

The EDA i6 Challenge Program: Assessment & Metrics

Final Report

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SRI International**

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This project would not have been possible without the contributions of many people – too many to name individually, with the exception of Maryann Feldman, at UNC Chapel-Hill. In particular, we thank the i6 grantee staff for their help. We are especially grateful to the two grantees that hosted our site visits.

Due to the short deadlines required for this report not all grantees participated or were able to provide us with every piece of data we needed. Further, as discussed in greater detail below, the different data gathering approaches pursued were subject to a variety of constraints. The two rounds of funding for the i6 program covered in this report only date from 2010, and participants include a rich but difficult to capture variety of participants and partners. Within these limitations, we believe this report provides an accurate overview and detailed analysis of the i6 program. The findings and observations contained in this report are those of the authors and do not necessarily reflect the views of any particular interviewee or of the Economic Development Administration in general.

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Executive Summary

In order to ensure effective program implementation and rigorous evaluation, EDA partnered with the University of North Carolina (UNC) at Chapel Hill and SRI International, via a three-year cooperative agreement (FY2012-2014), to explore new performance metrics and assessment methods that will enhance the ability of all economic development practitioners and policymakers to design, implement, and evaluate programs in effective and rigorous ways.

This report on the **i6 Challenge Program** represents one element of the larger effort.

About the i6 Challenge Program

The i6 Challenge was launched in 2010 and aims to spur innovation, commercialization, and new enterprise formation by awarding up to \$1 million for projects (in each of the six EDA regions) that show the greatest promise of increasing and accelerating technology commercialization.

This multi-agency competition (including the National Institutes of Health, Small Business Administration, and National Science Foundation) is designed to accelerate technology commercialization and new venture formation, spur economic growth, and create jobs. The inaugural 2010 round focused broadly on innovation, technology commercialization, entrepreneurship, and regional economic development. In 2011, the competition was reformulated as the i6 Green Challenge, aimed at technology commercialization and new venture formation and focusing on the nexus between economic development and environmental quality to contribute to a vibrant, innovation-based clean economy.

The i6 Challenge activities are focused on individual entrepreneurs, start-ups, and small businesses, supporting them as they advance new technologies or new applications of existing technologies into the marketplace. The six funded projects in 2010 encompassed a wide

variety of industry sectors, including medical technology, biosciences, nanoscience, drug development, and sustainable building. The 2011 round funded six projects in the fields of renewable energy, energy efficiency, reuse/recycling/restoration, and green building technology.

Logic Model for i6 Program Evaluation

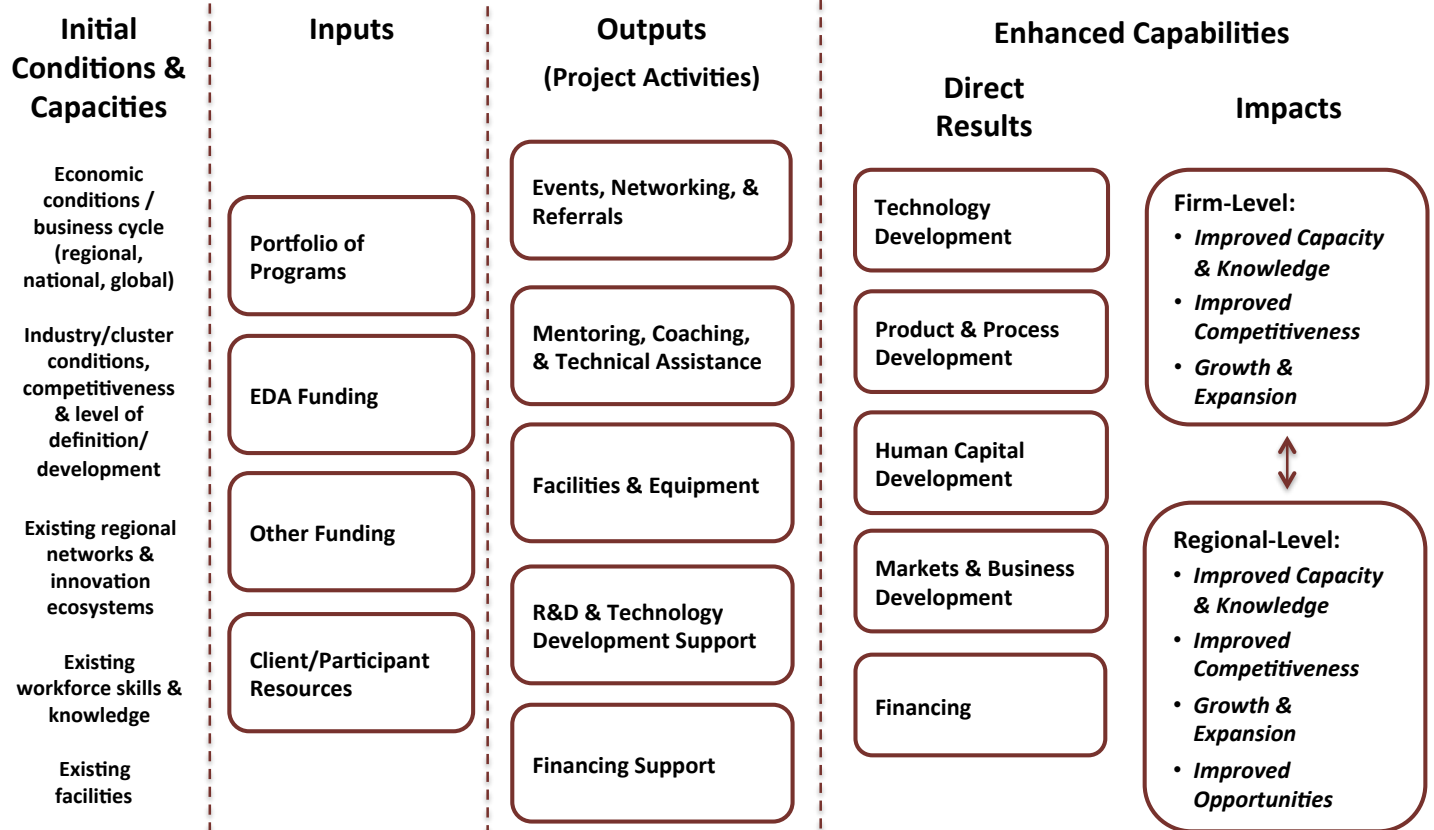
The i6 program engages in a diverse set of activities that focus on technology development and entrepreneurship; these yield diverse, not easily measured inputs, outputs, and outcomes. To address this diversity, the SRI team has created a logic model to serve as a framework for this study and for future i6 program assessments.

This report is organized around the components of the model:

- **Inputs:** Investments made in running the program.
- **Program Activities:** Activities performed by grantees and their clients/participants, which are the outputs of the program.
- **Enhanced Client Capabilities:** Direct/immediate benefits for participants and their broader impacts.

The focus of this study and the larger project is to identify and assess different metrics and data collection methods for conducting program evaluations; as such, the study does not assess the effectiveness of individual i6 grantee's approaches or the i6 Challenge program as a whole. However, the results reported below provide direction to grantees and EDA staff for the development and implementation of non-infrastructure programs in the future.

Recommended i6 Challenge Program Logic Model



- Each item in the logic model can be measured and evaluated using a variety of quantitative and qualitative metrics.
- A variety of data collection methods can be used to gather these metrics, as outlined below. Each method has its own pros and cons, and multiple approaches are optimal to build a full picture of program outputs and outcomes.

Sample Quantitative and Qualitative Metrics:

- | | | | | |
|--|--|---|--|--|
| <ul style="list-style-type: none"> • Regional, national cluster growth rates • Prior innovation metrics (patenting, etc.) • Ecosystem metrics • Prior workforce Skills, Qualifications, & Abilities (SQAs) | <ul style="list-style-type: none"> • Existing capabilities (staff, programs) • I6 grantee funding received from EDA • I6 grantee match funding (cost-share) • Technologies & ideas brought by clients/participants | <ul style="list-style-type: none"> • # of events, participation, & satisfaction • # of boot camps/accelerators, participation, & satisfaction • # of entrepreneurs mentored • New facilities established • # of joint research projects conducted • # of SBIR proposals supported | <ul style="list-style-type: none"> • # of technologies licensed or commercialized • # new business plans developed • # of new products launched by participants • # of employees with new skills • # of new business contacts made • # of new investment deals, loans, or grants | <ul style="list-style-type: none"> • Improved capacity to access capital • Workforce skills development • Market diversification • Improved innovation/entrepreneurship ecosystem • Job, revenues, and/or business growth • Growth of target cluster • New economic activities in a distressed region |
|--|--|---|--|--|

Possible Direct and Indirect Data Collection Methods:

- | | | | |
|--|--|---|--|
| <ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals) • Third party data (through a standard set of regional and cluster indicators maintained by EDA) | <ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Grantee site visits, interviews | <ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Client/stakeholder surveys (standardized survey instrument) • Grantee interviews, site visits | <ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Client/stakeholder surveys (standardized survey instrument) • Grantee interviews, site visits • Third party data (to measure increased cluster, industry, community, and regional-level capacity and impacts over the long run) |
|--|--|---|--|

i6 Program: Inputs

The “inputs” into the i6 program are the resources available and investments made in running the program and serving its clients. The key input categories from the logic model are listed to the right, together with possible metrics.

The input categories are very broad and could potentially be parsed into many different measures, but given the inherently qualitative nature of these metrics, systematic, program-wide measurement is largely impractical (other than for funding metrics). These inputs could be tracked by EDA in a broad, qualitatively rich way via grantee applications and should be considered as an important factor in program evaluation.

This heterogeneity in inputs contrasts with the fact that a majority of clients and participants in the program are entrepreneurs, start-ups, and other established businesses, as indicated in the chart below (for the purposes of this study, an entrepreneur is defined as someone with a business idea or new technology who has not yet established a corporate entity).

The chart below and the charts that follow are based on a short web-based survey of businesses and organizations that have received support or services as a result of the programs implemented by i6 grantees. The survey was distributed by eight i6 grantees and there were a total of 47 valid responses (roughly one-fifth to one-quarter of clients/participants invited to participate).

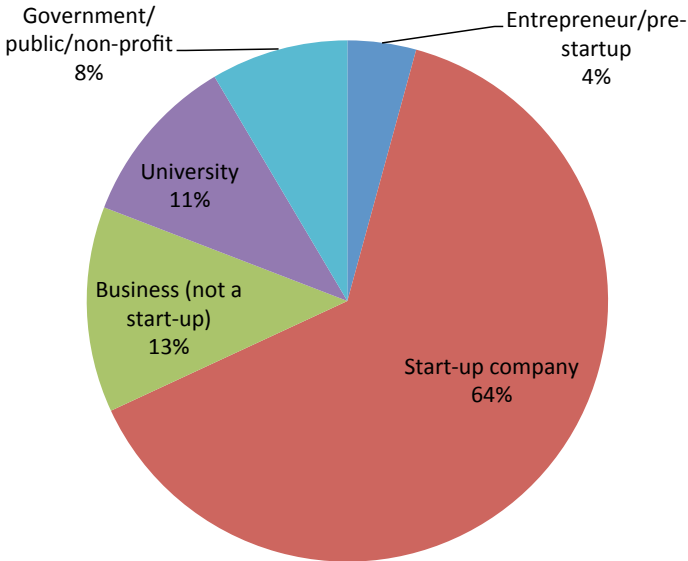
- Portfolio of Programs**
- Extent of grantee/partner staff support & expertise
 - Extent/quality of grantee networks of partners/stakeholders
 - Extent/quality of grantee/partner facilities, labs, etc.

- EDA Funding**
- Amount of EDA funding to grantee

- Other Funding**
- Amount of grantee match
 - Amount of other federal support (i6 and non-i6)
 - Amount of state & local funding
 - Amount of private & non-profit funding

- Client/Participant Resources**
- Availability of technology & innovative ideas
 - Availability of funding & cost-share for projects
 - Extent of staff expertise
 - Extent/quality of networks
 - Extent/quality of facilities

Types of Clients/Participants in i6 Grantee Programs



Source: SRI survey of i6 clients/participants

i6 Program Metrics: Project Activities (Outputs)

As illustrated in the logic model, the “outputs” of the program are a measurement of all of the activities performed by the i6 Challenge grantees and their partners, clients, and participants. The key activities are listed to the right, together with possible metrics. Outputs help quantify what the program is doing and whether it is implementing what it set out to do. They build participant capabilities and foster other program outcomes. The evidence is that clients and participants have a shared focus on the technology and regional cluster being supported, and engage fairly deeply with the i6 grantees in the areas of technology development and networks.

Key finding: i6 grantees engage their clients fairly intensively.

Events, Networking, & Referrals

- # of events & trainings: participation & satisfaction
- # of conferences, showcases, exhibitions: participation & satisfaction
- # of referrals made to outside services

Mentoring, Coaching, & Technical Assistance

- # of boot camps/accelerators: participation & satisfaction
- # of businesses/entrepreneurs receiving mentoring/coaching (& satisfaction)

Facilities & Equipment

- Sq.ft. & usage of new physical space provided for start-ups & businesses
- Sq.ft. & usage of shared facilities/labs/equipment

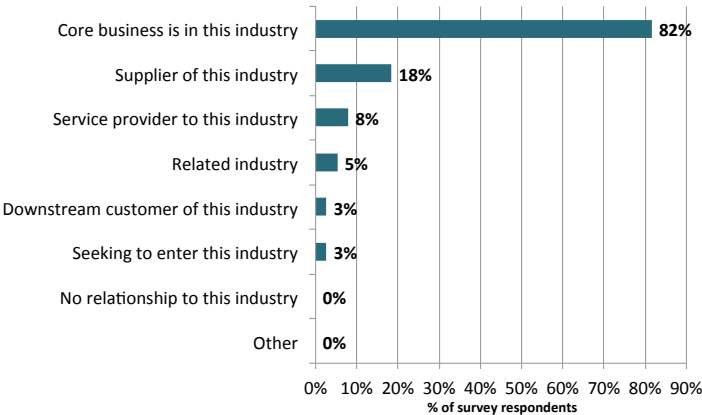
R&D & Technology Development

- # of joint research projects with entrepreneurs, start-ups, and businesses
- # assisted with technology transfer/commercialization
- # assisted with patents & regulatory approvals

Financing Support

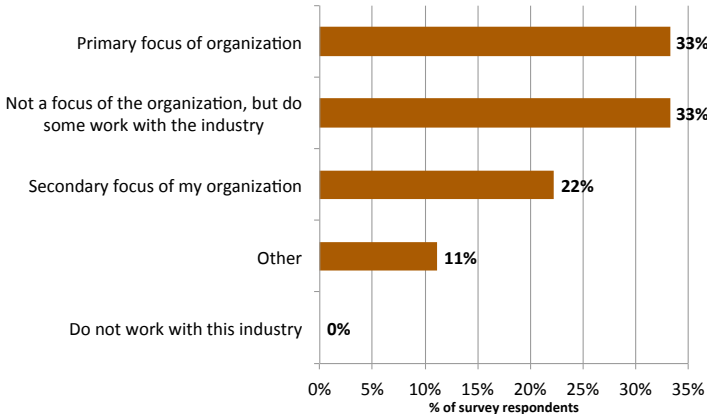
- # assisted in preparing a venture pitch/connecting with investors
- # assisted in grant/award proposals (e.g., SBIR) & success rate
- # of Angel/VC/seed competitions held & participation

Relationship of Business Clients/Participants to Industry Cluster Focus



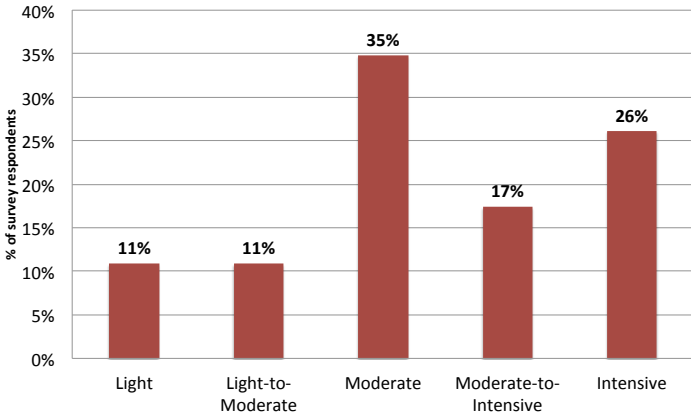
Source: SRI survey of i6 clients/participants

Relationship of Other Client/Participant Institutions to Grantee Industry Cluster Focus



Source: SRI survey of i6 clients/participants

Level of Client/Participant Engagement with i6 Program

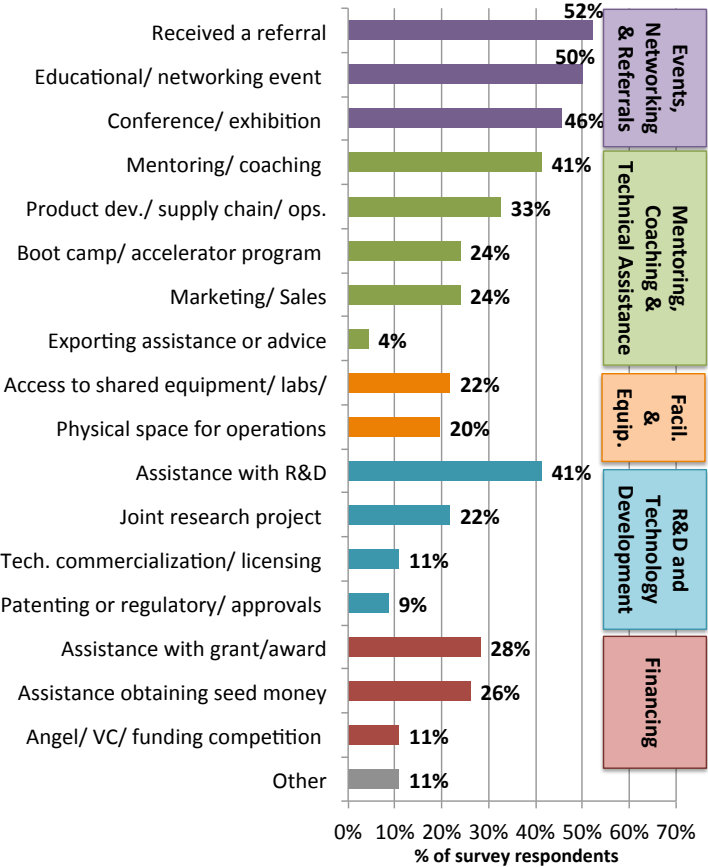


Source: SRI survey of i6 clients/participants

The range of activities that i6 Challenge grantees have engaged in illustrates the diverse types of services required to develop technologies and support start-ups, and that can lead to capacity-building in the long run.

