the researcher must study the meanings, intentions, and actions equally. So the first question asked is "what is happening here?" (Glaser, 1978; Glaser, 1992; Glaser and Strauss, 1967).

The purpose of this study is to explore the entrepreneurial university community at Cornell University. The three major components of data collection were included: data from the field, interviews, and online survey. First, data on student-based startup firms was collected over a 2 year period and from publicly available sources. Multiple sources were used for triangulation, including, the Cornell Startup List/Startup Tree, a self-reported database, the Center for Technology Licensing (formerly Cornell Center for Technology Enterprise & Commercialization), Johnson School of Management, School of Hotel Administration, and Life Changing Labs, an organization that supports Cornell's top entrepreneurially minded students, including an incubator program for founders in the summer.

Data from the field was also gathered from documents, including entrepreneur op-eds, articles, interview transcripts, press releases, funding announcements, etc., conferences, workshops, information about the different organizations and programs on campus, and immersion learning. Next, numerous seminars, lectures, and

presentations associated with a wide variety of entrepreneurship institutions on campus, such as Cornell Entrepreneurship and Innovation Institute and the Cornell Entrepreneur Network, enabled interaction with co-founders. These interactive observations provided insight into co-founding relationships and an extensive understanding of the entrepreneurial context and community. These observations and data collections occurred over a six month period and were analyzed for ideas, concepts, and elements that became apparent and were synthesized. This field procedure also included detailed written reports and content analysis logs about direct observations including formal and informal settings.

A commentary diary, containing impressions, content analysis, and other explanatory notes was also kept with significant details that emerged from engaging the context of the student entrepreneurs, through repeated interactions over time. This enabled the researcher to assess changes, themes, etc. over the entire duration of the project, retaining objectivity as the situation evolved, given that a written record allowed the research to go back to concrete and tangible evidence, rather than memory recall. The data was collected over systematic and iterative observation.

For instance, the researcher attended a weekly entrepreneurship colloquium at Kennedy Hall on Wednesdays at which entrepreneurs, advisors, and industry leaders

contributed to the knowledge of the community, worked on issues startups faced, and provided workshop help. These recurring events, group meetings, and social function, both formal and informal, helped tremendously in creating a realistic picture of the entrepreneurial environment at Cornell. Data collected in this way was supplemented by countless informal conversations with the entrepreneurial actors (Whyte, 1979).

For interview materials, the researcher also created an analytical log documenting notes and commentary generated by the conversations. This analytical "notebook" was an extraordinarily useful strategy in tracing the researcher's thinking, keeping abreast of the developments of the study, and sorting the insights into different arrays. Additionally, the memos of the notebook became a running reflexive history of the researcher's understanding of the themes as they emerged in the research. Herz (1997) and Bott (2010) provide a succinct argument for the usefulness of this type of reflexive thinking: "Reflexivity should mean that research involves the active construction of interpretations of experiences in the field and a questioning of how these interpretations arise" (Bott, 2010).

The dissertation project initially relied heavily on iterative data collection from the field to inform the semi-structured interview questions, which in turn informed the

deep online survey questions. The survey was designed to gather demographic and categorical information for descriptive quantitative analysis but also provide a chance for entrepreneurs to think and answer meaningful qualitative questions on their own time. Inclusion of the quantitative steps of analysis was especially important when trying to corroborate and support the qualitative data and generalize results. Additionally, the survey included many qualitative questions probing the nature of the startup process.

It is also important for understanding the rationale of the underlying relationships that emerged in this case study. As a matter of fact, this notion of triangulation to argue in favor of an integration of qualitative and quantitative methods is not limited to content analysis but has been raised by many researchers (Diekmann, 2003; Kelle, 2001; Mayring, 2001). The interview and survey procedures are discussed in subsequent sections. Additionally, the analysis too, as a result, was performed throughout the duration of the study. New data was constantly analyzed and directed future investigation.

The Interview Process and Online Survey

Interviewing is an important sociological method and staple of sociological research at the center of ongoing methodological conversation (Pugh, 2013; Weiss, 1997). In

depth interviewing is an essential instrument of unearthing narratives providing sociological insight, revealing multiple layers of reality, and understanding how people grapple with their social and cultural environments. Qualitative research interviews, according to Kvale (1996), are used as a way to understand the views of participants in terms of their perspectives of the world around them. Kvale further explained that interviews work well to gradually reveal meanings of experiences and to expose a lived world prior to any scientific explanations. This is particularly important to capture in this research project as the institutional context and entrepreneurial environment within which Cornell entrepreneurs find themselves, plays an interdependent and indispensable role. Though the focus is on the totality of the experience, the institutional role cannot and is not ignored. It is addressed where appropriate in the analysis.

Additionally, the interviews help capture the "intangibles" mentioned previously that emerge only from an intimate conversation. And because this research project was an exploratory study, it was important that the researcher have enough flexibility throughout the different phases of inquiry. Therefore and in accordance with Charmaz (2006) and Creswell (1998, 2007, 2009), a semi-structured interview format (See Appendix) was used. This allowed the researcher a more in-depth investigative tool for exploring the intricacies of this particular case.

The interview process for this study allowed the researcher and intended readers a window's view into the participants' lived experiences and therefore served as a valuable means to gather information (Creswell, 1998). According to Charmz (1996), Creswell (2007, 2008) and Berg (2009), because semi-structured interviews allow for greater flexibility, the researcher can create more questions in conjunction with how the research itself evolves. As proposed by Neuman (2003), validity with respect to the qualitative aspect of this research is characterized by objectivity which comes from one's first-hand experience. Incorporating Neuman's principle, this study utilized open-ended, semi-structured interviews as the foundation of its data gathering process.

The interviews informed the researcher to which conferences, talks, workshops, resources, etc. were of importance to analyze. A certain amount of flexibility was exercised with respect to the interview's structure, phrasing, and order. This allowed the researcher to freely navigate the responses, gaining additional insight (Draper and Swift, 2011). According to Jones (2009), this approach is especially well chosen for the dissertation project as it investigates the "how's" and "what's" in the subjects' entrepreneurial lives.

Having invested considerable time in integrating into the entrepreneurial community at Cornell, the researcher was able to use network connections made to recruit entrepreneurs for the study. Initial contacts led to referrals and within certain programs, access was almost instantaneous. During January through April 2016, the researcher gathered qualitative data through in-depth interviews with entrepreneurs on campus. The willingness of each entrepreneur to open up and share their experience was overwhelmingly important to the study. This kind of attitude prevailed in the entrepreneurial community.

Specifically, the dissertation project used a semi-structured interview protocol (Merriam, 1998; Nee and Opper 2012). The dissertation includes data, such as direct quotes, from interviews with founders who are not currently in stealth mode. Stealth mode is defined as a venture's temporary state of secretiveness, or cloaked state, to avoid alerting competitors to pending product or service launches. In the case of the startups at Cornell, it is often to protect the founders' ideas or proprietary technology.

Other interviews, those from ventures in stealth mode, are not being released or quoted, due to NDA agreements. However, anonymous content from these interviews are used as part of the larger analysis (such as trends, resources, etc.). Carefully avoided using any identifiable info and not include technical/proprietary

information that founders did not want released. All of the questions were asked of all participants, but the order was sometimes changed to accommodate a more natural conversation flow. Some questions were answered by participants in the course of answering other questions as well. Interview and survey questions came from extensive research of the industry, talking to VCs in Silicon Valley, and multiple conversations with startup advisors on campus. This allowed the researcher to put a direct finger on the pulse: what do entrepreneurs actually do and care about? What are their top concerns?

The participants' interviews were taped and then transcribed into written documents (Kvale, 1996; Morrow, 2005; Sewell, 2004). After each interview, detailed notes were taken by the researcher immediately as field notes which are discussed in the section of credibility and trustworthiness. According to Weiss (1997), the advantage of taping is so that the researcher does not miss any words since it is impossible for a researcher to record every word on a note-pad (Mertus, 2005). A notebook was also carried consistently to make any annotations immediately before or after the interviews.

The recording device that was used was an Etekcity Digital Recorder Model No.: VR-Bk8. The recorder was placed on the table or by the computer/phone speaker

so as not to interfere with the interview process. The interviews for this study were conducted in English. Most interviews were conducted in person but others were on the phone or via Skype (video conferencing) at a mutually agreed upon time. Interviews lasted approximately 30 minutes. The researcher created backup records on her computer. The interviews were transcribed word for word using Microsoft Word. As mentioned previously, the documents released in the study are done only with the permission of the interviewee. Those startups in stealth mode did not approve transcript release. Interview transcript documents were saved on my computer, a usb drive, and Google drive. The transcripts underwent content analysis, a "reduction and sense-making effort… to identify core consistencies and meanings" (Patton, 2002).

The intensive interviewing technique augments the methodological arsenal by providing the explanation and foundation for the entrepreneurial context and infrastructure at Cornell, and is the basis for the survey which provides further information and confirmation, with empirically interesting new insight. The interview findings were clustered and thematized by the researcher in order to unfold the different knowledge and experiences of the student entrepreneurs at Cornell.

The interviews were key to formulating the survey as well. Based on the theoretical assumptions confirmed in the interviews, reliable classifications and categories emerged to be used in the survey tool. Summarily, the provision of a rich source of raw data obtained in semi-structured interviews assisted in the process that led to the formulation of the survey and the continuation of data collection happened throughout as a constant process. Online surveys have the potential to unlock vast amounts of information in understudied populations, like student entrepreneurs. It provides an increased opportunity for population-focused data collection by enabling the researcher to capture the unique and nuanced experiences of populations and subpopulations in new, innovative ways (Andrews, Nonnecke, and Preece, 2003; Buchanan and Hvizdak, 2009; Willis, 2011; Wright, 2005).

This survey was web-based, where the survey is hosted on Google. Participants were sent the survey link and filled out responses directly submitted through the online platform (Andrews et al., 2003; Gunter, Nicholas, Huntington, and Williams, 2002; Hoonakker and Carayon, 2009). Furthermore, the survey was formed by insights gained through interviews but also other industry studies in entrepreneurship, conversations with VCs on in Silicon Valley, and access to internal research programs at VCs. The survey was essentially a digital tool that mimicked a face-to-face interview. Given that the entrepreneurs were extremely

busy with their startups and maintaining classes, this survey enabled the researcher to reach a larger audience. Many of the questions asked in the interview appeared on the survey and participants were given unlimited space to answer for some questions.

The target population was defined and the researcher chose a strategic platform. Google forms was chosen because it not only is free, but also automatically runs diagnostics on answers, providing descriptive statistics. The approach was also active: each individual entrepreneur was contacted directly with the opportunity to participate (Bortree, 2005). In terms of content design, questions were constructed carefully considering the intended sample population. To maximise response rate, usability, interface, and survey length were all considered. In total, there were thirty five startups interviewed and surveyed in this dissertation project.

Confidentiality and Informed Consent

The researcher submitted a proposal to Cornell University's Institutional Review Board (IRB). All research that involves human participants must either be exempted from review or approved by the IRB before it can be initiated. After training and project approval, the researcher created an informed consent form to be signed (or electronically "signed") prior to interview or survey. Participants were informed by

the researcher that the recorded interviews would be saved on a USB Drive and the researcher's secured computer. The recordings would be deleted after the completion of the dissertation. Some startups in stealth mode requested complete confidentiality and thus their interviews will not be presented, sampled for quotations, etc. No identifying information, no technical or proprietary information will be released for these specific startups.

Specifically, at the beginning of the interview, participants were asked if they had read the consent form and understood it, along with the purpose of the study. This was to ensure participants understood the confidentiality terms and limitations of confidentiality. Proceeding with the interview denoted their agreement to it. After criteria for this study had been met by the participants and a brief description of the study had been explained to them, participants were also allowed to ask any questions related to the study at the end of the interview. Most participants asked about the researcher's dissertation project and its path forward.

Also included in the consent form was that participation in the present study was voluntary and participants would have the freedom to withdraw at any time from continuing participation in the present study without penalties. The same process was repeated for the survey except a few key differences: consent form was

presented at beginning of the online survey, and proceeding with survey was understood as participant giving agreement.

Summary

The researcher used a combination of different methodologies in order to raise the validity and reliability of the study, which included a qualitative research design particularly a data analysis of the interviews (and survey), a triangulation of the different data sources, and the field notes of the researcher. All data gathered were central to the formation of the earlier stages of the study. The study was built with in-depth data collection, dual reliance on interviews and survey methodology, and gathering and analyzing deep qualitative and quantitative data to provide mutual and extensive evidence and support.

CHAPTER 4

CASE STUDY FINDINGS

The Entrepreneurs and their Startups

This chapter begins by providing descriptive quantitative results of the founders, the startup, and the process of innovation. The types of resources used and relationships that emerged are addressed next. Third, the chapter provides detailed illustrations of several startups in varying stages to build a holistic picture of the entrepreneurial environment, incorporating the different factors mentioned previously in the quantitative results. The chapter concludes with analysis of the findings.

Based on the survey results, 86.7% of entrepreneurs identified as male, while 13.3% identified as female (Fig. 1, below).
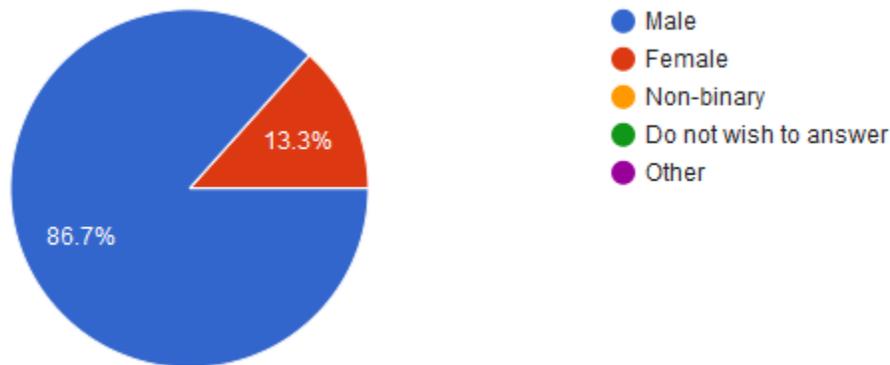
Figure 1: Gender Identification

These results reflect accurately the general trend in entrepreneurship that shows more male startup founders than female founders. Almost 40% of founders ranged in age between 18-22 years old. Another 40% were between 26-30 years old. Around 10% fell into 23-25 years old, a second 10% fell into 31-35 years old and the rest were between 36-40 (Fig. 2, below).
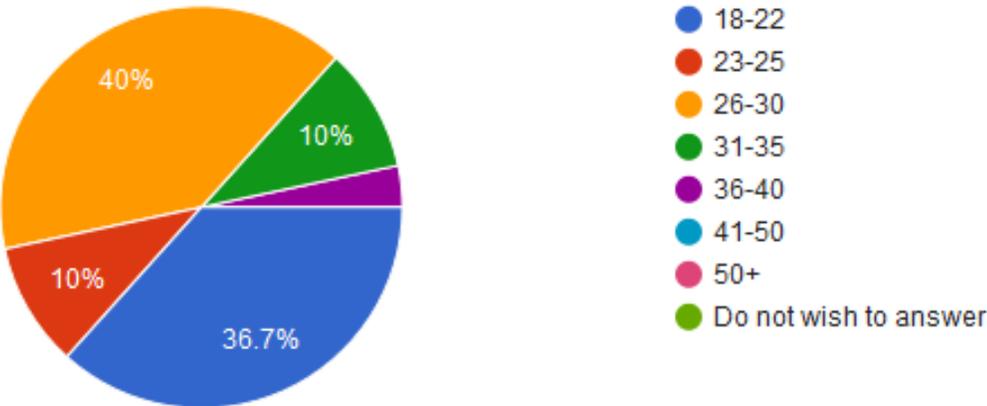
Figure 2: Age Range

The results support this data given that the majority of founders are either undergrads between the ages of 18-22 or graduate students in the older age category of 26-30. In fact, over half of the founders were undergraduate students, at 56.7% (Fig. 3, next page).
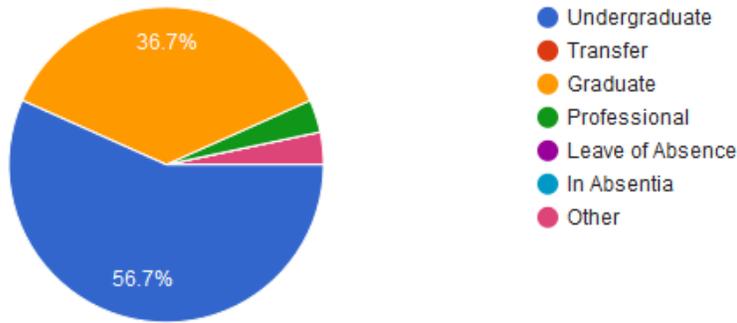
Figure 3: University Status

The majority of the remainder were graduate students at 36.7%. Fifty percent of founders identified as white, while Asians made up the next largest group at 20%. Almost 7% were Hispanic, another 6.7% black, and the rest identified as other or did not wish to answer (Fig. 4, below).
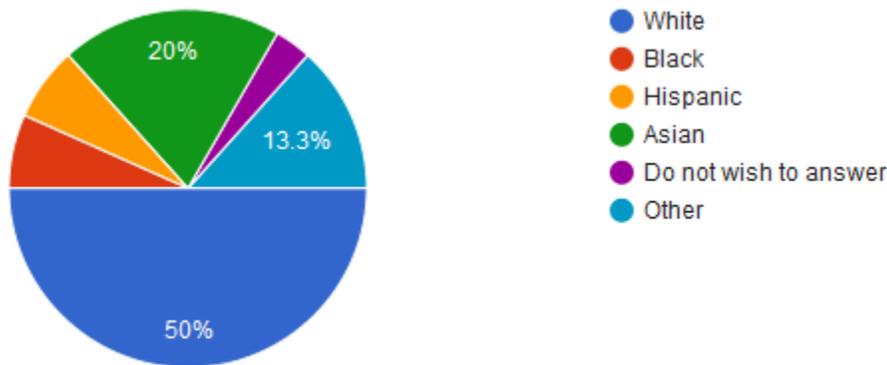
Figure 4: Race/Ethnicity

The distribution of founders in the different colleges was most interesting. Though College of Engineering had the most at 23.3%, the College of Agriculture and Life

Sciences and the College of Arts and Sciences came in close at 20% and 16.7% of respondents, respectively. The Samuel Curtis Johnson Graduate School of Management came in fourth at 13.3% (Fig. 5, below).

