

Emerging Trends in Technology Commercialization

Section 1: Written Report

For:
The Maryland Technology Development
Corporation (TEDCO)

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June 2016

Executive summary

This study was commissioned to surface emerging trends and practices in technology commercialization and to consider the potential fit and feasibility of each for the Maryland Technology Development Corporation (TEDCO) and the state's entrepreneurial ecosystem. Extensive research and in-depth interviews with Target Organizations (other economic development organizations, universities and federal research labs, and commercial enterprises) from around the country resulted in in-depth profiles of over 20 program models that TEDCO should consider for their potential positive impact on Maryland.

One of the most striking and consistent findings that emerged from this research is that building a thriving entrepreneurial ecosystem requires more than an array of individually successful programs – it requires transformational leadership and a compelling narrative that is shared by members of the ecosystem and understood by outside actors. Across the U.S., several ecosystems that arguably have fewer innovation resources than Maryland are attaining comparable prominence by virtue of their strong, collaborative leadership and vision. The overarching theme of leadership and vision therefore demands as much, if not more, consideration as specific program models.

Interviews with experts and program leaders in other states confirmed that a vibrant and collaborative entrepreneurial ecosystem requires a leader, or group of leaders, that will step beyond their own organizations, serve as a neutral third party, and consistently champion the overall cause. The most important attributes of these leaders are a commitment to ongoing research related to the local ecosystem, the ability to develop and deliver a consistent narrative for the state or region, and the capacity to be a highly engaged 'dot connector' that unifies and coordinates key local players. As opposed to only looking inward at their own organizations and related performance, these leaders must spend at least as much of their time and energy looking outward, with a focus on the entire spectrum of services to companies, the local ecosystem, and more intentionally connecting their local regions to other national and global ecosystems and players. Entrepreneurial ecosystems do not tend to thrive with top-down or bureaucratic structures, so these leaders and their organizations must be comfortable operating within a more fluid, organic network that consists of a diverse set of private, public, and not-for-profit organizations.

The findings for this project are organized around a technology commercialization framework. It serves as a lens through which to view trends and programs, current TEDCO responsibilities, and gaps and opportunities in Maryland's ecosystem. The framework is organized into three basic categories based on how a company normally forms and moves through the phases of the commercialization pipeline, in addition to the overarching category, or theme, of leadership and vision:

- Leadership and vision: looking outward to champion and drive the entire ecosystem, within the state and beyond
- Pre-pipeline: fostering a culture of entrepreneurship and inclusiveness
- Current TEDCO pipeline: providing intense support and seed funding for established early stage tech firms, from basic research through scale up
- Post-pipeline: ongoing support and connecting from scale up into the middle market stage

Within the four categories of this framework, the 20 profiles of program models, plus sidebars and links related to many other examples, are organized by theme for easy evaluation, such as inclusive entrepreneurship and pre-accelerators in the pre-pipeline phase or exports and mergers and acquisitions in the post-pipeline phase.

Based on this analysis, there are three general directions (or combinations of them) that TEDCO must consider: 1) double down on its current pipeline (focus exclusively and with greater resources), 2) extend programmatic reach into pre- and/or post-pipeline phases, or 3) commit to becoming a true, visionary ecosystem leader. Because TEDCO must determine its own vision and direction before moving forward with any new programs, this report does not provide specific recommendations. It does, however, provide a framework for evaluation, a set of potential new programs, and a series of implication questions to aid TEDCO in determining its future direction and associated new activities.

1. Introduction

The Maryland Technology Development Corporation (TEDCO) is an economic development organization whose purpose is to grow Maryland's technology-based economy by creating high-paying jobs and expanding the tax base in this sector. It was established to facilitate the transfer and commercialization of technology from Maryland's research universities and federal laboratories into the marketplace and to assist in the creation and growth of technology-based businesses in entrepreneurship in all regions of the State. TEDCO serves this purpose primarily by offering early stage seed funding and related programmatic support to established start-ups in the state.

Given the dynamic nature of technology and entrepreneurship, TEDCO constantly seeks to adapt existing programs, and develop new ones, to achieve its mission and best meet the changing needs of its core market. The purpose of this study is to gather information about new and useful programs developed by Target Organizations and use the results to inform TEDCO's upcoming strategic planning efforts and improve overall organizational effectiveness. A companion study, being conducted by FireDrive Marketing Group, provides an assessment of the needs of the Maryland entrepreneurial ecosystem, how well those needs are being met by TEDCO and its ecosystem partners, and the public perception of TEDCO.

2. Structure and Approach

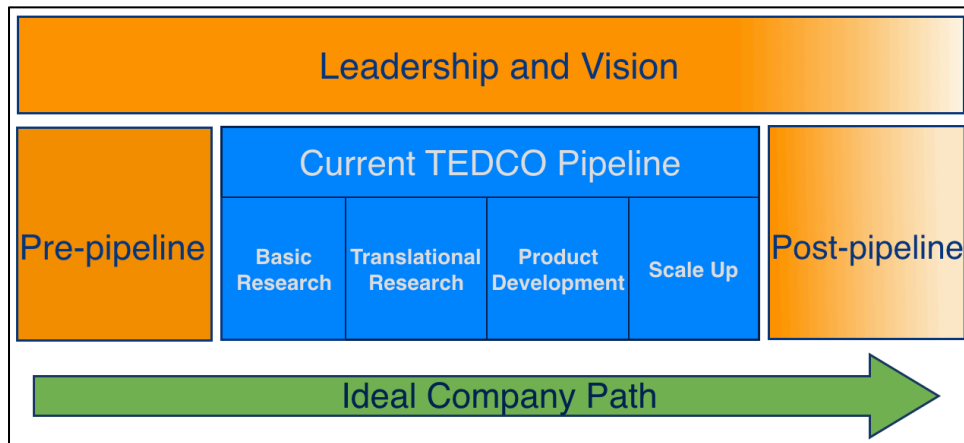
This report is organized around a technology commercialization pipeline framework. TEDCO's responsibilities currently span a clearly defined portion of this pipeline, from basic research through initial venture capital investment. Part of this report is dedicated to exploring innovative practices being implemented by Target Organizations within this span of the pipeline. However, the report also examines concepts and programs that fall outside of TEDCO's current areas of focus and responsibility, but that are important to companies working their way through the pipeline from pre-start-up through middle market stages (beyond where a company would typically 'graduate' from TEDCO services). These represent opportunities being acted upon by Target Organizations in other states that TEDCO could feasibly implement, or incentivize and/or encourage other actors to take on.

This report organizes emerging trends and practices into four basic categories:

- **Leadership and vision:** looking outward to champion and drive the entire ecosystem, within the state and beyond. Creating a more vibrant and robust ecosystem by developing a research-driven narrative, leading place-making efforts, and setting the overall entrepreneurial ecosystem strategy.
- **Pre-pipeline:** fostering a culture of entrepreneurship and inclusiveness. Ensuring that a more diverse, qualified, and sustainable stream of entrepreneurs and firms are commercializing technology and receiving funding and support.
- **Current pipeline:** providing intense support and seed funding for established early stage tech firms, from basic research through scale up. Fostering technology

commercialization from research laboratories to commercially viable business enterprises.