Key finding: i6 grantees engage in a broad set of activities, especially those focused on networking and technology development.

i6 Grantee Activities



Source: SRI survey of i6 clients/participants

i6 Program Metrics: Enhanced Capabilities

The activities of the i6 program enhance the capabilities of the participating entrepreneurs and businesses (and to a lesser extent other participating organizations). These enhanced capabilities include the direct, short-term results of program activities (as described by the logic model categories to the right). They also lead to broader and longer-term impacts, as described on the next page.

Evidence from the client/participant survey indicates that over 90% of respondents attributed direct positive results for their capacity as a result of the services or support that they received through the i6 program; most reported results across multiple categories.

Key finding: Participants saw advancing technology and developing networks as the most significant direct results of i6.

Direct Results

Technology Development

- # of technology concepts advanced (Technology Readiness Levels / TRLs)
- # of technologies commercialized/ licensed (and royalties)
- # of patents, government approvals received

Product & Process Development

- # of businesses registered
- # of business/strategic plans
- # of new/improved products & processes
- # of businesses w/ cost, efficiency, quality improvements

Human Capital Development

- # of entrepreneurship/leadership programs completed & satisfaction
- # of technology/cluster-aligned degrees & certificates completed
- Extent of employee/management skills development in cluster firms
- Growth in knowledge about how to access outside assistance

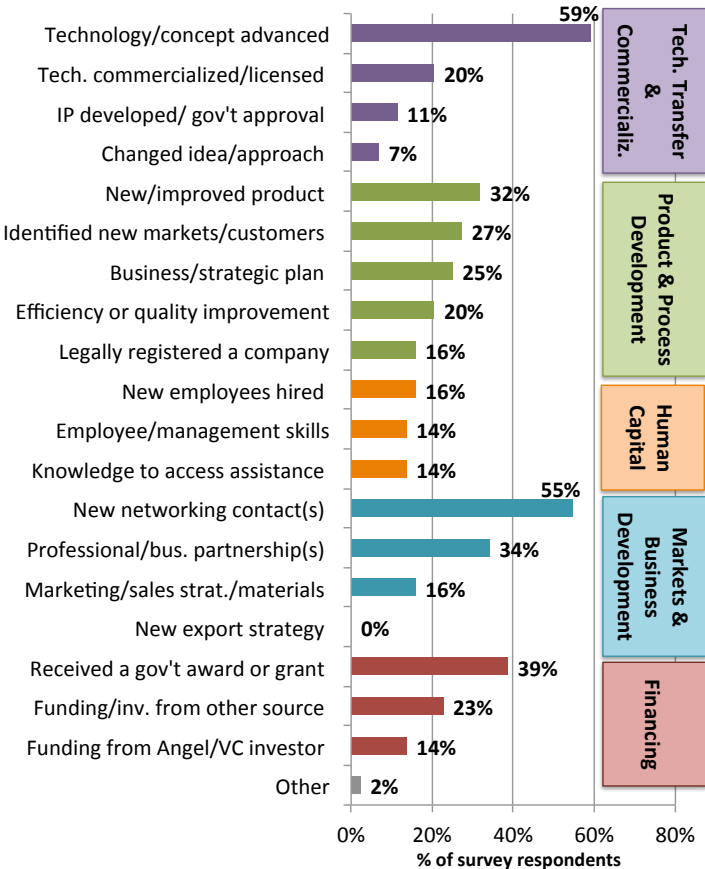
Markets & Business Development

- # of businesses with new network contacts or partnerships
- # of businesses identifying new markets/customers
- # of new sales/marketing strategy or materials
- # of export strategies & new export sales

Financing

- # seed/angel/VC deals + amount
- # of loans obtained + amount
- # of government awards/grants/loan guarantees + amount

Direct Results Experienced Through Participation in i6



Source: SRI survey of i6 clients/participants

The direct results experienced by i6 Challenge program participants (as described above) translate into broader impacts on entrepreneur, firm-level, and organizational capabilities, both in the short-term and long-term. These impacts include **increased capacity and knowledge, increased competitiveness, growth and expansion, and new opportunities**, and the impacts can occur at both the firm/organizational level and at the regional level (as described in the logic model categories to the right).

Key finding: i6 program impacts are broadly distributed for entrepreneurs/businesses.

Given that there were only nine respondents to this question from non-business/start-up participants in the survey, it is difficult to infer much from their responses. **However, seven of the nine indicated an improved innovation and entrepreneurship ecosystem in their region.**

Impacts

Firm-Level:

Improved Capacity & Knowledge

- Improved access to capital/investment
- Growth in management/employee capabilities and knowledge
- Expanded technical & business networks
- Environmental or energy efficiency improvements

Improved Competitiveness

- Increased productivity/efficiency
- Diversification, entering new markets, reaching new customers

Growth & Expansion

- Business stabilization/survival
- New/increased sales or revenues
- Increased employment
- New business creation
- Established a new location/moved business into the region
- Business acquisition or merger

Regional-Level:

Improved Capacity & Knowledge

- Workforce skills development
- Environmental or energy efficiency improvements

Improved Competitiveness

- Improved innovation/entrepreneurship ecosystem

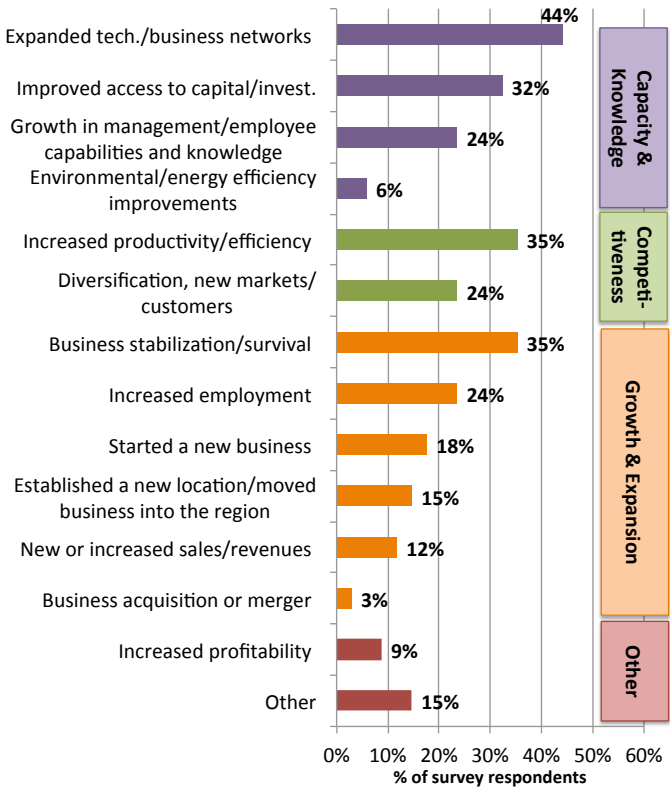
Growth & Expansion

- Growth/development of a key/targeted industry cluster
- Growth of existing businesses and/or startup of new businesses
- Growth of higher skill/wage job opportunities

Improved Opportunities

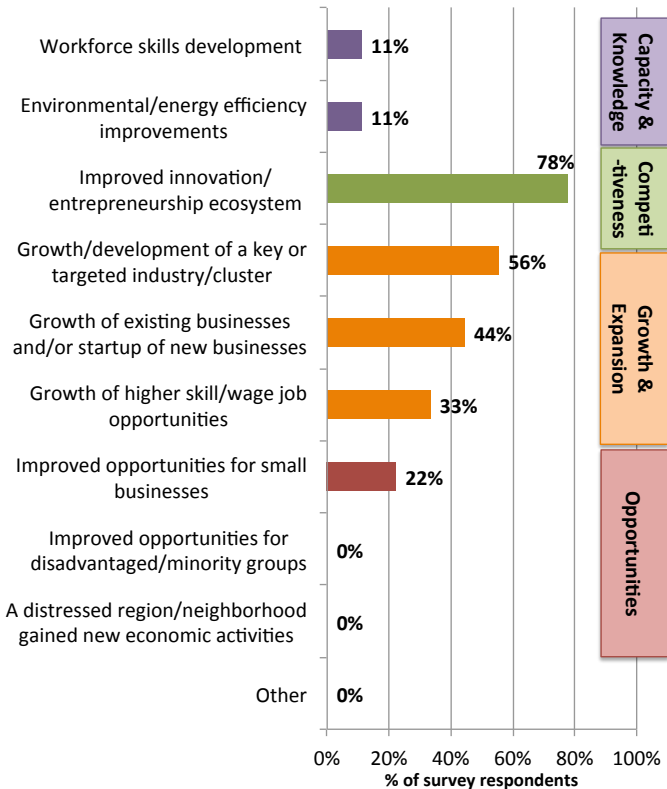
- Improved opportunities for small businesses
- Distressed region/neighborhood gains new economic activities
- Improved opportunities for disadvantaged/minority groups

Enhanced Firm-Level Capabilities: i6 impacts on Participating Entrepreneurs/Businesses



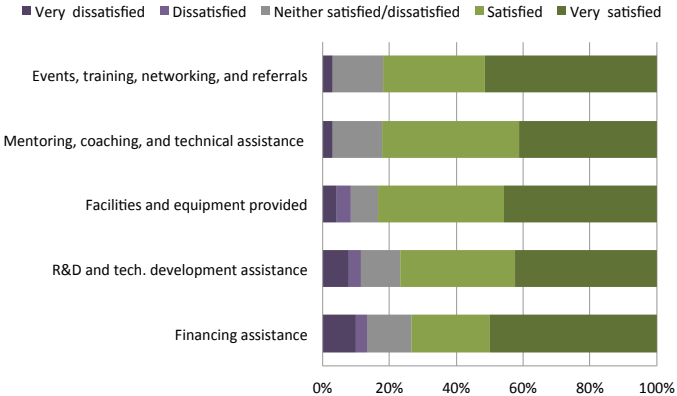
Source: SRI survey of i6 clients/participants

Enhanced Regional Capabilities: i6 impacts Experienced by Participating Organizations



The overwhelming majority of participants are satisfied or very satisfied with the various types of activities they participated in.

Client/Participant Satisfaction with i6



Source: SRI survey of i6 clients/participants

i6 Program Recommendations

Recommendation 1: i6 Program Data Collection Methods

Standardized EDA database

EDA should make the case to executive and legislative leaders for a significant investment in a single program database with a content management system open to grantees, home to standardized input, output, and outcome metrics (drawn from program logic models). The database should be appropriate to the needs of all EDA non-infrastructure programs and investments and would warrant the significant extra dollars (over and above existing program dollars) and EDA staff time (stretching over many months) that would be required.

Standardized use of metrics in program implementation

Successful program implementation and assessment requires reliable, consistent data. The metrics to be used, the protocols governing their collection, and the mechanisms by which they are reported and aggregated, should all be specified before the program is implemented. The FFOs should reference these elements, and their adoption and implementation by grantees should be a contractual requirement, governing the content of the technical reports submitted.

Recommendation 2: i6 Program Input and Activity Metrics

Program grantees should use Client Management Systems (CMS)

Many of the network-based activities supported through the i6 program should be tracked in a low-cost way through a Client Management System (CMS) and reported to EDA based on a standard protocol. Measuring network-based activities and outputs is difficult, and qualitatively rich tracking of this activity is likely to impose a burden on grantees and participants. However, because of the centrality of networks to the development of regional clusters and innovation ecosystems, it is recommended that a simple score card is maintained by grantees, using a CMS, to track interactions, exchanges, meetings, etc.

Program grantees should employ and report a standard survey instrument

Many program activities and outputs can be captured through required surveys of participants and clients, for which the EDA should supply standardized instruments and protocols (surveys are also indispensable for tracking outputs and new capabilities). This standardized survey should err on the side of simplicity, focusing on key activities and goals of EDA programs. The use of technology should make collecting and reporting this information into a central database relatively low cost.

Recommendation 3: i6 Program Technology Output and Capacity Metrics

Measure technology development with Technology Readiness Levels (TRLs)

i6 program grantees should employ a standard definition of Technology Readiness Levels (TRLs) to measure success in technology development. A key goal of the EDA, and indeed the U.S. government, is to build successful regional economies through technology development and innovation. This requires a shared measure of technology development. TRLs are used effectively by other Federal agencies, and should become standard practice across EDA programs.

i6 Program Recommendations (continued)

Recommendation 4: Sample Metrics and Possible Collection Methods

A variety of metrics are proposed and discussed throughout this report, organized and linked with the i6 program logic model that captures program inputs, activities, outputs, and outcomes. The graphic below presents a sample of some of the proposed metrics for program evaluation, along with possible data collection methods.

Initial Conditions & Capacities	Inputs	Outputs (Project Activities)	Enhanced Capabilities Direct Results	Impacts
Sample Quantitative and Qualitative Metrics:				
<ul style="list-style-type: none"> Regional, national cluster growth rates Prior innovation metrics (patenting, etc.) Ecosystem metrics Prior workforce Skills, Qualifications, & Abilities (SQAs) 	<ul style="list-style-type: none"> Existing capabilities (staff, programs) I6 grantee funding received from EDA I6 grantee match funding (cost-share) Technologies & ideas brought by clients/participants 	<ul style="list-style-type: none"> # of events, participation, & satisfaction # of boot camps/accelerators, participation, & satisfaction # of entrepreneurs mentored New facilities established # of joint research projects conducted # of SBIR proposals supported 	<ul style="list-style-type: none"> # of technologies licensed or commercialized # new business plans developed # of new products launched by participants # of employees with new skills # of new business contacts made # of new investment deals, loans, or grants 	<ul style="list-style-type: none"> Improved capacity to access capital Workforce skills development Market diversification Improved innovation/ entrepreneurship ecosystem Job, revenues, and/or business growth Growth of target cluster New economic activities in a distressed region
Possible Direct and Indirect Data Collection Methods:				
<ul style="list-style-type: none"> Grantee self-reporting (e.g., grant proposals) Third party data (through a standard set of regional and cluster indicators maintained by EDA) 	<ul style="list-style-type: none"> Grantee self-reporting (e.g., grant proposals, reports) Grantee/partner surveys (standardized survey instrument) Grantee site visits, interviews 	<ul style="list-style-type: none"> Grantee self-reporting (e.g., grant proposals, reports) Grantee/partner surveys (standardized survey instrument) Client/stakeholder surveys (standardized survey instrument) Grantee interviews, site visits 	<ul style="list-style-type: none"> Grantee self-reporting (e.g., grant proposals, reports) Grantee/partner surveys (standardized survey instrument) Client/stakeholder surveys (standardized survey instrument) Grantee interviews, site visits Third party data (to measure increased cluster, industry, community, and regional-level capacity and impacts over the long run) 	

I. Introduction

About This Study

The U.S. Department of Commerce's Economic Development Administration (EDA) is the only federal government agency focused exclusively on economic development. Economic development *creates the conditions for economic growth and improved quality of life by expanding the capacity of individuals, firms, and communities to maximize the use of their talents and skills to support innovation, lower transaction costs, and responsibly produce and trade valuable goods and services.* Economic development requires effective, collaborative institutions focused on advancing mutual gain for the public and the private sectors and is essential to ensuring the nation's economic future.

EDA recognizes that all of its programs should be designed in such a way as to allow for effective implementation and rigorous evaluation, in order to advance the objective of delivering smarter and more accountable government.¹ To that end, EDA partnered with the University of North Carolina (UNC) at Chapel Hill and SRI International, via a three-year cooperative agreement (FY2012-2014), to explore new performance metrics and assessment methods that will enhance the ability of all economic development practitioners and policymakers to design, implement, and evaluate programs in effective and rigorous ways.

The first phase of this project explored the various sources of digital data, from both private vendors and government agencies, which could be used to provide timely data that could be tailored to examine diverse configurations of firms within regions. This work culminated in the report,

¹ See Office of Management and Budget, Memorandum to the Heads of Departments and Agencies, July 26 2013, "Next Steps in the Evidence and Innovation Agenda."

*Innovative Data in Regional Economic Analysis.*² The second phase of the study developed an EDA logic model and piloted a set of metrics.³

This report on the **i6 Challenge** program represents one element of the larger effort, and has been produced alongside reports on parallel studies of the Jobs and Innovation Accelerator Challenge (JIAC) and Trade Adjustment Assistance for Firms (TAAF) programs.

Building on the three program-focused studies, SRI will refine and prepare final recommendations for EDA on applying useful metrics to an evaluation system that will support economic practitioners and program staff in program design, progress monitoring, and assessment.