- College of Agriculture and Life Scie...
- College of Architecture, Art, and Pla...
- College of Arts and Sciences
- College of Engineering
- College of Human Ecology
- School of Hotel Administration
- School of Industrial and Labor Rel...
- College of Veterinary Medicine

△ 1/2 ▼

- Graduate School
- Samuel Curtis Johnson Graduate School of Management
- Weill Cornell Graduate School of Medical Sciences
- Law School
- School of Continuing Education and Summer Sessions
- Other

△ 2/2 ▼

Figure 5: College at Cornell

Student majors and disciplines widely varied including Biology, Industrial & Labor Relations, Information Science, Policy Analysis and Management, Pharmacology, Sustainable Global Enterprise in the MBA program, various Engineering disciplines, Economics, Architecture, Design, and International Agriculture and Rural

Development. Companies founded in 2016 were the largest category at 33.3%, with those founded in 2015 close behind at 26.7%. In 2014, 6.7% of startups were founded while in 2013 and 2012, 10% each were founded. In 2011 and 2010, about 6% of the startups were founded, and almost 7% before 2010 (Fig. 6, below).
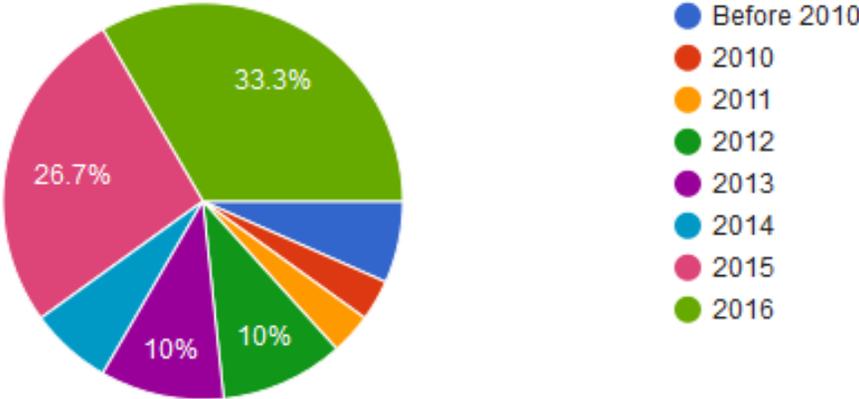
Figure 6: Year Founded

Though the highest category of industry was in software, the data did not indicate that the software always had to do with technical or engineering services (Fig. 7, next page).

Figure 7: Industry
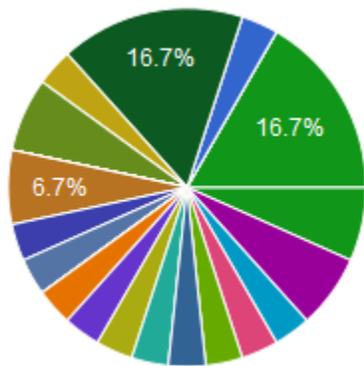
Advertising & Marketing
Analytics, Business Intelligence
Apparel
Biotechnology
Consumer Products
Ecommerce
Education
Energy

▲ 1/5 ▼

Enterprise, Storage, Networks
Finance & Payments
Financial Technology (FinTech)
Food & Beverage / Tobacco
Gaming
Hardware
Healthcare IT, Services
Healthcare Products

▲ 2/5 ▼

Human Resources
Internet Publishing
Life Sciences
Manufacturing
Media & Entertainment
Mobile
Private Equity, Venture Capital
Publishing

▲ 3/5 ▼

Figure 7 (Continued)

- Real Estate
- Retail & Distribution
- Security
- Social Entrepreneurship
- Social Networking & Collaboration
- Software
- Technology
- Telecommunications

▲ 4/5 ▼

- Transportation
- Venture Capital
- Other

▲ 5/5 ▽

Additionally, over 93.3% of startups were for profit (Fig. 8, below)

- For Profit
- Non-Profit
- Undecided
- Other

93.3%

For Profit
28 (93.3%)
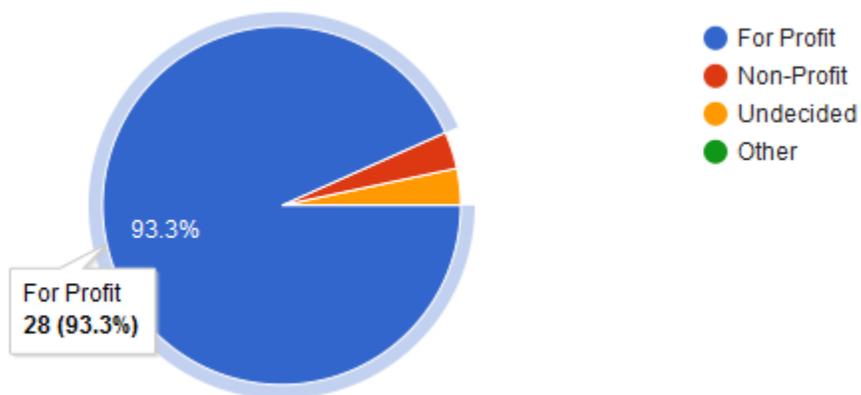
Figure 8: For/Non Profit Category

and most, 56.7%, were in pre-seed phases or currently not seeking funding (36.7%)

(Fig. 9, below).
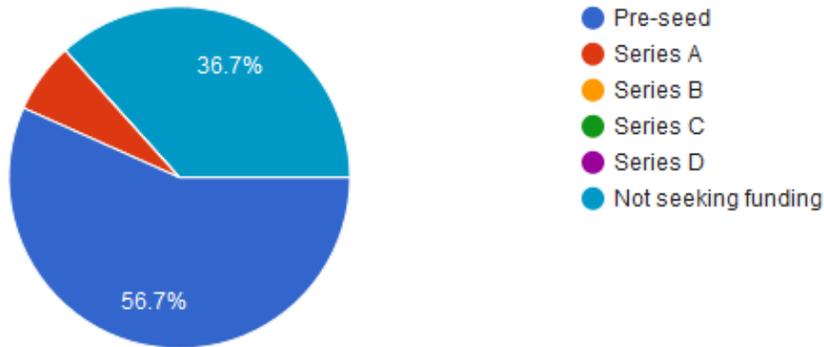
Figure 9: Funding Stage

Given the nascence of the startups, this data makes logical sense. Among the

entrepreneurs the top concerns included financing the business (63.3%) and finding

customers, (46.7%) (Fig. 10, below.).
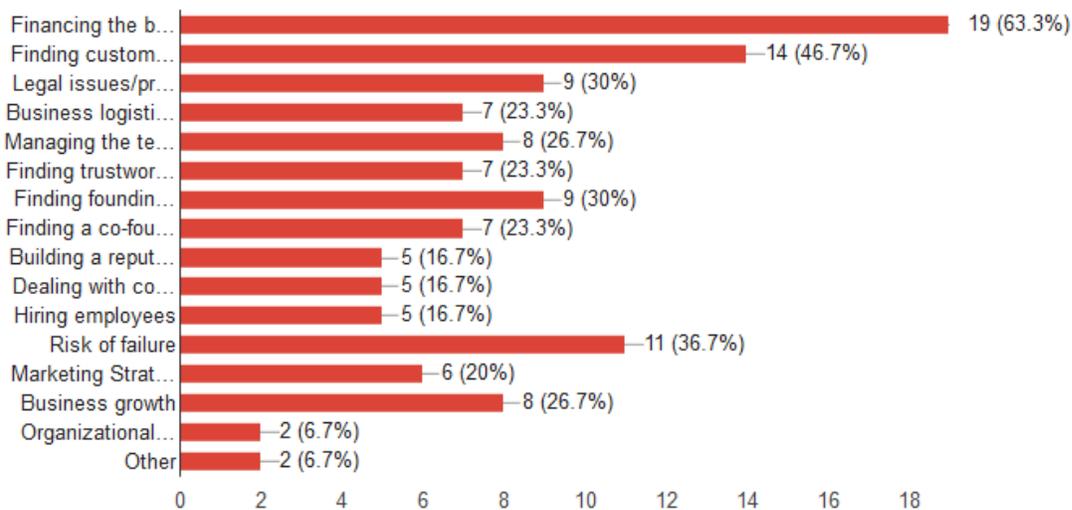
Figure 10: Concerns of Entrepreneurs

Conclusively, 60% of startup founders plan to pursue their ventures full time after

graduation (Fig. 11, below).
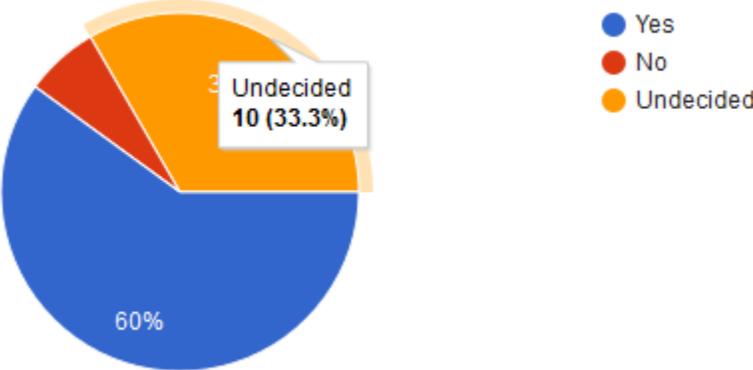
Figure 11: Pursue after Graduation

Teams ranged in size of 1-9 members (63.3%) with a smaller 20% at 10-20 members

(Fig. 12, below).
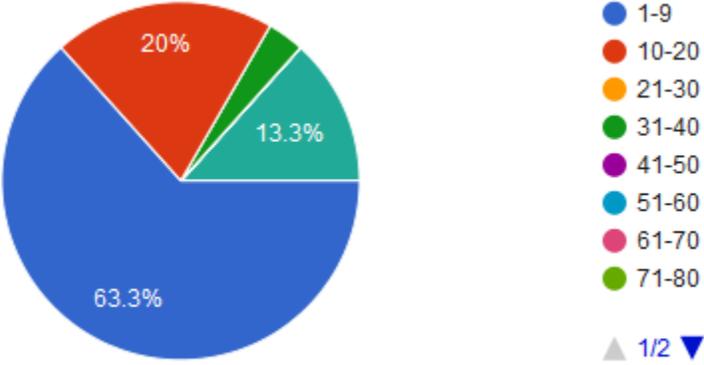
Figure 12: Team Size

Figure 12 (Continued)

- ● 81-90
- ● 91-100
- ● 100+
- ● Just me and/or co-founder(s) for the time being
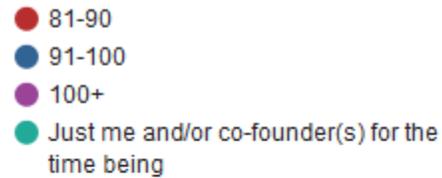
▲ 2/2 ▼

Teams were assembled through local connections, personal networks and the undergraduate community, applications, on-campus targeted recruitment, word of mouth, through project teams (courses at Cornell), job postings on Handshake (previously Experience/CCNet), and informal mentors according to survey results. Most often cited was the reaching out of founders into the Cornell community, similar to the trend in finding co-founders.

Entrepreneurs were explicit in citing that the most important relationships for the startup venture were university relationships (such as faculty referrals to entrepreneurial professors). In terms of statistics, startups with 1 advisor make up 23.3% of the sample, while startups with 2 and 3 advisors make up 26.7% and 16.7% respectively. Interestingly, 23.3% of the sample have 5 or more advisors (Fig. 13, next page).
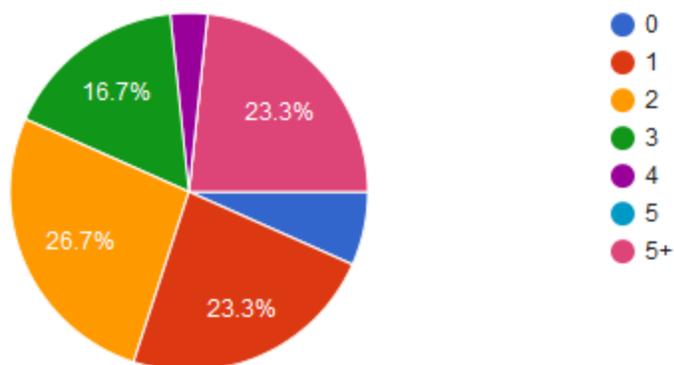
Figure 13: Number of Advisors

This lends credence to the notion that given the access student entrepreneurs have to multiple resources on campus, there would be more advisors available as well. More specifically, the most popular advisors include Felix Litvinsky, director of Blackstone LaunchPad, Zach Shulman of Entrepreneurship at Cornell, informal advisors, John Greene, entrepreneur in residence at Cornell and VPBD of a Cornell-based startup, Rhett Weiss, Sandy Khaund, elab mentors (Steve Gal, Ken Rother, Tom Schryver), Peter Cortle at eLab, Professor Streeter, Haroon Ismail (leed mentor in the Entrepreneurship community), Pam Silverstein, a local entrepreneur and executive coach/mentor, and Professor Ken Birman in the Cornell CS Department.

Cornell's Entrepreneurial Institutions, Organizations, and Resources

A diverse group of university-wide activities along with partnerships across colleges emerged that promote entrepreneurial education, events, commercialization, and

experiential learning opportunities. Many of the institutions on campus take on incubator/accelerator like characteristics that perpetuate norms of entrepreneurial activity across campus student entrepreneurs perceived them as indispensable to the creation of their firms. Thus, a detailed examination of the context of the entrepreneur-institution relationship shows that the university setting is an important factor in the existence of entrepreneurial activity on campus. Following is a deeper examination of the most used and relevant institutional resources at Cornell[1].

Entrepreneurship at Cornell is a formal university-wide program that finds and foster entrepreneurship in every college. It is governed by the 12 deans of the participating schools and colleges who provide guidance and financial support, consist also of an advisory council of 100 Cornell alumni, and are sponsored by a variety of financial and legal services firms. It was also cited as the most used resource by 70% of the survey participants and is an overarching, umbrella organization that houses several key resources used by the entrepreneurs. According to Zach Shulman, Director of Entrepreneurship at Cornell's goal is to connect all channels of entrepreneurship on campus as well as creating opportunities for students to connect with successful entrepreneurs, venture capitalists, and financiers off-campus. The focus is on

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[1] The most used and relevant institutions were determined from the survey. Participants checked off a list of institutions they used and then identified the top institutions relevant to their startup process.

collaborative programming, business plan competitions, and other events to nurture and support entrepreneurial teams. Most important is the "bring to market" mentality. Ultimately, this formal university resources was most often used and is key in underlining the new relationship between institution and entrepreneur.

Within Entrepreneurship at Cornell, there resides several sub-organizations dedicated to providing startup resources. eLab, created in 2008 by Student Agencies Foundation in collaboration with Entrepreneurship at Cornell, is a business accelerator which 60% of respondents cited using. eLab accelerates top Cornell startups working with hundreds of students in turning concepts into real businesses. Admissions into the program is highly competitive, however, for those teams not accepted, many resources are still made accessible such as Life Changing Labs, addressed below, co-working spaces, and Blackstone LaunchPad, also discussed below.

