Innovation Accelerators: Defining Characteristics Among Startup Assistance Organizations

by

C. Scott Dempwolf, Jennifer Auer, and Michelle D'Ippolito
Optimal Solutions Group, LLC
College Park, MD 20740

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Abbreviations

IP – Intellectual Property

IPO – Initial Public Offering

NBIA – The National Business Incubation Association

NESTA – National Endowment for Science Technology and the Arts

POCC – Proof-of-Concept Center

RIAN – Regional Innovation Acceleration Network

SBIR – Small Business Innovation Research program

STTR – Small Business Technology Transfer program

VC – Venture Capital

VDO – Venture Development Organization

1. Executive Summary

The accelerator phenomenon has been cited nationally and internationally as a key contributor to the rate of business startup success. Accelerators select and invite a small group of entrepreneurs to startup boot camps, providing mentoring, resources, and, most important, industry connections during these programs. Successful graduates leave with the next stage of funding or revenue in hand, and all graduates leave with a small percentage of their company's equity ceded to the accelerator. Accelerators address the funding gap for startups and the information gap for would-be investors by acting as network brokers. They reduce search costs for angel funders and venture capitalists while creating a pipeline of vetted technologies for the market. By concentrating resources through seed funding, access to investment networks, and intensive mentoring, accelerators are able to identify "winning" ideas more quickly and help those startups grow.

Although successful examples of high growth startup companies are reported by accelerators like Y Combinator in Northern California (e.g., Dropbox, Reddit), accelerator advocates have encountered criticism for the lack of statistical data and metrics to validate this impression of success. Do accelerators produce viable companies? Increase innovation? Create jobs? Produce windfalls for their founders? There is debate concerning the accelerator model's potential, and resolution of this debate is partially hindered by the fact that thus far there has been no consensus in the literature regarding what defines an accelerator and how to distinguish the many types of accelerators from other startup assistance programs, such as business incubators.

To help bring clarity to the debate, this study creates a taxonomy of startup assistance organizations and provides a working definition of an innovation accelerator that departs from those found in the existing literature. Previous definitions have highlighted accelerators' services and focus on software applications as key characteristics of the definition. The proposed taxonomy distinguishes accelerators from other startup assistance organizations based on the organization's value proposition and business model, both of which are influenced significantly by the accelerator's technology focus and the founder's motivation for starting. Through this taxonomy, three categories of startup assistance organizations are identified: (1) incubators and venture development organizations, (2) proof-of-concept centers, and (3) accelerators. Accelerators are further subdivided into social accelerators, university accelerators, corporate accelerators, and innovation accelerators.

Further, this study discusses the metrics that should and could be measured according to the taxonomy and the definition proposed, and concludes that metrics designed to look for long-term outcomes provide the most appropriate assessment of accelerator performance. Nonetheless, the report questions the public value generated by innovation accelerators versus other subtypes, and demonstrates that if public resources are used to support accelerators, it is important to consider the accelerator subtype.

2. Introduction

Although they are a relatively new phenomenon, accelerators have garnered intense interest from the private and public sectors in the United States and abroad. The number of new accelerator programs has grown substantially since the launch of the popular accelerator Y Combinator in 2005.The phenomenon has inspired a wide range of events, such as the White House's endorsement of a Global Accelerator Network in 2010, and even a currently airing Amazon Instant Video series, *Betas*, depicting the trials of one fictional accelerator cohort.

Accelerators are programs that help entrepreneurs bring their technologies, ideas, or products into the marketplace and ideally lead entrepreneurs to develop viable businesses. Accelerators may appear to be very much like private-sector versions of business incubators, which have been in existence since the early 1960s. Accelerators and incubators work with startup businesses and provide a range of assistance and support services to these companies. Both prefer to work with for-profit startups with high-growth potential, and accelerators deal exclusively with these types of businesses. Both are focused on coaching and developing these startups so that they can secure early-stage "seed" funding. Despite their seemingly similar activities, accelerators are quite different from incubators. However, substantive differences have not been comprehensively documented in the accelerator literature to date.

This study compares accelerators and incubators, placing both within the larger context of an innovation ecosystem.[1] Such a comparison gives rise to a series of important questions that are due in part to the obvious appeal and rapid rise of accelerators. The questions that are central to discussions later in this report include the following:

1. What are accelerators?
2. Approximately how many currently exist?
3. Are accelerators and incubators the same thing?
4. Are there different types of accelerators, and if so, how do they differ?
5. Do accelerators have the potential to accelerate economic growth?
6. How can the performance and impact of accelerators be measured?

This research seeks to answer the first four questions and contribute to an ongoing dialogue surrounding the last two. The study also uses information from the first four questions to advance current debates concerning accelerators as a business model. For example, it is important to determine whether or not the accelerator model is applicable to multiple industries, such as advanced manufacturing. If not, does the business model embodied by accelerators only work for industries where the majority of existing accelerators have purportedly concentrated (i.e., software development and mobile device applications)? Is there a market failure that warrants a role for government as it relates to accelerators? Should the government assume a regulatory or incentivizing role for some accelerator subtypes?

[1] The term *innovation ecosystem* refers to clusters and networks of entrepreneurs, inventors, firms, universities, research labs, government agencies, and other institutions, and the resources they bring to bear on new process and product development.

The U.S. economy is increasingly dependent on innovation as a source of growth, and public programs actively support entrepreneurship in a variety of ways. Answering the questions stated above requires understanding the accelerator phenomenon from its roots. It calls for a grounded definition that accounts for the broader goals of innovation ecosystems. Without this base, it will not be possible to move to empirical studies that compare return on investment, the effects of different program durations, the relative outcomes when accelerators are employed in different industries, or the many other questions that policy should consider as it allocates attention across business-development strategies.

To develop a working definition and general understanding of accelerators, this report starts with a survey of existing literature (section 3). This section provides background about the available literature and identifies characteristics associated with accelerators, particularly in comparison to incubators. It also discusses the range of accelerator programs and organizations that have started over the past 10 years, and differences between accelerators found within the United States and abroad. Section 4 discusses the taxonomy that forms the center of the working definition of accelerators, including its methodology and framework. The taxonomy identifies important and defining differences between accelerator variants, and between accelerators and incubators. The section ends with a flowchart to facilitate classification.

Section 5 reviews the data sources and metrics identified in the literature review as they relate to defining accelerator success. This section focuses primarily on performance evaluations of accelerators and their startups, and ends with considerations for designing an evaluation system. Section 6 summarizes the results of the previous three sections to discuss the policy implications related to accelerators.

3. Literature Review

Current State of the Literature and Methodological Implications

What is known about accelerators is based on the small number of peer-reviewed articles and secondary media sources. The dearth of peer-reviewed literature can be attributed not only to the newness of the accelerator phenomenon—scholars have only had a few years to study them—but also to the fact that accelerators are generally privately held and funded, meaning they have no obligation to disclose information about their programs. Due to the limited number of peer-reviewed articles, it is currently necessary to rely on media sources or "gray" literature to define and characterize accelerators. Indeed, secondary media sources, including online articles, policy briefings, and interviews and correspondence with experts, are commonly referred to in the few academic articles that exist. A fuller description of the search strategy conducted for this literature review is provided in appendix 1.

On the whole, secondary media sources provide useful information to fill gaps in understanding about accelerators in the short term and potentially even in the longer term. However, the reliance on media-related sources in the scholarly literature has contributed to a lack of definitional clarity regarding accelerators as a distinct economic phenomenon. This situation makes it difficult to reliably synthesize findings on accelerator attributes, such as services, and ultimately, their performance. The information presented below highlights those articles that are

aimed at delineating accelerators from incubators and more recent articles that have proposed definitions of accelerator programs. It also presents information on early, well-known accelerators and the spread of programs across the U.S. and abroad. The systematic definition and classification of accelerators and related entities—the focus of this paper—is a necessary first step before truly reviewing the accelerator phenomenon and its outcomes.

Characterizing and Defining Accelerators

Accelerators are programs that help entrepreneurs bring their products into the marketplace. They typically operate by inviting a cohort of startup companies to work intensively on their technologies for a period of time. Early articles on the accelerator phenomenon defined them by the unique services they provide to entrepreneurs. For example, experts at the Kauffman Foundation explain that accelerators are organizations offering a suite of professional services, mentoring, and office space in a competitive program format (Fishback et al. 2007).

As the number of accelerator programs has grown substantially, scholars have since observed that a more precise definition is needed, especially to distinguish accelerators from business incubators. Both incubators and accelerators can be broadly characterized as groups of experienced businesspersons who provide nascent firms with advice, businesses services, financing on occasion, and often office space to help them develop and launch their businesses with greater success than if the startups had not received assistance (Bøllingtoft and Ulhoi 2005; Hoffman and Radojevich-Kelley 2012; Isabelle 2013). Yet, business incubators have been a popular means to support startups since at least the early 1980s (Allen and Rahman 1985).

The National Business Incubation Association (NBIA)—a membership organization for the incubator industry—derived a useful list of characteristics shared by incubators and accelerators. The analysis indicates that their differences sometimes lie in the nature, intensity, and duration of a characteristic, rather than its presence or absence in a program. For example, NBIA describes its members' startups as crossing numerous industries, ages, and experience levels, whereas it characterizes accelerators as being focused on Web-based technologies and their commensurate youthful and male-dominated founders. NBIA describes accelerator services as designed to quickly move startups from one stage to the next, while incubator services aim to move entrepreneurs toward self-sustaining, mature businesses. Importantly, incubators rarely invest directly in their startups, while accelerators typically provide funding in exchange for an equity stake in the startup's future profits. Table 1 presents other aspects of NBIA's comparison.