Study Methodology

SRI has used a variety of traditional and non-traditional data-collection approaches to gather the information presented in this report. The research team began by augmenting the EDA logic model to capture the inputs, outputs, and desired outcomes of the i6 Challenge program. For each component of the logic model, the team has identified various data collection methods and metrics for effectively measuring and evaluating inputs, outputs, and outcomes. Data collection methods included i6 Challenge grantee site visits and interviews, an i6 Challenge client/participant survey, review of online and printed materials, the collection and analysis of metrics of regional capacity, and econometric analysis of an i6 Challenge client/participant database.

² Feldman, M. et al. (2012). *Innovative Data Sources for Regional Economic Analysis. Proceeding from a Conference.*

³ Feldman, M. & Lanahan, L. (2014). *Stage I: Initial Findings on Metrics and Potential Data Sources. Examining the i6 Challenge and the Jobs and Innovation Accelerator Challenge (i6) Projects.*

The SRI analysis of these data formed the basis for program recommendations on:

- Refining and improving EDA’s evaluation and data collecting methods for the i6 Challenge program;
- Identifying implications of the new evaluation methods and metrics for i6 Challenge program design and management.

The focus of this multi-program study is to assess the utility of different metrics and data collection methods for conducting program evaluations. While the study does not assess the effectiveness of individual i6 grantee’s activities, approaches, and outcomes, the data available to the project team about individual grantee programs were sufficient to provide a systematic understanding of the practices developed as part of program implementation. These inform the recommendations included in this report. The relatively short timeframe that the i6 program has been in existence (since 2010) means that longer-term outcomes cannot yet be detected.

About This Report

This report presents the following information and analysis:

II. Overview of the i6 Program. Provides a brief background on the i6 program and how it is currently implemented.

III. Framework for i6 Program Evaluation. Describes the key challenges faced in assessing the i6 Challenge program and presents a logic model and data collection methods explored by this study for conducting future evaluations.

IV. Measuring Inputs: i6 Grantee Characteristics. Presents the logic model structure, proposed metrics, and data collection methods for assessing i6 Challenge program inputs.

V. Measuring Outputs: i6 Program Activities. Presents the logic model structure, proposed metrics, and data collection methods for assessing i6 Challenge grantee activities.

VI. Measuring Enhanced Capabilities: Direct Results and Impacts. Presents the logic model structure, proposed metrics, and data collection methods for assessing enhanced client and participant capabilities that result from i6 Challenge grantee activities, along with the longer-term impacts these have at the firm and regional levels.

VII. Key Findings & Implications for Program Evaluation.

Presents the SRI team’s findings and recommendations on i6 Challenge program design, data collection, and evaluation methods, based upon the results of this study.

Appendix A: i6 Grantee Profiles. Presents a profile for each i6 Challenge grantee. Each grantee’s profile contains details that differentiate its approach in terms of program operations, success strategies, and measuring outcomes, along with a set of descriptive statistics about the center.

Appendix B: i6 Grantee Client/Participant Survey. Contains the survey instrument and summary results for the web survey of i6 Challenge clients/participants. The survey was distributed by eight i6 grantees and there were a total of 47 valid responses (roughly one-fifth to one-quarter of clients/participants invited to participate).

II. Overview of the i6 Program

The i6 Challenge is a multi-agency competition led by the U.S. Department of Commerce's Economic Development Administration (EDA) and including the National Institutes of Health (NIH), the Small Business Administration (SBA), and the National Science Foundation (NSF). The program encourages the creation of proof-of-concept centers that identify innovations to commercialize and helps them to put together the building blocks to create high growth, successful companies. These proof-of-concept centers are designed to accelerate entrepreneurial thinking among innovators and researchers, assist entrepreneurs and start-up companies, develop a network of experts to support entrepreneurs and new ventures, and spark future job creation and economic growth across the United States.

Description of the i6 Program

Launched in 2010, the i6 Challenge aims to spur innovation, commercialization, and new enterprise formation, with the ultimate purpose of helping to drive economic growth and job creation. The i6 program awards grants up to \$1 million for projects (in each of the six EDA regions) that show the greatest promise of increasing and accelerating technology commercialization.

To date, the i6 Challenge has included three funding rounds, one each year from 2010 to 2012. The inaugural 2010 round focused on technology commercialization and entrepreneurship. In 2011, the competition was reformulated as the i6 Green Challenge and was aimed at technology commercialization and new venture formation focusing on the nexus between economic development and environmental quality, to contribute to a vibrant, innovation-driven clean economy. In 2012, the focus of the program shifted to specifically target proof-of-concept centers that increase innovation and create processes to commercialize or implement innovation. Each round of the competition was funded primarily by EDA, with supplemental funding and other assistance provided by partnering agencies that differed for each round.

While each round of the competition had a slightly different theme, the unifying elements of technology commercialization, entrepreneurship, and collaborative partnerships to support regional economies remained constant. The idea of proof-of-concept centers was primary in the 2012 round, included in the i6 Green Challenge in 2011, and implicit in the inaugural 2010 round, with good reason.

Proof-of-concept centers aim to accelerate entrepreneurial thinking among innovators and researchers, create quality entrepreneurs and start-up companies, develop networks of experts to support entrepreneurs and new ventures, and spark future job creation and economic growth across the country. Proof-of-concept centers leverage and accelerate technology commercialization to fill in gaps in the commercialization continuum and also leverage regional strengths, capabilities, and competitive advantages.

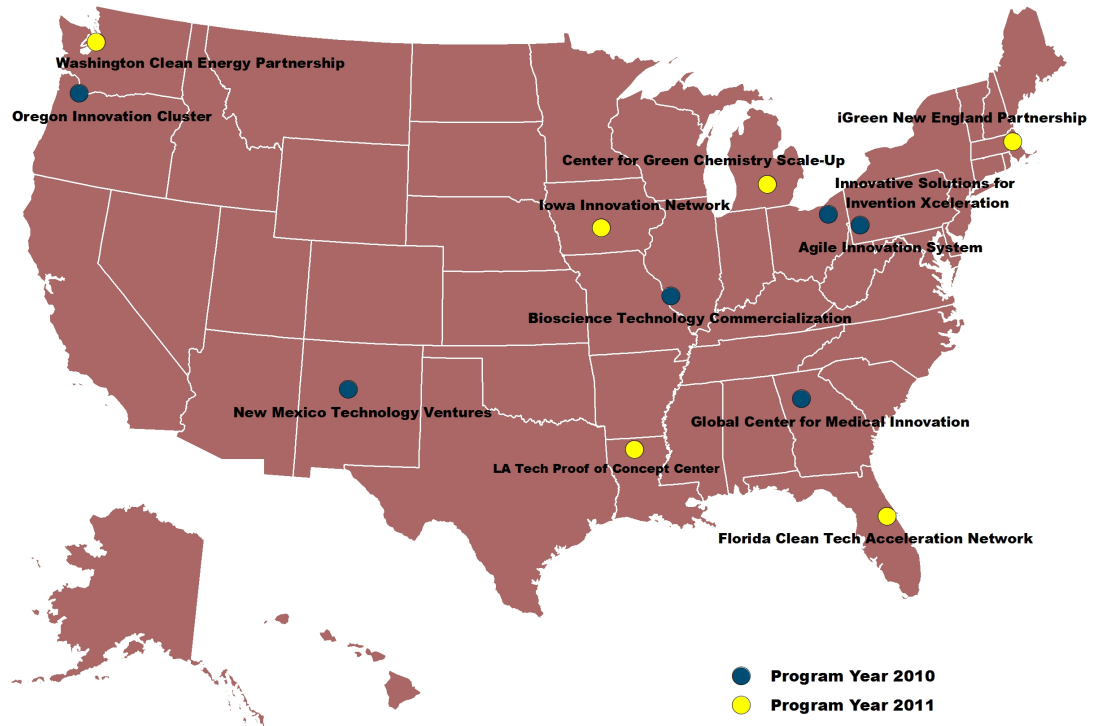
i6 Program Goals

The goals of the i6 program are centered on supporting innovation, entrepreneurship, innovative regional economic development, and commercialization of research. The 2012 round of the i6 Challenge specifically states that proposed projects must focus on one or more of these aims:

- **Innovation:** Projects that nurture innovation broadly, and market-based applications for that innovation specifically, through the:
 - Creation of a broad-based, expansive culture of idea-generation and the useful application of that innovation through R&D at universities and research centers;
 - Engagement of a diverse set of researchers, innovators, and practitioners; and
 - Engagement with industry professionals, investors, and successful entrepreneurs with innovation at its earliest stages.

Figure II-1

**EDA’s 2010 & 2011
i6 Challenge
Grantees**



- **Entrepreneurship:** Projects that develop a large number of high-growth entrepreneurs and create an ecosystem for them to experiment with and commercialize their innovation, as determined by:
 - Support of educational programs to prepare students and researchers for entrepreneurial challenges and work environments; and
 - Growth of the ecosystem to ensure a steady stream of high-growth start-ups to drive job and value creation.

- **Regional Economic Development:** Projects that drive economic development through the lens of innovation and entrepreneurship, as defined by:
 - The presence of special events to showcase technologies and entrepreneurs, promote the exchange of ideas, and the formation of new collaboration.
 - Engagement with local business associations and government to ensure that high growth entrepreneurs become part of the local business community.

- **Commercialization of Research:** Projects that convert ideas, research or prototypes into viable products and services that can be monetized and brought to market sustainably and rapidly, as defined by:

- Incorporation of mentors and industry catalysts that provide advisory services and linkages to external networks;
- Access to seed funding to support the commercialization of research through networks created by the organization or outside funding networks and tools;
- Assistance with market evaluation and business plan development; and
- Creation of processes that integrate scientific review with market potential to accelerate ideas from lab to market.

i6 Program Implementation & Grantee Characteristics

The i6 program’s objectives – support for centers for innovation and entrepreneurship that increase the commercialization of innovations, ideas, and research – mirror the Obama Administration’s focus on supporting innovation to promote viable economic development.

The 2010 grant cycle provided funding and assistance to six winning projects; one in each of the EDA regions (see Figures II-1 and II-2). Each of these six projects received \$1 million in funding from the EDA, for a total of \$6 million. In addition, supplemental funding and technical assistance was available from other federal agencies. NIH Phase II and Fast Track SBIR grantees that were part of a winning project were eligible for a total of up to \$500,000 in

supplemental awards from the NIH. Similarly, NSF Phase II SBIR grantees that were part of a winning project were eligible for a total of up to \$500,000 in supplemental awards from the NSF. The U.S. Patent and Trade Office (USPTO) also made available customized intellectual property seminars to entrepreneurs and innovators associated with the winning projects.

The project period for EDA activities was expected to last up to 2 years, with the option of EDA extending the period at its discretion. EDA funding also required a matching share of at least \$500,000 from non-federal sources, such that the amount of EDA assistance did not exceed 50% of total project costs (projects in high need areas were eligible to receive up to 80% of project costs subject to EDA's discretion). The matching share requirement could be met through in-kind contributions, such as space, equipment, services, or assumptions of debt.

The 2010 projects encompassed a wide variety of industry sectors, including medical technology, biosciences, nanoscience, drug development, and sustainable building. All projects focused on accelerating the development and commercialization of innovative ideas, products, and services, utilizing a variety of methods, including creating networks, building collaborations, supporting research, providing early stage funding, and generally addressing gaps in the commercialization continuum.

In the 2011 round, the i6 Green Challenge, six projects were funded, with five projects receiving \$1 million each in funding while the remaining project received \$500,000, for a total of \$5.5 million in EDA funding (see Figures II-1 and II-2). In addition, supplemental funding totaling up to \$6 million was available to NSF, Environmental Protection Agency (EPA), and U.S. Department of Agriculture/National Institute of Food & Agriculture (USDA/NIFA) SBIR Phase II grantees involved in winning projects. Non-SBIR supplemental funding was also available to winning projects from the EPA and Department of Energy (DOE). The U.S. Patent & Trademark Office (USPTO) and National Institute of Standards & Technology's Manufacturing Extension Partnership (NIST MEP) Centers also offered technical assistance to winning projects. The expected project period and matching share requirements for the i6 Green program were the same as those for the inaugural 2010 i6 program.

The winning projects for the i6 Green program were required to have a focus on one or more of the following green project outputs:

- Renewable Energy, including wind, solar, biomass, and geothermal energy;
- Energy Efficiency;
- Reuse/Recycling/Restoration, which includes advances in waste management practices, ecosystem restoration, and other activities that protect and revitalize natural and cultural systems; and
- Innovations in Green Building Technology and Manufacturing, including areas such as energy and water efficiency, materials, and indoor air quality, as well as manufacturing process innovations utilizing green technology.

This study focuses on the grantees from the first two i6 Challenge funding rounds in 2010 and 2011. While the majority of the funding for i6 grantees came from EDA, additional funding was available to winners in the form of supplemental funds from partner agencies, which included funding for related SBIR projects as well as non-SBIR related funding. This study focuses specifically on grantee activities funded by EDA. In practice, grantee activities funded by different agencies (as well as non-federal matching funds) were at times intermingled and complementary, and in some cases it was difficult and impractical for EDA activities, outcomes, etc. to be teased out by grantees in interviews. However, wherever possible, the contents of this report of focus specifically on activities funded by the EDA portion of the i6 Challenge grants.

See Figure II-1 (Page 4) and Figure II-2 (Page 6) for more details about the 2010 and 2011 i6 Challenge grantees that are included in this study.

Figure II-2

2010 and 2011 i6 Challenge Grantees						
Project Title	Grantee(s)	Key Partners	Location	Geographic Focus	Industry Focus	Total Funding Amount
2010 Grantees						
The Global Center for Medical Innovation	The Global Center for Medical Innovation	Georgia Institute of Technology	Atlanta, GA	Atlanta, GA and the Southeastern U.S.	Medical Devices	\$1,000,000
New Mexico Technology Ventures Corporation	Technology Ventures Corporation	Lockheed Martin; Sandia National Laboratories; New Mexico Angels	Albuquerque, NM	State of New Mexico	SBIR Phase I and II Companies	\$1,000,000
Innovative Solutions for Invention Xceleration (ISIX)	University of Akron Research Foundation; Austen BioInnovation Institute in Akron		Akron, OH	Northeast Ohio	Biomedical and polymer science	\$1,000,000
Bioscience Technology Commercialization	BioGenerator (subsidiary of BioSTL); Washington University; University of Missouri – St. Louis; Donald Danforth Plant Science Center; St. Louis County Economic Council; St. Louis Development Corporation		St. Louis, MO	St. Louis MSA	Bioscience	\$1,000,000
Agile Innovation System	Innovation Works; Carnegie Mellon University		Pittsburgh, PA	Pittsburgh, PA region	Technologies being developed in the region's universities and small businesses	\$1,000,000
The Oregon Innovation Cluster	Oregon Translational Research & Drug Development Institute (OTRADI); Oregon Nanoscience & Microtechnologies Institute (ONAMI); Oregon Built Environment & Sustainable Technologies Center (Oregon BEST)		Portland, OR	State of Oregon	Clean technologies, nanoscience, bioscience	\$1,000,000

Figure II-2

2010 and 2011 i6 Challenge Grantees						
Project Title	Grantee(s)	Key Partners	Location	Geographic Focus	Industry Focus	Total Funding Amount
2011 Grantees						
Igniting Innovation (I2)	University of Central Florida	Space Coast Energy Consortium; Florida Energy Systems Consortium; Space Florida; Florida High Tech Corridor Council; Technological Research & Development Authority	Orlando, FL	State of Florida	Clean technologies	\$1,000,000
Louisiana Tech Proof of Concept Center	Louisiana Tech University	Private companies co-investing in technologies	Ruston, LA	I-20 Innovation Corridor – North Louisiana, South Arkansas, West Central Mississippi, Northeast Texas	Green technologies	\$1,000,000
Proof of Concept Center for Green Chemistry Scale-Up	Michigan State University Bioeconomy Institute	Lakeshore Advantage; The Prima Civitas Foundation; NewNorth Center	Holland, MI	National	Green chemical technologies	\$500,000
Iowa Innovation Network	Iowa Innovation Council; Iowa State University	Iowa Economic Development Authority	Des Moines, IA	State of Iowa	Green technologies	\$1,000,000
iGreen New England Partnership	New England Clean Energy Foundation	Association of Cleantech Incubators of New England; Steering Committee Partners from each State	Boston, MA	New England States - CT, ME, MA, RI, NH, VT	Clean technologies	\$1,000,000
Washington Clean Energy Partnership Project -- WA Clean Energy Regional Innovation Cluster	Puget Sound Regional Council (PSRC); Innovate Washington Foundation; Clean Tech Open; South Seattle Community College		Seattle, WA	State of Washington	Clean energy	\$1,000,000

III. Framework for i6 Program Evaluation

A primary goal of this study is to explore how metrics and data collection methods may be used to assess the **i6 Challenge** program. To provide an overall structure for these metrics and how they support program evaluation, the SRI research team prepared an i6 Challenge program logic model that captures the key inputs, outputs, and outcomes of the program. This section lays out the rationale behind the logic model and explains how this model can be used as a framework for structuring future i6 Challenge program data collection approaches and metric identification.

Key Challenges for i6 Program Evaluation

A number of challenges exist in evaluating and measuring results for a program such as i6 Challenge, which engages in a diverse set of activities; serves a broad range of clients; and yields fairly diverse, not easily measured outcomes.

Heterogeneous i6 grantee approaches

The i6 Challenge program is aimed squarely at technology commercialization and new enterprise formation in support of regional economic development, with a different emphasis in each round of funding. This report has limited itself to studying the 2010 and 2011 rounds, since the third round is too recent to be reliably examined. The 2010 round of funding addressed technology transfer broadly, especially that section of the “research to deployment” continuum most in need of assistance (often referred to in the literature as the “valley of death”). The second round, i6 Green, emphasized technology transfer within the clean tech sector, aiming always at regional economic development. This makes for a narrower focus as compared to EDA’s Jobs and Innovation Accelerator Challenge (JIAC) program, in which the development and application of new technologies may play a role, but alongside other capacity-building activities aimed at sustaining a particular economic and regional cluster, including training and network development.