Acceptance into eLab provides companies exclusive resources and serves as a bridge to the broader entrepreneurship community. Dedicated mentors provide both their personal expertise as well as access to a variety of resources within and outside of the Cornell network. Specifically, eLab provides a $5,000 investment into the business, one-on-one mentorship from successful entrepreneurs, the ability to earn

up to 5.5 credits for working on the startup, legal consultation courtesy of WilmerHale (worth $20,000), Proto.io, a mobile prototyping platform, for 3 months free with 50% off all services after, co-working space in Cornell's brand new eHub, access to Cornell's vast alumni network through specific advisor networking events, regular updates and guidance regarding various business competitions, hackathons, and pitch events, and an end of program celebration with presentation opportunity to over 400 guests including venture capital firms.

Access to these resources come with admission into the program and at no additional equity. Throughout the fall, eLab works with teams defining the problem, the customers, what the customers value, and the solution. Teams attend boot camps, work with REV business incubator (located in downtown Ithaca), attend entrepreneurial events in NYC, and practice pitching. Teams then work on their company message, branding strategies, and iterate on the process of moving a product forward.

Furthermore, Entrepreneurship at Cornell's Celebration Annual Conference is an annual two day conference held in Ithaca, NY and a highlighting example of the nature of university environment. The conference entails multiple roundtables, competition finalist presentations, networking opportunities, presentations by

different companies and institutes such as The Pillsbury Institute for Hospitality Entrepreneurship, new business and emerging technologies showcases, and multiple panel session on different topics covering cutting edge technology, pitching to VCs and funding issues, networking for entrepreneurial mobility, profitability and selling to the right market, and how to deal with the competition, success stories. Other events included the "Big Idea" undergraduate startup competition final and the conference highlight "eLab Demo Day", two of the most prominent functions of the conference.

The Big Idea Competition is open to all current Cornell undergraduate students. Eight finalists (individual or team) are determined by a group of entrepreneurs (social), non-profit, and business professionals. Twenty-five semi-finalists also receive consultations. Prizes are awarded in business and social categories. The finalists are given three minutes to present to a live audience of peers, faculty, entrepreneurs, distinguished guests, and public audiences. The entries are early-stage, pre-seed. The researcher attended the Big Idea competition in two years and the environment and context very closely resembled that of a startup giving a pitch to a venture capitalist. Alyssa Holman '18, a biology and society major in the College of Arts and Sciences, pitched the idea of creating 3-D hearts that could be

used in transplants. Holman is motivated by summer work she did on cardiothoracic medicine and her own research into tissues and 3-D printing.

Beverly Wallenstein '16 attended Camp Start-up at the Samuel Curtis Johnson Graduate School of Management when she was 13, and the experience stuck with her. Her idea focuses on providing similar entrepreneurial support to young girls across the country. Thus, her startup, Girls Mean Business, would offer eight-week, summer or weekend programs for middle or high school girls who want to explore entrepreneurship, whether they have a business idea, want to learn about funding or want to be part of an entrepreneurial team. The importance of an early entrepreneurial education is critical. Danny Janeczko '17 and Emily Wafler '17 presented an idea for an app that would allow travelers to save leftover metro fares from cities across the globe and trade it in for metro cash in another city. In New York City alone, the MTA brings in $500 million in unused fares every year.

At Demo Day, students pitched their startups in 6 minutes. Afterwards, a "Meet and Greet" session allowed for observation and interaction with co-founders, while the session also provided an opportunity to interact with other fellow entrepreneurs, venture capitalists, and business alumni. Several other business competitions also culminate during the Celebration conference. The Cornell Venture Challenge,

sponsored by Johnson's BR Venture Fund, offered a $25,000 first prize, which also includes an incorporation package worth $20,000 and matching money from the Center for Technology Licensing. Teams are evaluated on their business team, the potential of their idea and the market size.

eHub, a student run entrepreneurial organization and used by almost 40% of respondents, was conceived in 2013 and opened in 2016 in Kennedy Hall and Collegetown. A community space for entrepreneurs, eHub provides an effective environment to hatch ideas, work together, discuss problems, and get mentorship. The eHub project is a partnership among Entrepreneurship at Cornell, the Student Agencies Foundation, the Samuel Curtis Johnson Graduate School of Management, the College of Agriculture and Life Sciences, the College of Engineering, the ILR School and the School of Hotel Administration. eHub's goal is to grow Cornell's entrepreneurship brand and programming. This endeavor is a direct response to the needs students have made clear. The eHub space in Collegetown houses several existing organizations: eLab, Student Agencies Inc. and PopShop (a community of entrepreneurially minded students, discussed below). The space ultimately will host other organizations that support Cornell entrepreneurship and experiential business learning and offer programs including mentors-in-residence, workshops, seminars and hack-a-thons, among other events. Though students meet through classes, clubs,

and other social organizations on campus, eHub provides a dedicated space for creative interaction and collaboration. Sam Langer '17, a psychology major in the College of Arts and Sciences, worked with PopShop directors last year to set up a successful series of meetings between creative students, such as musicians, filmmakers, and fashion designers. The Kennedy Hall space includes offices for Entrepreneurship at Cornell, spaces for group meetings, conferences, events, classes, presentations and open areas for discussions and planning. Both spaces are open to all students across the Cornell campus.

PopShop, opened in 2012, is a gathering space for entrepreneurial students to make connections, work on class projects, engage in scheduled programs and chance encounters, discuss their entrepreneurial ideas, organize meetings for their startups, and receive guidance and from experienced entrepreneurs on campus. This is a space dedicated to students from various backgrounds to work on entrepreneurial projects they would not normally be engaged in, for instance, due to a lack of overlap in networks. PopShop is open to any student to take advantage of scheduled workshops with an entrepreneur or on such topics as selling, pitching an investment or digital fabrication, and social events. PopShop works closely with eLab as well: PopShop manages the space and programming, while eLab provides mentoring and

support. This is an interesting instance of formal and informal resources working in tandem

In October 2015, the Blackstone Charitable Foundation announced a three-year $4.5 million grant to establish a partnership among Cornell, New York University (NYU), Syracuse University, and the State University of New York Albany and Buffalo to introduce entrepreneurship as a career option. The partnership, known as Blackstone LaunchPad (BLP), provides more than 180,000 students with venture coaches and support systems. Blackstone LaunchPad connects the university campuses, business communities, and local entrepreneurs to create a nurturing environment including providing students with development of entrepreneurial skills and access to key networks. The ultimate goal again is to bring to market startup ideas. Endorsed by late President Elizabeth Garrett, she noted that Blackstone LaunchPad is a critical new addition to a robust entrepreneurial ecosystem enabling and accelerating students along the entrepreneurial path.

In February 2016, Felix Litvinksy, a seasoned international technology entrepreneur and a member of various angel investor groups, was named the first managing director of BLP. Litvinsky built his career launching and leading technology startup companies. He was founder and CEO of Abakama, an international products and

services company and also founded and held executive positions at companies such as loT Partners, minority Venture Partners, and Alarity Corp. Litvinsky has been speaking in classes, contacting alumni, and meeting with students to mentor and spread word of BLP's resources.

BLP works with Entrepreneurship at Cornell by providing free and confidential mentorship along with opportunities to connect with mentors for business advice, attend networking and educational events, and have access to global online resources. BLP is often the first stop for budding student entrepreneurs. The institutional goal is to enrichen the entrepreneurial ecosystem providing yet another resource for students to consider and to legitimize and normalize entrepreneurship as a potential career path.

Life Changing Labs (LCL) is a non-profit organization that supports Cornell's top student founders through the summer incubator program, providing the opportunity to get hands on experience, mentorship, and guidance from serial entrepreneurs, investors, and veteran professionals. Founded by Peter Cortle in 2011, LCL has grown to provide structured support, resources, and a formal environment for students year round with a team of students including engineers, designers, MBAs, JDs, and PhDs. Mentors include industry experts such as Canaan Partners co-

founder and managing partner Eric Young, Red Antler co-founder and CEO JB Osborne, Google Hardware Astronaut & Author of "Exploring Arduino" Jeremy Blum, Behance Founder and Pinterest & Uber Investor Scott Belsky, CBORD Group Founder & Chairman John E. Alexander, Andreesen Horowitz Partner Morgan Beller, and Zach Schulman, Director of Entrepreneurship at Cornell.

LCL also provides a summer incubator program for intensive business development. Six student teams work on their startups, meeting together at least three times a week in the PopShop space in Collegetown. They are supported by the LCL management team, internal mentors and a group of 10 student interns – so called "Life Changers". The program runs for 8 weeks during the summer, makes available resources up to $200,000 for every LCL startup, and takes 0% equity in return. The programming also includes weekly dinners (Y Combinator Style), weekly talks, weekly standups (one-on-one status checks), and an invite-only pitch day. Most recently, six companies were chosen from 100 applicants to join the incubator. Each company plans their sprints, tracks their key performance indicators and, ultimately, pushes their progress. Other leaders of the incubator include Haroon Ismail '13, LCL partner, founder of AkibaH, and participant in accelerator program Techstars. There is a myriad of background experience including business, software, hardware and design. The incubator is supported in part by Entrepreneurship at Cornell, and

students receive free resources from partners such as Google Cloud, Amazon Web Services, Microsoft Bizspark, Github, Braintree, Proto.io and Invision.

For instance, Kirk Samaroo, Ph.D. '14 in mechanical engineering, applied to the program to incubate his business creating a treatment for arthritis. Lab results have been promising and Samaroo is currently licensing the technology and developing a financing strategy. Aditya Agashe '17, a computer science major in the College of Engineering, and Michelle Jang '17, an industrial and labor relations major, are working on an app called Belle, a peer-to-peer food delivery service, where students would be paid to visit restaurants or groceries and pick up items for other students. Belle has launched and currently has 100 beta testers. Lauren Stechschulte '17, a computer science student in the College of Arts and Sciences, joined the intern program with no startup idea in mind but with an eagerness to immerse herself in the entrepreneurial culture. She has developed product algorithms and conducted legal research.

Lastly, hackathons are catalysts for entrepreneurial growth and are an up and coming way to encourage innovative, entrepreneurial practice in a contained, modeled environment. A diverse group of people come together usually for a weekend to come up with a solution for a problem. Uniquely, Cornell hackathons do not focus

solely on coding, but rather on creating a fully developed solution. The end goal is to create a product that would be consumer ready or feasible to achieve in the real world.

The process itself is divided into two stages. In Stage 1, teams gain access to a number of resources such as application program interfaces, tech talks, research, or speakers. Students then formulate ideas and pitch to each other. Participants then form teams based on interest and fit. The second stage of the hackathon involves interacting with mentors and project managers to develop a viable solution. On the last day of the hackathon, the projects are reviewed by a panel, the top 10 teams do a four-minute pitch and Q&A with the judges, and then a winner is selected.

The entrepreneurial skills developed during a hackathon include pitching, thinking on one's feet, and teamwork. Entrepreneurs must be able to pitch their ideas to recruit other participants for their teams. They must also convey their ideas in a way that the mentors can understand, with or without technical knowledge, so that judges can fully see the startup vision. Brainstorming and feedback are then used to iterate. Additionally, there is a tremendous amount of pivoting that occurs, which mirrors the reality of the startup process in general: starting with one idea, moving to another, starting over, etc. Students also learn to acquire different skills needed to build a

team with good fit. The balance between innovators, executors, and challengers is essential and all three types of people are critical to startup success.

The importance of investment came up repeatedly throughout the dissertation project. At Cornell, a few resources emerged as the main funding sources for early entrepreneurs on campus: business plan competitions, such as the previously discussed Big Idea Competition and Cornell Venture Challenge (CVC), pitch competitions, and on-campus funding grants. Business plan competitions provide an avenue for entrepreneurs to write their first business plan, get constructive feedback, and be monetarily rewarded. For instance, the Cornell Hospitality Business Plan Competition is an annual entrepreneurship event for students to form teams and develop executive summaries for their business plans. The competition is targeted at seed and early growth phases while prizes total over $35,000. The New York State Business Plan Competition, held at Cornell, is one of the most popular with prizes totaling over $500,000. XBoard, created by CEO Jeffrey Ly ('16) and CTO Eric Berg ('19), is the world's first electric skateboard with which one can do tricks and won $10,000 in the competition. The startup targets skateboard enthusiasts.

Pitch competitions offer many student entrepreneurs the ability to practice a pitch and develop presentation skills. In September 20167, eHub hosted the first Life Changing Labs pitch competition. Three Cornell undergraduate students had one minute to sell their startup idea. After deliberation on four core categories (Startup Idea, Presentation Deck Quality, Verbal Presentation Quality, and Wow Factor), Andrew Smith ('18) was announced the winner by "split decision" by pitching Campus Connect. Campus Connect aims to improve college recruitment, an idea that formed from his own recruitment process at Cornell. Smith was awarded $100 from Life Changing Labs at Cornell. At this time, Campus Connect is in stealth mode to maintain Smith's creative property. While cash prizes offer a large incentive, the opportunity to gain feedback on a pitch and concept is equally valuable.

For many student entrepreneurs, the pitch deck that gets used in a local pitch competition will serve as the foundation of the one the entrepreneurs will use in front of investors and VCs down the road. Students learn to control their tone, their way of speaking, what to do with their hands, how to move, etc. One becomes not only a master of the material, but also master at engaging the audience, most importantly in an organic and passionate way. Otherwise, the pitch is forgettable, regardless of content. Thus, the ability to practice in front of an audience is invaluable. Ly,

XBoard's CEO and master pitcher, has won an astounding 4 pitch competitions. The Electrical and Computer Engineering Innovation Award Competition, another pitch opportunity, challenges student teams of two to three to design and develop an innovative technology based on electrical and computer engineering. Ideas must address a practical business and or social challenge. Multidisciplinary and diverse teams are encouraged and work to create an elevator pitch. Teams then present at the oral competition. Two winning teams are awarded $10,000 each. Furthermore, Cornell has established many grant opportunities to fund student innovation. Examples include the Community Partnership Funding Board, Engaged Cornell, and the Janet McKinley '74 Family Grant.

The Cornell Startup Narrative

This section sheds light on several different startups in varying stages to provide support and evidence for the quantitative survey results above and qualitative analytical results to follow. Aspects highlighted include such concepts as an understanding of the entrepreneurial process, how cofounders/teams were formed, where ideas came from, and setbacks. Many of the institutional resources mentioned in the online survey were also used by entrepreneurs who were interviewed by the researcher. Content was also richly derived from the interviews.

The first startup is currently under stealth mode, created by entrepreneur Brianna

Singer.   With her permission, this dissertation highlights aspects of the

entrepreneurial process without revealing any intellectual or proprietary

information. Brianna's startup is in the earliest stages and currently there are two

co-founders. Their day to day activities follow:

> *...we have a shared document with a list of... sort of to*
>
> *do's that need to get done right now it's mostly related to*
>
> *research and networking and looking of funding and every*
>
> *week on Sunday evening, I send an email to my partner to*
>
> *let him know how much I've gotten done that week and*
>
> *what I'd like him to work on..., just make sure we're in*
>
> *sync... let's see so right now day to day work is mostly...,*
>
> *doing online research and sending emails.*

Additionally, many cases in the project reported finding advisors through courses

taken at Cornell. Brianna describes a typical example of this experience below.

> *...I also meet regularly with professor Deborah Streeter,*
>
> *she is a professor of mine in the AEM school, I'm an ILR*
>
> *student but I'm taking an AEM class with her and..., I meet*

with her periodically for advice…and she has offered

more advice than anyone else…

In fact, Brianna got the idea to apply to the Launch Your Idea contest as a suggestion from Dr. Streeter and also applied to the Big Idea Competition. Dr. Streeter is the Bruce F. Failing, Sr. Professor of Personal Enterprise and Small Business Management in the Department of Applied Economics and Management at Cornell. She focuses on entrepreneurship, small business management, and outreach. Her research focuses on university-wide models for teaching entrepreneurship and gender issues in business and entrepreneurship.

Furthermore, Brianna's startup is a great example, even though in early stages, of a founder without experience, attempting to map out where the startup is going. Though seemingly counterintuitive, given that this project found the startup process tends to be meandering, a map is necessary for startups in the sense that attainable goals are set, even if they are reset repeatedly. This process itself can be nonlinear and iterative. Ultimately, there is no one "right" path for all entrepreneurs to take when building a startup. For instance, Brianna describes the following:

So right now... okay so kind of I understand a lot of with

the technology related startup idea have is they go straight

to prototyping… and so actually… Deborah Streeter suggested that one of my immediate goals should be… somebody who understands application development and have them start making my prototype and I had to tell her that that is not a good idea yet… because we don'ts.. first the first step should be doing enough research where that means doing like reading and also conducting surveys to demonstrate a need and then based on the information you get from that… to sketch out with a pen and paper… exactly how the prototype should look and then only after that…getting…anything even remotely close to a prototype because if you try prototyping now you're trying to guess what people want and that's, you're gonna end up regretting later it's ridiculous and it's an expensive process and we it's money we don't have.. so right now the immediate goal is to conduct an experiment to… to see people are comfortable… having the kind of… conversations like web chats discussions with… strangers from foreign countries who happen to be available or speak the language you're learning… see that's an

educational experience if people like it if people would pay

for it or opt to do it paid for with their time so just be.. if

that's a go then the next thing to do would be to do a very

low tech version of the application and that means making

like a spreadsheet of language learners from various

schools… a lot from we have there are a lot of schools that

are connected to London School of Economics so their

abroad program with a language program attached to it

so we reach out to them first so after, so after that we'd

establish a network of a students who want to talk to each

other to study their language honestly start out with phone

calls you know skype accounts to make sure that works

and if that network is popular enough and it proves to be

a useful tool then we would digitize it then it would be time

to start making a prototype application uh to basically

digitize and make more efficient a system that we have

already proved is working and from there it would be a

decision to make ah whether we charge for this

application or whether we pay for it with advertising or

maybe we have two different versions you know a lite

version you get for free with ads and… premium version

uh and from there it would be… what we would do next.