- **Post-pipeline:** providing ongoing support and connecting from scale up into the middle market stage. Continue to focus on firms that have already received seed funding or venture capital, but may have additional needs related to accessing new funding rounds and markets, attracting talent, or finding strategic M&A partners.



From the company perspective, movement through the pipeline at various stages of growth would ideally be seamless, characterized by uniformly robust programs and services that are managed by various players in a cohesive ecosystem. This framework allows gaps and shortcomings in the ecosystem pipeline to be more readily identified.

Potential Directions for TEDCO

This report is designed to provide an overview of emerging and compelling practices and trends in entrepreneurship and tech commercialization, but is not designed to prescribe a certain strategy or course of action. All of the program models and examples presented in this report could potentially bring value to Maryland's tech firms. Ultimately TEDCO will have to set its own vision and establish its desired role in the ecosystem to determine which of these programs it should incorporate. Further, TEDCO must better define Maryland's entrepreneurial ecosystem, as existing players in the ecosystem do not seem to have a common understanding or ready ability to describe it.

Based on the analysis in this report, there are three general directions (or some combination of the three) that TEDCO could take.

- **Double down on TEDCO's current pipeline:** TEDCO could focus exclusively, and with increased resources, on taking startups from proof of concept through scale up and commit to ensuring that it has the best programs possible to serve this phase of the pipeline. TEDCO is already considered highly effective, both locally and nationally, at delivering funding and programs within this specific phase of the overall pipeline; however, there is room for improvement and growth.

- **Extend programmatic reach into pre- and/or post-pipeline phases:** TEDCO could retain its current tactical focus on delivering funding and support programs to established early stage firms, but extend its reach earlier and/or later in the pipeline.
- **Commit to becoming a true, visionary ecosystem leader:** TEDCO could assume the role of an ecosystem leader and set the strategy and direction for technology-based economic development in Maryland overall. It could influence the interactions and direction of the numerous actors that form the ecosystem and more intentionally connect Maryland to national and global markets.

Because TEDCO needs to determine its own vision and role within the ecosystem before deciding which of the trends or practices described in this report are relevant to its strategy, each major segment of the overall pipeline discussed in this report is followed not by recommendations, but by a set of implications in the form of “if/then” statements. A critical assumption of this analysis is that, whichever direction TEDCO takes with its own programs and investments, it is also in a position to incentivize and fund programs carried out by other organizations. Some program models identified here lie far beyond TEDCO’s current role (as defined by state legislation and current mandate), but are included because they matter to the firms that TEDCO serves and influences and should therefore be familiar to TEDCO.

3. Task and Research Process

Based on direction from TEDCO, the research for this report proceeded in three stages, all oriented towards identifying themes and program models that TEDCO can consider as it engages in strategic planning for improving current programs, developing new programs, and enhancing overall organizational effectiveness.

- **Research broadly for best practices:** A survey of published studies describing new trends in other Target Organizations was conducted, including not just other technology-based economic development organizations (TBEDs), but also state, city and regional economic development organizations (EDOs); universities; federal research laboratories; and commercial enterprises.
- **Conduct in-depth interviews with targeted organizations:** The most successful and/or innovative Target Organizations were interviewed and compelling existing program models, as well as those that were not yet published in available reports, were identified. These include both established practices with proven results as well as experimental, unproven approaches. More than 30 individual executives and project leaders across 20 states and regions were interviewed. A list of interviews is included at the end of the case studies section.
- **Assess feasibility for Maryland:** The most promising new and useful programs and concepts were identified and the feasibility of their potential implementation by TEDCO was assessed, taking into consideration their novelty and creativity, their effectiveness, TEDCO’s organizational characteristics, and the characteristics of

Maryland's entrepreneurial ecosystem. Interviews were conducted with Johns Hopkins (Tech Ventures and Science & Technology Park), Biohealth Innovation, and TEDCO staff and board, in order to better understand the Maryland ecosystem.

4. Ecosystem and Economic Development Trends

A core assumption of this report is that every state or regional entrepreneurial ecosystem is different, with variations by industry, access to capital, role of government and other anchor institutions, private sector engagement in economic development, and more. To understand how a program from another ecosystem might work in Maryland, one must assess how these and other characteristics differ in each location. Because each entrepreneurial ecosystem is different both in terms of culture and technology, and TEDCO cannot import another organization's approach entirely, it will have to consider modular pieces that it can adapt to fit the Maryland ecosystem. Maryland can't become another region, like Boston or Silicon Valley, and accordingly, TEDCO can't directly emulate one of the organizations that serves those ecosystems.

The scope of this project did not allow for an in-depth analysis of the Maryland ecosystem or TEDCO's role within it. Nevertheless, this section provides some context on the ecosystem, in order to establish a point of reference for identifying which emerging trends and programs were relevant to Maryland and TEDCO. This context should also allow readers to draw their own conclusions about the feasibility of implementing certain practices highlighted in this report.

Maryland's Entrepreneurial Ecosystem

It is notable that during this project it was difficult to define the roles of, and relationships between, the major actors in Maryland's entrepreneurial ecosystem. It is clear that there are certain dominant players in the public (TEDCO) and academic (Johns Hopkins, UMD) realms, but it was challenging to discern the overall role of the private sector and the connections between various organizations. While this in part reflects the inherently messy and fast-moving nature of the tech-based economy, it is also true that other regions interviewed for this project were better able to explain the basic contours of their ecosystems. Many of the organizations in Maryland seemed more inward-focused. As one interviewee noted, Maryland has historically had many tacticians but few strategists or visionaries.

While Maryland's support system for tech commercialization is rich (and increasingly so) compared to most states, it also arguably lacks one or more clear leaders and has not positioned the state as a recognized national leader in the technology and innovation space. Unlike the economic development field overall, in which the Maryland Department of Commerce is the clear lead agency, the tech-based economy has no clear hierarchy or center of gravity. This is not necessarily a negative, however, as interviews with numerous organizations in Maryland suggest that the ecosystem is collaborative and organizations generally understand and respect one another's missions and contributions. It was also suggested that the lack of clear alignment in the ecosystem allows the various organizations to be more nimble and experimental. However, there was also general agreement that some ecosystem players view themselves as being in competition with

others and no organization is generating the narrative and consistently and aggressively telling the Maryland entrepreneurial and innovation story.