Nonetheless, the activities of i6 Challenge program grantees observed as part of this study indicate that grantees have approached their projects in very different ways and with different emphases. Examples of this diversity are captured in the i6 grantee profiles presented in *Appendix A*. For example, some grantees are fairly tightly tied into university or laboratory technology transfer programs and place a significant emphasis on a facility capable of providing technical support to entrepreneurs trying to commercialize a technology (such as through the provision of machine shops, clean rooms, instrumentation etc.). Others work at arms length with a number of research institutions, sometimes “virtually,” even as they support the development of university produced technology. Finally, each grantee focuses on a different technology space (sometimes broadly defined), and their geographic focus ranges from a single metro area, to a set of counties, to a multi-state region in one case, to nationwide in another case.

These factors lead to variations in the way i6 grantees implement their programs and interact with their clients. This variation makes sense given the variation in underlying circumstances (available partners, regional characteristics, etc.) but also creates challenges for assessment and analysis.

Difficult to define technology focus

Each i6 grantee focuses on advancing the development of a set of technologies defined either by a broad technological area (for example green chemical technologies) or sometimes by partner (for example, anything coming out of a national lab or key regional institutions). In practice, as became clear from the research team’s site visits, the boundaries of a grantee’s technology scope are often defined in part by the ideas, proposals, and innovations that come through the door. Since these, in turn, often flow from a grantee’s partners (hospitals, local firms, incubators, foundations, etc.) the kinds of technologies supported, and the services

provided, are endogenous to the partnerships that constitute the program.

Although the SRI team did not closely study the relationship between the geographic focus of each center and its level of technology/industry focus, observation indicates that there does not appear to be a clear correlation between the two. Among the programs that focus primarily on a specific metro area, two have a very specific technology focus (St. Louis' Bioscience Technology Commercialization and Atlanta's Global Center for Medical Innovation) while one has no technology focus at all (Pittsburgh's Agile Innovation System). Meanwhile, the one program that is national in its geographic scope (Proof of Concept Center for Green Chemistry Scale-Up) has one of the most specific technology focuses of all the grantees studied. The intensity of technology focus across the i6 grantees seems to reflect a number of factors, including the existing depth of cluster development in their regions; the specific needs identified in their regions; along with the number and nature of grant partners, their operational styles, and their capacity to pinpoint unique opportunities building off of existing regional assets.

Analytically, this has consequences for assessment in the short run, but less so in the long run. In the short run, program outputs are heterogeneous, with such diverse activities as design and engineering support, clean room use, entrepreneur boot camps, and regulatory approval – all mixed together, at different levels and in different ways by each partner. Tracking these activities is valuable, as grantees are careful to do, but outcomes cannot be inferred in the short run from the activities observed. Outcomes can be captured in the long run by standard measures of innovation (patents, SBIRs) and by using new indicators of the kind pursued by the larger indicators project (new product launches, etc.).

Both qualitative and quantitative outputs & outcomes

The goals and focus of the i6 program are broadly stated in the Federal Funding Opportunity (FFO) announcements, and the set of possible partners is expansive. Grantees are required in a general way to show impact through “quantifiable benefits” that help the regional economy (the i6 Green FFO refers specifically to jobs), but the specific metrics required are left up to the grantees themselves (who generally provide very detailed, but widely varying, reports on activities and outcomes). This report, therefore, will focus on activities and outputs that can be collected and reported in a consistent way, using in

many cases those metrics adopted by grantees. The metrics employed are both qualitative and quantitative. Those metrics that are (or could be) collected in a direct way will apply mainly to inputs and outputs; those metrics obtained through third-party sources can be indirectly collected.

For the purposes of this report, direct collection of information is an indispensable complement to the third-party approach, with information obtained through self-reporting, interviews, and surveys. In the future, the importance of the direct approach should decline as the use of third-party indicators becomes more firmly established.

Direct collection can be made less burdensome by establishing a single protocol and a single set of desired measures, capable of being reported through a common content management system into a single database. This discussion will be continued in the recommendations section of this report (see *Section VII*).

External forces and causal relationships

A key challenge for outcome measures and third-party indicators is attribution. Local, national, and international economic conditions; technology trends; workforce availability; the depth and availability of financial and other business support services; and the density of social and business networks continuously shape program partners and participants.

In the context of capacity-building, with its several critical elements, one approach is to apply capacity measures to a region and/or cluster before the program, and then track these indicators over the long term. This is an idea at the heart of this project, but requires a much greater timeframe than available to the team working on this report. The discussion of capacity metrics will illustrate how this could be done, even if the present program offers only a very limited opportunity to apply this approach.

Use of Logic Models for Program Evaluation

To address many of the challenges described above, the SRI team has created a logic model to serve as a framework for this study and for future i6 Challenge program evaluations. The value of a logic model is that it provides a clear, graphical framework for identifying program inputs, outputs, and outcomes/impacts, as well as the logical, “if-then” relationships across these

components. Logic models are well-established as useful programmatic tools for a number of purposes.⁴

Recommended Logic Model for i6 Program Evaluation

SRI's articulated logic model for the i6 Challenge program is presented on the following page. The i6 Challenge Program logic model was informed by a variety of information sources and inputs, including individual i6 grantee interviews and site visits, review of program documents and past evaluations, etc. As illustrated in the graphic below, each section of the logic model (inputs, activities/outputs, outcomes) can be measured and evaluated by a wide variety of possible metrics. These metrics can be gathered and tracked via a variety of different data collection methods.

The value of the i6 logic model as a programmatic tool is that it can help address many of the evaluation challenges described above:

- It can capture the heterogeneous issues and needs of i6 participants, as well as the heterogeneous approaches used by grantees to work with their partners and participants.
- It captures both qualitative and quantitative activities, outputs, and outcomes via a variety of data collection methods.
- It can account for key immediate capacity-building and qualitative outcomes, while logically relating these to longer-term quantitative outcomes (such as firm sales and job growth).
- It acknowledges the many external forces and underlying conditions that affect firms and participants outside of the work they do via the i6 program – therefore addressing the issue that many program outcomes can be captured logically and qualitatively, but cannot always be “proven” statistically.

⁴ For good primers on logic models and their uses, see: W.K. Kellogg Foundation (January 2004), *Logic Model Development Guide*, <http://www.wkkf.org/resource-directory/resource/2006/02/wk-kellogg-foundation-logic-model-development-guide>; W.K. Kellogg Foundation (March 2001), *Executive Summary: Introducing Logic Models*, http://www.innonet.org/resources/files/Introducing_logic_models.pdf; and Innovation Network (December 2010), *Logic Model Workbook*, http://www.innonet.org/client_docs/File/logic_model_workbook.pdf.

SRI team recommends that this type of logic model could be used by EDA for the i6 program in the future to structure and guide grantee proposals, program management, data collection, and evaluation.

The remaining chapters of this report explain and discuss key sections of the logic model: program inputs (*Section IV*), activities/outputs (*Section V*) and enhanced capabilities (*Section VI*).

Each of the chapters that follow review, in detail, the data collection methods and key metrics to be used for measuring and evaluating each component of the logic model. The pros and cons of various data collection methods are discussed, as well as what metrics *should* be gathered for improving i6 program management and evaluation. The final chapter (*Section VII*) then provides the SRI team's overall recommendations about how to use this logic model to improve i6 program data collection and evaluation, as well as the implications for improving program design, monitoring, management, grantee selection, and so on.

A Note About Initial Conditions & Capacities

It is important to note that the logic model takes a set of underlying conditions relating to economic, industrial, and regional conditions and competitiveness as the starting point, as these have an important influence on expected outcomes and program success.

Each i6 grantee begins work from a different “baseline” in terms of the level of technology development and innovation capacity, network and innovation ecosystem development, workforce skills, facilities available, and so on. Some grantees utilize their i6 award to put in place the infrastructure and networks needed to nurture of a variety of nascent technologies (for example, Iowa Innovation Network and LA Tech Proof of Concept Center). Some seek to focus on catalyzing specific technologies that are already well-rooted in their regions (for example, Global Center for Medical Innovation and Washington Clean Energy Partnership). Others (such as St. Louis Bioscience Technology Commercialization and Oregon Innovation Cluster) have already established a foundation of support for their target technologies and use their i6 award to extend and expand these activities.

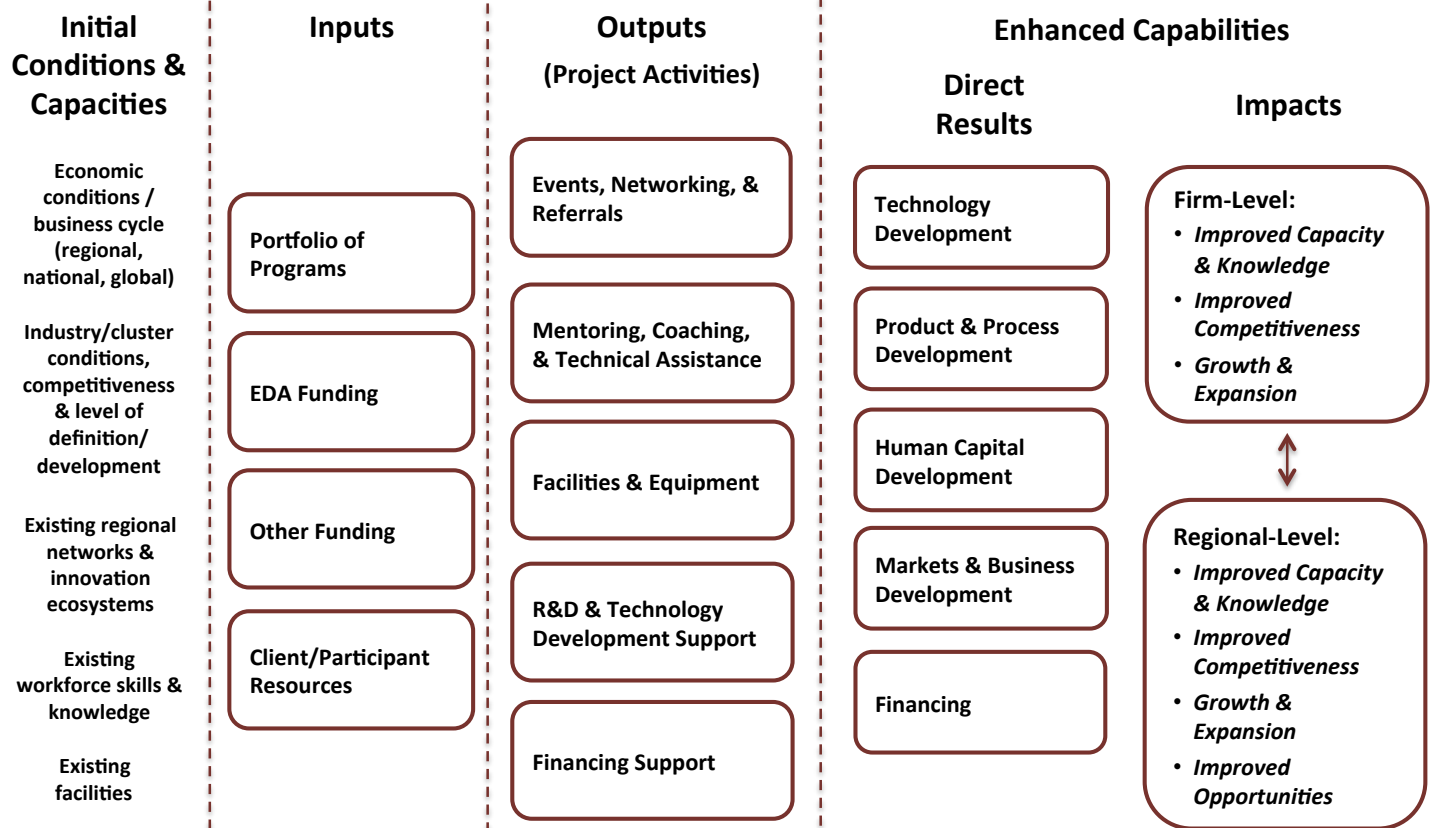
In addition, each i6 awardee's region has a different set of underlying economic conditions in terms of growth trends, unemployment, and other measures of economic

“success” or “distress.” For example, recent economic growth trends in cities such as Atlanta, GA are very different than those experienced by other i6 grantees in regions such as northern Louisiana and northeast Ohio. These factors influence the outcomes that might be expected from individual grantee’s programs.

The i6 program FFO requires all applicants to provide in their grant applications some baseline information of this nature, including identification of a real or persistent problem or an unaddressed opportunity, identification of key challenges facing the region’s entrepreneurs and innovators, and a plan to leverage regional strengths and mitigate weaknesses. This data can and should be mined by EDA in the future to establish important baseline measurements for grantees, to be used in program evaluation; recommendations to this effect are discussed further in *Section VII*.

Technology Readiness Levels (TRLs) – discussed in more detail in *Section VI* and *Section VII* – are another tool that could be employed to establish underlying/baseline conditions for grantees, gauge progress against this baseline over time, and compare baseline conditions against program outcomes.

Recommended i6 Challenge Program Logic Model



- Each item in the logic model can be measured and evaluated using a variety of quantitative and qualitative metrics.
- A variety of data collection methods can be used to gather these metrics, as outlined below. Each method has its own pros and cons, and multiple approaches are optimal to build a full picture of program outputs and outcomes.

Sample Quantitative and Qualitative Metrics:

- | | | | | |
|--|--|---|--|--|
| <ul style="list-style-type: none"> • Regional, national cluster growth rates • Prior innovation metrics (patenting, etc.) • Ecosystem metrics • Prior workforce Skills, Qualifications, & Abilities (SQAs) | <ul style="list-style-type: none"> • Existing capabilities (staff, programs) • I6 grantee funding received from EDA • I6 grantee match funding (cost-share) • Technologies & ideas brought by clients/participants | <ul style="list-style-type: none"> • # of events, participation, & satisfaction • # of boot camps/accelerators, participation, & satisfaction • # of entrepreneurs mentored • New facilities established • # of joint research projects conducted • # of SBIR proposals supported | <ul style="list-style-type: none"> • # of technologies licensed or commercialized • # new business plans developed • # of new products launched by participants • # of employees with new skills • # of new business contacts made • # of new investment deals, loans, or grants | <ul style="list-style-type: none"> • Improved capacity to access capital • Workforce skills development • Market diversification • Improved innovation/entrepreneurship ecosystem • Job, revenues, and/or business growth • Growth of target cluster • New economic activities in a distressed region |
|--|--|---|--|--|

Possible Direct and Indirect Data Collection Methods:

- | | | | |
|--|---|---|---|
| <ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals) • Third party data (through a standard set of regional and cluster indicators maintained by EDA) | <ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Grantee site visits, interviews | <ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Client/stakeholder surveys (standardized survey instrument) • Grantee interviews, site visits | <ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Client/stakeholder surveys (standardized survey instrument) • Grantee interviews, site visits • Third party data (to measure increased cluster, industry, community, and regional-level capacity and impacts over the long run) |
|--|---|---|---|

Study Data Collection Methods

As described above, the nature of the i6 Challenge program requires both quantitative and qualitative data collection methods to capture the depth of what the program does and how it impacts client firms and other participants. UNC and SRI employed and compared both direct and indirect data collection methods to gather the information presented in this study. The various data collection methods employed allowed the research team to assess the usefulness of various methods and metrics for measuring components of the i6 Challenge program logic model presented above.

Review of Reports and Background Materials

SRI reviewed each i6 Challenge grantee's website and other background materials and printed materials supplied by many grantees. These documents provided a baseline of inputs into the analysis presented in this report, supplementing what was gathered via interviews, surveys, and data analysis.

i6 Grantee Interviews and Site Visits

Guided by an interview protocol, the team visited two i6 grantees to conduct in-person interviews with program directors and their staff; the remaining nine grantees were interviewed via telephone.

The site visit locations [The Global Center for Medical Innovation in Atlanta, GA, and the Innovative Solutions for Invention Xceleration (ISIX), in Akron, OH] were chosen to cover different geographic regions and different types of i6 programs. These visits enabled team members to gather the rich information that comes only from in-person meetings, in order to inform the interview protocol for the remaining grantees, nine of which were interviewed in a 45-90 minute telephone call.⁵ Interview results are used and presented throughout this report as a key component of program evaluation, and also provided important inputs into the i6 Grantee Profiles presented in *Appendix A*.

i6 Client/Participant Survey

The SRI team conducted a short web-based survey of businesses and organizations that have received support or services as a result of the programs implemented by i6 grantees, which we term *i6 clients/participants*. The

survey was designed to gather their direct inputs on experiences, outputs, and impacts from their participation in the i6 Challenge program. The survey instrument was designed based on findings from the i6 interviews and site visits (the survey instrument and summary results are provided in *Appendix B*).

Grantees of the i6 Challenge distributed the anonymous survey, on behalf of SRI, directly to their own clients/participants via an invitation email and web link. The target population was defined as any businesses, organizations, or individuals that had received services from each i6 grantee's program. The survey was distributed by eight of the twelve i6 grantees from the 2010 and 2011 rounds, and responses were received from clients/participants of seven grantees, for a total of 47 valid responses. While it is not possible to calculate the distribution of responses, nor an exact response rate, due to the indirect and anonymous way the surveys were distributed, we estimate that roughly one-fifth to one-quarter of those invited to participate responded. Given the modest response rate and the difficulties of interpreting non-response, especially in an anonymous survey, the findings of the survey provide a useful illustration of how the program can and often does work – but are not necessarily representative of the total i6 client/participant population.