Table 1. Characteristics of incubators and accelerators

Characteristics	Incubators	Accelerators
Clients	All kinds, including science-based businesses (biotech, medical devices, nanotechnology, clean energy, etc.) and nontechnology; all ages and genders; includes those with previous experience in an industry or sector.	Web-based, mobile apps, social networking, gaming, cloud-based, software, etc.; firms that do not require significant immediate investment or proof of concept; primarily youthful, often male technology enthusiasts, gamers, and hackers.
Selection Process	Competitive selection, mostly from the local community.	Competitive selection of firms from wide regions or even nationally (or globally).
Terms of Assistance	1 to 5 or more years (33 months on average)	Generally 1- to 3-month boot camps
Services	Offers access to management and other consulting, specialized intellectual property and networks of experienced entrepreneurs; helps businesses mature to self-sustaining or high-growth stage; helps entrepreneurs round out skills, develop a management team, and, often, obtain external financing.	"Fast-test" validation of ideas; opportunities to create a functioning beta and find initial customers; linkage of entrepreneurs to business consulting and experienced entrepreneurs in the Web or mobile apps space; assistance in preparing pitches to try to obtain follow-up investment.
Investment	Usually does not have funds to invest directly in the company; more frequently than not, does not take equity.	Invests $18,000 to $25,000 in teams of co-founders; takes equity in every investee (usually 4 to 8 percent).

Source: Excepts from Atkins, D. 2011. What are the new seed or venture accelerators? Available at http://www.nbia.org/resource_library/review_archive/0611_01.php.

Other scholars and institutions (including NBIA) have highlighted differences in the characteristics of organizations hosting accelerator programs. From a policy perspective, the organizational distinctions among these entities are useful. Isabelle (2013), Atkins (2011), and Hoffman and Radojevich-Kelley (2012) spelled out several of these distinguishing characteristics. They found the typical characteristics associated with incubators to include the following:

- They are nonprofit organizations, frequently associated with universities.
- They provide office space at reasonable rates for the startups they support.
- They target local startups.
- They do not invest in the startups.

On the other hand, they found the following characteristics to be more typical of accelerators:

- They are for-profit organizations that receive equity in exchange for the provision of funding to the startups.
- They do not necessarily provide office space for the startups they support, but typically provide meeting space.
- They target regional, national, or even global startups.

The blurred identities of incubators and accelerators have partly been of interest because incubators are recognized by scholars and policy-makers as an established local economic development tool when, in fact, accelerators were popularized in the private sector. The role of accelerators in the larger innovation ecosystem, including among other publicly supported organizations, is not yet clear. For example, in its simplest form, innovation begins with basic scientific discovery, which leads to the development of new technologies and technology platforms from which a wide array of products may be invented. This process of innovation continues with the identification of funding for product development, testing, production, and marketing of those products for eventual sale in the marketplace—a process often referred to simply as "commercialization."[2] Startup assistance and business development organizations facilitate that process in various ways. Regardless of an accelerator's place in the overall ecosystem, the perceived success of accelerators in fostering new companies has led state governments to adopt variants of the model and provide funding to local organizations that help attract, nurture, and support venture-backed, high-growth startups (Sparks 2013).

The similar and sometimes overlapping characteristics of accelerators and incubators have led to some inconsistency in classification. Organizations may refer to themselves as being one type when their operations more closely reflect the other. In the absence of a standardized definition, scholars and practitioners have arrived at their own definitions, and each one is different. For example, several open-source data sources such as Seed-DB, maintain online listings of accelerators, while scholarly reports, including Miller and Bound (2011) and Christiansen (2009),[3] may provide accelerator lists based on the definition created in the report. Few accelerators are found across all lists.

This study cross-referenced six accelerator inventories to compile a list of over 80 accelerator organizations or programs that appear in at least two of the inventories. This process helped identify entities that are considered accelerators (rather than an incubator, for example) by more than one source. The accelerators, along with the location and founding date, are shown in appendix 2. The appendix indicates that accelerators operate not only in regions with well-known entrepreneur cultures (e.g., San Jose, New York, Austin), but also in regions that may be unexpected (e.g., Cincinnati, Provo). Many operate independently, but some well-established accelerators, such as Techstars, have branches in multiple cities. Table 2 shows the very few accelerators (or accelerator program sites) that were identified in all six lists.

Table 2. Frequently cited accelerators

Capital Factory	Austin, TX
DreamIT Ventures	Philadelphia, PA location
Techstars	Boston, MA location
Techstars	Boulder, CO location
Y Combinator	Mountain View, CA

[2] This simplified linear model of the innovation process is presented primarily for the benefit of readers who may be unfamiliar with the process of innovation, and to set up a simple definition of the innovation ecosystem. The actual process of innovation is much more complex, interactive, and variable.

[3] Christiansen subsequently founded the online accelerator database, Seed-DB.

Outside the United States, accelerators are emerging throughout Canada, South America, Asia, the United Kingdom, and many European countries. According to the National Endowment for Science Technology and the Arts (NESTA), some of the European accelerators have adapted the business models of U.S. accelerators to account for differences in local funding and networking needs (Miller and Bound 2011). There are even government-funded accelerators. For instance, Start-Up Chile in Santiago (an accelerator found in just one of the six lists) attracts businesses from other countries and provides short-term funding to the startups but does not take equity stakes in the companies.

Table 3. Comparison of accelerators in the United States and abroad

	Organizational Structure	Access to Investors	Industry Focus
United States	Geographically based: Cohorts of small businesses are located in close geographic proximity to mentors and investors to reduce barriers to market entry.	Access to potential investors factors into location of accelerator.	Software design and mobile application development
Abroad	Event-based: Accelerator headquarters or branch offices host events around the region for small businesses. Investors are not necessarily in close proximity to the mentored businesses.	Access to potential investors is not always a factor in organization of accelerator events. Access is limited by distance between startups and investors.	Software design and mobile application development

Organizational structure and access to investors are some primary differences between accelerators in the United States and those located overseas (Miller and Bound 2011). For example, Startupbootcamp operates programs in alternating European cities. Some accelerators, like the London-based accelerator Seedcamp, are working to close the investment gap in startups between the United States and Europe. Seedcamp has worked with the British government to develop a visa that would allow accelerator founders from outside the European Union to relocate and work in the UK at a lower cost. Multistage investment funds have also been developed to help close this gap. Proponents view this investment strategy as a way to increase the "pipeline" of companies in need of investment from venture capitalists.

As noted by NESTA and NBIA, accelerators typically focus on startups pursuing software design and mobile applications. However, at least one of the top-cited accelerators listed in table 2 (DreamIT Ventures) specifically states on its website that its industry interests are broad-based and include anything that can be developed into a product in 3 months. Other accelerators in the list, such as Impact Engine, focus on software and mobile applications but in socially minded contexts, for instance civic ventures that help reduce the recidivism rate at jails or to promote multicultural meal-sharing. Basic questions, such as the most common industries that accelerators target, the rate of new program creation, and the geographic distribution of programs, are currently difficult to answer. A standardized definition is necessary in order to sort out these differences and provide a foundation for future research, as well as to answer deeper

questions about this burgeoning startup assistance model, such as the average return on investment for accelerators.

Recent additions to the literature have begun to address the need for a widely shared definition. The articles indicate a convergence of thought around a defining set of characteristics. The report by NESTA, an innovation-focused research firm in the UK, provided the following list of accelerator characteristics (Miller and Bound 2011):

- An open but competitive application process.
- Provisions of pre-seed investment, typically in exchange for equity.
- A focus on small teams (generally including up to four members) rather than individual mentoring.
- Time-limited support that includes programmed events and intensive mentoring.
- Cohorts of startups rather than individual companies.

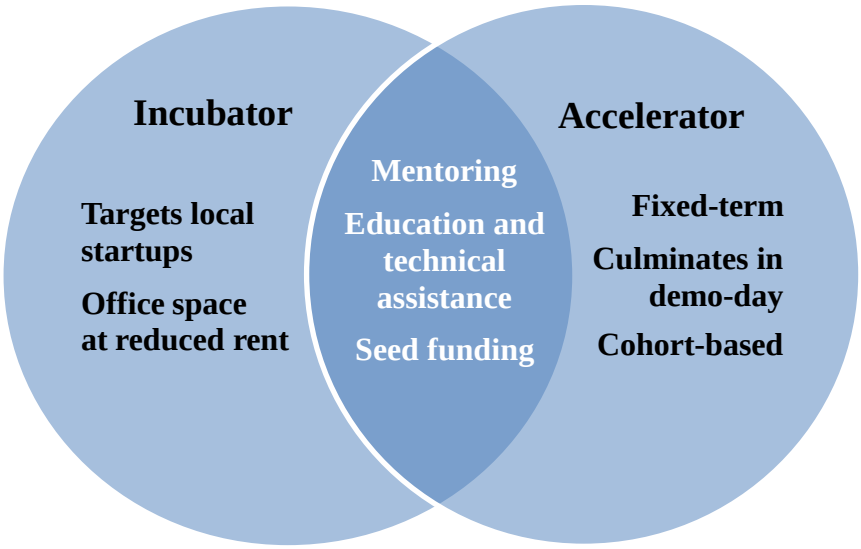
One of the most recognized sources of information on accelerators, —Seed-DB, —also advocates and applies most of these as criteria for compiling its database.[4] Collaborators on an inter-organizational effort called the Seed Accelerator Ranking Project largely concur with NESTA's approach (Cohen 2013; Cohen and Hochberg 2014). They provide a succinct definition of accelerators based on four characteristics:

> a *fixed-term*, *cohort-based* program, including *mentorship and educational components*, that culminates in a public pitch event or *demo day*.[5]

This definition also helps distinguish which aspects of accelerator and incubator programs are more typical of one or the other and which aspects are shared. The Venn diagram in figure 1 illustrates the unique and overlapping characteristics of the two kinds of organizations.

[4] See Seed Database, Seed Accelerator Definition webpage. http://www.seed-db.com/about/view?page=definition, accessed on August 18, 2014.
[5] Cohen and Hochberg (2014, p. 4). Italics in original

Figure 1. Venn diagram of incubator and accelerator characteristics



Criticisms of Accelerators

The accelerator phenomenon is not without its critics. One important criticism is that their effectiveness at improving startups' rate of survival and success is unproven. Jared Konczal, policy analyst at the Kauffman Foundation, argues that some in the industry have misused statistical measures to present an overly positive assessment of early accelerator results (Konczal 2012). Among his criticisms are several statistical problems, including missing or inaccurate data, limited population and sample sizes of startups, and measures that may be heavily skewed by outliers (Y Combinator in particular is highlighted as an outlier). Other measurement and performance-evaluation problems that Konczal identifies include selection bias, introduced because accelerators select only high-potential startups, and inaccurate or incomplete reporting of costs and performance data by accelerators and their startups. Central to Konczal's criticism is the actual cost per job created; he contends that this cost is substantially higher than the amount reported by industry groups (e.g., Grasshopper Blog, Global Accelerator Network).