Maryland's ecosystem is perhaps most clearly differentiated from others by the degree to which government entities (including National Labs) and academic institutions lead the innovation and commercialization system, as opposed to the private sector. The state ranks 2nd for non-industry (primarily federal government) investment in R&D, is home to two of the nation's top 40 research universities (#1 Johns Hopkins and #31 University of Maryland), ranks 4th for SBIR-STTR dollars awarded to local firms, and is home to major federal research agencies, such as NIH and NIST.¹ At the same time, Maryland ranks only 18th for industry investment in R&D and 27th in entrepreneurial activity, signifying that the state is not adequately leveraging its rich research assets into new business formation.²

Fortunately, over the past five years or so, there has been a marked uptick in dedication and investment in the innovation and technology commercialization ecosystem by a number of these public entities and academic institutions. Universities are becoming more organized and investing more in commercialization, driven primarily by the decline of NIH funding (Tech Ventures) and by increasing demand from students and faculty. The University of Maryland BioPark and Science & Technology Park at Johns Hopkins are becoming established. BioHealth Innovation was started. TEDCO is growing, with new investments from the state and the absorption of the Maryland Venture Fund. Accelerators are proliferating, in keeping with national trends. And more players are entering the game, as evidenced by the Maryland Institute College of Art's (MICA) recently announced startup challenge.

TEDCO's Role in the Maryland Tech Ecosystem

TEDCO's role revolves primarily around funding specific activities in the commercialization pipeline. In this role, it is expected to make good investments that provide a return while also achieving economic development outcomes for the state. While it offers other general entrepreneurial support programs and resources, these are principally designed to serve companies that have received TEDCO funding, as opposed to serving the ecosystem overall.

TEDCO's activities are constrained by state legislation, but its significant financial resources and ability to invest in companies give the organization a degree of power and credibility in the ecosystem as a whole. TEDCO can shape state TBED strategy either by bringing money directly or exerting influence via incentives (for example, TEDCO currently funds incubators to some extent as well as studies that justify certain new activities in incubators). But as will be discussed later, it is not clear whether TEDCO is currently fully leveraging its potential influence throughout the ecosystem.

Disruption in Economic Development

As TEDCO decides whether or how it should expand its scope, it should take into account the fact that state and regional economic development agencies are beginning to expand

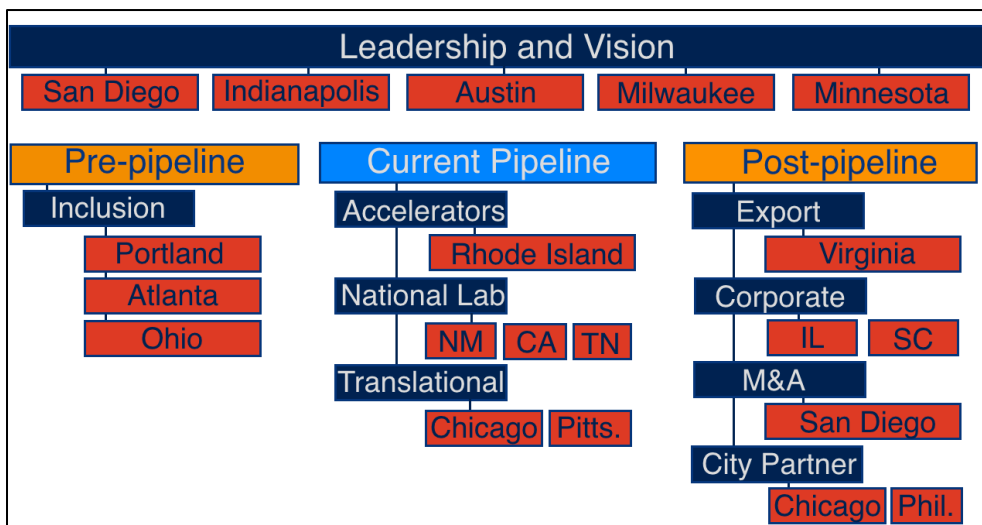
¹ ITIF State New Economy Index 2014; National Science Foundation; U.S. Small Business Administration

² ITIF State New Economy Index 2014

into territory that has previously been the sole province of TBED organizations. With traditional business attraction volume down significantly and EDOs facing pressure to diversify, more are beginning to play a stronger role in initiatives related to new topics, such as innovation and global trade and investment. There is, in short, an ongoing convergence between traditional and technology-based forms of economic development. This means that even if TEDCO decides that the best strategy is to double down on its current pipeline, it is likely that other economic development actors will increasingly operate in this space, creating potential confusion. Therefore, TEDCO may have reason to proactively define how it and other EDOs can most effectively and cooperatively operate throughout the pipeline.

5. Summary of Themes and Profiles

A key objective of this report is to clearly articulate themes that represent areas of opportunity based on TEDCO’s interests and capacity, not to deliver long lists of example programs and tactics. The research and interviews conducted for this report yielded a set of 20 highly relevant program models that are described in detailed 2-3 page profiles. These profiles are organized within nine key themes that fall into the four categories of the pipeline discussed previously. The below chart illustrates the way in which the core elements of this report – pipeline phases, themes, and profiles – are organized:



The analysis of these phases (pre-pipeline, current pipeline, and post-pipeline), themes (topics in black above), and program models is divided into two report sections: 1) this report section, which provides brief summaries of each of the 20 program models and their implications for Maryland and/or TEDCO; and 2) a companion report section, which provides more in-depth profiles of each of the 20 program models, plus sidebars and other examples. The sidebars offer brief overviews within additional themes of relevant organizations or programs that did not warrant full profiles, but may be of interest. The examples point to other researched programs that TEDCO may want to examine on its own.

The remainder of this report section serves as a summary of the themes and program models in each phase and contains the following:

- Rationale for engaging in each phase (i.e., why pre-pipeline efforts matter)
- Rationale for each theme within the phases (i.e., why inclusion matters)
- One-paragraph overview descriptions of the 20 profiled program models
- Lists of sidebar topics
- Implications for Maryland and/or TEDCO in the form of “if/then” statements

LEADERSHIP AND VISION

Looking outward to champion and drive the entire ecosystem, within the state and beyond.

Rationale for the theme:

While the tech commercialization framework had initially been devised to cover more tactical phases related to TEDCO's current pipeline, the interview process revealed another, over-arching dimension that demanded consideration – leadership and vision. Those interviewed both within Maryland and in other states and regions stressed the importance of strong leadership, not only to drive individual organizations, but also the entire ecosystem. The entrepreneurial ecosystem does not tend to thrive with a top-down or bureaucratic culture (it tends to function better within a more fluid, organic network); however, it does need one or more neutral, third party organizations that are well-connected and can act as convening and coordinating agents that set broader vision and strategy. In interviews, most places pointed to the private sector as the initial catalyst for new, transformative initiatives, but also stressed that government collaboration and follow-on investment was equally important. It also requires a leader, or group of leaders, that will step beyond their own organizations and consistently champion the overall cause. The most important attributes for ecosystem leaders based on interviews are a dedication to good and consistent research related to the ecosystem (not just the performance of their own organizations), the ability to develop and deliver a consistent narrative or story for the state or region, and the capability to be a 'dot connector' that unifies and coordinates the key players.