⁵ One grantee did not respond to the research team's request for an interview, so in total, eleven out of the twelve grantees from 2010 and 2011 were interviewed either in-person or via telephone.

IV. i6 Inputs: Grantees, Partners & Resources

The “inputs” into the i6 Challenge program are the resources available and investments made in running the program and serving its clients. While these inputs of course include the financial resources invested in the program, they also include a variety of other less obvious and less tangible factors, such as the experts, staff, and others dedicated to supporting program participants. The scope and quality of the resources invested in the i6 program by any particular grantee and its partners clearly have an effect on the types of outputs and the magnitude of impacts that can be expected to result from the program.

As illustrated in the i6 Challenge logic model, the SRI team has identified four categories of inputs into the program, related to: 1) the portfolio of existing programs; 2) EDA funding; 3) other funding; and 4) client/participant resources. The following sections elaborate on each of these categories of inputs, although systematic, program-wide measurement of these metrics is largely impractical. A good, qualitatively rich understanding of the inputs mobilized by each grantee and its partners is critical to assessment, but comprehensive comparative metrics are impractical.

Federal financial inputs and grantee match funding for i6 are presently being measured consistently. Tracking some other selected, non-financial inputs would add a useful dimension to understanding the program’s operations. The SRI team recommends that EDA track in a broad and qualitatively rich way the inputs mobilized by grantees as part of their i6 Challenge program (for example, through standardized categories required on grant applications and/or in quarterly/annual reports), while recognizing the difficulties of a more systematic approach to this piece of the logic model.

i6 Logic Model – Inputs

Portfolio of Programs

- Extent of grantee/partner staff support & expertise
- Extent/quality of grantee networks of partners/stakeholders
- Extent/quality of grantee/partner facilities, labs, etc.

EDA Funding

- Amount of EDA funding to grantee

Other Funding

- Amount of grantee match
- Amount of other federal support (i6 and non-i6)
- Amount of state & local funding
- Amount of private & non-profit funding

Client/Participant Resources

- Availability of technology & innovative ideas
- Availability of funding & cost-share for projects
- Extent of staff expertise
- Extent/quality of networks
- Extent/quality of facilities

Portfolio of Programs

- **Extent of grantee/partner staff support & expertise**
- **Extent and quality of grantee networks of partners/stakeholders**
- **Extent and quality of grantee/partner facilities, labs, etc.**

While new entities are often established as a result of successfully applying for an i6 grant, it is fair to say that all grantees are building on existing institutions and existing activities. The partners who collaborate on an i6 application bring technologies ready for transfer, facilities useful for advancing the technologies, and a wide range of other networks that provide support to program participants (although it should be noted that one clear differentiating factor among grantees is the use of EDA resources to establish a new facility, as opposed to coordinating the work of existing facilities within an enlarged network).

Coordinating and enlarging the work of existing facilities and institutions should not be seen as the duplication of existing efforts. Rather, this is a key feature of the i6 program. The FFO specifically requires that the applicant “leverage existing infrastructure and institutions, such as economic development organizations, academic institutions, or other non-profit organizations, in new and innovative ways.” The intended effect, in the long run, will be to build and expand existing innovation ecosystems and economic development capacity. Leveraging existing assets is the best way to obtain the highest return on the public resources invested.

The i6 Green initiative sees proof-of-concept centers as the hub that coordinates and delivers program activities, incorporating “... a range of services in support of innovation-based, high growth entrepreneurship – from technology and market evaluation, through business planning and mentorship, and on to early stage access to capital.” This network hub is designed to give focus to program activities. (We note that in some cases, for example the Florida Cleantech Acceleration Network, the proof-of-concept center is virtual.)

The implication for assessment is that the existing capabilities of grantees are worth being tracked (to the extent possible in a straightforward and streamlined way), because we expect to observe a connection between these capabilities and program outputs/outcomes.

Unfortunately, due to limited access to grantee proposals, the SRI team was unable to use the budget documents submitted with i6 proposals to estimate their **staff size and characteristics**. However, that data could be tracked by EDA in the future (especially if future grant applications and quarterly/annual reports specifically request such information).

Networks are even more difficult to track, yet are clearly recognized in the academic literature and by practitioners as crucial to economic development success. They resolve information problems, build trust, and foster the spillovers that are at the heart of successful regional clusters. A very simple requirement would be for applicants to have in place at the time of the application a basic Client Management System (many grantees already use some kind of CMS). Simply keeping score of the quantity of interactions among partners and participants has limited value. But, if part of the i6 program is to enlarge networks and use them more intensively, then some kind of low cost tracking is helpful, even if subject to all the drawbacks of self-reporting.

Grantees and partners also bring **physical assets** to the table, as noted above, which in principle are easier to measure. However, a clean room or wet lab has a very different value compared to an incubator conference room. Since spaces of these kinds often have local market values, the \$ per square foot for an annual lease could be a useful reporting metric (and the value of equipment made available can also be estimated), but the dollar value of these facilities is far less important than their intangible value in advancing the development and growth of participating entrepreneurs, firms, and partners. As with the other metrics discussed above, the physical assets brought to the table by grantees are difficult to track in a quantitative, systematic manner, but could be tracked qualitatively by EDA by drawing upon information provided in grant applications and grantee quarterly/annual reports (especially if these forms specifically request such information).

EDA Funding & Other Funding

- Amount of EDA funding to grantee
- Amount of grantee match
- Amount of other federal support (i6 and non-i6)
- Amount of state & local funding
- Amount of private & non-profit funding

EDA funding is automatically tracked by the i6 program, as are funds from NIH, NSF, and (in the case of the 2011 FFO) DOE. Tracking the grantees' match is also automatically part of the application process. Taken together, overall program funding is roughly at the same level for each grantee (with some variation in the match, both in level and kind – for example space vs. personnel, etc.).

More interesting is to track the level and source of other funds – state and local, non-profit etc. – that are mobilized by the i6 grantees and partners. These resources are valuable in themselves and are good proxies for the commitment of the partnership network supporting i6 projects. The number and levels of outside resources tapped into by grantees should be a strong predictor of outputs and impact. Outside resources mobilized in the course of the grant would be welcome items to be included as part of grantees' quarterly/annual reporting requirements.

Client/Participant Resources

- Availability of technology & innovative ideas
- Availability of funding
- Extent of staff expertise
- Extent and quality of networks
- Extent and quality of facilities

The clients and participants involved with each i6 project are quite heterogeneous, although are generally dominated by individual entrepreneurs, start-ups, and a few more established businesses. As can be seen in Figure IV-1 (based on the SRI survey of i6 clients/participants), over 80% of survey respondents were entrepreneurs, start-ups, or established businesses. Public/non-profit and higher education entities comprised the remaining respondents. While the survey response rate was modest, this result is consistent with the purpose of the i6 program, which is to focus on the needs of entrepreneurs and innovators.

What this means is that most clients/participants bring little to the table except talent and technologies. The

grantees and their partners are the key to bringing other resources, such as staff, facilities, and their own networks – all things that cannot be easily captured or measured.

Third-party indicators have an important role here. They can capture the technology level of the cluster in which the clients/participants are embedded; they can capture skill levels in a region or cluster; they can map existing facilities and other assets; and they can also capture entrepreneurial networks. The characteristics of those who participate in the i6 grantees' work are likely to mimic these independent estimates. Indeed, these estimates can be used to judge the value of a grant application, as being predictive of the key characteristics brought to the table by the program clients and participants. They can also be used to track changes and growth in these characteristics over time, as program outcome measures.

Types of Clients/Participants in i6 Grantee Programs

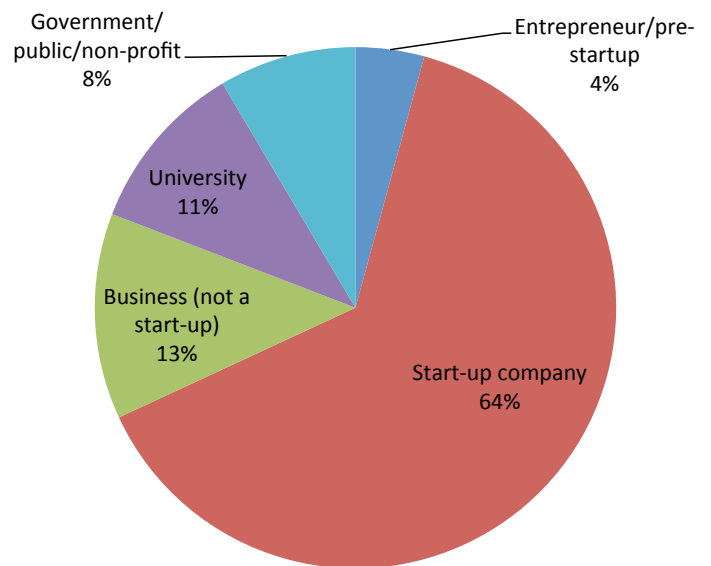


Figure IV-1

Source: SRI survey of i6 clients/participants

i6 Challenge Program Inputs: Two Case Study Examples

Global Center for Medical Innovation (2010 Grantee)

Atlanta, Georgia's *Global Center for Medical Innovation i6 Project* was designed to catalyze development of the medical device cluster in the Atlanta metro region and the southeastern United States. The Georgia Institute of Technology (Georgia Tech), where the project is based, has long been known for medical device research and innovations, spanning its strengths in both biosciences and engineering. Georgia Tech's unique, interdisciplinary Bioengineering graduate program (a partnership with Emory University) is one of the top-ranked Ph.D. programs in the country. The State of Georgia is also home to one of the nation's largest bioscience clusters, largely centered in the Atlanta metro area, with 433 bioscience companies employing nearly 20,000 people as of 2012 (see http://selectgeorgia.com/publications/Bioscience_Industry_Report.pdf). In spite of these strengths, regional stakeholders noted that there were not a lot of medical devices being commercialized out of Georgia Tech, and medical devices was not a particular cluster strength in the region. The Global Center for Medical Innovation (GCMi) was founded to address this challenge; it provides a physical space and supporting services to promote medical device development and commercialization. The idea for GCMi was in place before the i6 Challenge program was announced, and regional stakeholders identified i6 as an opportunity to fund the project and get it started.

GCMi operates as a partnership of four of Georgia's leading research and health care organizations: Georgia Tech, Saint Joseph's Translational Research Institute (SJTRI), Piedmont Healthcare, and the Georgia Research Alliance. GCMi is staffed by an executive director with over 12 years experience in medical technology commercialization, along with an experienced biomedical engineer and a machinist, who bring their extensive knowledge to support the researchers and startups working in the center. The program is also supported by an Advisory Board closely affiliated with Georgia Tech, including members of the Georgia Tech Biomedical Engineering Department, the head of the Georgia Research Alliance, an angel investor, a healthcare lawyer, and a pediatric cardiologist, who bring experience along the continuum of the medical technology development pipeline. GCMi contracts out with a large network of outside experts and partners to assist clients on specific projects as needed. While the GCMi facility was newly built under the i6 grant, the facility is located on the edge of the Georgia Tech campus and has the advantage of its close proximity to the extensive university resources and facilities, along with those of the broader medical community in Atlanta. In terms of financial resources, the center was initially funded through via \$1 million i6 grant, along with facilities and equipment grants from EDA (\$1.3 million) and Georgia Research Alliance (\$1.3 million). After opening in 2012, GCMi also started earning revenues from clients working in the building, as it operates under a fee-for-service model.

i6 Challenge Program Inputs: Two Case Study Examples

Washington Clean Energy Partnership (2011 Grantee)

The *Washington Clean Energy Partnership i6 Project* aims to grow the clean energy cluster in the State of Washington. The project was conceived following on the development of a new regional strategy in the Seattle region (with the Brookings Institute's Metropolitan Business Plan program), which had identified clean energy as a key target cluster, with particular competitive advantages in energy efficiency technologies, especially for commercial buildings (see http://www.brookings.edu/~media/Projects/state%20metro%20innovation/12_metro_business_puget.PDF). While the region has the right mix of public policies, software, and other technologies and research strengths to grow this cluster, the pieces were not coming together to translate into business growth. Stakeholders identified a number of key barriers for commercializing energy efficiency technologies, including: 1) customers are not convinced the technologies worked; 2) the technologies are too expensive; and 3) turning innovative ideas into marketable products/services is hugely challenging. The *Washington Clean Energy Partnership i6 Project* was conceived to address these challenges and implement initiatives identified in the regional strategy planning process.

This i6 grant is a partnership of a number of organizations, each of which brings different expertise and staff members to the table, including the Puget Sound Regional Council (PSRC), Innovate Washington Foundation, Cleantech Open, South Seattle Community College, the City of Seattle, and the Northwest Energy Efficiency Alliance (NEEA). While the project focuses on the entire State of Washington, activities are centered in the Seattle area, which is the economic engine of the state and a hub for energy efficiency activities. In addition to the \$1.14 million i6 Challenge grant, the region was able to leverage other sources of funding to support key activities, including \$5 million from the State of Washington and \$5 million from the Northwest Energy Efficiency Alliance (a nonprofit created by Pacific Northwest region utility companies to research programs that would help them meet new clean energy and sustainability laws).

V. Measuring Outputs: i6 Project Activities

As illustrated in the i6 logic model, the “outputs” of the program are essentially a measurement of all of the activities performed by the i6 grantees and their partners, clients, and participants. Outputs help quantify what the program is doing, and whether it is implementing what it set out to do. They also lead to program outcomes. Outputs can be measured by both the *quantity* and *quality* of the work or activities that are being done.

Reflecting the technology development goals of the i6 program, the activities conducted by grantees are focused on supporting entrepreneurs and start-ups, although the set of activities that fall within that category are quite varied, ranging from the provision of lab space and other specialized facilities, to the provision of networking opportunities and leadership training, or to business support services (legal, financial) and sometimes financing. The figure opposite summarizes the categories of outputs from the i6 logic model, together with some possible metrics that could be usefully tracked. Once again, we note that EDA will have to weigh carefully the value of collecting and reporting data against the burden on grantees – and their partners and clients – of doing so.

While none of the i6 grantees conduct *all* of the activities described in this section, each one offers a cross-section of the types of activities illustrated here. It is up to each grantee to provide the mix of services and activities they think appropriate to the meet needs of their regional economy, the technologies they are pursuing, and the needs of the entrepreneurs and businesses that use the program.

Note that this chapter focuses specifically on the types and level of activities conducted by i6 grantees, while the impacts of these activities on clients/participants are captured in the metrics discussed in *Section VI*.

i6 Logic Model – Project Activities (with possible metrics for evaluation)

Events, Networking, & Referrals

- # of events & trainings: participation & satisfaction
- # of conferences, showcases, exhibitions: participation & satisfaction
- # of referrals made to outside services

Mentoring, Coaching, & Technical Assistance

- # of boot camps/accelerators: participation & satisfaction
- # of businesses/entrepreneurs receiving mentoring/coaching (& satisfaction)

Facilities & Equipment

- Sq.ft. & usage of new physical space provided for start-ups & businesses
- Sq.ft. & usage of shared facilities/labs/equipment

R&D & Technology Development

- # of joint research projects with entrepreneurs, start-ups, and businesses
- # assisted with technology transfer/commercialization
- # assisted with patents & regulatory approvals

Financing Support

- # assisted in preparing a venture pitch/connecting with investors
- # assisted in grant/award proposals (e.g., SBIR) & success rate
- # of Angel/VC/seed competitions held & participation

Notwithstanding this diversity of activity, the entrepreneurs and businesses participating in the i6 program are generally focused on the cluster or technology being supported by the grant, as Figure V-1 indicates (based on the SRI survey). **Although the kinds of activities being pursued are quite varied, the overall cluster and technology development goal is shared by almost all.**

There was only a small sample of other, non-business organizations captured by the SRI survey (see Figure V-2, and we recommend treating the results with caution). However, those sampled were connected to the focus of the grant in varying degrees and in varying ways.

In comparison to the JIAC program, there is evidence that the level of client engagement in i6 is generally higher (see Figure V-3). In the JIAC program, participants and clients tended to be either lightly or intensively engaged. In the case of the i6 program, participants and clients tend to skew towards more intensive engagement. This is consistent with the level of effort required to advance technology and help an entrepreneur succeed.

Indeed, while the SRI team had limited success in obtaining commensurate client lists from both JIAC and i6 grantees, there is evidence that in the i6 program the effort is focused on a limited number of clearly defined clients and participants, who receive significant and varied support. For example, the Bioscience Technology Commercialization project in St. Louis, MO, supported 12 projects through a technology commercialization project aimed at earning significant follow-on funding. It is not realistic to define an optimum number of clients and level of engagement – this is conditioned to a great extent by the “bottom-up” design of the program. However, the character of any engagement should be documented, and specific goals identified, by the grantees.

In summary, the evidence is that a limited set of clients and participants engage fairly deeply in a variety of ways with the i6 grantees.

These engagements are captured, to the extent possible, in the analysis presented in this chapter.⁶ The reported data in this section relies on client and participant surveys.

⁶ The variations in operating approaches across the i6 grantees being studied are also captured in the grantee profiles presented in Appendix A.