Although the statistical problems Konczal identifies are real, we argue later in this report that assessing the performance of privately funded for-profit accelerators using nonprofit and public criteria (i.e., job creation and equitable access to services) is simply not appropriate. The next section elaborates on this fundamental difference. But in summary, the difference between privately funded and nonprofit accelerators points to a more serious criticism of accelerators and one reason for this current study. There is considerable confusion among the many types of programs available for startups. In the absence of clear distinctions, entrepreneurs may not have sufficient information to make informed decisions when entering into agreements with accelerators. At the same time, policymakers may not have sufficient information to enact appropriate policies to, for example, promote or support the long-term viability of young entrepreneurs in the startup market.

Additional criticisms are leveled at specific subtypes of accelerators.[6] For instance, a number of large corporations, such as Microsoft, have founded their own accelerator programs. Some authors in the field are concerned about corporate accelerators due to previous experience with corporate incubation programs, which they argue may have created market bubbles because of corporations' fluctuating interest in investing (Bradford 2014; Konczal 2012; Trotter 2013). Other criticisms of corporate accelerators include mixed performance from the startup perspective. These span several important dimensions, including mentorship, appointment of accelerator directors, and accelerator incentive systems that reward short-term accelerator performance instead of long-term startup growth (Bradford 2014). Bradford echoes the problem of startups having insufficient information to make decisions; he identifies some accelerators' misrepresentation of deal terms as a problem that startups and corporate sponsors alike need to be aware of and address.

Toward an Accelerator Taxonomy

The literature to date has generally characterized accelerators by the services they provide and the programs through which they provide these services. Although this approach yields a useful starting point for research, there may be opportunities to define accelerators by more fundamental criteria. The definition cited above is based on accelerators as programs within an organization rather than as a business entity itself. Incubators and other startup assistance organizations that engage in the process of accelerating innovation may or may not call themselves accelerators, and many of the organizations that call themselves accelerators (as defined by Cohen and Hochberg) may be more aptly characterized as businesses in the seed-capital investment industry. Specifically, they provide innovation-acceleration services as a means of securing and enhancing their investments in a portfolio of startup companies. For instance, as will be discussed shortly, corporations and universities have both sponsored accelerators. Some of these programs meet the definition provided and most are absent from the inventories, but they are important variants of the accelerator phenomenon.

In addition, a definition based on services provided does not offer adequate foundation to determine whether and how public policy should respond. As private ventures motivated by profit, most accelerators are *not* primarily in the business of providing a public service to entrepreneurs, which is a critical difference between accelerators and other startup assistance programs that have their genesis as publicly funded programs. This profit objective is a defining characteristic of the early accelerators.[7] Although attention is often focused on the startups themselves and the more altruistic goal of helping them succeed, the for-profit accelerator business model is rooted in an investment strategy for developing a portfolio of seed-stage investments. The portfolio is designed to yield a predictable minimum return on its contents as a whole over a specific time frame, although this time frame may vary significantly across accelerators. Once a cohort of startups is selected, the accelerator enhances the prospects that its investment will be profitable by providing a rigorous program of training, mentoring, and technical assistance that gives the new startups the best chance for rapid and high growth.

[6] Accelerator subtypes are discussed in more detail in section 4.

[7] Cohen (2013) also discusses this "business model" feature as an important and defining characteristic, however it is not included in the definition proposed in Cohen and Hochberg (2014).

Given the differences in accelerator-like organizations, a taxonomy of both key services and key foundational elements may help sort their benefits and their place within the innovation ecosystem. The methodological approach for developing a taxonomy of accelerators and similar startup assistance programs is summarized here and described further in appendix 1. The following steps were taken to develop the taxonomy:

1. Thoroughly review the literature to determine how the defining characteristics of accelerators relate to the accelerator business model.
2. Evaluate the differences between accelerators and incubators from the business plan perspective (a departure from prior classification efforts that evaluated accelerators only from the perspective of observed characteristics).
3. Reframe the observed characteristics within the business model framework.
4. Identify other organizations with accelerator services described in the literature and their distinct characteristics, including examples.
5. Create a classification chart that sorts organizations with accelerator services and characteristics into their respective organization type.

4. Classifying Accelerators

Overview and Goals of an Accelerator Taxonomy

Taxonomies are classifications of items into ordered categories based on shared characteristics, from general, observed characteristics to unique and potentially unobserved characteristics. They are frequently used in biology (e.g., to classify species), but the method can be applied broadly and will be useful for differentiating among startup assistance organizations. The first goal of the taxonomy is to help identify and organize fundamental and observable characteristics of accelerators and disaggregate them from characteristics that they share with similar types of organizations. Once an accelerator typology has been established, a second goal is to use this new taxonomy to classify existing accelerators, incubators, and similar organizations to help understand the marketplace for accelerator services.

What Makes Accelerators Unique: The Value Proposition and Business Model

Accelerators, incubators, and related entities may be differentiated by their value proposition and business model.[8] Previous characterizations have hinged on related attributes, such as accelerators' tendency to be for-profit, and the tendency of incubators and other startup assistance providers to be nonprofit organizations. This research argues that the business model and the value proposition are essential to the classification of an accelerator. The business model determines how the accelerator is structured, including its choice industry, and the value proposition determines what the accelerator offers to startups.

[8] A *value proposition* is a marketing statement that summarizes why a product will solve the potential customer's problem better than another product. A *business model* is the company's plan for how it will generate revenue and make a profit from its operations.

Value proposition of an accelerator

The value proposition describes the overall package of products, services, requirements, and costs associated with the seed capital provided to startups. The value proposition clarifies aspects of the business that create value for the customer, how customers experience that value, and what alternatives the customer has in the marketplace. The value proposition has five parts: (1) customer market, (2) activities, (3) rewards, (4) value experience, and (5) alternatives and differentiation. Each aspect is described below for accelerators.

1. Customer market

Accelerators focus on a stage of new product development that occurs at the transition from invention to a commercial product. They serve three distinct markets concurrently during this stage:

- New and potential startup businesses comprising one or more entrepreneurs with rapid growth potential.
- Venture capitalists and other investors interested in funding startups once they emerge from the early stages of invention.
- Existing firms searching for new products or firms to acquire as part of their own business strategies.

2. Activities

Accelerators offer bundles of services to each of their customer markets. To the startups, they offer a bundle of services in exchange for equity stakes in the startups. These bundled services generally include brokerage services (e.g., demo days), mentoring and technical assistance services (e.g., human resource management), and a combination of cash and in-kind contributions (e.g., office space). Venture capital (VC) investors and established firms also receive brokerage services that keep them informed of viable investment and acquisition opportunities, respectively.

3. Rewards

An accelerator offers many potential rewards to startups.[9] These may include the acquisition of specialized knowledge (e.g., through the mentoring process), additional seed capital to proceed to the next stage of development, or even an initial public offering (IPO), and ongoing proof of their concept throughout the accelerator experience. The best accelerators and their founders have also developed strong brands, which tend to attract the best startups. This reputation for quality confers a distinct status on the startups that may benefit them in networking and searching for capital.

Rewards to VC investors and existing firms primarily include a reduction of real and opportunity costs associated with the search for new investment opportunities and the due diligence

[9] *Rewards* defines the ways in which the products and services described in the activities benefit the customer.

necessary to validate investment prospects. This effectively reduces investment risk along two important dimensions: product risk and company risk.

4. Value experience

Accelerators deliver a different value experience to each of their three markets.[10] However these value experiences are linked through the accelerators' brokerage function, which unites parties from each market. Thus, the value is an emergent and unpredictable reward based on the social capital created among the parties. Nonetheless, they are intentionally enhanced by such factors as the brand effect and cohort design of the accelerators.

5. Alternatives and differentiation

Accelerators operate in a specialized niche with relatively few established alternatives[11] in terms of firms offering similar specialized services, rewards, and value experience for that particular industry.

- ***Differentiation:*** Accelerators may be differentiated along several dimensions, including the technology industries in which they specialize and their unique combination of brokerage, mentoring, and funding activities.
- ***Alternatives:*** Alternatives to participating in an accelerator include the "null" option, in which startups and investors navigate the transition from invention to product on their own without commercial or institutional assistance. The best-known institutional alternatives are business incubators, while other institutional alternatives generally provide a more limited subset of an accelerator's services. For example, Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Phase I grants provide capital for prototyping activities, while angel and venture investment "clubs" facilitate certain brokerage services that accelerators provide. But the systemic lack of coordination among the various partial programs and incubators' specific limitations may have helped create the niche market for accelerators.

Although any entity in the innovation ecosystem should seek to define its value proposition, the specific customer-market focus and benefits described here are proposed as unique foundations of an accelerator.