Lastly, Brianna has already decided to take her startup fulltime after graduation. She stated that entrepreneurship was something she always wanted to pursue and that after graduation there would be more time to devote her bandwidth solely to progressing the startup.

Compel Agency, created by founder Gage Hunt, is a creative agency specializing in brand development, web design, and that is primarily geared towards non-profit organizations. Compel is also in an early stage. According to his interview, on a day to day basis Gage does most of the work. There are many small work and design projects to complete. In this process, Gage decides what platform would be most appropriate for the task at hand, company, or brand. However, Gage sometimes brings on others to do sound production or animation work, things he does not have the skill set to complete.

The founding team was created by Cornell students who met as transfers. They then took a class together in entrepreneurship, another example of courses as an institutional resource engendering entrepreneurship, then created the startup out of

the course and its final project. Gage stated, "…by the end of the course we had actually gone ahead and executed on it". From this point, they got involved in eLab, a significantly valuable program, according to Gage and reflected in the survey results. Among the highest concerns were hiring, stated by other founders as well, and competitive edge of the startup.

> *So you know when the question of hiring comes up it's…*
>
> *factor in that person's role on the contract so they exist for*
>
> *the project and then you have the budget for it… the*
>
> *biggest thing for me is the creative, would be that the scope*
>
> *the differentiation I've chosen which is working primarily*
>
> *with non-profits, one concern that has been around will*
>
> *the scope of my work…*

Gage also provides an interesting picture of the nature of startups. He mentioned that currently, they are working concurrently on brand development, website design, and video work: several aspects of the startup process at once. The innovation is there; however, Gage pointed out that continuous improvements not only to the idea of the product, but delivery as well are factors the startup iteratively addresses over its lifetime.

Stash, created by Rahul Shah, is a startup in its beta-launch[2] stage. Stash allows customers to store links and automatically analyze content of the link is. When customers want to find it later, they can find it based on what the type is and how it got categorized, as opposed to relying purely on memory recall. For instance, Rahul explained that if a consumer was shopping for a shirt, he could press the Stash button and the program would automatically store it categorizing it as a product and under apparel. Later, when the consumer wants to revisit the shirt, he can search for it based on the descriptions "product" and "apparel".

The team is compact at three people. Rahul works as CEO, second co-founder Chris works as COO, and lead developing engineer Sachin who rounds out the team. Rahul stated that though his official role is CEO, he works on multiple aspects of the startup such as pushing the product forward and recruiting. The team appears diverse, spanning multiple areas of expertise. In terms of building his team beyond the founding one, Rahul indicated that it had been a continuously arduous process. Initially, Rahul spent a summer in Ithaca working on a different consumer application with an entirely different team. The project lasted six months before that summer team decided to work their way into the business to business (B2B) market

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[2] Beta-launch: first initial "soft" launch to test the product/service, iron out bugs, etc. before the official "hard" launch

space selling to the media industry. At this point, the summer team joined the small Stash team and grew to 15 people. Rahul emphasize that the team grew and shrank several times. However, most recently, the founders brought the team significantly down in an attempt to find the right people for the startup and be more efficient in completing tasks.

> *...first of all, we realize that [a] bigger team does not necessarily mean more productive so in our sort of strategy right now we feel it's a thing that can be filled by someone else a fourth person and that we felt that the overhead of bringing them on the overhead of training them and the overhead of getting them you know integrated with our process is less than the value they can provide so they can provide more value than they cost , not cost at a how much we pay them, but more cost at it'll slow us down because we have to keep one more person in the loop, one more person integrated. So you know when we're at that phase that we think a component of the process that is carved out and more importantly we find a person that is capable of understanding our process, good fit for the team, at that point we'd work towards hiring but*

it's not something that we you know are committing to

doing in the near future.

The process of innovation was also organic. According to Rahul, "Again it was kind of iterations…". The first application of the product was a system that could put in a search query and summarize from the web a short synopsis. Rahul and his team began working on developing a technology capable of analyzing meaning behind content, specifically web content. Through this process, they found a particular niche, one in which the news media needed analytics. They then switch gears slightly towards this market targeting the business to business model.

However, for a student startup, Rahul realized there wasn't enough time nor resources to scale at such an exponentially rapid pace. They made another iteration of adjustments and took the technology back to the consumer space, which is currently where the startup is located. The goal of course is to reenter the business to business market; however, for now, they are discovering their target consumers and working on necessary iterations. Rahul's biggest concern was about the issues "…you don't know are on the horizon…" though he plans to go full time with the startup after graduation.

Yorango was created by four Cornell co-founders in June 2012. Yorango was born out of the co-founders' frustration at alternative platforms for renting housing, particularly sites that lack credibility and authenticity and took copious amounts of time to navigate. Thus, Yorango was built to simplify rental. The software features tools for listings, contracts, payment, and communication. Unlike the competition, Yorango provides a two-sided platform that gives both landlords and tenants an efficient solution.

Yorango's team consists of a CEO, a CTO, 2 software developers, and 1 business member, a team of diverse expertise. Each was found either through tangential friend networks or through lecture labs and the entrepreneurial network at Cornell. Yorango launched with eLab but also used LCL and eShip in their startup process. According to the founders, the entrepreneurship community for Yorango's team was pivotal to the development, refinement, and operations of the startup and also providing formal resources and establishing relationships with funders, supporters, and other entrepreneurs. Adam Kirsch, one of the founders, stated that his biggest concern was about funds and resources, a major concern cited by other founders in the survey as well.

> *I mean I'm leaving a lot of money on the table like by doing*
>
> *this and not taking a career like other the MBAs have. And*

you know it's hard when you have to call a company and turn down an offer that… you know I'd be out-earning my parents combined in 5 years of graduating and like I'd love to still do that… but you know part of it is about taking it to completion. You know to, to systemizing this and being able to take pass of it. And before that or sell it and create value through that transaction. …the biggest thing is that things aren't moving fast enough… like every morning I wake up and the first thing I wake up and this is the last thing before I go to sleep… is this. Everything I'm doing you know is… coming back to this. …so it takes a lot of… it's a lot… it's very mental thing. To all of us there. …Basically it's very… I mean it's. The biggest concern is we're going to work so hard and not sell any product or not to it fast enough obviously… Um, you know you need to have momentum especially as this is a cash first business and a revenue positive business…

Adam set high goals for his startup, carefully defining what would be a picture of success for Yorango and for himself as CEO of the startup.

If…I can't sell $100,000 of software, I would consider myself a failure. You know, if I can't live off this business, within you know a year of graduating… I'm a failure… If I can't pay my employees I'm a failure. Like, it's that's kind of the way I see it.

Even if it came to selling the company, for Adam, this would still be a success.

I have no qualms about selling it. I'm in a business to make money I think a lot of entrepreneurs, especially when I found technical entrepreneurs are in business for the product. And what I've seen with people I know and with others in the industry, is that you get so obsessed with making a product that you forget the reason capitalism exists and it's because you have complete control over your destiny and that destiny is directly linked to the power of the product.

Next, Annabel's Grocery is a student run, non-profit grocery store on campus that addresses student food insecurity. People may be food insecure if they have to compromise on the quality of their food or cannot acquire adequate food by socially

acceptable means. On university campuses, students, for instance, may eat $1 ramen every night, even when the want to eat more nutritious food because they cannot afford it or may have to skip meals entirely. Annabel's Grocery puts at least 22% of Cornell's students in the food insecure category, a non-insignificant percent. Annabel's is an example of startup that is fairly far along, with a cemented business plan.

Annabel's also worked with LCL and participated in their summer program, which allowed them to team up with advisor Pam Silverstein, the entrepreneur in residence. The startup also secured $360,000 in funding. Annabel's provides a great example of the messiness and non-linear process of a startup.

> *Well… it has been high stress for a while, emotionally volatile just because we went through phases of… this project sounds good and we think it'll be approved and then it wasn't, and the steps we had to go through to get it approved kept changing and getting bigger. And then at one point we went to a trusted advisor who is an expert in the grocery industry he critiqued our model and said that he didn't think it would work. And so for a good month I believed the whole thing was just for nothing. And then*

we improved the model, got more support, and it's much

better now. That was a big challenge and then we worried

that maybe this isn't the best way to address food security

and so with that we just had to keep talking to people who

were looking for assistance and they kept saying, yeah it

sounds like a good idea, so.

The revision of the business plan provides an illustrative example of how difficult it is to execute on an idea, beyond innovation, how multiple things happen concurrently, and how complicated the startup process can be.

Furthermore, Annabel's advisory board consists of several board members ensconced in Cornell's different institutional arms. The following members are on the board: Dean of Students Renee Alexander, Julie Carmalt, Associate Director of the Sloan Program in Health Administration and lecturer in Policy Analysis and Management, Gary Fine, Assistant Director of Durland Alternatives Library within Cornell Transformative Action, David Levitsky, Professor in Human Ecology's Human Nutrition. Institutional involvement is not limited only to entrepreneurial programs and faculty.

Maidbot, an up and coming startup garnering significant interest in the entrepreneurial and industry community, is a robotics company creating robots for commercial cleaning. Maidbot is deeply embedded in its funding and beta-launch stage. Micah Green, the founder, has built a team consisting of himself, who is good at robotics, and a team of engineers, talented at coding. Micah found his team in the following manner:

> *...actually all [members were recruited] from different ways so one was from a mentor, who was a PhD student here at Cornell and like look, he's like a genius robotic, look I need a CTO, and I was hoping you know.. but... he already has plans and stuff but he was like look, the number 1 guy on my list is one of my friends for life he's a faculty member at Georgia Tech, I don't know if he's going to, you know it's the odds are very low that he's going to move up to Ithaca or quit his job, whatever, but you know it's, it could be interesting for him. So we started talking, a few calls and he was like yeah I'll do it and he got one of his former students since he's a faculty member to come up and work as well, and that was like a 5 minute call. Because he hated his job, and then other*

than those 2, the Cornell students, is like really random so

I met a couple of them through competition not even that

actual competition is like a business case like

competition. …but the information session took like

before we even applied, and I just started speaking with

them and they had an idea for like a heated umbrella or

something and it was like interesting but hey knew that

they probably needed a better product so they came up

with more and then just drew different connections like

different people… and the community.

This example provides support for the survey findings as well: founders find team members and others through the entrepreneurial network by attending competitions, events, talks, etc. This is a consistent finding across all startups. It seems there is a significant force the entrepreneurial community exerts on the startup process.

Furthermore, Micah shared that in 2015 he had a mental breakdown, not knowing what to do nor how to do it. He lost direction, had imperfect information on which to make important decisions, and his anxiety became increasingly overwhelming. He met with his professor and advisor, Pam Silverstein, a mentor

who is often mentioned in the interviews and survey, who gave him brutally honest advice to just start executing on the startup. Micah proceeded to do the following:

> *I started going and the main thing was finding a team. That was the first step. The first thing I put into in terms of money. My own money is…, was actually buying a banner for the career fair. So yeah, me and my friends sat down for like 10 minutes he quickly like put up a quickly made a logo for us, which we had until like last month. And then we got it printed on a huge banner and it was at career fair and found some people there uh find some people through different ways and then,… at the career fair. So I really didn't know what I was doing, I didn't know the steps I still don't… I mean there's… it's like hard to know what you're supposed to do.*

Even with guidance and a blueprint, Micah's experience demonstrates the uncertain nature of the startup process. However, Micah believed that the turning point was being part of LCL and its summer program. Every week, assessing KPI was a requirement. KPI is a key performance indicator. It is a measurable value that demonstrates how effectively a company is achieving key business

objectives. Startups use KPIs at multiple levels to evaluate their success at reaching

targets. Micah states his KPI reports included the following:

> *Like you know we did this, this much testing, there's many*
>
> *hours of testing, we spoke with this many these many*
>
> *general managers, these many housekeepers, whatever it*
>
> *might be. For me, I don't know I feel like, it's useful, but*
>
> *to an extent, so I think our real key performance indicators*
>
> *are not quantitative, like they shouldn't be I guess, they*
>
> *are more, qualitative I'd say in terms of like you know*
>
> *looking and determining something is done or like, can*
>
> *move forward in terms of technical development.*

Maidbot also uses a process known as SCRUM to help facilitate the often chaotic

and organic process startups go through. SCRUM is an iterative, agile framework

for completing complex projects (Verheyen, 2013). Work is divided into fixed

length iterations, called Sprints and each one contains some combination of analysis,

design, implementation, testing, and research. During each Sprint, the team decides

what needs to be addressed for completion, top priority items, etc. It enables teams

to self-organize, collaborate, communicate, and execute. Benefits include shorter

interactions, more feedback, and faster goal attainment (Verheyen, 2013). It can be

viewed as a continuous process of refinement. Summarily, SCRUM is a flexible and holistic development strategy where a team works as a unit to reach a common goal. Micah illustrates the organic and less than straightforward process of starting up as follows.

[E]very week we have something called the SCRUM process. So what we do is, as you probably know, yeah you talk about what you accomplished the first week or the week before and then you talk about goals for the following week. So with the goals with the following weak we set very specific tasks. We call them stomps because I think tasks sound boring. We call them stomps and each person gets like either a few maybe it's just one, like one person on the team has 1 project and he's been working on at for a couple weeks. But like that, I think that is key and we set, if it is a project, that's going to take a few weeks, you know you have to indicate what do you want to accomplish each week or every other week. But if it's something that should be done in that week, which most of the things should be, then yeah we just look at it and say yes, like we did this and then what we do is check it off

essentially and we have a tool the project management tool, and I think it's looking more at the stomps and maybe that's not the best way to do it but it's been working for us so far and uh, the issue is just that with what we're doing, so startups are really hard as you probably know, hardware startups are REALLY hard. Because you don't and I mean software's super hard too, with hardware you have to deal with parts coming in, you have to deal with machines that, like 3D printers, we've had a couple that have been down for a couple week, so there's so many factors that could other than just someone's computer crashing they can't code where the code gets wrecked. There are a lot of factors that go into that. And I think that it's, can be a big pain. So we understand that and I think everyone on the team realizes that but the truth is they understand that but as long as we do these weekly things consistently um and another thing to add pressure to the team I guess is I do weekly report where I mention to investors, advisors, mentors, literally 55 people on that, even executives at Marriott and some of the major hotel

companies are on there. So it's kind of pressuring to them

maybe not as much as I'd like it to be but they have to like

or list off what we accomplished on the tech side and the

business side. So tech side is honestly not tons of stuff but

I like to have that every single Sunday and I haven't missed

one. Literally since like February last year.

The SCRUM process emerges as an important aid in MaidBot's journey. Again, this is a recurring theme that points to the non-linear path of a startup and the need for a means to work through this uncertainty. As a result, MaidBot illustrates how some founders turn to the institutional resources, advisors, and some industry tools to make sense of the complexity.

InTouch, created by Dong Ki Kim and Moon Young Kim, is an example of startup that is no longer active. Dong Ki met Moon Young in January 2014 in a signals and systems course, yet another example of founders finding each other through institutional resources, and specifically a class at Cornell. And for the final course project, they met over lunch to discuss potential ideas.

…we begin to talk about noise in the city because we found

that there are cars honking is very unnecessary for many

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people because… car honking is usually for cars but I

guess for pedestrians or like nearby people they don't need

to hear it but since they're out and that is the traditional

way to communicate between the cars there wasn't any

real … it was really unnecessary and we tried to do

something. So I think that was the beginning or progress

on communication stuff.

Over breaks, the co-founders began coding and during the semester, decided to partake in the Big Idea Competition and found motivation to go further by participating in LCL's summer camp. There they met their advisor Peter Cortle, founder of LCL, who was able to assess the startup as unrealistic. Dong Ki recalls,

We had an idea [for] car communication but in order for

our idea to be implemented all the cars had to have our

device which is really unrealistic so [we] beg[a]n to think

[about] other ideas…

As a result, the startup duo began participating in many of the programs on campus to develop their product. They participated in demo day and recruited three people into the team. However, the startup soon ran into additional problems. Initially, the

team was just Dong Ki and Moon Young. Dong Ki stated that having just two on the team "…was much better in terms of moving forward…". Co-founders with similar expertise and skill sets can enable efficient and fast progress. However, this does not ensure that the direction of the progress is the right fit for the startup and what it offers to the market. Dong Ki stated that they realized this need and attempted to recruit more members of a diverse background. Dong Ki and Moon Young are both engineers, so they hired Jasmine, a designer. The problem that emerged next; however, was that with a diverse team came varied ideas and opinions which led to people moving in different directions. Dong Ki stated that it became extraordinarily difficult to make forward progress. He also explains a further issue.