San Diego – Networked Leadership and CONNECT

The story of how San Diego rose from a relatively unknown player in the R&D space 50 years ago, to a top U.S. metro today, is one of necessity, strategic investments and initiatives, a new approach to research, a highly collaborative culture, and leadership dedicated to creating a truly entrepreneurial ecosystem. Key to the region's success were individual leaders, notably Dwayne Roth, who, starting in 2004, became not only the leader for CONNECT, but the visible leader and "dot connector" of San Diego's innovation community. The San Diego region is now one of the nation's premier R&D and innovation hubs, anchored by major research institutes, including UC San Diego, Scripps Research Institute, Salk Institute for Biological Studies, Sanford-Burnham Medical Research Institute, West Health Institute, and J. Craig Venter Institute. This dense concentration of R&D has led to hundreds of new companies and established clusters in life sciences, communications, software, and clean tech.

Indiana – BioCrossroads and the Central Indiana Corporate Partnership

BioCrossroads serves as the clear leader and catalyst for Indiana's life science community. It was formed in 2002 around a vision to do more with the state's admirable life sciences corporate and academic assets (which includes Eli Lilly, WellPoint, Cook Medical, and Roche) and is credited with driving Indiana's emergence as a nationally known life sciences hub, including raising over \$250 million for grant funds and capital investments to start and support life sciences opportunities, organizing four venture and seed funds, and launching new enterprises. David Johnson, who became CEO in 2005, not only oversees day-to-day management of the organization, but also has become a recognized local and

national leader in the field of life sciences and in private sector initiatives. He credits research as being the foundation of all that BioCrossroads has accomplished during his tenure. BioCrossroads is one of six economic development initiatives sponsored by the Central Indiana Corporate Partnership, a CEO driven organization formed in 1999 (with major support from the \$13 billion Lilly Endowment) and dedicated to the region's prosperity and growth.

Milwaukee – Water Council

The Water Council aims to establish the Milwaukee region as the world hub for water research, economic development, and education. It has gone a long way towards achieving this status in the few years since its official formation in 2009. The cluster consists of over 200 water technologies companies covering the entire spectrum of the business pipeline. It has a physical presence in the Global Water Center, a 98,000 square foot research and accelerator facility completed in 2013 and is located in the recently established Milwaukee Water Technologies District near downtown. It is further supported by the University of Wisconsin-Milwaukee's school of Freshwater Sciences, created in 2010. This effort was initially catalyzed by the private sector and is driven by intense collaboration and significant levels of commitment among business, academic, and public sector agents. The Water Council's budget is \$3.5 million, sourced from leasing at the Global Water Center, grants, membership, and fees.

Minnesota – Medical Alley Association Cluster Research

The Medical Alley Association, the industry group for Minnesota's health technology cluster, has created a lean but effective research operation over the past several years that supports the association's public policy efforts, provides local firms with actionable industry intelligence (around such topics as supply chains, product approvals and investment trends), and promotes Minnesota's cluster assets and specialized expertise nationally and globally. In just one year and with two staff, the Medical Alley research team released more than 20 reports on the cluster. Medical Alley's research expertise has allowed it to form effective partnerships with other economic development organizations.

Austin – Dell Medical School Innovation Zone

The Innovation Zone, a 14-acre site in downtown Austin centered on the University of Texas's new Dell Medical School and teaching hospital, represents both a new model for collaboration between public, private, and academic institutions and a good example of the potential linkages between university technology transfer and community inclusion. The Innovation Zone aims to help bridge Austin's tech and start-up community with a new model for health care delivery. Not only is the Dell Medical School the first new medical school built alongside a tier one research university in the country in the last fifty years, it is also the first to focus all its clinical, teaching, and research assets around new clinical care models that improve the overall quality and cost of care—not just the use of new technologies. In particular, the school has the explicit goal of pursuing comprehensive value-based care (reimbursements based on patient outcomes, not simply the amount of procedures done). UT has partnered with a number of community organizations, created research areas, and attracted faculty aimed at achieving this mission.

Sidebars: Leadership and Vision (see case study profiles section)

- Virginia Commonwealth Center for Advanced Manufacturing (CCAM)
- San Antonio Cyber Cluster Initiative
- Jumpstart Ecosystem Building (see pre-pipeline case study profile on Focus Fund)

Implications: Leadership and Vision

- If Maryland wants to have an effective and cohesive entrepreneurial ecosystem, then a leader or group of leaders needs to pull together a unified effort across the ecosystem and strengthen networks between organizations.
- If Maryland wants to be widely recognized (internally and externally) as a nationally relevant entrepreneurial ecosystem, then it needs to produce consistent research that tells the Maryland story and confirms its status as an innovation powerhouse.
- If Maryland wants to compete with other ecosystems that are led by the private sector, then it will need to figure out how to better leverage the private sector in Maryland or ensure that government and large institutions are able and willing to fill the catalytic roles that the private sector does elsewhere.
- If TEDCO wants to assume a leadership role and drive the success of Maryland's entrepreneurial ecosystem, then it will need to shift from a primarily inward focus on its own effectiveness to include an equal and outward focus on the success of the entire ecosystem.

PHASE 1: PRE-PIPELINE

Fostering a culture of entrepreneurship and inclusiveness.

Rationale for the phase:

The pre-pipeline phase refers to efforts to grow and broaden the innovative capacity of the Maryland economy. In other words, rather than taking the amount of innovation as a given and working to maximize the commercial success of those innovations, TEDCO (or its partners) could actively work to foster a more innovative culture across currently overlooked populations and industries. The objective would be to increase the diversity of people and companies that are innovating in the first place, thereby organically growing the size of the ecosystem over time.

Investing in pre-pipeline programs recognizes the growing evidence that minorities and women are significantly under-represented in high-tech occupations, and that many high potential students in Maryland schools and universities never consider the idea of starting a business or studying technical subjects. It also recognizes that rapid technological innovation is reshaping more than traditional “tech” industries, including manufacturing and consumer services.³

³ Mark Muro, Kelly Kline, and Bruce Katz. “Software Eats Manufacturing (and Manufacturing Gains).” Brookings (2016).

Theme: Inclusive Entrepreneurship

Rationale for the theme:

Amid broader national conversations about wealth inequality, particular attention has been paid lately to the striking lack of racial and gender inclusion in technology-based industries – a particularly troubling trend given that these are some of the fastest-growing and highest-paying industries and occupations. It is also a trend with particular relevance for Maryland, where as of 2014 over 47 percent of the population is minority, the 7th highest minority share among U.S. states. Meanwhile, less than 1 percent of angel and venture capital funding is invested in minority-owned business, and just 3 percent is invested in women-owned companies. Minority- and women-owned companies are 22 percent and 19 percent less likely, respectively, to raise venture capital than those run by white males.⁴ Further, minority entrepreneurs are less likely to be able to raise money from family – the net worth for the median white American family is \$111,000, compared to \$8,300 for a Latino family and \$7,100 for a black family.⁵

The urgency of this challenge is perhaps best highlighted by the action that companies themselves have taken. In addition to setting (and exceeding) an internal goal of increasing its minority hire rate to 40% in 2015, Intel created a \$125 million diversity fund to invest in startups run by women and minorities. Since 2011, Comcast Capital has run a “Catalyst Fund” that makes seed and Series A investments in tech companies founded by minority entrepreneurs. Despite these growing private sector efforts, there clearly remains a role for public and nonprofit entities to play in addressing gaps left by the market.