Relationship of Business Clients/Participants to Grantee Industry, Cluster or Technology Focus

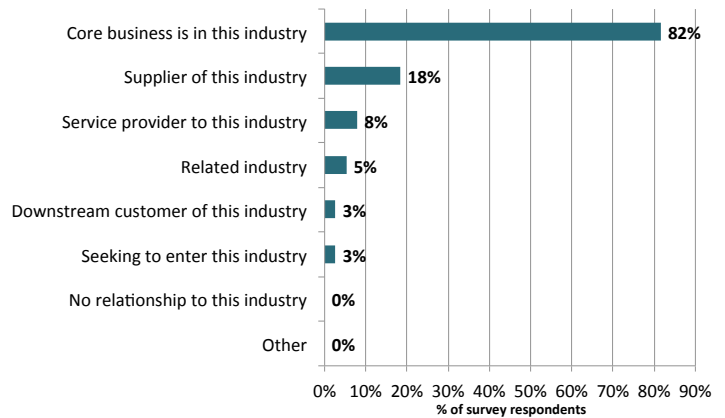


Figure V-1

Source: SRI survey of i6 clients/participants

Relationship of Other Client/Participant Institutions to Grantee Industry, Cluster or Technology Focus

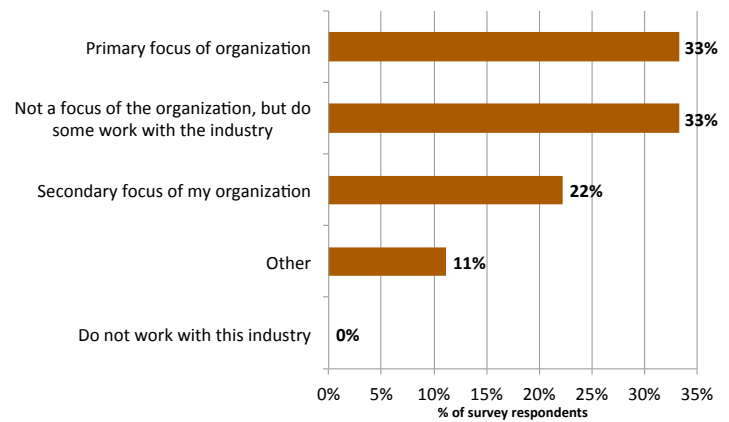


Figure V-2

Source: SRI survey of i6 clients/participants

Level of Client/Participant Engagement with i6 Program

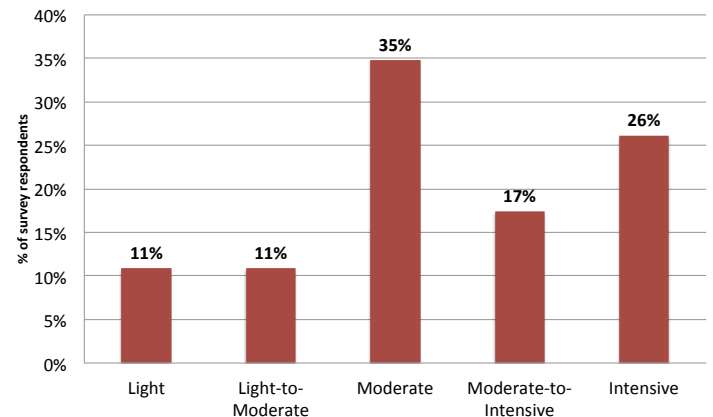


Figure V-3

Source: SRI survey of i6 clients/participants

The metrics suggested (examples of possible metrics to be adopted by EDA as appropriate) could be collected in the future through a combination of grantee surveys – employing a common survey instrument and reporting protocols developed by the EDA – and direct collection by grantees. The grantees would self-report, subject to validation as necessary by EDA through independent review.

Events, Networking, & Referrals

Proposed Metrics

- **# of events & trainings: participation & satisfaction**
- **# of conferences, showcases, exhibitions: participation & satisfaction**
- **# of referrals made to outside services**

Using networks and network-related activities to support technology development and entrepreneurs is a critical, if unglamorous, piece of the puzzle when it comes to successful commercialization and technology-based start-ups. But entrepreneurs are often relatively isolated from information and connections. Networks, events, and online resources are devices that overcome these barriers. For example, the iGreen New England Partnership facilitates connections through a team of on the ground liaisons. They help connect entrepreneurs to resources throughout the region, such as incubation networks and state economic development programs. An online network also connects entrepreneurs to regional expertise and infrastructure using a combination of online and personal interactions.

These kinds of straightforward activities – while valuable constituent elements of social capital – cannot be measured in a qualitatively rich way without making life burdensome for grantees. In keeping with the discussion in the previous section, a Client Management System (CMS) is an easy way to keep a simple score of these kinds of activities. In addition, a standardized client/participant survey should also be part of the tracking mechanism (see recommendations in *Section VII*). Some grantees already conduct surveys, while some use more informal means for feedback. EDA should consider designing a short, standardized survey instrument, administered online using a standard protocol, so that satisfaction, in addition to participation, can be estimated.

Mentoring, Coaching, & Technical Assistance

Proposed Metrics

- **# of boot camps/accelerators, participation & satisfaction**
- **# of businesses & entrepreneurs receiving mentoring or coaching, & satisfaction**

Mentoring and coaching provide critical support for entrepreneurs and early stage companies, without which innovative technologies are likely to wither. For example, the Oregon Innovation Cluster supports entrepreneurs-in-residence who provide start-ups and spin-off companies with business assistance including business plans, human resources, grant applications, and connections with venture capital. Taking advantage of this counsel and guidance also requires access to the networks mobilized by the grantees. Eighty-five companies were assisted in this way as a result of the Oregon Innovation Cluster i6 grant.

These types of activities can be tracked both in terms of quantity/participation, which only says a little, and in terms of the satisfaction levels of the participants. As noted above, the impact of these and all other i6 grantee activities is captured in the metrics discussed in the next section. The level of activity and the observed results/impacts, taken together, give a much richer picture of the value of the program.

Facilities & Equipment

Proposed Metrics

- **Sq. ft. & usage of new physical space provided for start-ups & businesses**
- **Sq. ft. & usage of shared labs/equipment**

It is relatively simple to capture the new space made available as a result of the i6 program (rather than the facilities brought to the program by the grantee and partners, as discussed earlier in *Section IV*), although facilities vary in terms of the equipment and support services offered. The usage figure is important because experience has shown that it is easy to build or establish facilities with program funding that are too little used and that wither after the funding cycle is over. In other words, the level of use speaks to sustainability, a goal of the i6 Challenge program identified in the FFO.

The Global Center for Medical Innovation (GCMI) in Atlanta, GA, is a prototyping design and development

facility that draws in entrepreneurs and small businesses trying to develop and bring to market medical device technology. GCMI's 12,000 square foot facility – which includes rapid prototyping facilities, a machine shop, and clean rooms – was launched as a result of the i6 grant. One of the operational goals of the center is to successfully implement a sustainable membership model that pays for the facilities in the long-term. The density of potential participants and clients in the Atlanta metro area, the depth of the end-use market, and the presence of world-class engineering and health sciences institutions make this a more feasible aspiration than may be the case in other areas.

Research & Technology Development

Proposed Metrics

- **# of joint research projects with entrepreneurs, start-ups, and businesses**
- **# assisted with tech transfer & commercialization**
- **# assisted with patents & regulatory approvals**

These output metrics are at the heart of the i6 project. In particular, mobilizing technical expertise and funding joint research projects is a signature activity of the program. For example, the Louisiana Tech Proof of Concept Center provided \$50,00-\$100,000 to 12 collaborative projects between firms and university researchers, focusing on taking technologies to the test/demonstration stage, and also provided direct guidance for the final stage of product development. As noted above, the Bioscience Technology Commercialization project in St. Louis, MO, engaged a like number of clients in the same way.

It is important to note, as Figure V-4 indicates, that while i6 grantees do help with licensing and patenting, the emphasis is on the technology itself. Many entrepreneurs and small businesses live in a world of trade secrets and tacit know-how and are less focused on the formal processes around patenting.

Note also that the metrics proposed for these activities (or any other metrics of this kind) should be aligned with metrics that capture results/impacts on enhanced participant capabilities (see *Section VI*). Information on these types of activities is scrupulously collected and reported by some grantees, for example the amount of time spent on joint projects, money spent, etc. A standardized reporting protocol for this kind of information would help program level assessment.

Standardized client/participation satisfaction surveys could be employed here as well.

Financing Support

Proposed Metrics

- **# assisted in preparing a venture pitch/connecting with investors**
- **# assisted in grant/award proposals (e.g., SBIR) & success rate**
- **# of Angel/VC/seed competitions held and participation**

The i6 program is more narrowly focused on the financing of start-ups than the JIAC program, although, as with the JIAC program, the hit rate is likely to be low. Grantees use networks to connect clients to sources of funding, prepare clients to make pitches, and assist with SBIR and STTR funding applications. The key distinction between i6 and JIAC is that the i6 program grantees are wholly focused on technologies that they support through the development and approval process. The goal is to get the technology as close to market as possible, and as fundable as possible, with follow-on funding as a measure of success.

Financing-related activities depend on deep networks. The ability of grantees to deliver these kinds of services, and to do so successfully, will depend on the underlying conditions faced by the region. As discussed in *Section III*, all i6 grantees provide extensive information in their grant proposals about their region's level of economic and cluster development along these lines, and this baseline information should be considered when assessing an individual grantee's progress in terms of financing support and other related activities.

The reality is that venture funding is distributed very unevenly across the country, and the presence and depth of angel networks also varies significantly. For example, the depth of angel and venture capital resources available to participants in the Washington Clean Energy Partnership (greater Seattle and State of WA) is fundamentally different than the investor networks available in Holland, Michigan, where the Proof of Concept Center for Green Chemistry Scale-Up program is based. Distressed regions are, almost by definition, at a disadvantage in this area. The energetic pursuit of federal awards such as SBIRs can be a counterweight, and the SBIR program is an important partner for the i6 program.

The spread of most of the activities discussed above was addressed by the SRI survey, which asked clients/participants about the activities they engaged in with the following question: **What type(s) or service(s) or support have you received through the i6 program?** Of the 46 clients/participants who viewed the question, 93% indicated some type of services or support received. The nature of support and services reported covers a diverse set of activities (see Figure V-4): over three-quarters (78%) of respondents indicated an activity in the events, networking, and referrals category; three-quarters (74%) in mentoring, coaching, and technical assistance; 50% indicated R&D and technology development; 48% financing; and 28% facilities and equipment.

In summary, all of the i6 grantees offered a mix of some or all of the types of services described above and in Figure V-4. Lower cost networking and mentoring activities, along with events and conferences, earned the highest response rates, but assistance with research & development was also significant. The wide range of activities that i6 grantees engaged in illustrates the vast and diverse types of services that can lead to capacity-building. The next section addresses the impacts that these activities and services have on client and participant capabilities.

i6 Grantee Activities, by Logic Model Category

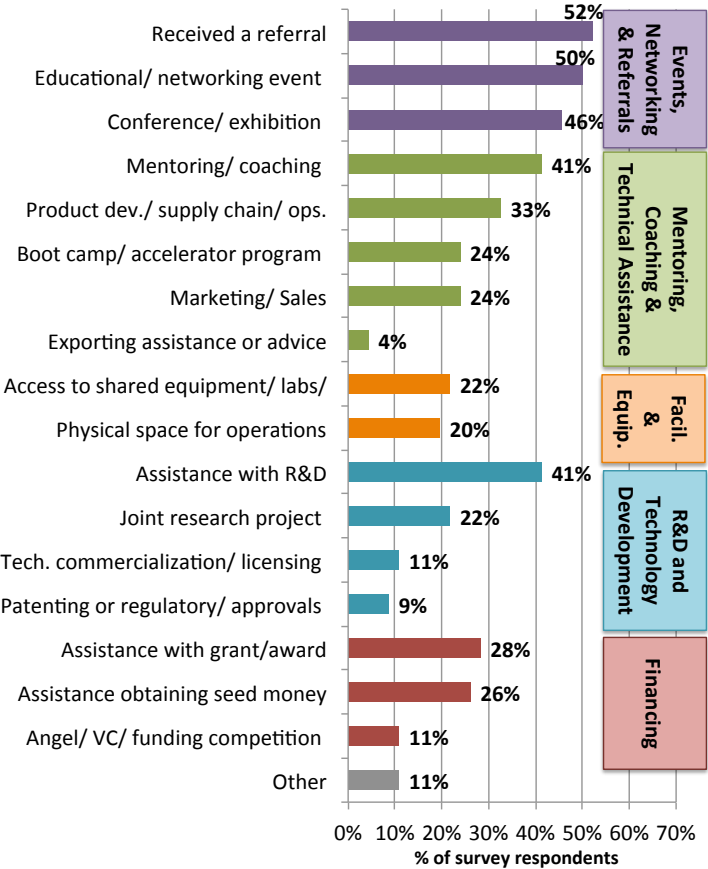


Figure V-4 Source: UNC-SRI survey of i6 clients/participants

i6 Challenge Program Outputs: Two Case Study Examples

Global Center for Medical Innovation (2010 Grantee)

The centerpiece of this i6 Challenge project is the 12,000 square foot Global Center for Medical Innovation, a fully equipped medical device prototyping and commercialization center that helps researchers and entrepreneurs take their ideas from concept to reality. The center provides the core infrastructure needed for medical device commercialization, with facilities and equipment that support conceptualizing, design, prototyping, small-scale manufacturing, clinical trials, and business development. Facilities available to clients include a prototyping and development lab, certified clean rooms, a state-of-the-art machine shop for prototyping and small-scale manufacturing of devices (for preclinical and clinical studies), and incubator space. Along with these facilities, GCMI offers a suite of supporting services and advice for clients in design and engineering, conducting clinical trials, getting FDA approvals, grant-writing, connecting with investors, connecting with contract manufacturers, and so on.

Anyone with a concept for a new medical device technology (university researchers, doctors, entrepreneurs, companies) can utilize GCMI's services. GCMI operates on a "fee-for-service" model, so clients have to bring some of their own money to the table, which helps ensure that clients are bringing "real" ideas and opportunities. GCMI staff work collaboratively with clients to identify their key objectives, test ideas, and work toward commercialization, drawing upon specialized support and advisors as needed along the way. To date, about one-third of GCMI's clients have come from Georgia Tech and Emory University, but clients have also come from throughout Georgia, Tennessee, Florida, and South Carolina. In addition to its client-focused programs, GCMI supports other programs that facilitate cluster development in the region. A quarterly Education Series educates regional cluster members on medical device innovation and commercialization, and other events have been held to educate the region's angel/venture capital community on how to invest in the sector. GCMI also offers an apprentice program for undergraduate biomedical engineering students at Georgia Tech to volunteer at the center in order to gain hands-on "shop" experience.

Washington Clean Energy Partnership (2011 Grantee)

The *Washington Clean Energy Partnership i6 Project* utilizes innovative strategies to prove the viability and cost efficiency of new energy efficiency technologies to potential customers, helps move these technologies from the research stage to market, and provides related workforce development strategies. To accomplish these aims, the project has four main activities, each managed by different partners in the grant:

- **Proof-of-concept center:** Creation of the Northwest Building Energy Technology Hub (NBETH), a statewide proof-of-concept center and regional test bed, which uses software and the cloud to monitor and fine-tune building energy performance in real time, supporting efficiency improvements and the measurement of costs savings. NBETH will coordinate networks of existing buildings as demonstration sites. This component is managed by Innovate Washington, working in partnership with Microsoft, Accenture, and the City of Seattle, University of Washington School of Medicine, Sheraton Hotel Seattle, and the Boeing Company (see http://www.seattle.gov/economicdevelopment/docs/High-Perf-Bldgs-Case-Study-7-2013-CityofSeattle_WWPS_CityNext_CS.pdf and <http://bottomline.seattle.gov/2013/07/09/high-performance-building-pilot/>)
- **Demonstration center:** Creation of the Northwest Smart Building Center, which will serve as a living laboratory for a variety of energy efficiency technologies. Building owners and operators will be able to see live technologies to select the best product, and inventors can test their technologies to demonstrate their efficacy (to be opened in 2015, see <http://www.smartbuildingscenter.org/>).
- **Accelerator services:** Providing business mentorship for clean tech companies (managed by Clean Tech Open, the world's largest cleantech accelerator). The goal of this activity is to mentor energy efficiency innovators and companies to help them get their products tested and ready for market.
- **Workforce training:** Developing training programs and internships to train people for jobs operating innovative energy efficiency technologies in commercial buildings. This component is managed by South Seattle Community College.

VI. Measuring Enhanced Capabilities: Direct Results & Impacts

The activities conducted by the i6 Challenge program are spread across a significant waterfront, as described in the previous section, albeit with a clear focus on technology development. These activities serve to move technologies to market and enhance the capabilities of the entrepreneurs and businesses participating in the program. Capturing these improvements is the subject of this section. We do this by reporting on the direct results of activities, and also on broader performance improvements as reported by the respondents to the SRI survey. These enhanced capabilities and impacts can be measured both qualitatively and quantitatively (as described by the logic model categories and metrics shown on the following page).

The 2010 i6 Challenge FFO required applicants to “demonstrate the job creation impact of the proposed Proof of Concept Center” and to identify and explain “...quantifiable benefits that go beyond the applicant and benefit the regional economy.” The design of any plan to track performance, and the specific metrics to be employed, are left up to the discretion of each individual grantee.

The inevitable result is a wide variety of different metrics differently defined by each i6 grantee, making *ex post* program assessment based on grantee-reported data difficult. Due to very limited access to the i6 grantee proposals and quarterly reports, the study team has limited information on grantee efforts in this direction, although telephone interviews were able to provide some information.

The emphasis is on the regional and ecosystem benefits of grantee activity, which is in keeping the overall goal of EDA non-infrastructure programs – that is, the development of long-term capacity. The enhanced capabilities and impacts discussed here are a bridge

between the granular, short-term details of program activity and outputs and the long-term goal of capacity-building, which is best captured by third-party indicators. Beyond jobs, however, which will be a poor metric in the short run for a program that focuses on entrepreneurs and technology, the program’s impacts on enhancing capabilities will be as varied as the activities that the grantees pursue.