> *…one of the issue was that Moon Young and I were seniors… Jasmine was also [a] senior… so after demo day…, we couldn't really move, even though we had… because many seniors were graduating so many core members were going out of the team. So after demo day we kind of split apart.*

Conclusively, though the founders had identified a problem, they focused too early on building a product. Peter Cortle, one of their mentors, told them that the first thing to deal with, no matter what, "…should be the problem because if there is a

problem, there is demand." However, Dong Ki admitted that rather than focusing on the problem, they focused more on building quick technology. Though Dong Ki and Moon Young thought similarly, it wasn't until Peter Cortle and others joined that flaws in the startup process were discovered. Additionally and counterintuitively, diversity, even though acknowledged by the founding team as important was not a perfect fix to the problems in the startup. Dong Ki said that lack of proper execution on multiple aspects led to the closing of the startup.

An example of an advanced startup is Waltz Networks. Current data networks operate on frameworks designed over 30 years ago. These outdated infrastructures struggle to keep up with the rapid growth in data traffic and the variability of this traffic (streaming videos, conference calls, Facebook live, etc.). Thus, these networks operate at only 30% capacity forcing network companies to physically lay down more cables to accommodate the rise in traffic. This is a significant cost cutting into profits, is time intensive, and a short-term, partial solution. Waltz has addressed this very dire need in the market by creating an algorithm that provides network control in real time.

In order to demonstrate this technology, consider the following example. Imagine driving home from work during rush hour traffic. The normal, shortest path route is

no longer the best, time optimal way home, given the traffic. Thus, one might tune into the traffic report on the radio listening for alternative routes. Local roads, though not the shortest path home, are free of traffic, and emerge as the better option for getting home in the shortest amount of time.

The nuance is to understand that without the traffic, the physically shortest path is also the optimal (shortest time) in getting home. However, with traffic, this assumption is no longer true and other physically longer paths, take less time. The algorithm created by Waltz, HALO, does exactly this in providing a dynamic and adaptive situation to network traffic. Ultimately, operating costs are significantly reduced, bandwidth utilization is increased, and latency is lowered. This provides an enticing solution to many different market segments.

The researcher spent over three years following this startup from inception to operation in San Francisco, CA. The researcher also spent a year conducting participant observation working with the startup. The tracking of Waltz began when the researcher conducted interviews with Electrical and Computer Engineering (ECE) faculty at Cornell University in order to learn more about the tech campus proposal (detailed in Chapter 5). Via this process, the researcher met Dr. Kevin Tang who then introduced Waltz, a startup based on one of his student's dissertation

project. The researcher then became involved in many aspects of this startups growth and progress.

At the beginning, the researcher worked with Waltz on finding its name, logo, and color scheme. Though seemingly insignificant, the researcher found this process must be treated with extreme caution. For instance, every potential name was researched in many different languages to avoid meanings that were offensive or inappropriate. Waltz, a type of ballroom dance, retained essentially the same meaning in every language.

Next, color research was also conducted in order to avoid colors that have negative connotations. Though eye-catching, red can be instigating, agitating, or arousing. Cool blues were found, through research in marketing, to be neutral and calming. Thus, Waltz picked an ocean based cool blue and aqua color scheme. During this process, the startup consulted often with the Dyson School's entrepreneurial advisors with business and marketing experience.

The startup also competed in pitch competitions and was awarded $20,000 in pre-seed investment from the Department of Electrical and Computer Engineering. Additionally, the startup consulted with many faculty members in the ECE

Department with expertise in serial entrepreneurship, routing technology, and networks. In fact this is how the first two engineers were hired as part of the team. Faculty advisors referred their graduate students to the project. Ning Wu became a part of the engineering team through this process.

Next, the startup began fundraising and the researcher wrote an NSF SBIR grant. The SBIR (Small Business Innovation Research) grant is angel funding, non-dilutive, and federally funded. The grant proposal was accepted and the company raised $1.4 million. For Series A, the researcher worked with the pitch development team. This team consisted of the researcher, an operations manager, an overseeing engineer, a business manager, and a legal aid, a diverse group. Each member contributed a different skill to the development of the pitch. The researcher for instance, provided her experience writing NSF grants in graduate school. The business manager outlined the revenue/profit model and the operations manager outlined the recruitment and hiring scheme for example.

The pitch itself was developed to target some of the largest VCs in Silicon Valley including Kleiner Perkins and Sequoia, all located on Stanford's campus. At series close, NEA (New Enterprise Association, the largest VC on the west coast with $18 billion in assets) invested $6.75 million dollars bringing total funding to $8.15

million. Though offered a much greater evaluation at $20 million and investment sum totaling over $10 million, the Waltz founding team decided to take a conservative approach. The reasoning follow: at series A, a startup is evaluated at "x". In between Series A and Series B, the "x" evaluation is expected to grow by "y". Thus, an initial evaluation at $20 million would imply, multiplying a growth factor, based on industry standards of 4x, an $80 million evaluation by Series B (which occurs in a year to year and a half). This would be an incredibly difficult evaluation to achieve in such a short time, and a risky venture, albeit if achieved, an almost assured indicator of success.

The next 12-19 months before Series B is known in the Valley as the growth stage. With Waltz, the researcher's role included developing the market position, messaging, company boiler plate, and product development. Product development was a constantly iterative process. Though the initial innovation, HALO, is optimal, it was difficult to convince customers in slightly different markets to adapt to the initial product. First of all, the team had to decide whether or not to offer hardware or software. Hardware would entail building routers and then convincing customers to completely overhaul their routing setups for the new ones. This the company decided was unfeasible.

As a result, the company settled on providing software that could easily be implemented on existing routing structures. For instance, the software would be installed by Cisco on to its routers. The software would then be able to optimally direct network traffic. If for any reason the software failed, it would automatically divert to the original network infrastructure in place. In this manner, the network would never be down. This last point was an incredibly enticing selling point for not only network providers but banks and hedge funds as well who could benefit greatly from uninterrupted information flow.

However, the team had to create three to four different versions of the original technology to target slightly different customers. Even then, the "original" technology went through several iterations of innovations. This was not necessarily to strictly improve the product but rather make it marketable or easily explainable for investors and easily digestible for consumers. The main target market was the SDN (software defined networking) market. This market comprises physical network infrastructure, virtualization/control software, security services, and professional services. It is expected to reach $12.5 billion by 2020[3].

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[3] "SDN Market to Experience Strong Growth Over Next Several Years, According to IDC." https://www.idc.com/getdoc.jsp?containerId=prUS41005016
(accessed December 20, 2016).

The researcher also worked on designing the website, creating content for the website, and conducting potential client research. This list included Alibaba in China, Deutsche Telekom in Germany, Telefonica in Spain, and various American companies such as Facebook, Comcast, Google, and Bank of America. Additionally, universities such as Cornell, were interested in implementing the technology, particularly at its new tech campus in New York City. At the end of the participant observation phase, the researcher worked on public relations. The researcher wrote targeted press releases, the funding announcement, and maintained the social media presence of the company online through Twitter, Facebook, and YouTube.

The researcher gained significant insight from this research process with Waltz. First, the researcher was able to see up close an example of how entrepreneurial ideas form. In this case, a graduate student's dissertation became the innovation for a startup. Additionally, the researcher was able to follow Waltz, birthed at Cornell, through its entire initial and execution process to San Francisco. The researcher was able to get a close look at how the startup utilized the resources and advisors at Cornell and how the entrepreneurial community influenced its hiring decisions. The researcher was also able to see how diverse team members worked together on projects. The iterative process of the startup journey also became clear. This was an

insightful opportunity to understand how a research idea is turned into a commercializable product.

Startups in this dissertation were not limited to tech companies. The table below provides some examples from the survey response. Subsequent tables are used to provide an organized and instant visual of the concepts demonstrated in the evidence provided above.

Table 1: Industry

Advertising & Marketing	Apparel
Biotechnology	Consumer Products
Ecommerce	Education
Energy	Finance & Payments
Financial Technology	Food & Beverage/Tobacco
Gaming	Hardware
Healthcare IT, Services	Internet Publishing
Life Sciences	Manufacturing
Media & Entertainment	Mobile
Private Equity, Venture Capital	Publishing

Table 1 (Continued)

Real Estate	Retail & Distribution
Security	Social Entrepreneurship
Social Networking & Collaboration	Software
Telecommunications	Venture Capital

Furthermore, ideas were generated from a plethora of campus based sources. The table below provides an illustration of this diversity from the also from the survey responses.

Table 2: Origin of Ideas

Professional development programs	Idea with Graduate Advisor
Undergraduate and graduate Research	Group work / Projects in Courses
PhD Thesis/Dissertation	Entrepreneurship Classes: "Entrepreneurship and Private Equity"
Business Classes: NBA 3000	Cornell Faculty Research
Research in the Greenhouses	

Founders also used some of the following resources to "get off the ground" (Table 3, below)

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Table 3: Resources to "Get off the Ground"

LCL Grant	Center for Transformative Action (Cornell University Institution)
NSF SBIR Grant	Business Plan Competition
Advisor/Mentorship	Cornell accelerator eLab
NY Business Plan Competition	Johnson and Dyson School Entrepreneurial Resources

Though many startups enjoy successful launch, it was not uncommon for these startups to face some setbacks. The online survey results pointed to the most frequently cited issues, illustrated in the table below.

Table 4: Frequently Cited Issues

Difficulty selling product/service	Team Recruitment/Management
Constant changes in business model	Funding
Operational Challenges	Co-founder relationships

Teams often turned to more experienced individuals for guidance. All cited advisors, mentors, and consultants from the survey follow in the table below.

Table 5: Advisors, Mentors, and Consultants

Pam Silverstein	Ken Rother
Matt Stefanko	Emma Johnston
Lizzi Gorman	Pat Wynn
Renee Alexander	John Alexander
Rob Hendricks	Dan Cohen
Scott Wiggins	Tom Schryver
Michael Razpuzzi	Peter Cortle
Diego Rey	Wes Sine
Lou Walcer	Ben Daniel
Zach Schulman	Dan Cosley
David Williamson	Feifan Zhou
Ricky Panzer	Parker Moore
Deborah Streeter	Jonah Eastzer
Ammad Raja	Manoj Thomas
Steven Gal	Felix Litvinsky

Table 5 (Continued)

Jack Fuchs	Hod Lipson
Aaron Proujansky	Mike Driscoll
John Greene	Rhett Wise
Sandy Khaund	Haroon Ismail
Eric Einhorn	Ken Birman
Brad Treat	

Finding co-founders and creating a team was an important task facing startups. Most startups had 2 or 3 founders. Co-founders were discovered most often through the following channels illustrated in Table 6 (below).

Table 6: Channels of Recruitment

Close personal network	Classmates
Course projects	Entrepreneurship network at Cornell
Mentors/Advisors	Shared degree programs
Recruitment at events	Entrepreneurship/Business courses

Thus, finding close potential co-founders in personal networks could be convenient but these relationships had their pros and cons. As in the example with InTouch,

Dong Ki Kim and Moon Young Kim came from similar engineering backgrounds and agreed on the direction to pursue. However, this cohesiveness was destructive because it was ultimately not the *right* direction. Without a diverse team and mentorship, it was difficult for the founders to overcome "groupthink" mentalities and the startup is no longer in existence.

Surprisingly; however, though many other startups in the project seemed to proceed well with a diverse team, InTouch was another key example in showing that this is not a panacea. In the case of BrewJacket (detailed later); however, the founders, though connected through personal networks, were able to make the relationship work, and thus, the startup is still active.

Team building emerged as a very porous journey. In some of the startups, team members came and went and team sizes grew and shrunk, depending on the phase of the startup. Often team members were not permanent fixtures. This happened through many different channels and types of networks depending on what each team member can bring and at what time, given the necessities of the current stage of the startup.

For instance, at Waltz Networks, the beginning of the startup's life was occupied by operations staff, grant writers, a few engineers in porous, informal roles, i.e. doing anything and everything that was needed, and the founders. As the startup aged, PR individuals, VC advisors, etc. all moved in and out of the team. Key pillar team members stayed, but others rotated in and out of the process. This was an organic and rather time consuming process that isn't the linear team building phenomena that is often presented by entrepreneurial researchers.

Regardless of size, founders also preferred tight teams even if this meant more work was spread among fewer people. This strategy was often favored by founders, such as Rahul Shah of Stash, who relied on trusted individuals to ensure the survival of the startup, rather than accruing the overhead of bringing on and training new team members who would be less integrated into the process. The value new members provide had to outweigh the cost, and at the start of a company's life, this was often not the case, particularly on campus startups that were in pre-seed stages. Team building can therefore be seen as a moving, dynamic, and adaptive process throughout the entire life cycle of the firm.

Ultimately, the source of co-founders and team members alike are through a new type of network, a result of the institutions evolved involvement in

entrepreneurships. Channels of networks emerge from competitions, workshops, entrepreneurial events/hostings, etc. that have become normative for students on campus. This is a prime example of how institutional involvement has gone beyond providing spaces and information sessions, but rather more importantly, a cemented framework of action from which people, resources, advisors, etc. become available.

This is the important fodder from which entrepreneurs are able to tap directly into rich networks of great potential. The study also found that largely speaking, teams were diverse. They were made up of CEOs, COOs, and CTOS, including engineers, designers, etc. There was distinct variation among startups with more than one founder and often skills were complementary. Though teams varied in size, each member brought different skills to the startup filling different roles. This showed the founders' desires to have both business and technical experience on the teams. The difficult nature of the startup enterprise arises from the fact that though the startup process is often organic and non-structured, aspects of it must be structured and thought through carefully in advance. Ultimately, founding teams, (more than one founder) always included diverse members. The following table shows the diversity of the teams in a more easily viewable format (Table 7, next page).

Table 7: Startups and Team Makeups

Startup	Team Makeup
Stash	CEO, COO, lead engineer
Yorango	CEO, CTO, 2 software developers, business operations
Annabel's Grocery	Co-directors, Project Coordinator, Director of: Finance, Fundraising, HR, IT, Operations, Programming, PR, Purchasing, Risk Management, Design
MaidBot	CEO, CTO, Robotics, Engineering
InTouch	2 Engineers, 1 Designer
Waltz	CEO, CTO, operations, business, marketing
MilesAhead (detailed later)	CEO, COO, Director of Recreation
BrewJacket (detailed later)	Biomedical Engineer, Research Engineer, MBA

Additionally, as previously mentioned, literature takes a rather traditional view of entrepreneurship favoring a sequential perspective in which one phase connects to the next. Although this is a clean theory of how things could work, reality is far

messier. Entrepreneurs repeatedly developed and improved products, hired and rehired people, and even revamped business models, take for instance Annabel's Grocery's experience. More importantly, the sequential model was insufficient to explain startups at Cornell, given that entrepreneurs did not have access to perfect information and made mistakes, as outlined in several of the examples above.

Furthermore, when asked to define entrepreneurship and the entrepreneur, student founders overwhelmingly stated that the term was overused - that entrepreneurship is more than creating something new. Sakib Jamal stated that an entrepreneur is a good problem solver who takes responsibility and risks. For Sagar Karnavat, an entrepreneur finds solutions to problems or issues in society and for Shivang Tayal, an entrepreneur creates unconventional and meaningful improvement. According to Brianna Singer, "…I would define the entrepreneur [as someone] who recognizes a need and comes up with a creative solution as to how to fill it…" For Gage Hunt, entrepreneurship is ultimately making the decision to venture into the unknown, take risks, and do something that hasn't been done before. Rahul Shah was detailed and had deeply thought about being an entrepreneur.

> *…there's a lot of different ways you can be an entrepreneur. I think… yeah I think being an entrepreneur is going to have 3 components to your life: you're trying*

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to build something that provides value to people, and it provides enough value that they want to pay you for it so you can create a sustainable revenue generating business at some point through some strategy whatever that might be, and number 3 the path isn't necessarily known so you can be an entrepreneur and don't need to start your own company but I think working on something where you don't necessarily know where it's going exactly how to see it, is a big part of being an entrepreneur so you know try value, and the unknown, and normally revenue generation has to be part of it otherwise you're not going to go on very long.

Many entrepreneurs stated repeatedly that entrepreneurship was about perseverance. Laurel Moffat described the process as follows:

...we thought we had it figured out and we didn't. It helps to have a really clear mission...We really had to keep going and find it within ourselves to keep working and keep hearing all the criticism admitting that they're right and then trying to fix it.