Portland – Startup PDX Challenge and Inclusive Startup Fund

The Startup PDX Challenge, run by the city of Portland’s economic development agency and targeted at minority entrepreneurs, awards six early-stage startups a one-year platform to set them up for later investment. Each company receives up to \$25,000 in the form of two-year low-interest loans or convertible debt, free office space in a city-owned building, in-kind business services (HR, accounting, marketing), and memberships to relevant industry organizations. The Inclusive Startup Fund is a new venture fund that is exclusively targeted at minority entrepreneurs, which has been capitalized with \$1.25 million from public sources to be matched with \$1.75 million in private funding.

Atlanta – Opportunity Hub and TechSquare Labs

Opportunity Hub is a co-working space and set of training resources, embedded within a larger incubator in Atlanta, that operates as a “platform to start, accelerate, incubate, and fund” technology companies with founders from under-represented populations. Opportunity Hub operates early in the pipeline, helping to build talent and connections to help minorities access the tech firms or start their own. Key programs include a pre-accelerator, coding school, and a yearlong intensive programming and entrepreneurship training program for inner-city youth. Across all of its programs, Opportunity Hub

⁴ John Paglia and Maretto Harjoto. “The Effects of Private Equity and Venture Capital on Sales and Employment Growth in Small and Medium Sized Businesses.” *Journal of Banking and Finance* 47 (2014).

⁵ Laura Sullivan et al. “The Racial Wealth Gap: Why Policy Matters.” Institute for Assets & Social Policy and Demos. (2015).

maintains a consistent focus on bringing minority entrepreneurs into mainstream spaces to interact with funders and corporations.

Ohio – Third Frontier and Jumpstart Inclusion and Diversity Tech Fund

To a greater degree than most tech-based economic development organizations, Jumpstart has made inclusive entrepreneurship a central element of its support for startup firms. The most recent manifestation of this is a \$10 million seed fund called the Focus Fund. Launched in 2016 with the encouragement and financial support of the state as well as matching funds from the Case Foundation, the Focus Fund will invest exclusively in women and minority-led tech startups. It will fund both Ohio-based entrepreneurs as well as startups from across the U.S. that have a business relationship within Ohio and are willing to relocate. This effort stems from Jumpstart’s outward orientation and mission of not only mentoring and funding startups, but also building public-private-institutional ecosystems.

Sidebars: Inclusive Entrepreneurship (see case study profiles section)

- St. Louis – Launchcode
- Charlotte – City Startup Labs

Theme: Pre-accelerators

Rationale for the theme:

In a February 2016 report, SSTI labeled pre-accelerators a “hot new trend”, noting that a number of universities had launched such programs in 2015 and 2016. Pre-accelerators, as the name suggests, are designed to proactively build pathways into accelerators. While a variety of models are emerging, they generally aim to respond to two gaps not addressed by traditional accelerators. First, there may be a significant population of potential innovators that aren’t aware of the mechanics of becoming an entrepreneur (especially on college campuses), or that are currently employed and unwilling to dive into a full accelerator without initial validation that their product is viable. Second, some are linked directly to specific accelerators and are used as a means of ensuring that entrepreneurs are fully prepared to maximize the accelerator experience from the outset, or to provide a less intensive program to firms that did not make it into oversubscribed accelerator cohorts. In terms of structure, many are very similar to traditional accelerators, but with a few key differences: they combine a shorter version of traditional accelerator curriculum with a heavier emphasis on business fundamentals, and they traditionally don’t take equity, which creates a culture more open to experimentation through failure.

Sidebars: Pre-accelerator (see case study profiles section)

- Pennsylvania – TechCelerator @ State College
- Chicago – Northwestern University’s The Garage
- London – FastForward Pre-Accelerator

Theme: STEM Outreach to K-12

Rationale for the theme:

Virtually every region of the U.S. is struggling with the challenge of producing a workforce with the science, technology, engineering, and math (STEM) skills that employers – particularly in tech-based industries – demand. A 2014 analysis by Brookings found that in the Baltimore metro area, job openings requiring STEM skills took over 40 days to fill on average, despite the fact that the average salary of these jobs was close to \$60,000. By that measure, the region is among the top 20% nationally in terms of the difficulty that firms face in finding STEM talent.⁶ Some regions and organizations are responding to these challenges by focusing on developing STEM skills and a culture of innovation at the K-12 level. These efforts recognize that, despite the growing popularity of college entrepreneurship programs, building a STEM-oriented workforce large enough to meet employer demand is a long-term endeavor. These K-12 programs also align with the fact that, nationally, 50% of jobs that require STEM skills do not require a bachelor's degree.

Sidebars: STEM Outreach to K-12 (see case study profiles section)

- San Diego – Qualcomm Thinkabit Lab
- South Carolina – CU-ICAR outreach
- Philadelphia – Firsthand Program at The Science Center

Implications: Pre-Pipeline Phase

- If Maryland wants to strengthen its entrepreneurial culture and ensure a consistent and diverse stream of new entrepreneurs and companies, then it will need to more intentionally cultivate the market before firms are even formed.
- If Maryland wants to develop the untapped potential of women and its large and growing minority populations, then it needs to make intentional and sustained efforts to reach out, provide support, and connect these entrepreneurs into the ecosystem.
- If TEDCO wants to serve this pre-pipeline role, it may have to consider either expanding its definition of what constitutes a tech company or moving beyond its exclusive focus on tech firms (as many startups are in, for example, food and apparel industries).

PHASE 2: CURRENT PIPELINE

Providing intense support and seed funding for established early stage tech firms, from basic research through scale up.

Rationale for the phase:

TEDCO was created by the Maryland State Legislature in 1998 to facilitate the transfer and commercialization of technology from Maryland's research universities and federal labs into the marketplace and to assist in the creation and growth of technology-based businesses in all regions of the state. It is intensely focused on providing funding and related support to tech-based startups in the phase from basic research to early scale up.

⁶ Jonathan Rothwell. "Still Searching: Job Vacancies and STEM Skills." Brookings (2014).

According to a 2015 economic impact report from Battelle, as well as an extensive survey of firms and partners in the state's entrepreneurial ecosystem by FireDrive Consulting in 2016, TEDCO has performed this function well and plays a key role in early-stage venture development. The Battelle report confirms that TEDCO's efforts are generating a strong and growing economic impact and have proven to be a very good investment for Maryland, with the economic contribution of TEDCO's five core programs totaling over \$1 billion in and 4,358 jobs in 2015. The FireDrive study confirms that TEDCO is respected and deemed critical by the startup community for its funding and related programs. Demand for TEDCO's existing set of programs and services continues to grow; however, there is strong evidence that much of this demand goes unmet, demonstrated by an acceptance level for core programs that is lower than most previous years. Further, there are opportunities for TEDCO to engage in new programs during this phase related to accelerators, labs and universities. The Maryland Economic Development and Business Climate Commission, in its 2015 report, recommended expanding TEDCO's funding to meet growing demand.