Accelerator business model

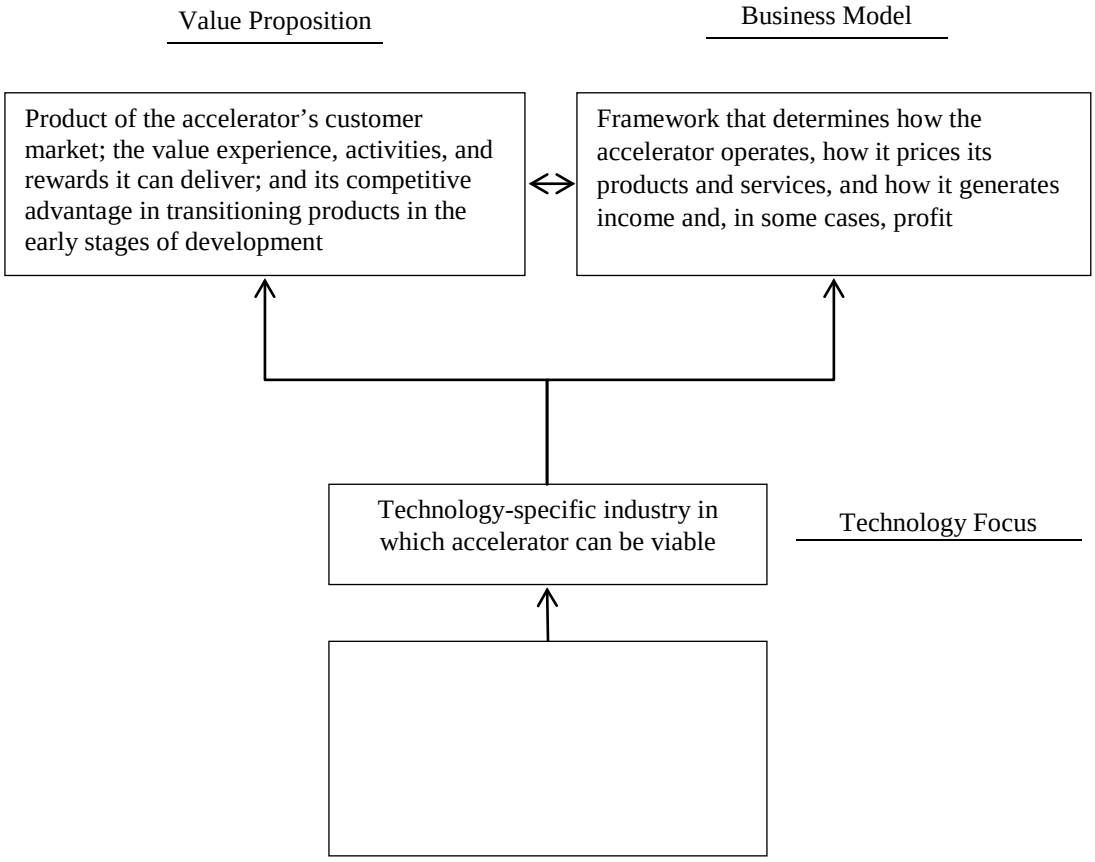
The business model describes how the accelerator is structured to obtain its goals, how it prices its products and services, and how it generates income and, in some cases, profit. Most of the existing accelerators to date have operated in the software or mobile applications arena, an industry characterized by relatively low capital requirements and short prototyping durations.

[10] *Value experience* refers to the ways in which potential clients or customers experience and receive the value created by the product—in this case, the accelerator.
[11] *Alternatives* and *differentiation* are intended to identify competitive alternatives to the offered product or service and how the product or service is differentiated from those alternatives.

The accelerator's revenue assumptions are then built around rapid growth and large-scale markets. These factors drive a business model that allows the accelerator to operate sessions that last approximately 3 months with modest-size cohorts and relatively modest equity percentages (in the range of 5 to 8 percent) in the participant startups.[12]

The focus on technology is a key factor that influences the accelerator business model, distinguishing accelerators from incubators and other startup assistance organizations. The term "technology focus" (or technology-specific industry) means that the accelerator is focused on startups in a relatively narrow range of related technologies. Figure 2 provides a conceptual map of how the business model and value proposition are influenced by the technology-specific industries in which accelerators work.

Figure 2. Foundational components of accelerators



The accelerator's value proposition and business model must be reconciled to create value for customers and a profitable, sustainable operation for the accelerator's founder. Founders motivated by profit achieve this value through a technology focus in which they have past

[12] Cohen (2013) reports the average accelerator program duration to be 3 months and the average equity stake to be 6 percent with a range of 5 percent to 8 percent.

experience and current networks. The founder's knowledge and networks in a technology-specific industry are critical in evaluating accelerator applicants. The founder must determine whether the applicant's idea represents an innovation or potential innovation, whether or not that innovation has significant market potential, and the extent to which the startup team understands its specific industry. It is possible for the founder to hire mentors or take on partners with technical expertise and networks in other technology-specific industries. However, in the basic accelerator model, such hiring adds costs and increases risk, both of which the accelerator founder is likely to avoid. The founder and mentoring team must then evaluate the extent to which the accelerator can add value and accelerate a startup applicant's growth process through their mentors, technical assistance, and network connections.

If one looks at the original accelerators founded in the mid-2000s (many of which are shown in appendix 2) and assumes competitive market conditions, then the technology-specific industry of accelerators is determined by their founders' technology specialization, experience, and networks. If the founder has primary motives other than profit, then the business model can balance the expected profit with other motivations; this influences the extent to which the accelerator focuses on startups in a technology-specific industry. For example, many incubators list job creation among their end goals and measures of success, and some accelerators focus on civic ventures. Differences in founders' motivations appear to drive significant differences in the value proposition, which in turn drive different assumptions and characteristics of the business model, including the level of support offered and equity stake required, which further influence the value proposition. Through the process of building a business model and value proposition that achieve the founder's goals, variations in the functional characteristics of the accelerator emerge.

Taxonomy Content

Different types of organizations offer various subsets of services associated with accelerators and exhibit similar observable characteristics. For the purposes of this research, six primary types of organizations have been identified that offer accelerator-like services to startups, yet have significantly different business models due to the founder's primary motivation or the founding objectives of the organization. The six types of startup support organization are: (1) incubators, (2) venture development organizations (VDOs), (3) university accelerators, (4) proof-of-concept centers (POCCs), (5) corporate accelerators, and (6) the primary focus of this paper, innovation accelerators. They are each described briefly.

1. Incubators

According to NBIA, business incubation is a business-support process that helps launch startup and fledgling companies by providing entrepreneurs with an array of needed resources and services.[13] These services are usually developed or orchestrated by incubator management and offered in the business incubator and through its network of contacts. A business incubator's main goal is to produce successful firms that will be financially viable and free-standing when they leave the program. These incubator graduates have the potential to create jobs, revitalize

[13] See National Business Incubation Association, What is Business Incubation webpage. https://www.nbia.org/resource_library/what_is/index.php, accessed April 7, 2014.

neighborhoods, commercialize new technologies, and strengthen regional economies. Critical to the definition of an incubator is the provision of management guidance, technical assistance, and consultation tailored to young, growing companies. Incubators usually also give clients access to appropriate rental space and flexible leases, shared basic business services and equipment, technology support services, and assistance in obtaining the financing necessary for company growth.

2. Venture development organizations

According to the Regional Innovation Acceleration Network (RIAN), one of the more recent and most successful technology-based economic development interventions to emerge for regional innovation is an adequately resourced regional venture development organization.[14] A VDO is a public or nonprofit organization that contributes to economic development by providing a portfolio of services, including

- assisting in the creation of high-growth companies;
- providing expert business assistance to those companies;
- facilitating or making direct financial investments in companies; and
- accelerating the commercialization of technology.

A high-performing VDO draws on the existing strengths of the region's innovation system and develops programs and initiatives targeted to overcome the system's weaknesses. Properly structured VDOs have the ability to work with a wide cross-section of the key assets of their particular regional innovation systems and the flexibility to adapt their portfolios of services to meet the specific needs of individual commercialization opportunities or ventures. Organizations identified as VDOs by RIAN include such groups as JumpStart in northeast Ohio and i2E in Oklahoma.

3. University accelerators

University accelerators are educational nonprofits that accelerate the development of student entrepreneurs and innovation at universities throughout the United States. University accelerators typically provide seed grants to support students through the early stages of development. Unlike for-profit accelerators, university accelerators do not take equity stakes in student-founded companies, and they are typically agnostic when it comes to technology focus. Some university accelerators, such as StartX at Stanford, extend services to faculty and alumni, as well. University accelerators provide the same range of services as other accelerators, including mentoring, technical assistance, use of facilities, and networking, usually including a demo day.

4. Proof-of-concept centers

Proof-of-concept centers accelerate the commercialization of innovations developed by university faculty and staff, and help move these innovations into the marketplace. POCCs

[14] The Regional Innovation Acceleration Network (RIAN), a project of the State Smart Transportation Initiative funded by the U.S. Economic Development Administration, was founded to establish and support a virtual nationwide community of nonprofit venture development organizations. See Regional Innovation Acceleration Network, Home webpage. http://regionalinnovation.org, accessed August 18, 2014.

provide seed funding for novel, early-stage research that most likely would not be funded by other conventional sources. Two examples of POCCs are iGreen New England Partnership and the Igniting Innovation (I2) Cleantech Acceleration Network in Orlando. POCCs facilitate and foster the exchange of ideas between university innovators and industries via the various mentors associated with the center. From a business-plan perspective, a POCC represents an investment by a university in improved technology transfer. In terms of the value proposition, POCCs provide a "collection of services to improve the dissemination and commercialization of new knowledge from universities in order to spur economic development and job growth" (Bradley, Hayter, and Link, p.3, 2013).

5. Corporate accelerators

These accelerators engage in the provision of seed capital and various combinations of mentoring, technical assistance, networking, and facilities to entrepreneurs, inventors, and startup teams to advance certain goals of the corporate or institutional parent. Corporate accelerators (examples are shown in table 4) grow and manage portfolios of complementary startups to accelerate innovation and gain a competitive advantage. CorpVenturing assists Global 5000 companies with investing in innovation strategies and it suggests the following objectives as inherent to a corporate accelerator:

- "Find next-generation products in your industry that you can help commercialize.
- Create an ecosystem of users and customers for your key products.
- Drive innovation at a much faster pace than is possible internally.
- Create growth options by taking stakes in interesting companies.
- Gain a window into the technologies and business models that will be winners.
- Profitably leverage your existing scale, distribution, and relationships into additional value." [15]

Table 4. Examples of corporate accelerators

Accelerator	**Corporate Sponsor**
Siemens Technology Accelerator	Siemens
Nike+ Accelerator	Nike, Inc.
Citrix Startup Accelerator	Citrix
Media Camp Academy	Turner Broadcasting System and Warner Bros. Entertainment, Inc.
The Microsoft Accelerator	Microsoft, powered by Techstars
Volkswagen Electronics Research Lab Technology Accelerator	Volkswagen Group of America
Kaplan EdTech Accelerator	Kaplan, Inc., powered by Techstars

[15] See CorpVenturing, Corporate Accelerators webpage. http://www.corpventuring.com/services-corporate-accelerators.html, accessed April 7, 2014.