Dong Ki Kim also defined entrepreneurship as perseverance, while included elements of patience. He described perseverance as a path to success.

> *I think I hear so many people… so many people [say] that many successful startups have failed so many times but they keep pursuing keep pursuing and revising and revising and finally they became successful…*

Micah also spoke passionately about entrepreneurship and what it meant to him.

> *I mean first of all, I'd just say entrepreneurship is, if you look at it at really high level, it's disobeying the norm. It's like not following the set you know, go to a great school, go to a great high school, go to a great college, get a masters or mba, go get a fantastic job, work your way up the ladder… be a seasoned executive, you know it's not, it's disobeying that in a sense. And um, entrepreneurship… so that's like the high level and I think it' sreally starting something from nothing. It hink that is entrepreneurship. But my philosophical is that you know cause I was thinking about it yesterday… Being an entrepreneur means being patient while being impatient,*

being persistent while knowing when to back off, being an

expert while knowing when to be ignorant, and being

slightly or very crazy all the time.

Their definitions are not like the academic ones that are about team building, creating product, etc. Rather the entrepreneurs in this study talk about value added to society and braving the unknown as some of the biggest components necessary to entrepreneurship. Entrepreneurship emerges as a roller coaster that never stops with frequent ups and downs and positives and negatives defining the experience.

Additionally, the entrepreneur emerged as an agent of change and a chameleon willing to take on simultaneously various roles for the venture, and someone who used critical thinking to engage a new market segment with a purpose. According to MaidBot founder Micah Green, "Being an entrepreneur means being patient while being impatient, being persistent while knowing when to back off, being an expert while knowing when to be ignorant, and being slightly or very crazy all the time."

There was also heavy emphasis on characteristics such as persistence. Founder Kevin Tang stated that in order to succeed, above all, vision and execution of that vision is critical. For Kevin, this meant making meetings happen with Verizon or

Cisco, getting the routers in the lab up and running, and finishing the NSF grants to push for funding. Given the maturity of Waltz, Kevin and his co-founder stated they felt a huge sense of responsibility for a team whose livelihood depends on the success of the company. They had to learn to exercise control, be resilient and level-headed, while also successfully identify a need in the market.

Though taking risks is often cited as a desirable characteristic of entrepreneurship, this research project found that rather than just being a risk-taker, an entrepreneur for whom tolerance for uncertainty and risk is incredibly high, such that he or she thrives in an unstable environment, and is a serial problem-solver, can be seen as having the stickiness needed to survive. According to Sakib Jamal, "...one can only claim to be an entrepreneur if he has enough skin in the game himself...".

For student entrepreneurs, Cornell's role in the startup experience is clear. Many startups in the online survey found several financial benefits such as investment directly from Cornell, financial aid, seed capital, funding from eLab, and free office space in PopShop. Furthermore, students also found credential benefits at Cornell. According to online survey responses, at least 50% of entrepreneurs found that institutional support was beneficial in finding capital investment, opening doors to meetings with industry experts or customers, access to scientists, and lending

legitimacy to early startups. Survey respondents also focused on access to networks and providing a framework for entrepreneurship.

Startups at Cornell, based on survey results, show that many of them have also won awards and grants within and external to Cornell. These awards and grants are in addition to formal funding such as Series A. Given the prolific nature of these awards, the *stickiness* and viability of the startups is promising. The external validation of these awards (beyond VC funding) provides ample evidence as such. The following table shows all the awards the startups in the project reported (Table 8, below).

Table 8: Awards

Breitenbach Scholarship	People's Choice for Big Idea Competition
First Place Big Idea Competition	GoMAD United World College Grant
Citrix $25K	ELR Community Engagement
Class of 2017 Charity	Hope Lab Real College Fellows
SBIR Grant	Bill & Melinda Gates Grand Challenge Grant

Table 8 (Continued)

Stein Family Prize for Sustainable Business Plan: 2013 Hotel School Business Plan Competition	NIH Grant
NASA Grant	DoD SBIR
2016 One Start	LCL Summer Pitch Competition
Advanced Innovation Materials Competition	CCMR JumpStart Award
Tech. Co New York Startup of the Year	Forbes' Fifteen Brightest Student-Entrepreneurs
SXSW Student Startup Madness Business Plan Competition	Tech Wildcatters Accelerator
New York Business Plan Competition	Harvard Business School Real Estate Venture Competition
Cornell University Johnson School Shark Tank & Venture Challenge Business Plan Competition	RECESS Pitch Competition
Princeton University TigerLaunch Business Plan Competition	John Jaquette Award

Table 8 (Continued)

NYS Qualified Emerging Technology	Excellence Community Engagement Award
Janet McKinley Family Grant	Cornell Entrepreneurship Summit

A few more examples of startups follow, which demonstrate the ideas put forth previously such as where ideas come from and the makeup of teams. Each short example provides further evidence for different aspects of the startup process from the founders' experiences.

Chitro Social, created by Sakib Jamal, retails hand-crafted products from poverty stricken women in Bangladesh. Chitro takes the products and exports them to developed countries like the United States where the products sell at much stronger values. Initially, Sakib faced several challenges. First, though he had an idea, he did not conduct enough market research and analysis. Hand-crafted products are readily available and it became difficult for Sakib to differentiate his products from those already on the market. As a result, the startup began stalling. Though the initial team had three members, all ran into time management and commitment issues. Sakib intends to hopefully move the startup forward by going full time in the near future.

Calmeet is an app that aids in meeting planning. It uses imported user calendar information to enable the patent-pending algorithm to suggest possible times based on availability. Aditya Rahalkar, creator of Calmeet, stated that one of his biggest challenges was recruiting engineers who could code. Aditya revealed that often times, business founders outsourced development. However, Aditya wanted someone on board who could deeply understand the product, the vision, the company, etc. Thus, he spent some time learning programming which allowed him to attract his co-founder who is an engineer with technical background.

Ezra Box was created by Sagar Karnavat and Shivang Tayal. Both are international students who had difficulty storing their belongings every summer when they went back home. The storage options were limited and expensive. Ezra Box is intended to connect students with other Cornellians whom they feel more comfortable with to store their belongings at a cheaper cost. The team currently has 20 people. Team members hail from a variety of backgrounds and colleges including the architecture, the hotel, and agriculture and life sciences school, providing another example of the diversity of startup teams at Cornell.

Marisa Sergi, a Viticulture and Enology major, created RedHead Wine as part of a capstone independent research project at Cornell. The project initially was to design

a label; however, the project evolved into a wine product. Her label and recipe were approved by the Alcohol and Tobacco Tax and Trade Bureau in 2014. Marisa has also won several awards including the Microsoft Business Competition and her startup provides an example of how the company can evolve.

Vita Shoes Company was created by Daniel Abaraoha, an Applied Economics and Management major. Vita Choes Company provides stylish shoes with an emphasis on affordability. For Daniel, several courses offered at Cornell were key in establishing Vita Shoes Company: marketing, which helped Daniel build a business plan, target market, and strategies, managerial accounting, including budgeting, and business management.

Ryan Kishore is co-founder of Sparkstone Analytics which is an algorithmic trading group. Ryan stated that he began the startup in college because he had access to like-minded people who were also passionate about entrepreneurship. This is a prime example of how an entrepreneurially inclined environment provides the infrastructure for entrepreneurial networks to emerge. The startup is also looking for analytics and trading team members, including those with a programming and finance background to build a varied-skilled team.

The following additional brief examples are intended to illuminate the different variety of startups at Cornell. The startups range in industry from obvious categories such as tech and software, to social entrepreneurship, hardware, agriculture, and food.

MilesAhead is a startup created by CEO Rob Karp from the hotel school. The startup customizes experiences, services, and advice for high-end travel. Most recently, the founders launched Big Red Rocket, a startup for carpooling private planes. Big Red Rocket originated out of a class project. However, the founders continued with the idea, approaching a charter company for support. MilesAhead currently has over 10 team members including recent additions COO Brian Becker and Director of Recreation Nelson Billington.

Flora Pulse is an agricultural smart data startup created in 2015. Flora Pulse emerged from a Mechanical Engineer PhD student's interdisciplinary and academic research. Flora Pulse delivers next generation water analysis capabilities to the precision agriculture and construction industry. Specifically, Flora Pulse offers a pocket-sized device that can monitor and track actual plant water content in real time, through the complementary mobile app. For water sensitive crops and water conservation this

is particularly important. Application of the technology is wide spanning wineries,

vineyards, orange groves, spice and coffee plantations, and more.

GIX was founded in 2015. GIX co-founders noticed that fellow colleagues often

had to "reinvent" the wheel in their research processes. For instance, a fellow

Biology PhD spent months of her time, not on research, but learning a coding

language Python, in order to perform certain analysis on her data. Many such

instances across campus inspired the co-founders to create GIX, a cloud-based data

analysis and storage platform for scientists where users can share their content. This

is the equivalent of GitHub, a web-based Git4 repository hosting service, which

offers all of the distributed revision control and source code management function

for science. This makes data collection and sharing as easy as posting a photo on

Facebook. GIX is a companion to Cornell's arXiv, which allows scientists to share

work that's nearly ready for publication. Gix allows scientists to upload data sets,

coding, etc., offering not only a more streamlined research process, but also greater

interdisciplinary collaboration as well. Co-founders are a Cornell graduate student

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[4] A Git is a distributed revision control system with an emphasis on speed, data integrity, and
support for distributed, non-linear workflows. Git was initially designed and developed by Linus
Torvalds for Linux kernel development in 2005, and has since become the most widely adopted
version control system for software development. Every Git working directory is a full-fledged
repository with complete history and full version-tracking capabilities, independent of network
access or a central server. Git is a free software distributed under the terms of the GNU General
Public License version 2.

in computer science and a Cornell undergraduate, also in computer science and physics.

BrewJacket was created in 2014 by three Cornell co-founders passionate about homebrewing. He met his second co-founder, a PhD student in Biomedical Engineering at Cornell, through an entrepreneurship course at Cornell, while an MBA student at the Johnson Graduate School of Management, where the two bonded over the passion of home brewed beer. A third co-founder, while working as a research engineer with the Cornell Biomedical Mechanics Group, became part of the Biomedical PhD students network and befriended him over their shared beer enthusiasm. He later joined the team bringing his mechanical engineering background to the startup. The launch product is the Lager Jacket, a miniature lagering device that allows home beer brewers to lager a beer without a refrigerator.

Utthan is a multidimensional social investment company that creates long-term sustainable impact in Nepal following the 2015 earthquake. Created by Shaibyaa Rajbhandari ('18), Utthan focuses on the loss of cattle during natural disasters and the ensuing loss of economic stability and social, religious, and cultural disruption. The startup was made possible through grants from Engaged Learning at Cornell, the Janet McKinley Family Grant Award, and funding from Entrepreneurship at

Cornell. Utthan also used Cornell Social Business Consulting, Cornell's pro bono consulting organization. In terms of advisors, Shaibyaa relied on Professor Deborah Streeter as chief mentor.

Shaibyaa also launched a second project called Patuka. Patuka gives women in Nepal an opportunity to handcraft tapestries which are then sold to the college market. All profits go to the creation of a vocational training program for the women. For this project, Shaibyaa used a variety of resources from organizations on campus such as The Women in leadership class with Professor Streeter and the Social Entrepreneurship class in SHA with Professor Stephanie J. Creary an assistant professor of strategy (management and organizations) at the Cornell University School of Hotel Administration (SHA) in the Cornell College of Business, a faculty fellow at the Cornell Institute for Healthy Futures, and a faculty fellow for Engaged Cornell.

Concluding Comments

With such an entrepreneurial environment, student founders, surrounded by entrepreneurial peers, industry resources, entrepreneurship networks, and key organizational support, answered on the online survey that fear of failure is not their highest concern. Startups are risky. However, the university institution provided a safer environment in which to explore those risks, without the consequences that

might be experienced in the broader population. In fact, failure, given the additional academic nature of the university campus, became a part of the learning process for many founders. In fact, college was the time to take a risk, especially entrepreneurs often cited, at a place like Cornell where there is maximum access to resources, especially beyond financial investment to help build startups. This allowed student entrepreneurs to feel minimal personal risk - if startups fail, students still leave with a prestigious degree from Cornell. The numerous and various competitions, pitch practices, demo days, accelerator/incubators, and other network resources led to a more holistic and cohesive entrepreneurial network community between institution and student entrepreneur who both share the same vision for startup success.

Conclusively, the aim of this chapter was to give a holistic look at the entire process. The project also highlighted qualitative insights of the startup experience often difficult to capture in purely quantitative surveys – thus the focus is very much on "experience" rather than simply charting the courses of startups, which has often been the aim of previous projects.

CHAPTER 5

CORNELL'S ENTREPRENEURIAL EXTENSION:
CORNELL NYC TECH CAMPUS

Introduction

A new applied science institution, Cornell New York City Tech Campus (Cornell
Tech), emerges as an empirically interesting new case in two important ways. First,
the campus is an institution that clearly delineates organizational practice: academic
and research responsibilities are directly in line with entrepreneurship, which is
prioritized over all other activities. Second, resources are dedicated solely to
application oriented research and commercialization. This ultimately results in an
institution that shifts its base paradigm to one that involves direct engagement.

Unlike traditional university accommodation, Cornell Tech's approach of direct
engagement, at its fundamental core, is designed to generate startup activity through
training. This notion pervades every aspect of the campus, from institutional design
to architectural design. The institutional approach maintains an undercurrent of
training, as opposed to education alone, purposively combining an academic
education with incubator like properties: applied research leading to
commercialization, incorporation of industry relations, business know how, and an
open startup culture. Cornell Tech's institutional design allows new and different
networks to interact and its ideological and physical separation from the main

campus and its Ivory Tower ideals, avoid many of the problems denoted in literature. The next section, provides information on the development of the tech campus.

Birth of Cornell Tech Campus

In response to the Great Recession, the municipal government of New York City made significant efforts to diversify New York City's interests and advance designs in growing the knowledge based economy specifically improving the city's scientific and educational capabilities while also encouraging the application of university research and tech entrepreneurship. Thus, as part of a larger initiative including the creation of incubators, accelerators, hackathon programs, meet-ups, and networking events with venture capitalists, then New York City Mayor Bloomberg and the municipal office turned to the Economic Development Corporation – an organization dedicated to developing, advising, managing, and investing in the city – to come up with a major initiative for a project design to diversify New York's economy.

After consulting with over 300 nongovernment sources, the EDC proposed to develop an applied science campus dedicated to training engineers with interests in founding high-tech startup firms. A call was set forth for research universities to submit proposals.

The Bloomberg administration and the EDC turned to institutions beyond the U.S. borders as well. Technion – Israel Institute of Technology, what is often called the Israeli MIT, was also approached by the EDC to consider a presence in New York City. As one of Israel's most prestigious universities located in Haifa, a city bursting with entrepreneurial spirit and skill, it topped the list of competitive candidates. Technion agreed to join the the New York City tech economy under two conditions: (1) no financial investment or contribution from Technion, and (2), Technion involvement with an American partner institution (Gustin, 2013) - a joint bid for the tech campus with Cornell University.

Cornell University responded with partner Technion to the call for proposals. Motivations for Cornell to compete came from a strong and largely known desire to become a globally competitive engineering school like Stanford or MIT and overcome several limitations of a geographically isolated location in rural upstate New York, such as limited access to industrial network/partnerships and access to highly sought-after human capital. Many strong academic and entrepreneurial faculty candidates choose universities in geographically advantageous regions that are well connected to industry and provide multiple job opportunities for spouses. These geographical boundaries map ideological ones, reflecting the tensions and paradoxes traditional university institutions face. A graduate campus in New York

provided the perfect opportunity for Cornell to meet these institutional goals and also clearly define institutional and organizational structure in an entity separate from the main campus and uniquely new to the academic scene.

Ultimately, eighteen other strong contenders including Columbia, New York University, Carnegie Mellon and what many outsiders considered the easy top candidate, Stanford University also applied. Out of a highly competitive process, New York City announced on December 19, 2011 that Cornell University and Technion had been selected to establish the new campus including a land grant involving $300 million worth of real estate on Roosevelt Island and $100 million for infrastructure improvements (Lorin, 2014).

Bloomberg's office and the municipal government in conjunction with the NYC presented the unique opportunity for a research university to experiment with a technology campus. This was also an important opportunity for the NYC EDC and the municipal New York government, to support the existing tech economy by supplying high quality engineers that would be drawn to New York through the tech campus. While New York's municipal office and the EDC created the institutional framework, designing, building, and launching the new campus would be left to institutional actors Cornell and Technion.

Data Collection

First, over a three year period, from online and print news articles, press releases, and the Cornell Tech website, background information was meticulously gathered concerning the development of the campus including institutional progress, relationship with New York City, and network building with new industry players. This provided a deep understanding of the institutional context and attitudes towards entrepreneurship that became the foundation for the study.