Theme: Leveraging National Laboratories for Regional Economic Growth

Rationale for the theme:

The federal government invests more than tens of billions of dollars annually in federal research centers and laboratories located in states throughout the country. These labs house some of the world's most cutting edge technologies and experts. Yet for too many states, national labs exist in isolation and are not contributing to the regional economy. The reality is these national labs—and the mission agencies like, DOD, DOE, and NIH—were created at the end of World War II when the U.S. government represented the lion's share of the global R&D output. In such an environment, labs could work in isolation with little concern to co-location with firms and universities because labs didn't need support to research and create relevant products and innovation was seen as a method to achieve the country's military goals not economic priorities. Today, states are economic ecosystems with their own public and private anchor institutions. In order to create synergies between national labs and state innovation ecosystems, explicit efforts are needed to connect states and labs. Three barriers consistently stand out for national labs: they do not work well with small firms, are not typically geographically located in high-growth metropolitan areas, and do not have a strong regional focus.

New Mexico – NMSBA National Lab Vouchers

With two of the largest national laboratories located in New Mexico—Sandia National Laboratory and Los Alamos National Laboratory—the state has more government supported R&D (given the state's size) than any other. In order to make the labs more relevant to small businesses, in 2000 the state partnered with its two national labs to create the New Mexico Small Business Assistance Program. The program allocates small businesses with \$10,000 (for firms in the Albuquerque metro area) and \$20,000 (for firms outside the metro area) vouchers to access technical resources at the two labs. Together, the program's budget is \$4.8 million—\$2.4 million for each lab, which comes in the form of a state tax credit. The labs administer their own programs. As of 2015, the program has assisted 2,500 small businesses to access technical assistance at Los Alamos and Sandia.

Tennessee – Oak Ridge National Lab RevV Vouchers

RevV is a voucher program that links small-and medium-sized manufacturers in Tennessee with Oak Ridge National Laboratory (ORNL) located in East Tennessee. Through the program firms are able to access technical assistance from ORNL scientists on a short-term basis. Vouchers range from \$10,000 to \$50,000 and pay for research time and equipment use. The program, first initiated in 2015 through a partnership between Governor Haslam and ORNL, has an annual budget of \$2.5 million. To be eligible, firms must have at least 10 employees, be a manufacturer, and be able to articulate job creation, energy savings, or other economic benefits to the state of Tennessee.

Tennessee – Oak Ridge National Lab Microlab

The Manufacturing Demonstration Facility (MDF) at Oak Ridge National Lab is the Department of Energy's first demonstration facility which aims to better leverage the lab's research capacity to assist the private sector. One of the major features of the MDF is its location, which is not on the highly secured lab's home campus but in a mixed public-private research park near Knoxville, TN. Being located "outside the fence", the MDF serves as ORNL's storefront for private sector collaboration. The facility focuses on additive manufacturing, battery technologies, and carbon fiber and utilizes the equipment and research expertise of ORNL to support regional businesses. According to Craig Blue, Director of MDF's Advanced Manufacturing Center, "being outside of ORNL's main campus and a mission to support the private sector, allows MDF to be a much stronger player in the regional economy than the lab ever could be on its own."

California – CalCharge Tech Assessment & Acceleration

CalCharge is a public-private industry association in California developed through a partnership between the state of California and Lawrence Berkeley National Laboratory tasked with supporting technology development and the competitiveness of the California battery industry. With that mission, in 2015, CalCharge developed a one-size-fits-all contract (called a CRADA) with Berkeley National Lab that can be applied to any CalCharge member firm. Doing so allows any member company to surpass the "terms and conditions" legal language to begin working with researchers at Berkeley lab. The blanket agreement has reduced the time it takes to sign a research contract with the lab from an average of 100 days to several weeks.

Sidebar: Intellectual Property Access (see case study profiles section)

- Minnesota – University of Minnesota MN IP program

Theme: Translational Research and University-Driven Entrepreneurship

Rationale for the theme:

Too often technology transfer from universities comes exclusively in the form of invention disclosures, patents, and licensing deals. Creating and supporting young companies that develop from academic research, however, represents an important economic benefit of universities. In 2016 alone, over 650 startups came out of universities nationwide. But fostering startups is more difficult than traditional technology transfer and requires strong partnerships with intermediaries outside the university that can help research

entrepreneurs access capital, connect with other firms and mentors, and locate customers. Universities can help facilitate these activities, but they cannot do it alone. Research startups are best positioned to succeed when supported by dense clusters of co-located intermediaries that work closely with university research, usually within urban settings.

Chicago – Innovation Exchange

The Chicago Innovation Exchange (CIE) is the University of Chicago’s complex that supports researchers and entrepreneurs translate scientific and academic research into new technologies and businesses. The goal of CIE is to support firms in the hard sciences within the first year of life. While the CIE is run by the University of Chicago, it brings together a variety of public and private institutions including Fermi and Argonne national laboratories, the University of Illinois, the Marine Biology Lab, and a number of private firms. The on-campus incubator hosts 10-20 start-ups at a time but also includes 1,900 members who utilize the co-working space. CIE currently occupies three buildings near the University of Chicago’s Hyde Park campus.

Pittsburgh – Life Science Greenhouse

The Pittsburgh Life Science Greenhouse (PLSG) is one of three state-sponsored institutions in Pennsylvania (the others are in Harrisburg and Philadelphia) that support early-stage life science and health IT companies with seed capital and mentorship. PLSG serves as an intermediary between academic research at both Carnegie Mellon University and the University of Pittsburgh and startups that follow from research. To support the creation and development of startups, the organization not only funds early stage companies but connects academic entrepreneurs with professional CEOs with the business acumen to bring technology to market. Since its inception, PLSG has invested in over 50 life sciences companies and has attracted more than \$300 million in follow-on funding.

Sidebar: Translational Research and University-Driven Entrepreneurship (see case study profiles section)

- Minnesota – University of Minnesota Entrepreneurial Leave Program

Theme: Accelerators

Rationale for the theme:

Accelerators are in vogue. It’s estimated that there are 3,000 active accelerators internationally and many times as many co-working spaces.⁷ Yet few states actually understand the economic impact of the accelerators within their borders, or how to make them more impactful. Research on accelerators suggests that the traditional accelerator model works best for software startups in cities with an abundance of venture capital. Unless tailored to the local market, traditional accelerators have limited effectiveness for other industries. For example, MIT researchers Daniel Fedher and Yael Hochberg find that cities that have accelerators see higher investments in software startups than those that do

⁷ Daniel Fehder and Yael Hochberg, “Accelerators and the Regional Supply of Venture Capital Investments,” National Bureau of Economic Research (2014).

not, but the presence of accelerators has no impact on funding of biotechnology startups.⁸ Even in cities and states with strong software clusters they often do not have the full ecosystems of major tech hubs—including access to venture capital, professional management talent, or tech-centric academic institutions. In order for accelerators to work in places outside of markets such as Boston and Silicon Valley, they should be tailored to connect entrepreneurs in a variety of industries with suppliers, customers, and investors.