Because corporate accelerators are driven by different motivations, their business models differ from those of other accelerators. However, they generally work with technologies at the same stage of development and offer similar services to startups.

6. Innovation accelerators (private, for-profit)

Innovation accelerators are stand-alone, for-profit ventures in the business of:

- Identifying cohorts of promising startup companies with rapid, high-growth potential.
- Making seed-stage investments in those companies in exchange for equity.
- Engaging in innovation-acceleration activities with these companies to help them obtain next-stage funding.
- Cashing out for a profit when these companies are acquired or have successful IPOs.

The business model of innovation accelerators is clear. Cohort size drives a probability model for each cohort and for the innovation accelerator's startup portfolio. This in turn allows the accelerator to balance the cohort size with anticipated return on investment across each cohort and the portfolio as a whole.

Taxonomy Structure

The six types of organizations offer a variety of services to startup companies looking for assistance. These organizations differ in key ways—in terms of program structure. operational features, financial capital and intellectual property (IP) rights and rules, and social capital and network-building opportunities. An accelerator founder's selection among them depends on the business model and value proposition of the organization. For simplicity's sake table 5 groups the characteristics into just two types of organizations — whether the organization's services and characteristics are more like an accelerator or incubator, as defined in the literature review.

Table 5. General characteristics of organizations that engage in startup assistance

	Characteristic	Incubator-like organization	Accelerator-like organization
Program Structure	**Startup Selection Process**	Competitive – based on available space and resources	Competitive – essential to business model
	Technology Focus	Broad	Narrow
	Stage of Technology	Seed and broad range of stages	Seed and pre-seed
	Cohort Structure	No	Yes—essential to business model
	Program Duration	More than12 months; average of 33 months	Less than 12 months; average of 3 months
Operational Features	**Office / Lab / Flex Space & Equipment**	Yes	Varies
	Mentoring	Yes	Yes
	Technical Assistance	Yes	Yes
	Post-Program Support	Varies	Varies
Financial Capital & IP Rights	**Seed Funding**	Varies – not typical	Yes—essential to business model
	Equity Stake	No	Yes—essential to business model
	Intellectual Property (IP) Conditions	Varies by organization's IP policies	Varies by equity agreement
Social Capital & Networks	**Networking with Angel / VC & Corporate Investors**	Varies according to staffing and resources	Yes—important to business model and value proposition
	Networking with Potential Customers & Suppliers	No	Yes—important to business model and value proposition
	Demo Day	No	Yes
	On-site Participation Required	Varies	Varies
	Cohort & Alumni Networking	Varies	Yes

The six organization types also display a range of primary motivations for promoting the success of startup companies. Table 6 organizes the entities across a set four motives, some private and some public. An organization founded with the objective to commercialize faculty and student research or generate local economic development are examples of "public good" motivations,

while an organization that intends to further a corporate innovation strategy or generate profit from investment in startups are examples of a "private good" motivation. The six organization types are associated with one or more objectives in the table. Identifying a primary motive is not to suggest that university accelerators, for example, are more interested in promoting university research than generating profitable startups. All organizations providing startup assistance likely want to see their participants succeed. However, the primary motive of a university starting an accelerator is one of commercializing research and generating economic development, rather than making a profit from its student startups.

Table 6. Unique characteristic of organizations that engage in startup assistance

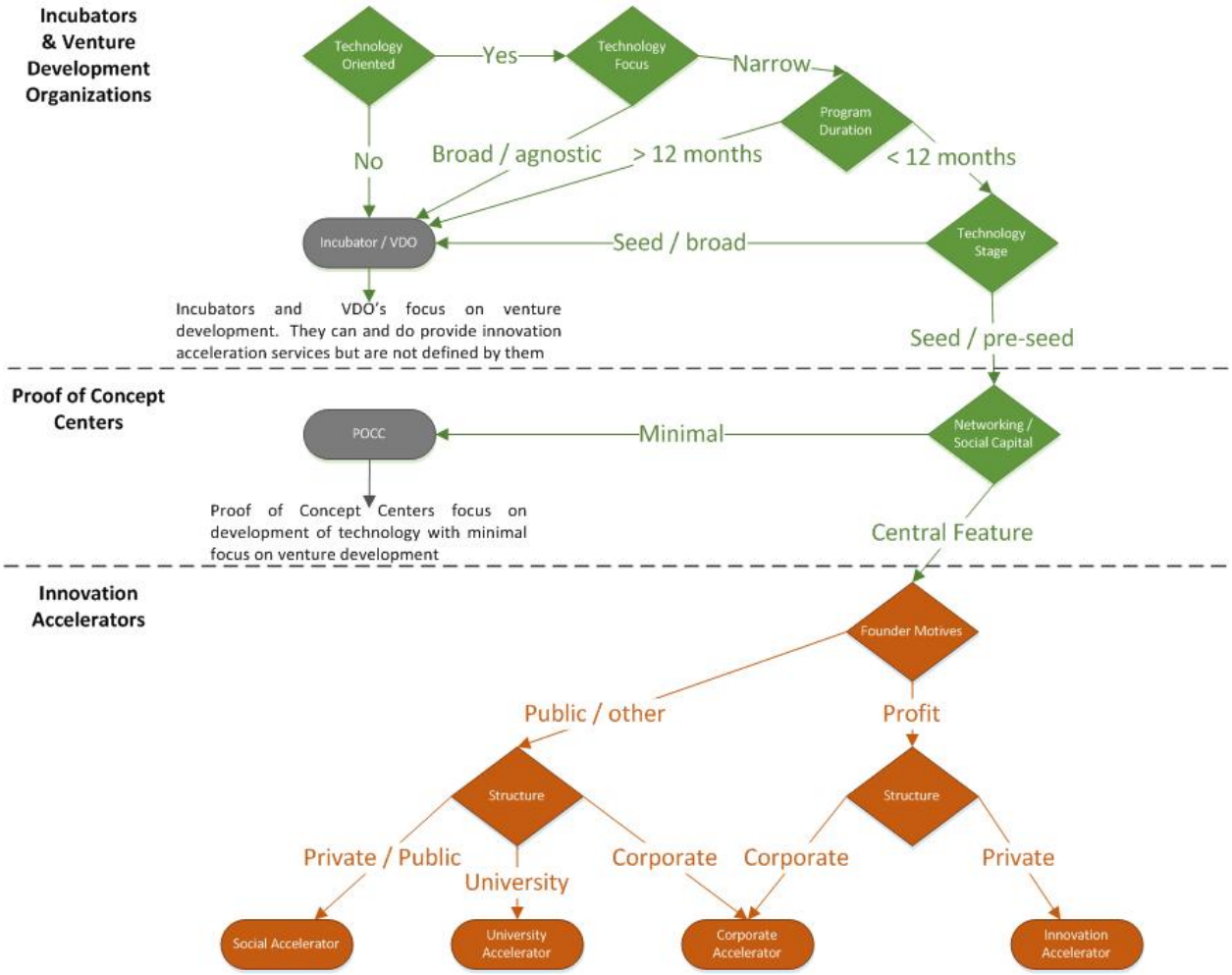
<table>
<tr><th rowspan="2">Broad Category</th><th rowspan="2">Objective</th><th colspan="2">Organization Types</th></tr>
<tr><th>Single Primary Objective</th><th>Multiple Primary Objectives</th></tr>
<tr><td rowspan="2">Nonprofit/ Public Good</td><td>Commercialization of university and sponsored research</td><td>Proof-of-Concept Centers</td><td rowspan="2">University Accelerators</td></tr>
<tr><td>Local/regional economic development</td><td rowspan="2">Incubators</td></tr>
<tr><td rowspan="2">For-Profit/ Private Interests</td><td>Profit from investment in startups</td><td rowspan="2">Venture Development Organizations
Social Accelerators</td></tr>
<tr><td>Further corporate innovation strategy</td><td>Innovation Accelerators</td></tr>
<tr><td></td><td>Corporate Accelerators</td><td></td></tr>
</table>

A seventh type of business assistance organization, *social accelerators*, also appears in table 6. They are quite rare and display a mix of founder motivations that bridge public and private goods. These experimental accelerators may seek profit while relaxing aspects of the business model to accommodate objectives that advance the public good. They may also be founded for the purpose of accelerating nonprofit and social enterprise startups while adopting features that promote accelerator profit. The ARK Challenge in Arkansas is one potential example of a social accelerator. It is focused on Web-based and mobile technologies in the financial information, health information, and government services sectors. It takes equity stakes in its startups, but is also organized as a nonprofit, has received federal funding, and seeks in part to promote job creation in the region.

On the one hand, two accelerators may present different general and observed characteristics—for example, one provides office space and the other does not—but they are still innovation accelerators because they share the same primary objective and the same basic business model that maximizes profit from investment in startups. On the other hand, an incubator and an innovation accelerator may both provide office space, but remain different types of organizations, because their organizational objectives are different and they have substantially different business models. To classify startup assistance organizations requires identifying the underlying differences in the founder's motivation and business model, which in turn results in differences in the observed characteristics.

Pulling together the foundational aspects, such as technology focus and key observed characteristics from the accelerator definition presented in the literature review, the taxonomy shown in figure 3 is a first attempt at accelerator classification. It can be used to facilitate classification of a specific organization. Walking through each decision point (green), a user can best estimate whether the organization is an incubator or VDO versus a POCC. Once in the arena of accelerators, the next series of decision points (shown in orange) lead to classification among the current variants of accelerators. The differentiation among the three levels is marked with dotted lines to represent the flexibility in the definitions of these organizations.