In the future, in order to establish a baseline for assessment, SRI recommends that grantees use a “look back” over a period leading up to their application (12 months, for example) and establish baselines for those metrics EDA wishes to track. (These metrics may be drawn from those suggested below, or others as judged appropriate.) Grantees will subsequently report on these metrics as part of their reporting requirements. There should be a clear expectations explicitly incorporated into grant contracts that reporting on metrics extends past the end date for grants (by at least 12 months).

This section focuses on measuring “Enhanced Capabilities” using metrics that can be gathered via client/participant surveys and direct reporting by grantees (as elaborated in the graphic on the following page). Some of these metrics could also potentially be examined using third party data sources, in order to capture quantitatively the program’s impacts and outcomes at a regional or industry cluster level. To be used effectively, third party metrics require a much longer timeframe for analysis than was available for this study, which examined grants made very recently (in 2010 and 2011).

i6 Logic Model – Enhanced Capabilities
(with possible metrics for evaluation)

Direct Results

Technology Development

- # of technology concepts advanced (Technology Readiness Levels / TRLs)
- # of technologies commercialized/ licensed (and royalties)
- # of patents, government approvals received

Product & Process Development

- # of businesses registered
- # of business/strategic plans
- # of new/improved products & processes
- # of businesses w/ cost, efficiency, quality improvements

Human Capital Development

- # of entrepreneurship/leadership programs completed & satisfaction
- # of technology/cluster-aligned degrees & certificates completed
- Extent of employee/management skills development in cluster firms
- Growth in knowledge about how to access outside assistance

Markets & Business Development

- # of businesses with new network contacts or partnerships
- # of businesses identifying new markets/customers
- # of new sales/marketing strategy or materials
- # of export strategies & new export sales

Financing

- # seed/angel/VC deals + amount
- # of loans obtained + amount
- # of government awards/grants/loan guarantees + amount

Impacts

Firm-Level:

Improved Capacity & Knowledge

- Improved access to capital/investment
- Growth in management/employee capabilities and knowledge
- Expanded technical & business networks
- Environmental or energy efficiency improvements

Improved Competitiveness

- Increased productivity/efficiency
- Diversification, entering new markets, reaching new customers

Growth & Expansion

- Business stabilization/survival
- New/increased sales or revenues
- Increased employment
- New business creation
- Established a new location/moved business into the region
- Business acquisition or merger

Regional-Level:

Improved Capacity & Knowledge

- Workforce skills development
- Environmental or energy efficiency improvements

Improved Competitiveness

- Improved innovation/entrepreneurship ecosystem

Growth & Expansion

- Growth/development of a key/targeted industry cluster
- Growth of existing businesses and/or startup of new businesses
- Growth of higher skill/wage job opportunities

Improved Opportunities

- Improved opportunities for small businesses
- Distressed region/neighborhood gains new economic activities
- Improved opportunities for disadvantaged/minority groups

Enhanced Capabilities: Direct Results of Program Activities

The metrics proposed in this section capture near-term capability enhancements for entrepreneurs and businesses from the projects and activities they participated in via the i6 Challenge program.

These metrics are chiefly collected via a survey, as they require clients/participants to self-report on the various enhanced capabilities they experienced through their program participation. An EDA-developed standardized client/participant survey form for tracking results (as discussed above, see also recommendations in *Section VII*) would enable these kinds of metrics to be gathered and tracked more easily and systematically.

The client/participant survey implemented by SRI as part of this study asked the following: **What direct results would you attribute (wholly or in part) to the services or support you received through the i6 program?** The answer choices were structured to mirror the categories and items listed under “proposed metrics” below, in order to test how participants responded to these choices.

In the SRI survey, 91% of respondents attributed direct results for their capacity as a result of the services or support that they received through the i6 program.

Most respondents reported results across multiple categories. As shown in Figure VI-1, The most frequently reported category of results was technology transfer & commercialization (66%); followed by markets & business development (61%); product & process development (57%); financing (52%); and human capital (30%). This reflects very nicely the priorities of the i6 program – technology advancement and ecosystem development, with finance also playing a significant part. (However, the low number of respondents and the low overall response rate qualifies these answers.)

In summary, as in the survey question on project activities (reported in *Section V*), participants obtained results that reflected i6 program activities and goals.

Direct Results of i6 Program Activities: Broad Categories

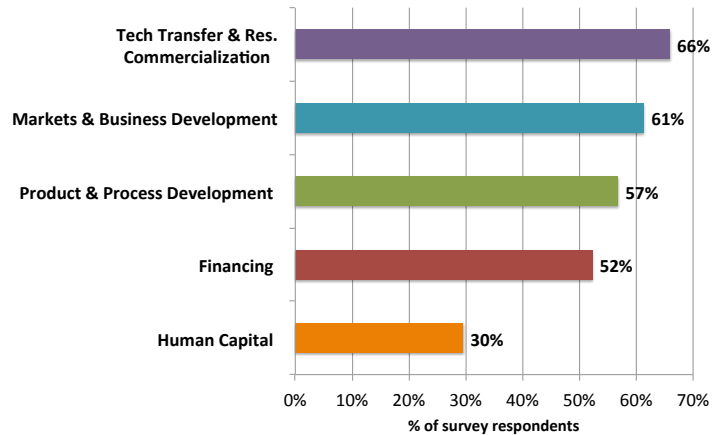


Figure VI-1

Source: SRI survey of i6 clients/participants

Direct Results of i6 Program Activities: Detailed Categories

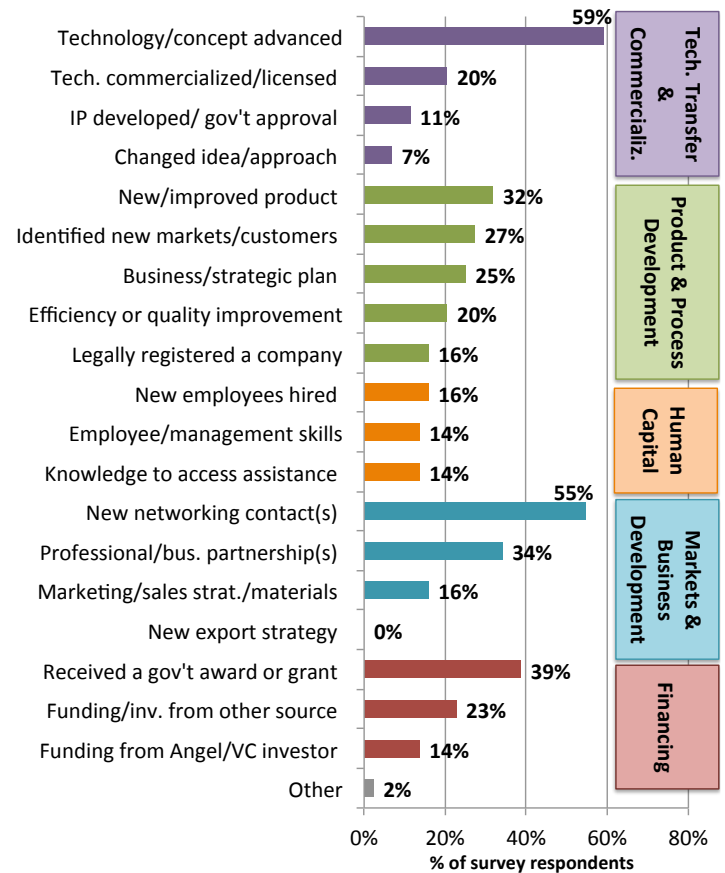


Figure VI-2

Source: SRI survey of i6 clients/participants

Technology Transfer & Research Commercialization

Proposed Metrics

- # of technology concepts advanced (Technology Readiness Levels, or TRLs)
- # of technologies commercialized/licensed (and royalties)
- # of patents and govt. approvals received

In the SRI survey, 66% of respondents reported that they experienced some kind results related to technology transfer & research commercialization.

Of these respondents, most (59% of all question respondents) indicated that a new technology or concept was developed, tested, or taken to the next stage of development. Twenty percent of respondents had a technology commercialized or licensed; 11% reported that intellectual property was developed or government approval received; and 7% realized an idea or technology would not work and changed their idea or approach.

Support for technology development is at the heart of technology-based regional economic development strategies. And while metrics such as patents and licensing are well known, so too are their deficiencies. They capture only a small part of the technologies developed by firms, and they are backwards looking (it takes years to obtain and report a patent). Also, as noted in the preceding section, developing, testing, and advancing a new concept is critical – applying for patents can be less important for overall business development.

The i6 grantees report on measures such as follow-on funding, firm incorporation, and new hires as metrics for increased capabilities. But it is striking that a program with technology development as its central plank did not specify *ex ante* a framework for capturing progress in technology development. As it happens, there is a well-known scale that captures the development of technology not mentioned in the i6 FFOs but widely employed by other Federal agencies, as well as overseas in the European Union. The Department of Defense and NASA commonly employ *Technology Readiness Levels* (TRLs), defined along a scale of 1-9, to judge and compare the development of technologies.⁷

⁷ See: <http://www.bnl.gov/techtransfer/docs/Technology-Readiness-Levels-Definitions-and-Descriptions.pdf>

The definitions of each level, and the metrics that capture the transition of technologies across levels, are not settled and are open to a degree of subjectivity. (Using the increased costs of moving a technology along the scale is one solution to these measurement challenges).⁸ However, this scale offers a relatively simple framework for judging and reporting the development of technology in the short run. In particular, levels 4-6 on the scale capture nicely the “valley of death” that is the specific target of the i6 Challenge program.

The activities of two similar i6 grantees illustrate how the TRL metric might be applied. The Innovative Solutions for Invention Acceleration grantee in the Akron region of Ohio, and the Global Center for Medical Innovation grantee in Atlanta, GA, provide support for entrepreneurs at three broad stages of development:

- Design, in which a concept is formulated and tested in a lab, (TRL 1-3).
- Prototyping, by providing labs, machine shops, and other facilities and equipment so that components and systems can be tested and validated in a relevant environment (TRL 4-6).
- Support for further financing, conducting trials, and achieving regulatory approval. (TRL 7-9).

In the long run, if a program is moving technologies along this scale in a systematic way, we should expect to observe movement in capacity outcome metrics (patenting and licensing), and in the other newer indicators piloted by this project. But the i6 Challenge program only dates from 2010, so a process metric like the *Technology Readiness Levels* (TRLs), which provides a framework for systematically reporting outputs, is a valuable tool that EDA should consider as a core metric for all future economic development programs. The TRL metric (based on self-reporting) could be integrated into a low cost reporting system, and EDA should settle on a protocol clearly defining each level.

⁸ See: <http://arc.aiaa.org/doi/abs/10.2514/6.2013-5369>

Product & Process Development

Proposed Metrics

- # of businesses registered
- # of business/strategic plans
- # of new/improved products & processes
- # of businesses with cost, efficiency, quality improvements

Over half (57%) of survey respondents experienced results in the product & process development category.

The development of a new or improved product was the most frequently reported result (32% of respondents). This was followed by the identification of new markets/customers (27%); development of a business or strategic plan (25%); cost reduction, operational efficiency, or quality improvement or certification (20%); and legally registering a company (16%).

Defining and implementing a completely new production process is challenging. Many improvements in the development of technology-based businesses are incremental and not easily recorded. Some take the form of increased “learning by doing” – very valuable but impossible to measure. However, the dollar value of expenditures on new product and production process improvements (as opposed to maintenance) can be tracked, and holds some potential as a useful metric.

As expected, new product announcements are among the most significant impacts reported by i6 clients, and are a relatively clear-cut output for tracking, although minor extensions to existing product lines are potentially difficult to distinguish from an attempt to enter or even create a new product category. The incidence of new product announcements within a regional industry cluster is proposed in the pilot study as an indicator of innovative activities.⁹ The development of new products directly as part of i6 program outputs could be matched to this broader indicator.

⁹ Feldman, M. & Lanahan, L. (2014). *Stage I: Initial Findings on Metrics and Potential Data Sources. Examining the i6 Challenge and the Jobs and Innovation Accelerator Challenge (JIAC) Projects.*

Human Capital

Proposed Metrics

- # of entrepreneurship/leadership programs completed & participant satisfaction
- # of technology/cluster-aligned degrees & certificates completed
- Extent of employee/management skills development within cluster firms
- Growth in knowledge about how to access outside sources of assistance

The human capital results discussed here focus on the development of skills useful to entrepreneurs within targeted technologies and clusters. Many entrepreneurs do not have business backgrounds, especially if they are pursuing an idea straight out of the lab. They need coaching and mentoring if their technology is going to make it to market. Some researchers or clinical professionals may never have thought of themselves as entrepreneurs, but may be drawn into pursuing a start-up through exposure to the possibility of entrepreneurship.

In general, however, human capital results were less frequently reported by i6 clients/participants. **Thirty percent (30%) of the survey respondents experienced some type of human capital improvements as a result of their participation in the i6 program:** 16% reported new employees hired; 14% employee or management skills development; and 14% new knowledge about how to access outside assistance, services, or sources of funding. One reason for these results may be the emphasis of the i6 program on entrepreneurs and start-ups, who often do not yet have a legally registered company and do not have any employees.

Tracking the completion of entrepreneurship or leadership programs supported by grantees is another useful but high-level measure of output, made more valuable if it is combined with a standard satisfaction survey of participants. Follow-up surveys with participants some months after the course ends are even more desirable, but harder to achieve.

Another valuable way to support entrepreneurs is through mentorships, which are actively supported by many grantees. Retired executives from the cluster and/or the region, or serial entrepreneurs where available, can provide crucial ongoing support. Tracking mentorship matches made, and then surveying the continuing satisfaction of both mentors and the entrepreneurs being

mentored, is a straightforward metric. However, mentors are generally busy volunteers, and any mechanism for obtaining feedback should carry a minimal burden.

Markets & Business Development

Proposed Metrics

- **# of businesses with new network contacts or partnerships**
- **# of businesses identifying new markets/customers**
- **# of new sales/marketing strategies or materials**
- **# of export strategies & new export sales**

The identification of new network contacts is at the heart of any innovation ecosystem. These kinds of contacts – peer entrepreneurs, mentors, experts, potential suppliers, or clients – are made available through the networks supported by a grantee and its partners. The customer management programs discussed previously can be used to flag the acquisition of new contacts, but only at a high level. Given the central role of start-ups in the i6 program, business development impacts that apply to established businesses are less important, judging by the SRI survey.

In SRI's survey, 61% of respondents reported results related to markets & business development. New networking contacts were the most commonly cited result (reported by 55% of respondents). New professional or business partnerships were also frequently reported (34% of respondents), while new advertising, sales, marketing, or branding strategies and/or materials were developed by only 16% of respondents. No clients/participants indicated that they had developed a new export strategy with the support of the i6 program. These results in part reflect the emphasis of the i6 program on serving start-ups and entrepreneurs, many of whom are not yet at the stage of developing advertising, marketing, or export strategies.

Tracking the interactions within a network and the outputs produced by the interactions faces a number of challenges. A customer management system is the standard practice, but this generally yields simple counts of contacts made. Qualitatively rich information can be captured, but at some cost in time and effort for grantees. There is a clear trade-off in this case between effectively tracking network activity and outputs, and the costs of doing so. Yet these activities are key to the development of social capital and long-term economic development capacity, as noted above.

One relatively simple way to track robust metrics about the usefulness of networking, referrals, new contacts, new partnerships, and new customers would be to include in a client survey a question specifically asking about the direct results of these activities. Survey respondents indicating that a new contact, partnership, etc. was made could then be asked whether that new contact led to new sales or revenue-generating activities for their business.

When we review all the mechanisms available for the direct collection of information on activities and outputs, surveys of clients/participants are clearly indispensable. We have already flagged the use of standardized instruments, used according to a standard protocol, as a practice to be strongly considered by EDA in the future; however, their use has to be tempered by consideration of the burden they place on participants who want to focus on developing new technologies and building new enterprises rather than filling out survey forms.

Financing

Proposed Metrics

- **# seed/angel/VC deals + amount**
- **# of loans obtained + amount**
- **# of government awards/grants + amount**

Early-stage finance is the hardest piece of the puzzle to find and fit when fostering technology-based and innovation-based regional economic development. Many i6 grantees are involved in seeking out or fostering angel networks, and in supporting entrepreneurs as they refine their pitches for later-stage financing. Providing technical support for applications to the SBIR and STTR programs, which are specific partners to the i6 program, is likely to be one of the most effective pathways to finding finance.

Results in this area are modest, although comparatively better than is the case in the JIAC program, with its broader scope. **Over half of the survey respondents (52%) indicated that they experienced results in the area of financing.** Thirty-nine percent of respondents indicated that they received a government award or grant; 14% from an Angel or Venture Capital investor; and 23% from some other source.

A more in-depth way to look at financing-related metrics might be to measure the number of clients *assisted by* each i6 grantee in seeking various types of financing (awards/grants, angel/VC investments, loans, etc.), as compared to the number of clients *actually receiving*

financing – thereby generating a financing success rate. However, such metrics would require far more detailed recordkeeping and reporting on the part of i6 grantees, with limited value, since there would be no pre-grant baseline on financing success rates to assess possible improvement over time. Given the types of clients served by i6 programs, the simple measure of number of clients receiving funding represents an important measure of a program “result” that would not have otherwise occurred. Improvement in clients’ capacity to seek and obtain financing in the future is another important and related metric, which is discussed in the following section.

Enhanced Participant Capabilities: Impacts of the Program

The direct results experienced by i6 program participants (as described above) translate into broader impacts on entrepreneur, firm-level, and organizational capabilities, both in the short-term and long-term. These impacts include **increased capacity and knowledge**, **increased competitiveness**, **growth and expansion**, and **new opportunities**, and the impacts can occur at both the entrepreneur/firm/organizational level and at the regional level.