Providence – BetaSpring Non-Venture Based Accelerator

BetaSpring is a top ranked accelerator in Providence, RI, and in 2015 created the RevUp program, which is the country’s first “revenue-first” accelerator program. Like most accelerators, BetaSpring accepts quarterly cohorts of startup firms (usually a dozen each year) to participate in an intense three-month program aimed at building these businesses and helping the founders both access capital and mentors. However, unlike other accelerators, BetaSpring does not take an equity share in the firms. Instead, in exchange for participating in the RevUp program, BetaSpring signs royalty contracts based on the company’s growth and firms pay BetaSpring roughly 4-8 percent of revenues for 36 months.

Sidebar: Accelerator (see case study profiles section)

- Des Moines – Global Insurance Accelerator

Implications: Current Pipeline Phase

- If TEDCO is turning away firms that qualify for and could benefit from assistance, then it should consider trying to meet demand and extend the reach of its current programs to more companies.
- If TEDCO believes that it is already highly effective at what it does, but is aware that there are specific areas to improve, then it should consider intensifying efforts in its current space.
- If TEDCO wants to leverage Maryland’s labs and nationally relevant research institutes as much as possible, then it should be at the forefront of creating and replicating new ways to commercialize research from them.
- If TEDCO wants to ensure the success of Maryland’s incubators and accelerators, it should work to ensure that they meet the needs of specific clusters and exist where entrepreneurs, researchers, and innovative companies want to be.

PHASE 3: POST-PIPELINE

Providing ongoing support and connecting from scale up into the middle market stage.

Rationale for the phase:

The post-pipeline phase refers to efforts to provide ongoing assistance to technology-based companies after they have received Series A funding and as they grow to become middle-market firms. Rather than assuming that successful startups will be able to seamlessly navigate the private sector and the economic development system and thrive as they expand nationally and globally, TEDCO could provide ongoing assistance and/or more

⁸ Ibid.

proactively coordinate the “handoff” of startups to other funders and economic development actors.

Investing in post-pipeline programs recognizes the fact that the creation of startups only meets TEDCO’s stated goal of “creating high paying jobs and expanding the tax base” if those startups actually go on to survive and grow. Research by Gary Kunkle reveals how rare this is for firms: from 2005 to 2010, only 12% of U.S. business grew at all (creating on average one job each), and just 1% of firms created 72% of all net new jobs (creating an average 17 jobs each). While the firms that TEDCO funds possess unique technologies and are therefore likely to be somewhat over-represented in the “sustained growth” category, it remains the case that the vast majority of startups encounter significant challenges as they grow – or fail to grow at all. And the challenges do not recede once firms move past the startup phase. Many established technology-based firms struggle with the ongoing demands of innovation or expansion from national to global markets.

Economic development organizations are well suited to address many of these challenges, as the examples in this section demonstrate. Too often, however, growing technology-based firms fall into gaps created by siloed organizational structures, misaligned incentives, or a lack of targeted resources and programs.

Theme: Exports and Global Engagement

Rationale for the theme:

Innovation is a well-established driver of export activity. In a cyclical pattern, exports can in turn contribute to a firm’s innovation capacity by exposing it to technological expertise that is not available in the local market.⁹ Furthermore, these benefits are not only available to the major, established multinational firms that are the most active exporters. In science-based industries, the age and size of firms has little bearing on their export intensity.¹⁰ Small firms in both goods and services industries are increasingly able to access global markets through an array of digital platforms. In a survey done in collaboration with 1776, the global incubator, McKinsey Global Institute found that 86% of startups had engaged in some kind of cross-border activity.¹¹ In 1977, 84% of U.S. exports came from large multinational firms, but that share had fallen to 50% by 2013.

Exports are poised to become increasingly crucial to the competitiveness of U.S. firms in coming years, as 81 percent of global economic growth is expected to occur outside the U.S. through 2020. Despite these benefits, very few firms actually export. Some are too preoccupied with the day-to-day concerns of running a business. Others are hindered by lack of financing, high tariffs, language barriers, and difficulty locating sales targets. The majority of exporters tend to export inconsistently, which has worse effects on firm performance than not exporting at all (due to sunk costs). While state and federal

⁹ Robert Salomon and J. Myles Shaver. “Learning by Exporting: New Insights from Examining Firm Innovation.” *Journal of Economics & Management Strategy* 14 no. 2 (2005).

¹⁰ Jose Pla-Barber and Joaquin Alegre. “Empirical Approach to the Sequential Relationships between Firm Strategy, Export Activity, and Performance in U.S. Manufacturing Firms.” *International Business Review* 13 (2007).

¹¹ McKinsey Global Institute. “Digital Globalization: The New Era of Global Flows.” (2016).

governments have well-established export promotion programs, other EDOs are realizing that they have specific roles to play in helping firms connect to global markets.

Virginia – Trade Development for Mid-Market Firms

Established in 2002, Virginia Leaders in Exports Trade (VALET) is the Virginia Economic Development Partnership’s flagship international trade program. It is a cohort-based export accelerator that provides high potential mid-sized firms with business planning guidance, capital, and expert research resources for entering global markets and expanding exports. Recently, the core elements of the VALET program have been modified to help defense contractors diversify into global markets (given U.S. federal budget cuts and sequestration). Another related program enlists universities, chambers, and industry organizations to drive increased usage of VEDP export resources.

Sidebar: Exports and Global Engagement (see case study profiles section)

- Colorado – Advanced Industries Accelerator

Theme: External Innovation

Rationale for the theme:

External innovation (otherwise known as open innovation) is not new, but it has recently achieved mainstream status. Large firms are increasingly relying on various forms of partnerships with startups to lower R&D expenditures and bring in new ideas, technology, and talent. They are motivated by the threat posed by young, nimble companies: if current trends persist, 75% of today’s S&P 500 will be replaced by new market entrants by 2027.¹² A 2014 survey by KPMG found that 88% of corporate executives believed that they needed to collaborate with startups to be sufficiently innovative.¹³ Corporations are investing accordingly: a 2015 Accenture study found that half of the 100 largest companies have a corporate venture unit, and they invested twice as much in 2014 as in 2013.¹⁴ One third of large corporations have an accelerator or incubator program.

Large firms expect to continue to prioritize more collaborative approaches: just 26% of large firms currently engage in joint innovation projects with entrepreneurs, but 38% expect to in the next three years. For startups, these corporate collaborations can provide a host of benefits, including access to a large company’s customer base and supply chain, market knowledge and expertise, and funding. Corporate collaborations also offer opportunities for testing products at scale and establishing a brand’s legitimacy. While clearly mutually beneficial, this type of collaboration doesn’t happen seamlessly. Blame often falls on the cultural divide between flexible, fast-moving startups and bureaucratic, risk-averse corporations. As such, a number of public and private sector intermediaries have stepped up to facilitate connections.