From this process, the researcher sought and received access to Cornell and partner university Technion's three part proposal for the tech campus[5]. The proposal contains a response to the RFEI, the full proposal (RFP), and an appendix. The RFEI is a request for an expression of interest from New York city's municipal office and the EDC and includes information on Cornell's history, core strengths and reputation, organization and structure, overview of student body, financial overview, contact information development experience, the proposed project including proposed program, research and application hubs, proposed phases, partnerships,

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[5] This project has exclusive access to the three part proposal submitted by Cornell and Technion. Permission was granted by Provost Kent Fuchs, and the project worked with Vice President of the tech Campus Cathy Dove for access to documents, after redaction of sensitive material. For brevity the proposals were not included in this project, as they number hundreds of pages.

management approach, architecture and design, timeline, property interest, and infrastructure and access requirements.

The full proposal (RFP) elaborates information in the RFEI and includes information on the development team, the decision making structure at Cornell and Technion, contact information, development and fundraising, institutional decision making and internal approvals, community relations record, history of entrepreneurship, research record, project leadership, financials, zoning, green building and sustainable design, project agreements, and much more. The appendix contains further legal information. For a direct look at the top down nature of campus design, mainly the RFEI and RFP were consulted.

Findings

The new model of education at Cornell Tech is designed around interdisciplinary "hubs" rather than departments that emphasize technology and enterprise. Real world impact is emphasized as hubs draw on core fields of computer science, electrical engineering, information science, and operations research. The focus of the hubs is dynamic, evolving to keep abreast of trends in both technology and markets. Hubs are focused on key New York City industries: healthier life, which aims to attract students interested in developing technology aimed at better health

care, connective media, which is focused on mobile technology and social media, and built environment, which will work on increasing the efficiency and sustainability of large-scale urban environments like New York City.

Rather than a direct replacement of the notion of departments, conceptually hubs embody the application of the research into real life problems and solutions concerning business, communication, design, economics, and public health. Additionally, hubs are agile and flexible, able to change their research directions in time scaled on the order of years, rather than the decades or more associated with traditional departments. Hubs are designed to evolve and remain current with industry needs and technology changes. Additionally, faculty members have the flexibility to move from one hub to another, or have multiple hub homes, depending on the nature of their research. The key work environment characteristic is flexibility.

Within each of these hubs, Cornell Tech is offering multiple innovative and blended graduate degrees with plans on installing more through the years. Three separate master's degree programs are offered – a Masters of Engineering in Computer Science that is industry-focused, a joint Johnson MBA at Cornell Tech that is tech-focused, and a M.S. dual-degree in Information Systems with a specialization in

Connective Media offered by the Technion-Cornell Innovation Institute. Students in the M.Eng. program are required to take 18 credits of technical advanced courses, ranging topics such as computer networking, physical computing, and modern analytics, which teach a mix of fundamental and practical materials. Business courses, such as Tech Enterprises, offered in conjunction with the Johnson School, an entrepreneurial life practicum, and a M.Eng. project in which students are paired with companies are additional requirements.

The four-semester MBA program from Johnson at Cornell Tech begins with an intensive ten week term that includes core business courses which teach the foundations of business and networking skills and strategies, leadership training, innovation and entrepreneurial work, and professional development work. A cross-disciplinary approach brings together entrepreneurial and innovation courses into one focused program. Projects are required of all degrees each semester. Student teams are paired with companies, organizations, and practitioners on projects called "Cooperative Masters Projects". Entities working on these projects include Tapestry, a startup, the Robin Hood Foundation, a nonprofit, Google, and Chief Entrepreneurial Officer Greg Pass.

Group projects are a requirement to encourage cooperation and joint problem solving. Practicums, organized by Greg Pass, are held on Fridays and are interdisciplinary in nature. These practicums are led by diverse guest practitioners that include entrepreneurs, designers, storytellers, artists, lawyers, and more, giving students broad, first-hand understanding and experience on how to be successful in the business world. Many of the guests expand on the points of success, but encourage students to not fear failure and share stories of personal failures as well. They urge students to take risks but to expect a precarious existence, be prepared for setbacks, and grow a thick skin. Furthermore, students attend entrepreneurship days during which projects are presented to industry leaders and VCs to get great practice pitching to investors.

Lastly, a master's degree is offered by the Jacobs Technion-Cornell Innovation Institute at Cornell Tech, meeting the growing demand for trained technologists and entrepreneurs in media-related industries. The program provides the ability to drive the digital-age transformation of information and industries and to lead the design and development of the next generation of social media applications. Graduates will receive two degrees: one from Cornell and one from Technion. The program combines coursework in science, engineering, business, and entrepreneurship with

a significant hands-on research and develop (R&D) project in collaboration with an affiliated company.

Concretely, Cornell Tech offers 11 out of 21 courses that are entrepreneurial, business, or applied in focus. The M.S. in IS, Connective Media offers 30 courses of which 17 are entrepreneurial, business, or applied in focus. Of the courses offered, almost 55% are geared towards grooming startup activity. Each academic program is designed to incorporate additional interdisciplinary requirements related to each hub with an emphasis on technology-innovation and commercialization. The coursework covers all aspects of innovation and commercialization and allows students to study companies, learn how to identify a market, leverage resources, and get their startups off the ground. Conclusively, real world experiences will be supplemented with required intensive business and entrepreneurship courses. Summarily, Cornell Tech's program emphasizes interdisciplinary training instead of traditional academic instruction.

Cornell NYC Tech Campus also reflects the institutional design motivations and goals by searching for candidates who meet stringent criteria for research excellence, commercial inclination, *and* entrepreneurial or startup experience to take up the training of engineer entrepreneurs. Faculty are not only leading research scientists

but also actively translating their research focus into practical, real world solutions (McCauley, 2013). The multidisciplinary hubs contain faculty that span the areas of expertise required to drive technology directed towards a particular sector of New York City's economy.

For example, in the Connective Media hub, Dr. Claire Cardie seeks to understand the "softer" side of the networked world and how emotions often hitch a ride on the information highway, the internet. Her research combs through online text for evidence of users' "opinions". Dr. Cardie is also a co-founder of Appinions, a New York city-based startup that monitors, gathers, and analyzes opinions across platforms. Additionally, Dr. Michal Lipson researches nanophotonics. She works on ways to manipulate and control the flow of light in novel ways. Her research aims to replace electricity with photonics. Photonics will also be used to facilitate communication between devices without the need for satellites, cell towers, or other intermediaries.

In the Healthier Life hub, Dr. Juan Hinestroza leads a team of scientists whose research merges textile and fiber processing with nanoscale science to create new materials for clothing and medical supplies, among other applications. Additionally, Dr. Ainu Kaushal is the founder and executive director of the Health Information

Technology Evaluation Collaborative or HITEC. HITEC is a consortium of state universities engaged in rigorous evaluation of an array of health IT initiatives.

In the Built Environment hub, Dr. Don Greenberg has led and guided efforts to build tools for medical imaging and virtual surgery, develop "electronic paper" screens and touch-sensitive tablets, and plot the topography of the moon. In addition, Dr. Greenberg researches the use of 30D simulations as a design tool for buildings that will have a symbiotic relationship with their surroundings, reducing energy consumption as well as environmental harm.

Additionally, Dr. Kevin Pratt works on next generation building simulation tools. His research works on ways to use parametric simulation to manipulate an imagined structure's shape, materials, and window arrangement, etc., generating accurate estimates of energy use for many permutations of design and engineering choices. Also, Dr. Pratt works on trying to construct a device capable of generating energy from slight wind vibrations. This research looks for ways to change wind flow through architecture, and then to incorporate the technology into building design. Conclusively, research is designed to be commercialized and has a substantial impact on the broad areas of complex data sets, human health, and intelligent infrastructure – all areas that impact social life.

Commercialization ultimately focuses on four areas of action: 1) nurturing a culture of entrepreneurship; 2) creating, identifying, and protecting intellectual property; 3) developing funding and other commercialization resources; and 4) building a commercial growth path (RFP, 101). Cornell Tech's program is specifically designed to establish pre-seed program funding to support promising applied research. This is to encourage simultaneous research and product development, rather than a sequential development, one that is most familiar to Silicon Valley. This paradigm provides a more conducive platform for training students given that faculty research obligations and responsibilities are clearly in line with entrepreneurial activity.

Industry leaders are also hired and incorporated directly into the curriculum to train students to think like entrepreneurs. Greg Pass is an industry individual, a serial entrepreneur, and active advisor to startup companies and nonprofits including Medium, charity: water, Rhizome, and Kik. Pass was most recently the CTO and VP of Engineering at Twitter, responsible for scaling the team and product during Twitter's early growth. Prior to Twitter, he was the co-founder and CTO at realtime search startup Summize, the co-founder and CTO at image search startup ToFish, and was a System Architect at AOL as a lead of search products and technologies. Pass is founding chief entrepreneurial officer at Cornell Tech in charge of leading

efforts to establish the entrepreneurial culture and programs at Cornell Tech including the entrepreneurial curriculum, student engagement with organizations and practitioners, support for living labs and startup activities, teaching Entrepreneurial Life practicums, and more. Pass is part of an industry team that provides real world experience to Cornell Tech students. Industry leaders oversee student companies in nascent markets and guide others on disruptive technologies. Most importantly, these players are founders and co-founders of their own startups and companies. The simultaneous entrepreneurial experience provides valuable, current training.

Summarily, the nature of the research and startup ventures are interdisciplinary focused on novel application of smart technologies and problem solving techniques learned not only in academia but also the industry. Data and resource management emerge as critical to the training at Cornell Tech. The hubs provide not only an opportunity for research, but also an incubator space for startups that will engage industry, technology, government, and society.

The Runway Startup Postdoc Program is a combination of business school, research, and startup incubator. Based at the Jacobs Technion-Cornell Institute, Runway transitions recent PhDs from an academic mindset to an entrepreneurial one. The

new Runway Postdocs bring ideas for application of digital technologies that are unproven and require time and experience to develop. Thus, the program lasts between 1 to 3 years, rather than a few months while incorporating intense academic and business mentorship, such as from the Jacobs Technion-Cornell Institute. Postdoc entrepreneurs receive salary, research budget, housing allowance, space, and other resources such as benefits and corporate support.

Lastly, the campus is designed to be its own ecosystem – a working model for sustainable built environments based on cutting-edge technology. At full build, the campus will have 620,000 square feet of academic and research space. This space is designed to accommodate classrooms and conference centers, faculty offices, research labs for faculty and scientists, and space for commercialization activities, from student projects to corporate-sponsored research. Ancillary space for exhibits, interactive and social gatherings, cafes, and other amenities as well as meeting spaces will also be constructed.

A significant part of the campus is dedicated towards commercialization activities and includes an incubator space with services and facilities needed to support startup businesses for both students and faculty, an accelerator space, partnered with local accelerators Dreamit, TechStars, and Betaworks, a demonstration space for venture

capitalists, corporate partners, and a corporate research space which will house corporate-sponsored research and lease space to companies wishing to collaborate with the tech campus. The corporate partner co-location space is a mini research park on campus that will house companies interested in working relationships with the tech campus.

Additionally, at full build, the tech campus will accommodate more than 2,500 full time equivalent affiliates in 800,000 square feet of housing on Roosevelt Island. The design projects 400 units for faculty and postdocs, and approximately 670 units for graduate students for student capacity of 1,281. The conference center will accommodate meetings, events, and conferences arising from the campus's academic programs and commercialization activities. The aim for Cornell Tech, unlike other academic institutions, is to provide a 24-hour live/work environment centered on entrepreneurship, incorporating mechanisms that easily enable open information sharing and joint-cooperation and problem solving. Ultimately, the campus's many entrepreneurial spaces are built to be a practical training arena for student entrepreneurs.

Conclusion

Currently, three buildings are under construction on Roosevelt Island scheduled to open July 2017: The Bloomberg Center main academic building, The Bridge - a corporate co-location building designed to bring together established tech companies, nascent startups, and academic researchers, and the residential tower. As part of a recent donation, Cornell has dedicated the namesake Verizon Executive Education Center, planned for 2019 as part of the second phase of the construction project. The end goal is, as it is on Cornell's main campus, bringing startups' products and services to market faster.

In this exploratory chapter, the researcher provided an investigative look at the new Cornell Tech campus, a unique institution generating prolific startup activity. Currently there are 22 faculty and 160 masters and doctorate students. Additionally, given the nascence of the institution, the chapter focused on descriptive reporting rather than institutional effectiveness. Continued research hopes to provide heuristic value in investigating the multiple iterations of entrepreneurs and startups generated by the tech campus including longitudinal analysis of the institutional and organizational legitimacy, survival, and success from the original blue print (Baron and Hannan, 2002).

CHAPTER 6

CONCLUSION

Overview of the Study

This chapter reviews the dissertation. The limitations of the data and research are discussed next, together with explanations on how it framed the study and how the researcher circumvented these issues. Next, the researcher offers recommendations to expand the scope of the study to improve the outcome of future studies before finally stating the conclusion.

The value of this dissertation project lies in filling an important hole in current literature and entrepreneurial research. The largest portion of research is dedicated to institutional aspects of entrepreneurship on the university campus such as commercialization, tech transfer, tensions between private and public science, and university policy. The next largest body of research focuses on students; however, mostly on predicting their entrepreneurial paths after graduation or personality type, characteristics, behavioral attributes, values, and beliefs. It is well established that institutions provide an entrepreneurial framework of action and that student entrepreneurs innovate.

However, what is lacking and what this dissertation focused on is what happens after this well-known accommodation stage. The dissertation found that institutions move into an execution mode, providing all the resources imaginable a startup would need. As a logical consequence of this action, an iterative, symbiotic relationship forms between institution and the student entrepreneur who not only uses the resources, but engages in providing feedback. Thus, there are two indispensable parties that must be studied in tandem. Ultimately, the project aim was to provide a holistic understanding of how students engage entrepreneurship at Cornell University, a traditionally R1 university in transition, and on the flip side, how the university is now responding to student entrepreneurs.

The theoretical implications are also important to address. First, Cornell's motivation towards generating entrepreneurship stemmed from a desire to be a competitive entrepreneurial university, such as Stanford or MIT. Cornell's move was an unprecedented embracing of agency, seeking out all elements needed for startups. Furthermore, as a later adopter to the entrepreneurial university structure, risk and uncertainty were reduced. This engendered network ties and norms of reciprocity (Nee and Opper, 2015). Operational boundaries were further enlarged and more formally codified. This new framework of cooperation has enabled increased trust as well (Nee and Opper, 2015). The formalization and

institutionalization of informal norms provided a concrete safety net for students to explore and innovate. The result is several fold. Cooperation has emerged resulting in what is structured to be a long term, dynamic, adaptive, and bidirectional relationship. There is a more effective and efficient allocation and utilization of resources, financial and otherwise, while risk and operating costs are reduced. An optimization of interaction is the key and creates a streamlined system for growing entrepreneurship.

Furthermore, the university alone is not the driving force behind entrepreneurship. Innovation comes from the individual students; however, this approach is looking solely at the blackbox, ignoring all other factors. In fact, what comes before and more importantly allows this "blackbox" to exist is the framework or structure the university provides for students to innovate in. The individual operates within the institutional environment, thus one cannot be addressed without the other. The environment is what enables the entrepreneur to bring to life their ideas. This particular view of the ecosystem as a community is critical. Entrepreneurs use the institutional environment but also learn from it, as does the institution. There is a clear iterative, symbiotic, and fluid relationship that enables startups to more successfully achieve bring to market stages.

Among the different resources available, eShip is the largest umbrella organization connecting all channels of entrepreneurship at Cornell. Under it resides eShip's annual conference at which students get the opportunity to pitch in front of VCs, industry leaders, and corporate sponsors. eLab and LCL are accelerator/incubators providing numerous resources. eHub and PopShop are more student based focused on providing working space to cement the entrepreneurial community.

Cornell's institutional contribution has been to provide a framework in which entrepreneurs can operate freely and expand on their awareness of global markets. The entrepreneurial ecosystem developed is the catalyst and platform for knowledge, collaboration, and testing. Beyond idea generation is the all-important execution support. Cornell also provides credential benefits and legitimacy. A prestigious image of the school helps to open doors to meetings and calls with industry experts and customers even if founders are relatively young and inexperienced.

Cornell benefits from this new entrepreneurial approach as well. It is an opportunity to develop Cornell's entrepreneurship brand and program through iterative feedback enabling Cornell to be competitive with other R1, entrepreneurial universities. The entire process legitimizes and normalizes entrepreneurship as a potential career path for students. A clear framework on how to meld innovation and academia in the

same bounded space emerges. Student entrepreneur benefits are numerous as well. They gain team building and management skills, mentorship, pitch/business/brand development, access to alumni networks, VCs, and co-working space, pre-seed funding, legal consultation, and maximum access to resources. Entrepreneurs find themselves in a safe environment in which to explore risk and they feel minimal personal risk. If startups fail, students still leave with a prestigious degree from Cornell and entrepreneurial experience. A holistic and cohesive community between institution and student entrepreneur emerges: one in which both parties share the same vision for success.