Figure 3. Taxonomy of organizations that engage in startup assistance



Innovation Accelerators

According to the definition of Cohen and Hochberg (2014), an accelerator program is a *fixed-term*, *cohort-based* program, including *mentorship and educational components*, that culminates in a public pitch event, or *demo day*. The present research proposes a modification to this definition which distinguishes between innovation acceleration as a *program* and an innovation accelerator as a *business model*. In this latter sense, innovation accelerators are defined as "business entities that make seed-stage investments in promising companies in exchange for

equity as part of a *fixed-term*, *cohort-based* program, including *mentorship and educational components*, that culminates in a public pitch event, or *demo day*." While the immediate goal of the accelerator is to help their startup companies obtain next-stage funding, their primary long-term goal is to make a substantial profit when those companies are acquired or have successful IPOs.

Cohen (2013), Cohen & Hochberg (2014), and this study identify similar defining characteristics for accelerators. The question remains as to whether or not the characteristics of the programs are defining features of the business entity. Cohen (2013) argues that the limited duration of accelerator programs is perhaps their single most important defining feature, an assumption that this study has also reflected. However, from the perspective of a business model and the value proposition offered to startups, the limited duration is not driven solely or even primarily by the accelerator founder's altruistic concern for the well-being of the startup. Such concerns may be genuine and strongly felt by a founder, but the limited duration is also a function of the business model economics. In addition to the "tough love" benefits that a short, intense, focused time frame offers startups, the limited duration is essential to controlling costs and increasing the number of startups in the accelerator's portfolio. This in turn increases the expected profit of the accelerator by increasing the probability of one or more high value exits into the marketplace. Insofar as policymakers and startups look to definitions proposed by researchers to make decisions about if and how to engage with accelerators, an understanding of both their programmatic and organizational characteristics are important.

5. Data and Metrics

What Should be Measured: Accelerator Performance and Evaluation

Different motivations at the founding of an accelerator, incubator, or other business development organization affect how success is defined. For example, an incubator could be evaluated for the number of new businesses that start and remain local, whereas an accelerator could be evaluated for the speed at which a new business is acquired. The metrics discussed in this section are applicable to business performance generally. To measure the effectiveness of accelerators, two questions about metrics need to be answered:

1. What metrics will help determine whether accelerators are successful?
2. What metrics will help determine how accelerator success varies by type of accelerator or business development organization?

Two reports in the literature review are focused on measuring accelerator performance, both of which were published in 2013. The metrics identified in table 7 are based on the discussion in the literature about the merits of evaluating performance of Canadian accelerators (Baird, Bowles, and Lall 2013; Caley and Helen 2013). In the short-term, metrics such as the startup's status after the program (e.g., operating or closed) are important for measuring performance. More specifically, Baird et al. (2013) suggest that the startup must raise $500,000 or more in investments to be considered a success. Over the longer term, performance measures should include the startup's growth, with metrics such as increased sales and investor rate of return. The

articles also discuss the performance of the accelerator. In the short term, accelerators can be measured on the acceptance rate and frequency with which graduate startups are acquired. In the long run, Baird et al. (2013) suggest accelerators evaluate their internal rate of return and sources of funding—particularly if the accelerator does not take equity stakes in its startups.

Table 7. Short- and long-term metrics for accelerators and their startup firms

Time Horizon	Accelerator Metrics	Startup Metrics
Short-Term (program duration plus 6 months)	Number of applicants Number of participants (cohort size) Number of investors at demo day Percentage receiving next-stage funding Percentage acquired Percentage failed	Operational status (operating, closed, acquired) Number of financial investments or number of investors Size of financial investments Number of customers gained
Long-Term (expected cash-out in 3–7 years)	Sources of funding (series or portfolio) Performance distribution (cohort or portfolio) Internal rate of return (cohort or portfolio) Network metrics (partnerships, etc.)	Sales or revenue Number of employees Rate of return to investors Stock prices (if applicable)

One shortcoming of these and other metrics- and performance-based evaluations is that they are not able to account for the scenario of a "successful failure." A startup may not last more than a few months; however, if this quickly demonstrates that its idea was not viable, it conserves resources for other ventures. This phenomenon is not captured in the current metrics, but the accelerator and the startup may consider such a scenario to be a valuable outcome. From the accelerator's perspective, it helped the startup and investors avoid going down an unprofitable path, and the accelerator could devote resources to helping the startup redesign the venture or develop a new venture that would be more successful. From the startup's perspective, the accelerator helped identify areas of weakness that could have resulted in a failed enterprise with potentially severe financial consequences.

The metrics in table 7 represent a good start for evaluating whether or not a specific accelerator is successful and whether or not accelerators in general are successful in their goals. A significant amount of overlap exists between the metrics that have been proposed for evaluating incubators and those proposed for accelerators (Voisey et al. 2006). To evaluate accelerator performance, especially as it compares to other similar entities, the evaluation design needs to consider program characteristics. Some characteristics that may be related to success, or the scale of success, in accelerator programs include:

- Intensive format of mentoring and business skills training.
- Program length.
- Historical connections to investors.
- Team-based startups rather than individuals.
- Technology-focused industry.

The results of an evaluation that takes into account the program design could help determine the value of accelerators as a type of "intervention" in small business development. Moreover, an evaluation that assesses long-term startup metrics will help determine accelerators' levels of success and their economic impact. Similar to determining the success of a single accelerator, determining the success of accelerators as a group or a class of business development organization requires several years before the metrics can provide useful indicators of long-term success.

What Can Be Measured: Data Landscape and Limitations

Currently, little public data is available to evaluate accelerators and their startups, in part due to the industry's propriety nature. The data on startup survival and success that are compiled typically lack consistency and an external verification process. Government and business data sources may provide the consistency and validity needed, but accelerator participants are not readily identifiable. Similarly, there is no reliable, centralized source of data on the accelerator programs themselves (e.g., number of graduates and number of startups that acquire a subsequent round of funding after the program), though entrepreneur and accelerator industry groups provide some centralized information. The table below provides an overview of the currently available types of data sources and their contributions to evaluating accelerators.

Additionally, the Seed Accelerator Ranking Project (discussed in the literature section) may represent the next stage in the development of sound, reliable data for analysis and policy. This project seeks to move beyond simple lists to develop rigorous quantitative and qualitative metrics around the characteristics, activities, and performance of accelerators (Cohen and Hochberg, 2014). More attention needs to be placed on collecting data on the performance and economic impact of accelerators to adequately assess whether they are more, less, or equally effective as other business development organizations. If data collection cannot be organized around a shared definition (like the one proposed here), it should be done under the guidelines of clear methodologies so that different sources can be reconciled.

Table 8. Overview of existing types of data sources and their benefits

Data Source	Description
Open Source	These sources provide free and easy access to data most directly associated with accelerators, but they are typically unverified by an external reviewer.
Techstars	The Techstars statistics database provides a complete listing of companies it has funded and other, more detailed information. The variables provided include current status (active, acquired, or failed), number of employees in each company, and average amount of funding received. It also reports this information by cohort in a summary table and cohort-specific tables that show how many companies were in each cohort, and the average amount of funding acquired by the cohort overall.
Seed-DB	Seed-DB provides statistics and listings of companies in a large number of accelerators. Seed-DB acknowledges that its database is incomplete and may contain outdated information, as much of the data are pulled from other sources such as CrunchBase. The statistics available are similar to those provided by Techstars.
CrunchBase	CrunchBase is a self-reported database of companies. Many accelerators and their startup graduates have profiles on CrunchBase that provide information on the founders, date of founding, current activity, and (occasionally) funding information. Because it is self-reported, it is not possible to guarantee that the information is complete or up to date. Daily e-mails or feeds provide news and information about recent activities. Downloadable spreadsheets are updated monthly.
Proprietary Market-Based Data Sources	Market-based data sources provide economic and financial information on startups after they have left the accelerator. The data are often proprietary, so the sources sometimes charge fees for the information.
Dow Jones VentureSource Database	The database provides accurate and comprehensive data on venture-backed companies. It includes investors and executives in every region, industry, and stage of development around the world. VentureSource is designed to help venture capitalists, corporate development executives, investment bankers, and service providers.
New York Stock Exchange	The exchange provides stock and financial information on startups that have gone public. It also may provide some information on investors associated with the startups.
Dun and Bradstreet (D&B)	This company provides information on businesses that have applied for business credit and have a DUNS number. It also provides basic information about these businesses along with information on their annual sales.
National Establishment Time Series (NETS)	This database offers time-series data on business establishments, including industry NAICS codes, sales, and other information extracted from D&B, plus information on parent firms, acquisitions, mergers, and company relocations.
Government	Government sources of data track a variety of important innovation indicators that may be manually linked to information on accelerator graduates.
Patent Filings	Patent filings show whether a startup has progressed on its goal or has expanded.
SBIR Awardees	SBIR awards provide valuable information on the success of a startup because they show that startups are active in the market and competitive for funding. Because many SBIRs also require annual reporting, it might be possible to obtain more specific information regarding the activities of startups with grants from the funding agency.
Quarterly Census of Employment and Wages (restricted)	This program provides information on employment and payroll on a quarterly basis. The data are restricted to qualified and authorized researchers. When reporting results using these data, care must be taken to avoid violating Privacy Act provisions.

6. Summary and Policy Implications

Accelerators are part of an innovation ecosystem that is the focus of active research. This study has reviewed the available literature and data on accelerators to describe the accelerator phenomenon, distinguish accelerators from other entities providing similar services, and examine potential metrics and data sources that might be used to measure and monitor the activities of accelerators. The research confirms that the study of accelerators is still nascent and often produced as a by-product of research in related fields, such as innovation and entrepreneurship, where the amount of research is more robust.

As this report and prior research have shown, distinctions between organizations often blur as startup assistance is designed to fit local conditions and meet local opportunities. Incubators, venture development organizations, corporate accelerators, social accelerators, and other variants surveyed in this study offer similar services to startups. Given the fluidity in services, a key distinction made here is between accelerator programs, which may be hosted by a range of entities, and innovation accelerators, which are a specific type of business entity with a clear value proposition for customers and business model designed to generate profit. Foundational elements that distinguish innovation accelerators from other entities that provide accelerator-like services include:

- the founder's motivation or objective in starting the organization, because different profit and public motivations shape the business model developed and the services offered; and
- the extent to which the organization is focused on specific technologies and development stages, which allows the organization to provide specialized technical assistance that increases its value proposition to startups.