¹² Innosight. “Creative Destruction Whips through Corporate America.” (2012).

¹³ Valeri Mocker, Simona Bielli, and Christopher Haley. “Winning Together: a Guide to Successful Corporate-Startup Collaborations.” Nesta. (2015).

¹⁴ Accenture. “Harnessing the Power of Entrepreneurs to Open Innovation.” (2015).

Illinois – Illinois Corporate Startup Challenge

The Illinois Corporate Startup Challenge, started in 2013, aims to build the capacity of the Illinois tech and innovation ecosystem by addressing the inefficiencies that prevent corporations and startups from productively collaborating. The program is essentially a highly curated matchmaking process between corporations in need of innovation and startups working on relevant technologies. It is designed to create real, tangible business partnerships in the form of pilot engagements, joint ventures, or investments.

Upstate SC – Mid-Market Innovation through Corporate R&D Commercialization

The Upstate region of South Carolina, in partnership with Clemson and the state, is creating ways for small and mid-sized companies to commercialize new and underutilized R&D in the region's major corporations, primarily in the advanced materials cluster. This initiative will take the form of an open innovation platform, IP collaboration toolkit, and supportive efforts by EDOs. It is designed to have impact beyond the direct benefits of commercialization. First, by developing a more collaborative ecosystem through connections between major corporations and smaller firms, the Upstate Alliance aims to attract foreign investment from manufacturers that value such collaboration. Second, by helping smaller firms gain credibility and exposure through innovation partnerships with larger firms, the Upstate Alliance aims to drive global venture capital and M&A activity towards companies that may not previously have been on the radar.

Sidebars: External Innovation (see case study profiles section)

- Ohio and Atlanta – Open Innovation Platforms
- Pennsylvania – Innovation Works Innovation Adoption Grant
- Milwaukee – Water Council Innovation Platform and Corporate Challenge

Theme: Mergers and Acquisitions

Rationale for the theme:

Mergers and acquisitions (M&A) are a growing market force. Though often unknown to EDOs, many firms are actively seeking to be acquired. In a survey of firms from a variety of industries with revenue from \$5 million to \$25 million, more than a third were in some way engaged in the M&A market – 9% were currently involved in a transaction and another 27% were open to the possibility in the next 12 months. The vast majority (87%) of foreign investment in the U.S. takes place via M&A. And M&A is a particularly pervasive force for venture-backed startups, accounting for 84% of exits since 2010.¹⁵

Despite the prevalence of M&A, EDOs have not typically been involved. They have viewed M&A as a highly confidential private sector undertaking that doesn't directly contribute to job creation goals and can be politically risky. That view, however, is beginning to shift. More EDOs are realizing that M&A can be good for the acquired firm and the region. Positive outcomes for acquired firms can take the form of a major cash infusion, access to managerial and technical expertise, higher innovation productivity, and the ability to exploit global distribution channels. Further, EDOs are realizing that they can play a role in

¹⁵ National Venture Capital Association

facilitating deals that are likely to have positive impacts, and positioning the firm and region to be top candidates for follow-on investment from the acquirer.

San Diego – M&A Matchmaking and Aftercare

Biocom and the San Diego Regional EDC both work to shape M&A by making connections and then providing aftercare services post-transaction. A main area of focus for Biocom is “capital development” for member firms. This revolves around events that enable large pharmaceutical firms from across the U.S. and world to make connections with local startups in order to invest in them or acquire them. The San Diego Regional EDC led the development of a regional foreign direct investment (FDI) strategy, a major component of which is to proactively respond to M&A activity through aftercare programs and ensure that San Diego is well positioned for further investment and expansion.

Sidebar: Mergers and Acquisitions (see case study profiles section)

- Korea – KOTRA Global Mergers & Acquisitions Support

Theme: City Partnerships

Rationale for the theme:

Urbanization is one of the defining trends of the 21st century. By 2025, close to 60% of the world’s population will live in urban areas. This urban boom is creating many challenges, and therefore opportunities for innovation. According to a 2016 White House report on “Technology and the Future of Cities”, urban innovation – including clean energy, water systems, construction technologies, and urban applications of the Internet of Things – is a “multi-trillion-dollar worldwide opportunity” for businesses. Frost and Sullivan predict that there will be 26 global “smart cities” by 2025, and that these will represent a \$1.5 trillion dollar market.

Many city governments are responding to the opportunities presented by new urban technologies. They are hiring chief technology officers, using data analytics to predict and solve problems, and deploying sensors to monitor air quality, traffic conditions, and safety issues. A few, however, are going one step further, finding ways to partner with tech startups to solve pressing urban issues. In doing so, they are seeking to achieve two goals at once. First, they are finding new ways to address challenging city problems. Second, they are supporting local innovation and technology transfer by helping researchers and startups use the city to test, scale, and ultimately commercialize technologies. This collaboration doesn’t happen without proactive efforts by city governments to make data available, streamline procurement processes, and enable startups to use the city as a test bed.

Chicago – UI Labs City Digital

City Digital is a collaborative partnership that brings together corporations, academic research institutions, and the city government to test and commercialize new solutions in areas such as physical infrastructure, energy management, transportation, and water and sanitation. City Digital works by running pilot programs that define an area of need for infrastructure innovation with city partners, identify appropriate technologies being

developed in Illinois startups and academic institutions, and then enable researchers and entrepreneurs to use the city as a test facility and first major customer.

Philadelphia – FastFWD Accelerator

FastFWD is a 12-week business accelerator that connects entrepreneurs with staff from eight city departments to collaboratively develop new approaches to city problems. Its first two cycles have included a total of 18 startups. The process is run according to an accelerator curriculum developed by GoodCompany Ventures, enhanced by the active involvement of city officials and research support from Wharton’s Social Impact Initiative. The program also facilitates connections with funders that can help finance and scale those approaches to other cities. Unlike City Digital, FastFWD has focused on “social entrepreneurship” technologies to address issues such as public safety, housing, and community stability, rather than infrastructure.

Implications: Post-Pipeline Phase

- If TEDCO’s mission is to grow jobs and the Maryland economy, then it must be concerned about what happens with companies after they graduate from its current set of programs.
- If TEDCO determines it is not going to directly work with companies past its current pipeline, then it needs to identify which organizations are providing those services, share industry- and firm-specific knowledge with them, and work with them to provide a smooth and effective transition.
- If TEDCO finds that certain post-pipeline services are vital to its firms but no organization currently provides those services, then it will need to either provide them itself or work with other organizations to determine who could provide them.
- If TEDCO wants to ensure that its client firms receive the best possible assistance after they graduate, they may need to accompany those firms to connect them with potential funders and other economic development service providers.