Cornell NYC Tech was also explored as part of the dissertation and an extension of entrepreneurship at Cornell University. The applied science institution is important in two fundamental ways: first, the institution clearly delineates organizational practice and two, resources are solely dedicated to commercialization and application. Direct engagement focuses on training and is achieved through interdisciplinary hubs and blended graduate degrees. The campus also offers an incredibly rich network of industry leaders, experienced serial entrepreneurs, and innovative faculty. Continued research would be longitudinal focusing on the legitimacy and survival of the branch-off institution and the success of the original blue print of the organization (Baron and Hannan, 2002).

The study employed a qualitative method of inquiry with mixed method analysis and a grounded theory approach to examine an unknown phenomenon. Grounded theory starts with a very different set of assumptions than traditional quantitative research. Rather, the process is inductive and assumes a flexible approach. The key issues are allowed to emerge organically and naturally. This framework explicates the basic processes in the data and provides flexible yet durable analyses that can be refined multiple times. The aim is to develop a rich conceptual understanding of the entire entrepreneurial experience at Cornell University and Cornell Tech.

In the case study method, the researcher, over time, gained very close first-hand knowledge of the field situation. Overarching themes were formulated concurrently as iterative fieldwork was completed. The strength of the study lies in helping the researcher gain a foundational understanding of the entrepreneurs' situation at Cornell in its totality.

The main source of data is the information collected from the community and generated from the interview and survey tools. The researcher used a semi-structured interview format to allow for a more in-depth investigation tool for exploring the experiences of the student entrepreneurs and also to create the online survey, which enabled the researcher to reach a broader sample of the population.

The dissertation project also considered the researcher's personal notes, notes from literature, notes written and kept in journals, and notes from memoing. The chosen case study was Cornell University because it is the place of residence of the researcher. This allowed for a unique in-depth learning of the research site.

Ultimately, in order to understand fully the process of starting up, different resources used, the kinds of relationships that emerged, and the networks that formed, the researcher spent copious amounts of time and effort to get "under the skin" of the entrepreneurs. Through a blend of methods and techniques, a richly detailed narrative emerged and has resulted in this dissertation.

Limitations and Recommendations for Future Research

The research design did come with some limitations. First, it was extraordinarily time investment heavy. After the interviews were conducted, the researcher spent several months transcribing and analyzing the interviews. This was done three times to ensure accuracy and to formulate meaningful questions for the survey. The survey design then took additional time as consultants outside of academia were engaged. There were also several difficulties in keeping up with the research instruments and the constantly evolving nature of the study. Difficulties arose in data security (trouble with Google servers), inconsistency and discontinuity in contact

information (including rerouting of research inquires to junk mail and spam folders), and technical difficulties with the web-based survey platforms.

However, these were addressed by the length in time and number of iterative collections over multiple sources resulting in rigorous triangulation. The survey, for instance, was subject to the same rigorous methodological standards – such as validity and reliability – as offline data collection methods (Stafford and Gonier, 2007; Wang and Doong, 2010). The research project whole-heartedly embraced the idea of not only face to face interviews, but using the online survey. This Google Form (online survey) enabled data collection that was immediately recorded by analytical software permitting easier access to the data and easier manipulation of the information gathered.

Furthermore, it permitted convenient, timely, and cost effective research (Bartell and Spyridakis, 2012; Denissen et al., 2010; Denscombe, 2009; Gunter et al., 2002; Wang and Doong, 2010). This freed the researcher to simultaneously gathering data by participation in the daily entrepreneurial events on campus, in addition to data analysis. This unique strategy enabled the researcher to finish within a reasonable amount of time, especially with limited resources.

The mixed methods adopted for use ultimately facilitated simultaneous collection of quantitative and qualitative data (Riggle, et al., 2005) and flexibility emphasizing exploration rather than prescription or prediction. The researcher was able to discover the environment in the most organic and non-invasive way possible. Conclusively, the focus landed on context specializing in deep data or thick description. This helped to bridge the gap between abstract research and concrete practice, particularly in the case on entrepreneurship.

The scope and limitations of the study have been purposely restricted to particularly focus on the student entrepreneurship experience at Cornell. It would be insightful for future research to relax the scope of the study to contribute to the knowledge of the topic and allow for greater generalizability. For student entrepreneurs on the university campus, future research aims to continue at new university locations in the United States.

 Studies will be conducted, including launching of interviews and surveys, at other R1 universities who have more recently stepped onto the entrepreneurial scene, such as Rice University in Houston, Texas, a city not generally known for entrepreneurship. The ultimate hope is to expand to international schools as well, such as a similar study conducted at Technion. Extended theoretical explorations

would consider and analyze the university institution's responsibility in balancing academic education, intellectual integrity, and business oriented entrepreneurship, particularly for research focused institutions.

Conclusion

This dissertation project was conducted in real-time, exploring the entrepreneurial campus as it develops at Cornell. It used robust and adaptive measures and tools increasing the ability to cope with the constantly evolving environment. The task at hand was not to make quantitative demands on the data. Rather the dissertation was concerned with uncovering a previously uninvestigated phenomenon, using evidence to provide explanation. Qualitative content analysis is a valuable tool when working in an interpretive paradigm. The goal was to identify important themes or categories within a body of content, and to provide a rich description of the social reality.

First, the researcher set clear definitions of the population of interest, questioned why it is empirically interesting, and provided a conceptual framework. Through careful observation, a number of data-gathering measures, and interpretation, thick descriptions presented the resulting behavioral characteristics and outcomes, supporting the developing themes of this proposal. This process permitted effective

understanding of operation and function. In this exploratory study, observational fieldwork and data collection helped define the organizational framework of the dissertation. Additionally, the focus was dictated by time, organizational, and logistical constraints but will provide the foundation for further studies that can yield more evidence and generalizations that can applied widely.

Lastly, the dissertation project was directed at enabling a larger audience, academic and otherwise, to deeply and intuitively understand how entrepreneurship is organized and prioritized by the university institution and how entrepreneurial students interrelate and change and define cultural parameters. Ultimately, the hope of the researcher is that this kind of discovery based, heuristic research will be the start of a lifelong research project.

Informed Consent Form for Interview
Academic Entrepreneurship

Purpose of the Study:
This is a study in sociology that is being conducted by Yujin Oh, PhD Candidate at Cornell University, in Ithaca, NY. The purpose of this study is to investigate entrepreneurship at Cornell.

What will be done:
You will be asked questions about your company and your entrepreneurial experiences at Cornell.

Benefits of this Study:
You will be contributing to knowledge about entrepreneurship in the university setting. After we have finished data collection, we can also provide you with more detailed information about the purposes of the study and the research findings.

Risks or discomforts:
No risks or discomforts are anticipated from taking part in this study. If you feel uncomfortable with a question, you can choose to not answer that question or withdraw from the study altogether. If you decide to quit at any time, your answers will **NOT** be recorded.

Confidentiality:
Some information that will be gathered in this interview is already publicly available. Other information gathered will be used for professional presentations and academic publications. Quotations may also be used for narrative purposes. If you are uncomfortable with the intended use of the information, you can refuse to answer certain questions or withdraw from the study altogether. If you do partake in the interview your answers will be recorded digitally for transcription purposes.

How the findings will be used:
The results of the study will be used for scholarly purposes. The results from the study will be presented in educational settings and at professional conferences, and the results might be published in a professional journal in the field of sociology.

Contact Information:
If you have concerns or questions about this study, please contact Yujin Oh at
yo56@cornell.edu.

By beginning the interview, you acknowledge that you have read this information, are 18 years or older, and agree to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty.

Interview Questions

1. Tell me about your startup. What is the name? What does your company do?

2. What is your official job title?

3. What do you do on a daily basis? What is your job?

4. How did you become a startup founder/entrepreneur? Where did you get your idea?

5. Why did you decide to become an entrepreneur?

6. What helped you get off the ground / get started?

7. How far along is your startup? (logo, angel investment, Series A/B, Pitch, Brand rec)

8. Did you use any metrics to gauge your progress?

9. Do you have any competitors/know of any startups doing similar things?

10. What are some of your biggest concerns?

11. Have you won any awards, competitions, pitch evaluations etc?

12. What is your definition of entrepreneurship? Of an entrepreneur?

13. Are you involved in any other startups? How?

14. Do you know any other entrepreneurs on campus? How do you know them? Do I have your approval to use your name to request an interview with them?

<div align="center">Entrepreneurship at Cornell
Informed Consent</div>

Purpose of the Study:
This is a study in sociology that is being conducted by Yujin Oh, PhD Candidate at Cornell University, in Ithaca, NY. The purpose of this study is to examine student-based entrepreneurship at Cornell.

What will be done:
The survey includes questions about your company and information about founding team members. We will also ask for demographic information (e.g., age, marital status, education level) so that we can accurately describe general traits of the entrepreneurs in this study.

Benefits of this Study:
You will be contributing to knowledge about entrepreneurship in the university setting. This is the first known study to address student based entrepreneurship at universities. After we have finished data collection, we will also provide you with more detailed information about the purposes of the study and the research findings.

Risks or discomforts:
No risks or discomforts are anticipated from taking part in this study. If you feel uncomfortable with a question, you can skip that question or withdraw from the study altogether. If you decide to quit at any time before you have finished the survey, your answers will **NOT** be recorded.

Confidentiality:
Some information gathered in this survey is already publicly available. Other information gathered in the survey will be used for professional presentations and academic publications. Quotations may also be used for narrative purposes. If you are uncomfortable with the intended use of the information provided on the survey, you can skip questions or withdraw from the study altogether.

How the findings will be used:
The results of the study will be used for scholarly purposes. The results from the study will be presented in educational settings and at professional conferences, and the results might be published in a professional journal in the field of sociology.

Contact Information:
If you have concerns or questions about this study, please contact Yujin Oh at
yo56@cornell.edu.

By continuing to the next section, you acknowledge that you have read this information, are 18 years or older, and agree to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty.

If you do not wish to participate for any reason, please exit the survey and close your browser.

Begin Survey

1. Please Enter your First and Last Name.

2. How do you identify:
   a. Male
   b. Female
   c. Non-binary
   d. Do not wish to answer
   e. Other

3. How old are you?
   a. 18-22
   b. 23-25
   c. 26-30
   d. 31-35
   e. 36-40
   f. 41-50
   g. 51+
   h. Do not wish to answer

4. What race do you consider yourself?
   a. White
   b. Black
   c. Hispanic
   d. Asian
   e. Do not wish to answer
   f. Other

Please provide some information concerning your education.

1. Which college at Cornell University do/did you attend?
   a. College of Arts and Sciences
   b. College of Engineering
   c. School of Hotel Administration
   d. College of Agriculture and Life Sciences
   e. College of Human Ecology
   f. Samuel Curtis Johnson Graduate School of Management
   g. Weill Cornell Graduate School of Medical Sciences

h. School of Industrial and Labor Relations
i. College of Architecture, Art, and Planning
j. Law School
k. College of Veterinary Medicine
l. School of Continuing Education and Summer Sessions

2. Please indicate your status when you founded your company.
    a. Undergraduate
    b. Transfer
    c. Graduate
    d. Professional
    e. Leave of Absence
    f. In Absentia
    g. Other

3. Please specify your major/discipline. Examples include: economics, physics, biology, electrical and computer engineering, sociology, etc.

Please provide some information concerning your company.

1. Please provide the name of your startup and a brief description of what it does.

2. When was the company founded?
    a. Before 2010
    b. 2010
    c. 2011
    d. 2012
    e. 2013
    f. 2014
    g. 2015
    h. 2016

3. Which of the following categories best describe the nature of your company?
    a. Advertising & Marketing
    b. Analytics, Business Intelligence
    c. Apparel
    d. Biotechnology
    e. Consumer Products

f. Ecommerce
g. Education
h. Energy
i. Enterprise, Storage, Networks
j. Finance & Payments
k. Financial Technology (FinTech)
l. Food & Beverage / Tobacco
m. Gaming
n. Hardware
o. Healthcare IT, Services
p. Healthcare Products
q. Human Resources
r. Internet Publishing
s. Life Sciences
t. Manufacturing
u. Media & Entertainment
v. Mobile
w. Private Equity, Venture Capital
x. Publishing
y. Real Estate
z. Retail & Distribution
aa. Security
bb. Social Entrepreneurship
cc. Social Networking & Collaboration
dd. Software
ee. Technology
ff. Telecommunications
gg. Transportation
hh. Venture Capital
ii. Other – please specify [Insert comment box]

4. Please choose one of the following:
a. For profit
b. Non-profit
c. Undecided
d. Other

5. What was your last funding round for your company?
a. Pre seed
b. Series A

c. Series B
d. Series C
e. Series D
f. Not Seeking funding

Startup History:

We would like to collect a life history of your company. Please note that the following questions do not suggest any sequencing. Your firm may have experienced events further down the list earlier in its life course than events listed higher up.

1. Where did you get the idea for your startup? Please describe in detail.

2. How did you get started? What got you off the ground? Please describe in detail.

3. Once you began your venture, who were the first people you approached to talk to about the process? Please describe in detail, using specific names, etc.

4. What relationships have been most important in your startup venture? Please describe in detail. You may skip this question if not applicable.

5. What were your biggest/main concerns as an entrepreneur? Check all that apply.
    a. Financing the business
    b. Finding customers
    c. Legal issues/protection
    d. Business logistics: taxes, incorporation, etc.
    e. Managing the team
    f. Finding trustworthy business partners
    g. Finding founding team members
    h. Finding a co-founder
    i. Building a reputation
    j. Dealing with competition
    k. Hiring employees
    l. Risk of failure
    m. Marketing Strategy

n. Business growth
o. Organizational blueprint

6. How many founders does your company have?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5+

7. If you founded the company alone/without a co-founder, please indicate why. Check all that apply.
    a. Could not find the right partner
    b. Did not require or need a partner
    c. Have not found a partner yet, but currently looking
    d. Will look in the future
    e. Other

8. How did you find your co-founder(s)? For each co-founder please describe in detail below. If you are founding alone, you may skip this question.

9. Please indicate the size of your team:
    a. 1-9
    b. 10-20
    c. 21-30
    d. 31-40
    e. 41-50
    f. 51-60
    g. 61-70
    h. 71-80
    i. 81-90
    j. 91-100
    k. 100+
    l. Just me and/or co-founder(s) for the time being

10. How did you assemble your team? Please describe in detail. You may skip this question if not applicable.

11. Please check all institutions/organizations/resources you use/used below:
    a. Startup Tree

b. Blackstone LaunchPad
c. LCL (Life Changing Labs)
d. eLab
e. eHub
f. Cornell Silicon Valley
g. Entrepreneurship at Cornell
h. Entrepreneurship at Cornell Celebration: Annual Conference
i. Summer Startup Incubator Program
j. Demo Day
k. Cornell Venture Capital
l. Center for Transformative Action
m. Cornell Tech
n. Hackathon
o. PopShop
p. Student Agencies
q. Formal coursework / classes on entrepreneurship
r. Pitch competitions
s. Big Idea Competition
t. Other

12. If there is a major institution/organization/resource/conferences/workshops, etc. not mentioned above that you utilized, please name and describe below. You may skip this question if not applicable.

13. Of the choices listed in the previous question, list the top 3 you worked most with. Please describe your experience with them: for example what did you do with them, how did you engage them, how did they help you, etc.

14. In total how many advisor do you have?
    a. 0
    b. 1
    c. 2
    d. 3
    e. 4
    f. 5
    g. 5+

15. Who are your advisors? What is the nature of your relationship with each? You may skip this question if not applicable.

16. Please list all awards, honors, recognitions, entrepreneurial research investments, grants, fellowships, scholarships, etc. you've received and provide a brief description of each. You may skip this question if not applicable.

Entrepreneurship:

The following questions address some different ideas and concepts involved in starting a company. In this study, I would like to capture ALL aspects of the entrepreneurial journey. Please answer to the best of your ability and share what you are comfortable sharing.

1. Please describe in detail what it means to you to be an entrepreneur. What is the definition of an entrepreneur?

2. If relevant, are you still on campus during the summer?
   a. Yes
   b. No
   c. Not relevant

3. If on campus during the summer, please describe your summer activities. You may skip this question if not applicable.

4. Why did you start a business while at Cornell? Please describe in detail. You may skip this question if not applicable.

5. What role do you believe Cornell played in your entrepreneurial experience?

6. Were there any financial benefits to being at Cornell? Please describe in detail.

7. Were there any credential benefits (legitimacy or name recognition) to being at Cornell? Please describe in detail.

8. Please describe any setbacks you have experienced.

9. If the startup is no longer a venture, please describe what happened. You may skip this question if not applicable.

10. Do you plan to pursue this venture full time after graduation?
    a. Yes
    b. No
    c. Undecided

You have reached the end of the survey. Please contact the researcher at yo56@cornell.edu with any questions. Thank you for your time!

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