Cohen and Hochberg (2014) provide a useful definition of accelerator programs which focuses on their operational characteristics. This report used that definition and adds to it in order to more narrowly define innovation accelerators as *business entities that make seed-stage investments in promising companies in exchange for equity* as part of a fixed-term, cohort-based program, including mentorship and educational components, that culminates in a public pitch event or demo day. The definition is based on structural characteristics that influence the business model and value proposition of accelerators, rather than operational characteristics that are determined by the business model and value proposition. Such a distinction helps suggest specific policy implications from this research.

Be Mindful of Accelerator Subtypes when Measuring Performance

As this report brings to light, there are inherent problems associated with measuring accelerator performance solely with a set of observed characteristics, or using outcome metrics such as job creation that are associated with nonprofits or government sponsored programs. The main problem is that these metrics often do not measure what is important to the accelerators, their startups, or subsequent investors, especially in situations where accelerator funding is entirely private. Indeed, these programs may be more interested in their startup exclusion criteria (i.e., high selectivity) and the speed with which startups can be abandoned or invested in more heavily. As a result, some metrics may be applicable to startup assistance programs generally,

but policymakers and researchers should be mindful of the accelerator subtype in question and moderate expectation accordingly. Specifically, accelerator metrics should address participation, process and performance for four distinct constituencies: startups, accelerator programs, accelerator sponsors, and follow-on investors. Such metrics would allow for true comparisons across the various types, business models, industries and so forth. They may also help distinguish new accelerator models, as the market for accelerators continues to grow.

Data are Needed to Report Relevant Metrics for Accelerators

As the data landscape survey suggests, the available data upon which new metrics might be developed is limited. Open source data are not validated and validated data are often restricted for use through regulations or cost. Moreover, important attributes of accelerators, such as their investor networks and ability to turn social capital into vital business assets, are particularly amenable to social network analysis metrics. Such metrics may require the ability to easily connect different data sources at the organizational level, or even individual level. While sources such as CrunchBase and Seed-DB seek to fill a data gap with open source data models, they do not do so for the purposes of informing public policy or academic research. The Seed Accelerator Ranking Project moves in the direction of academic research. However, it is currently unclear whether or not those data would be available for public research, under what conditions, and at what cost. Specific data needs will arise out of the development of a clear set of metrics. Government administrators may work in partnership with current data collection efforts to further the reliable use of these data for academic and policy research on accelerators and related topics.

Areas of Further Research Should Foster Public Objectives

Innovation accelerators have emerged from the private sector as viable companies for turning a profit. Accelerator programs have now also developed from academia and local nonprofit organizations. As such, accelerators represent a broad-based market response to the real and perceived need and opportunity associated with providing early stage startups with a well-defined set of services and network opportunities. They reduce the costs an entrepreneur faces–in time and resources–during the commercialization process. Nonetheless, many factors affect the viability of a startup, which causes innovation accelerators (if not other accelerators) to pick and choose those with the best chance of high-growth success. There is still much that remains unknown about accelerators in terms of potential market failures in startup assistance, which some variants are positioned to address. For example, much could still be learned about who participates in accelerators and why; whether the geographic distribution of accelerators provides adequate access to potential participants; and how the acceleration process differs across industries, particularly in national priority industries like advanced manufacturing. Rigorous empirical research into this emergent phenomenon is scant, and several topics could provide valuable information to help local and federal governments determine their role in innovation acceleration.

Targeted Pilot Projects Could Proceed

While there is a need for more research, this obstacle is not one that needs to prevent governments from engaging in targeted pilot projects that support innovation acceleration in key industries, for example, advanced manufacturing. Even with the limited available data, the business model makes it clear that accelerator will face greater challenges in industries where the time to prototype a product is longer, the process is more complex, and the capital requirements are higher. Well-designed pilot projects could help determine appropriate levels of support and mechanisms for delivering such support equitably to accelerator programs across the range of business models. Such policies will require evidence of what works outside of the early business models of innovation accelerators. Conversely, government support of a limited expansion of participants (and data collection) in a well-functioning innovation accelerator may provide another useful pilot project. Targeted accelerator pilot projects could develop evidence while researchers continue to develop new datasets, metrics, and empirical research on the broader impacts of accelerators.

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Appendix 1: Methodology and Research Protocols

Literature Review

During fall 2013, Optimal conducted an extensive Internet search of published and unpublished research using variations and combinations of the following key words: "innovation," "accelerator," "incubator," "venture capitalists," "innovation ecosystem," and "entrepreneurship." The search started with peer-reviewed journal articles, was then expanded to working papers and government, nonprofit and business reports, and was finally extended to include gray literature, such as news articles, blogs, and the websites of specific accelerators and incubators. The literature was then categorized by topic (e.g., policy-related topic, core accelerator research, incubator definition articles, proof-of-concept center information). It was reviewed for trends in definitions across accelerators and incubators, characterizations of innovation and the innovation ecosystem, and trends in key characteristics of accelerators, their founders, and their purposes. Additional key research articles related to the definition of an accelerator were added to the review in the summer of 2014 due to its relevance for evaluating trends in a nascent research field.

Compendium of Accelerator Inventories

Several organizations and media groups have published inventories of accelerators in the form of rankings, working lists, websites for centralized advertising to startups, and more. Optimal selected six inventories to generate the list of accelerators in appendix 2:

- Seed-DB's online database of accelerators;
- The top 62 accelerators by country, produced by Emergent By Design blogger Venessa Miemis;
- A guide to choosing the best accelerators among 70, produced by Tech Cocktail;
- A list compiled by Webbmedia Group including accelerator and incubator programs that have invested in startups in the past 12 months;
- A working list of U.S. and non-U.S. accelerators compiled by NESTA; and
- A short list of popular accelerators compiled by the founder of Seed-DB, Jed Christiansen, which was replaced by the full list on Seed-DB during this project.

Citations for these data sources are found in this report's references. The inventories represent some continually updated lists, which Optimal accessed during winter 2014, and some static lists published between 2011 and 2013. The compendium in appendix 2 represents all accelerators that were identified in at least two of the six inventories. This process was meant to reduce the number of defunct accelerators and the number of incubators and other entities that self-identify as an accelerator but have less of a consensus around that identification.

The six inventories include different data points about accelerators, such as year founded, founder(s), city, state, country, focus, website(s), or the funding provided to startups. The compendium contains the two most commonly available data points: year founded and location. Any discrepancy in location was resolvable through the inventories because most of them contained the location. In the event that the year founded could not be verified in at least two inventories, or the inventories produced an inconclusive result, Optimal consulted two additional

data sources during spring 2014. First, the online startup database CrunchBase was used to provide a second verification source or to resolve inconclusive results from cross-referencing within the inventories. If the discrepancy or missing data could not be resolved with CrunchBase, Optimal visited the accelerator's website or LinkedIn webpage. Where a founding date was identified on an accelerator webpage, Optimal did not require an additional data source for verification, however very few of the remaining dates that were undetermined could be found on the websites. All remaining missing or inclusive data is marked as "undetermined" in appendix 2.

Although the compendium was created using a systematic process, readers should be aware of its limitations. In the case of multi-site accelerator programs, it is important to note that the inventories contain a mix of accelerator headquarters (or first location) and specific accelerator sites. Some multi-site programs operate continuously at specific sites and some vary the locations of operation. The website provided in the compendium is the primary location website. In addition, the compendium was not systematically reviewed to remove accelerators that are no longer operating. However, in reviewing websites, those accelerators with websites that no longer operated were removed as being defunct.

Approach to Development of Taxonomy

Taxonomies in biology differentiate two types of variation among observed specimens. The first is *genotype*, which refers to fundamentally different characteristics arising from specific variation in their genetic codes. The second is *phenotype*, which refers to observed differences that may arise from the interaction of environmental influences and random genetic variations. A similar approach may be applied to classifying accelerators, incubators, and their variants. Certain characteristics may be viewed as fundamental differences in structure and function, while others may be viewed as minor variances driven by local conditions or personal preferences, for example. Fundamental characteristics that define structure and function are typically evident in an accelerator's business plan and value proposition (*genotype)* variations, while minor variations in service provided among accelerators would be considered *phenotype* variations.

After extensive review of the literature and accelerators listed in appendix 2, Y Combinator stood out as a consistently referenced accelerator, suggesting that there is widespread agreement that Y Combinator exhibits characteristics that tend to define accelerators. Optimal has therefore set Y Combinator's characteristics as an initial benchmark for comparison purposes, recognizing that after the full comparison is complete, the definition of innovation accelerators may vary somewhat from that initial benchmark.[16] Several documents provided background for the development of a generic value proposition and business model to frame this understanding in a structured way (see, for example, Barnes, Blake, and Pinder 2009). In addition, the foundational aspects of accelerators and other related entities were discussed informally with practitioners. Information on observable characteristics was largely obtained through the literature review.

[16] Because an important reason for defining accelerators is to differentiate them from other models, such as incubators, and to identify variants among accelerators, *relative* differences between operating models determine the import-defining characteristics. Therefore, identification of a preliminary benchmark may be somewhat arbitrary, because it only serves a temporary function.

After creating the taxonomy flowchart, the classification system was refined using a small random sample of entities from the list in appendix 2.

Appendix 2: Compendium of Accelerator Inventories

Note: The authors compiled the following compendium (table A.1) from pre-existing lists of accelerators, during early 2014. In the case of multi-site accelerator programs, the entry—including founding year, and location—may reflect the program headquarters, founding location, or one of multiple sites at which the program operates. Optimal did not verify the information outside of the process described in the appendices of this report.[i] The website and source columns were added by Optimal.

Table A.1. Compendium of Accelerator Inventories

Accelerator	Year founded	City	State	Country	Website	Sources
10Xelerator	2011	Columbus	OH	USA	http://10xelerator.com/	1, 5, 7, 8
500 Startups	2010	Mountain View	CA	USA	http://500.co/	1, 2, 3, 4, 5
Acceleprise	2012	Washington	D.C.	USA	http://www.acceleprise.vc/	1, 3, 5, 7, 8
AlphaLab	2008	Pittsburgh	PA	USA	http://www.alphalab.org	1, 2, 4, 5, 6
Amplify.LA	2011	Los Angeles	CA	USA	http://amplify.la/	1, 4, 5, 7
AngelPad	2010	San Francisco	CA	USA	http://angelpad.org/	1, 3, 4, 5
Berkeley Ventures	2009	Berkeley	CA	USA	http://www.berkeleyventures.com/	4, 5, 7, 8
Betaspring	2009	Providence	RI	USA	http://betaspring.com	1, 2, 4, 5
Bethnal Green Ventures	2010	London	N/A	United Kingdom	http://bethnalgreenventures.com/	1, 3, 7, 8
Bizdom - Detroit	2007	Detroit	MI	USA	http://bizdom.com/	1, 4, 5, 7
Bizdom - Cleveland	2009	Cleveland	OH	USA	http://bizdom.com/	4, 5, 7
Blueprint Health	2011	New York City	NY	USA	http://www.blueprinthealth.org/	1, 2, 3, 4, 5
BoomStartup	2010	Salt Lake City	UT	USA	http://boomstartup.com/	1, 2, 4, 5, 7
Capital Factory	2009	Austin	TX	USA	http://www.capitalfactory.com/	1, 2, 3, 4, 5, 6
Code for America Accelerator	2009	San Francisco	CA	USA	http://codeforamerica.org/	1, 3, 5, 7, 8
Communitech HYPERDRIVE	2012*	Kitchener	N/A	Canada	http://hyperdrive.communitech.ca/	1, 3, 7

Accelerator	Year founded	City	State	Country	Website	Sources
DreamIT Ventures - NYC	2007*	New York City	NY	USA	http://www.dreamitventures.com/	1, 4, 5
DreamIT Ventures - Philadelphia	Undetermined	Philadelphia	PA	USA	http://www.dreamitventures.com/	1, 2, 3, 4, 5, 6
Entrepreneurs Roundtable Accelerator	2011	New York City	NY	USA	http://eranyc.com	1, 2, 3, 4, 5
Environmental Business Cluster	1994	San Jose	CA	USA	http://www.environmentalcluster.org/	3, 4, 7
Extreme Startups	2012	Toronto	N/A	Canada	http://www.extremestartups.com/about/	1, 3, 7, 8
FinTech Innovation Lab	2011	New York City	NY	USA	http://www.fintechinnovationlab.com/	3, 5, 7, 8
Flashpoint	2010	Atlanta	GA	USA	http://flashpoint.gatech.edu/	1, 5, 7, 8
Founder Institute	2009	Silicon Valley	CA	USA	http://fi.co/	3, 4, 7
FounderFuel	2011	Montreal	N/A	Canada	http://founderfuel.com/en/	1, 3, 7, 8
Greenstart	2011	San Francisco	CA	USA	http://greenstart.com/	2, 3, 4, 5
GrowLab	2011	Vancouver	N/A	Canada	http://www.growlab.ca/	1, 3, 7, 8
Healthbox - Boston	Undetermined	Boston	MA	USA	http://healthbox.com/	1, 3, 5
Healthbox - Chicago	Undetermined	Chicago	IL	USA	http://healthbox.com/	1, 3, 5
Healthbox - London	Undetermined	London	N/A	United Kingdom	http://healthbox.com/	1, 3
H-Farm Ventures	2005	Treviso	N/A	Italy	http://www.h-farmventures.com/en/	**1, 2, 7**
Hub Ventures	Undetermined	San Francisco	CA	USA	http://www.better.vc/	1, 4, 5
iAccelerator	2008	Ahmedabad	N/A	India	http://iaccelerator.org/	1, 6, 7
ignite100	2011	Newcastle-upon-Tyne	N/A	United Kingdom	http://ignite100.com/	1, 2, 7

Accelerator	Year founded	City	State	Country	Website	Sources
Imagine K12	2011	Redwood City	CA	USA	http://www.imaginek12.com/	1, 3, 4, 5, 7
Impact Engine	2011*	Chicago	IL	USA	http://www.theimpactengine.com/	1, 3, 5, 7
Incubate Miami	2009	Miami	FL	USA	http://www.linkedin.com/company/incubate-miami	1, 5, 7, 8
JOLT	2012	Toronto	N/A	Canada	http://jolt.marsdd.com/	1, 3, 7, 8
Joystick Labs	Undetermined	Durham	NC	USA	http://www.linkedin.com/company/joystick-labs	4, 5
JumpStart Foundry	2010	Nashville	TN	USA	http://www.jsf.co/	1, 4, 5, 7
K5Launch	2011	Los Angeles	CA	USA	http://k5launch.com/	1, 5, 7, 8
Kicklabs (aka Transmedia Capital)	2009	San Francisco	CA	USA	http://transmediacapital.com/	3, 4, 5, 7
LaunchHouse	2009	Cleveland	OH	USA	http://www.launchhouse.com/	1, 5, 7, 8
Launchpad LA	2009	Los Angeles	CA	USA	http://launchpad.la/	1, 3, 4, 5, 7
Matter.	2012	San Francisco	CA	USA	http://www.linkedin.com/company/matter-	1, 3, 7, 8
Microsoft Accelerator	Undetermined	Seattle	WA	USA	http://www.microsoft.com/bizspark/accelerator/	1, 5
Momentum	2008*	Grand Rapids	MI	USA	http://www.momentum.vc/	1, 5, 7
MuckerLab	Undetermined	Santa Monica	CA	USA	http://www.muckercapital.com/	1, 5, 7, 8
NDRC LaunchPad	Undetermined	Dublin	N/A	Ireland	http://www.ndrc.ie/launchpad/	1, 3
NewME Accelerator	2011	San Francisco	CA	USA	http://www.newmeaccelerator.com/	4, 5, 7
NYC ACRE	2009	New York City	NY	USA	http://www.nycacre.com/	3, 4, 7
NYC SeedStart	2010*	New York City	NY	USA	http://www.nycseedstart.com/	1, 2, 3, 4, 5, 7
Openfund	2009	Athens	N/A	Greece	http://theopenfund.com/	1, 2, 3, 6, 7

Accelerator	Year founded	City	State	Country	Website	Sources
Oxygen Accelerator	2011	Birmingham	N/A	United Kingdom	http://www.oxygenaccelerator.com/	1, 2, 7
Propeller Venture Accelerator	2010	Dublin	N/A	Ireland	http://www.ryanacademy.ie/propeller-venture-accelerator	1, 2, 3, 7
Rock Health - Cambridge	Undetermined	Cambridge	MA	USA	http://rockhealth.com/	3, 5
Rock Health - San Francisco	2011	San Francisco	CA	USA	http://rockhealth.com/	1, 2, 3, 4, 5
Seed Hatchery	2011	Memphis	TN	USA	http://seedhatchery.com/	1, 4, 5, 7
Seedcamp	2007	London	N/A	United Kingdom	http://www.seedcamp.com/	1, 2, 3, 6
SeedRocket	2008*	Barcelona	N/A	Spain	http://www.seedrocket.com/en/	1, 6, 7
StartEngine	Undetermined	Los Angeles	CA	USA	http://www.startengine.com/	1, 5, 8
Startl	Undetermined	New York City	NY	USA	http://startl.org/	1, 2, 3, 7
Startupbootcamp - Copenhagen	2010*	Copenhagen	N/A	Denmark	http://www.startupbootcamp.org/	1, 2, 7
Startupbootcamp - Madrid	2011*	Madrid	N/A	Spain	http://www.startupbootcamp.org/	1, 2, 7
StartupHighway	2011	Vilnius	N/A	Lithuania	http://startuphighway.com/	1, 2, 7
Summer@Highland	2007	Cambridge	MA	USA	http://summer.hcp.com/	4, 5, 7
SURGE Accelerator	2011	Houston	TX	USA	http://surgeaccelerator.com/home	1, 3, 5, 7, 8
Tech Wildcatters	2009	Dallas	TX	USA	http://techwildcatters.com/	1, 2, 3, 4, 5, 7
Techstars - Boston	2009	Boston	MA	USA	http://www.techstars.com/	1, 2, 3, 4, 5, 6
Techstars - Boulder	2007	Boulder	CO	USA	http://www.techstars.com/	1, 2, 3, 4, 5, 6
Techstars - Cloud	Undetermined	San Antonio	TX	USA	http://www.techstars.com/	1, 3, 5
Techstars - NYC	2011	New York City	NY	USA	http://www.techstars.com/	1, 2, 3, 4, 5
Techstars - Seattle	2010	Seattle	WA	USA	http://www.techstars.com/	1, 2, 3, 4, 5

Accelerator	Year founded	City	State	Country	Website	Sources
The Brandery	2010	Cincinnati	OH	USA	http://brandery.org/	1, 2, 3, 4, 5, 7
Think Big Partners	2010*	Kansas City	MO	USA	http://thinkbigpartners.com/	1, 4, 5, 7
University Technology Park	2011	Chicago	IL	USA	http://www.universitytechnologypark.com/	3, 4, 7
Unreasonable Institute	2009	Boulder	CO	USA	http://unreasonableinstitute.org/	3, 4, 7
Victory Spark	Undetermined	Milwaukee	WI	USA	http://gan.co/members/view/victory-spark	1, 4
Women Innovate Mobile	2011	New York City	NY	USA	http://wim.co/	1, 4, 5, 7
Y Combinator	2005	Mountain View	CA	USA	http://ycombinator.com/	1, 2, 3, 4, 5, 6, 7

[i] Sources: The accelerators in this appendix were compiled from the following six inventories of accelerators and include those accelerators that appear in at least two: (1)Seed-DB, (2) NESTA, (3)Emergent By Design (4) Webbmedia Group, (5)Tech Cocktail, and (6) an early list compiled by Seed-DB founder. Where information about the accelerator was indeterminate (conflicted across sources or was missing), the data were cross-referenced with the following two additional data sources: (7) Crunchbase, or (8) the accelerator's own website or LinkedIn page. Only those accelerators without an active website were removed from the comprehensive list. For more information about the data sources and process of compilation, see the methods section of this report.

* Information was found in only one of the eight sources.