This expansion of participant capacity represents a bridge between the immediate consequences of the i6 program and the long-term capacity-building that the EDA has as its central purpose. As a supplement to the metrics proposed above for measuring direct results, we propose metrics for participant impacts that can only be gathered via a client/participant survey, as they require self-reporting on the impacts experienced.

Proposed Metrics

of clients/participants reporting the following impacts:

Capacity & Knowledge

- Improved access to capital/investment
- Growth in management/employee capabilities and knowledge
- Workforce skills development (regionally)
- Expanded technical & business networks
- Environmental or energy efficiency improvements

Competitiveness

- Increased productivity/efficiency
- Diversification, entering new markets, reaching new customers
- Improved innovation/entrepreneurship ecosystem (regionally)

Growth & Expansion

Firm-Level

- Business stabilization/survival
- New/increased sales or revenues
- Increased employment
- New business creation
- Established a new location/moved business into the region
- Business acquisition or merger

Regional-Level

- Growth/development of a key/targeted industry cluster (regionally)
- Growth of existing businesses and/or start-up of new businesses (regionally)
- Growth of higher skill/wage job opportunities (regionally)

Opportunities

- Improved opportunities for small businesses (regionally)
- Distressed region/neighborhood gains new economic activities (regionally)
- Improved opportunities for disadvantaged/minority groups (regionally)

The UNC-SRI survey of i6 clients/participants asked the following question to respondents who identified in a previous question as entrepreneurs, start-ups, or businesses: **What impacts would you attribute (wholly or in part) to the services or support you received through the i6 program?** Respondents to this question identified a diverse set of individual and firm-level impacts observed as a result of the i6 program (see Figure VI-3). The most

Enhanced Firm-Level Capabilities: i6 Impacts on Participating Entrepreneurs/Businesses

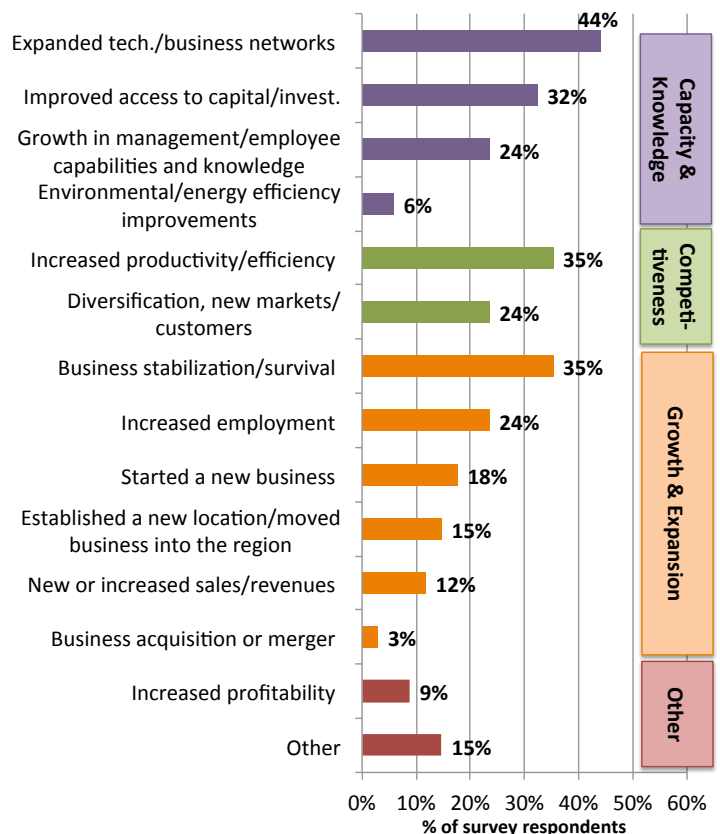


Figure VI-3

Source: SRI survey of i6 clients/participants

frequent outcomes include: expanded *technical or business networks* (44%); *increased productivity or efficiency* (35%); *business stabilization and/or survival* (35%); and *improved access to capital/investment* (32%). The results are broadly distributed, with networks, finance, productivity, and business sustainability being the most important.

In addition, the survey asked the following question to respondents who did not identify as businesses (i.e. government, non-profits, universities) in a previous question: **What impacts would you attribute (wholly or in part) to the services or support of the i6 program?** Given that there were only nine respondents to this question, it is difficult to infer much from the responses (see Figure VI-4). However, it is notable that seven of the nine indicated an *improved innovation and entrepreneurship ecosystem in their region*.

Do these self-reported impacts translate into overall participant satisfaction? Given the modest response rate for the UNC-SRI survey, it is important to be reminded that while the findings of this survey provide a useful illustration of how the i6 Challenge program can and often does work, they are not representative of the total i6 client/participant population. However, with that caveat in mind, the results reported in Figure VI-5 for the overall satisfaction of i6 program participants is relatively encouraging. The overwhelming majority of participants are satisfied or very satisfied with the various types of activities they participated in.

Enhanced Regional Capabilities: i6 Impacts Experienced by Participating Organizations

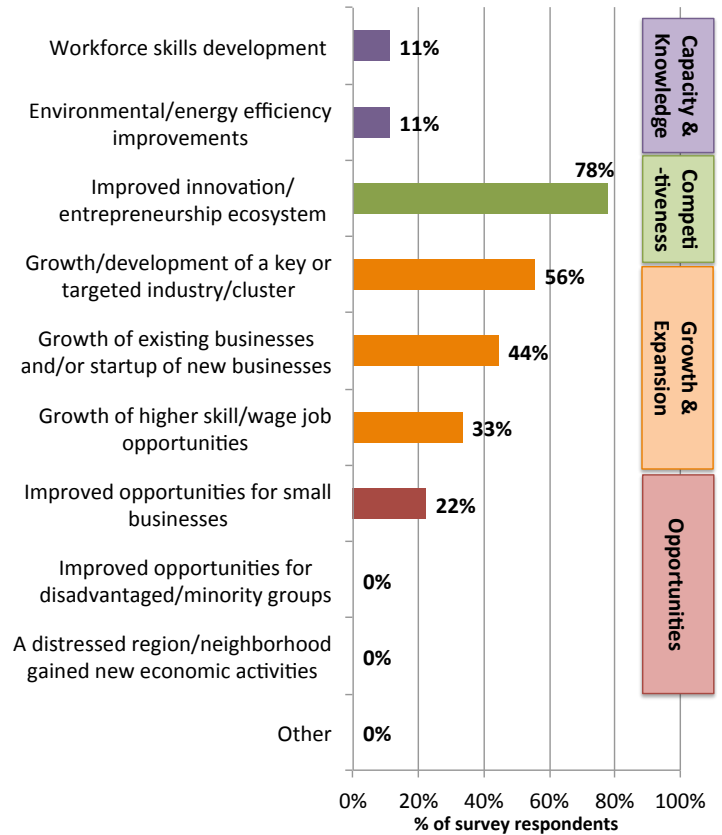


Figure VI-4

Source: SRI survey of i6 clients/participants

Client/Participant Satisfaction with i6

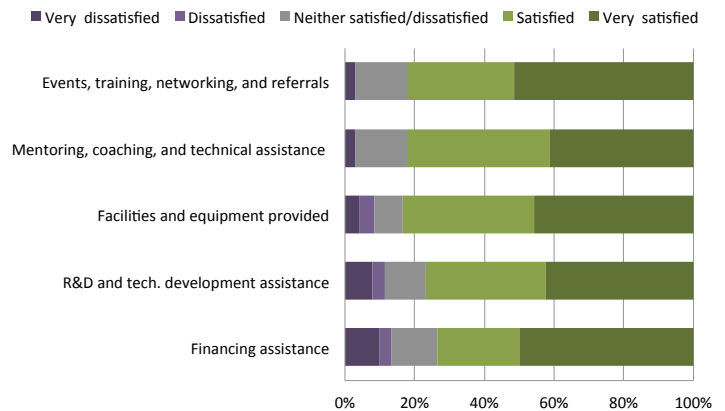


Figure VI-5

Source: SRI survey of i6 clients/participants

i6 Challenge Program Enhanced Capabilities: Two Case Study Examples

Global Center for Medical Innovation (2010 Grantee)

Since it opened in 2012, the Global Center for Medical Innovation has established considerable momentum in developing Atlanta's medical device cluster. Key capacity improvements and near-term impacts include the following:

- **Commercialization infrastructure:** GCMI provides comprehensive facilities and support services in one location, reducing the costs and accelerating the process developing and converting medical device innovations into functional prototypes and clinical products. This important infrastructure addresses one of the critical gaps that had been identified by regional stakeholders as preventing more medical device startups from launching and growing the in the Atlanta region.
- **Medical device cluster development:** Given that GCMI has only been open two years, and medical device commercialization is a lengthy process, it is too soon to see the center's work translated into measurable job growth in the region's cluster. However, the facility is already operating at full capacity and is running out of space, indicating that it is meeting an important demand for its services in support of the cluster. In response to the project, the Metro Atlanta Chamber (MAC) has ramped up efforts to support the medical device cluster and is using GCMI as a key asset for recruiting companies. MAC also launched an effort to estimate the size of the region's medical device cluster, counting over 200 companies and organizations in the cluster (see <http://www.metroatlantachamber.com/business/bioscience-health-it/medical-devices>).
- **Medical device developments:** While GCMI cannot reveal details about the technologies currently being developed in the center, the facility is currently full of tenants and clients who are working on prototypes, clinical trials, proof-of-concept, and commercialization of a variety of medical device innovations, primarily with a mechanical focus. Clients are attracted to the facility not only because of its equipment and services, but just as importantly because of the networking opportunities that occur from being co-located with other medical device startups and entrepreneurs. The "water cooler" effect is very important, as clients are able to share experiences and advice about working their way through the long and challenging device development and approvals process.

Over the longer term (10+ years) project stakeholders expect to see a variety of outcomes, including the location of more medical device startups in the Atlanta region, recruitment of larger device companies, a stronger investment community supporting medical device development, and overall growth of Atlanta's medical device cluster.

Washington Clean Energy Partnership (2011 Grantee)

The *Washington Clean Energy Partnership Project* enhanced innovation capacity in greater Seattle and the State of Washington with a number of important impacts over the near-term:

- **Technology demonstration:** The proof-of-concept work is in its early stages, and pilot data from the Northwest Building Energy Technology Hub (NBETH) project is just starting to be compiled. Initial results show strong potential for participants. For example, participant Sheraton Hotel Seattle notes that it can use the new technology to identify HVAC equipment that is likely to fail before it actually fails; it is interested in using the technology nationally. Project staff members expect to complete an economic impact study to quantify the energy savings from using various technologies (as well as how this affects a company's bottom line), as this is important to show the potential for innovative clean energy technologies to save companies money in the long run, in addition to providing positive environmental impacts from energy savings.
- **Business development:** Over 400 companies were recruited and vetted for business mentorship and technology commercialization assistance; more than 30 have been matched with mentors to receive hands-on support and advice.
- **Workforce development:** In Fall 2014, South Seattle Community College launched a new Bachelor's of Applied Science program in sustainable building science technologies to prepare the region's workforce to support energy efficiency cluster development (see <http://www.southseattle.edu/programs/bas/sustainable-building-science-technology/>). The program is now accepting students for its second cohort.

VII. Implications for Program Evaluation

Based on this preliminary report on i6 Challenge – a new and important program – the SRI team has developed some preliminary recommendations for refining and amending the program’s design, implementation, and evaluation methods. The SRI recommendations are drawn from the research team’s review of background materials, meetings and interviews with the program grantees, and a survey of i6 clients/participants. The recommendations outlined below address the short-term need for data on the activities and outputs of grantees and the program as a whole.

It should be noted that while some of the recommendations offered below are intended to streamline and standardize reporting practices – which will have the effect of lowering the current reporting burden – other recommendations involve the collection and reporting of new metrics. This increases the burden on grantees, and in some cases, their clients. For this reason, while all the recommendations listed below are the product of careful, evidence-based analysis, the UNC-SRI team believes that they should be treated as a menu of possible new or improved metrics or practices. EDA should, with deliberate care, select for implementation only those changes that in its judgment yield the highest return in terms of usefulness.

The i6 Challenge program is very new, and the time, resources, and information available for this report were limited. This means that no precise estimate can be made at this time about the overall goals of the program, or the successes so far achieved by program grantees. However, as is immediately apparent from the summaries of grantee activities (see *Appendix A*), it is possible to make the following assessment:

A tremendous amount of work has been done by the i6 grantees – support for developing, proving, testing, and funding new technologies; as well as training, counseling,

and supporting new entrepreneurs – in ways tightly aligned around program goals.

As a matter of fact, i6 grantees already point to start-ups that have received venture funding, or that have taken new products to market. Further, the surveyed i6 program clients, mainly start-ups and businesses, report high levels of overall satisfaction with the program.

The team’s key recommendations, which are elaborated in the table below, focus on three areas:

1. **i6 program data collection methods:** Proposes new, more effective, and more efficient methods for gathering and monitoring i6 program and client data.
2. **i6 program input & activity metrics:** Recommends mechanisms for directly collected metrics that could improve monitoring of program inputs and activities.
3. **i6 program technology output metrics:** Recommends directly collected metrics that could be used to improve monitoring and evaluation of technology development, a key element of the i6 program.

The goal of the recommendations outlined below is not to review again the metrics suggested in previous sections of this report. These metrics, or others thought desirable by EDA program staff, should be subject to continuous review as this and other EDA programs are implemented. The recommendations outlined below focus on three specific operational issues in the collecting and reporting of metrics that will increase and improve the data available for assessment, and that will also lower the burdens of reporting on, or inquiring about, grantee activities and outputs. These practices will be a complement to the practices to be developed in the collection of third-party indicators.

i6 Program Recommendations

Recommendation 1: i6 Program Data Collection Methods

Standardized EDA database

EDA should make the case to executive and legislative leaders for a significant investment in a single program database with a content management system open to grantees, home to standardized input, output, and outcome metrics (drawn from the i6 logic model presented above). The database should be appropriate to the needs of all EDA non-infrastructure programs and investments and would warrant the significant extra dollars (over and above existing program dollars) and EDA staff time (stretching over many months) that would be required.

At present, grantees are required to make quarterly reports, following a standard format, with data that must be lifted out and reentered if it is to be aggregated and analyzed. This practice could be improved and simplified by an EDA program database into which grantees themselves enter a defined, carefully selected set of program metrics. If the data required is appropriately selected, this arrangement should reduce the incidence of requests for information to grantees by program staff. While such a database should meet the needs of EDA programs generally, the metrics that require direct collection may vary across programs, with a core set of metrics common to all programs being reported alongside a second set of metrics selected to meet the characteristics of a specific program.

In addition, the detailed information provided by grantees in their grant applications on underlying economic conditions and level of cluster development should also be incorporated into the standardized program database and metrics, to establish baseline conditions that can be tracked and gauged as a benchmark for program evaluation purposes.

Standardized use of metrics in program implementation

Successful program implementation and assessment requires reliable, consistent data. The metrics to be used, the protocols governing their collection, and the mechanisms by which they are reported and aggregated, should all be specified before the program is implemented. The FFOs should reference these elements, and their adoption and implementation by grantees should be a contractual requirement, governing the content of the technical reports submitted.

Given the widely varying underlying economic/industry conditions and characteristics across individual grantees, the definition of “success” and “impact” is different for every region and every grantee’s program. Therefore, the specification of metrics and protocols should include establishment of baseline, pre-grant conditions for key indicators, so that progress and program outcomes can be assessed within an appropriate context.

Recommendation 2: i6 Program Input and Activity Metrics

Program grantees should use Client Management Systems (CMS)

Many of the network-based activities supported through the i6 program should be tracked in a low-cost way through a Client Management System (CMS) and reported to EDA based on a standard protocol. Measuring network-based activities and outputs is difficult, and qualitatively rich tracking of this activity is likely to impose a burden on grantees and participants. However, because of the centrality of networks to the development of regional clusters and innovation ecosystems, it is recommended that a simple score card is maintained by grantees, using a CMS, to track interactions, exchanges, meetings, etc.

Program grantees should employ and report a standard survey instrument

Many program activities and outputs can be captured through required surveys of participants and clients, for which the EDA should supply standardized instruments and protocols (surveys are also indispensable for tracking outputs and new capabilities). This standardized survey should err on the side of simplicity, focusing on key activities and goals of EDA programs. The use of technology should make collecting and reporting this information into a central database relatively low cost.

i6 Program Recommendations (continued)

Recommendation 3: i6 Program Technology Output and Capacity Metrics

Measure technology development with Technology Readiness Levels (TRLs) i6 program grantees should employ a standard definition of Technology Readiness Levels (TRLs) to measure success in technology development. A key goal of the EDA, and indeed the U.S. government, is to build successful regional economies through technology development and innovation. This requires a shared measure of technology development. TRLs are used effectively by other Federal agencies, and should become standard practice across EDA programs.

Recommendation 4: Sample Metrics and Possible Collection Methods

A variety of metrics are proposed and discussed throughout this report, organized and linked with the i6 program logic model that captures program inputs, activities, outputs, and outcomes. The graphic below presents a sample of some of the proposed metrics for program evaluation, along with possible data collection methods.

Initial Conditions & Capacities	Inputs	Outputs (Project Activities)	Enhanced Capabilities Direct Results	Impacts
<u>Sample Quantitative and Qualitative Metrics:</u>				
<ul style="list-style-type: none"> • Regional, national cluster growth rates • Prior innovation metrics (patenting, etc.) • Ecosystem metrics • Prior workforce Skills, Qualifications, & Abilities (SQAs) 	<ul style="list-style-type: none"> • Existing capabilities (staff, programs) • I6 grantee funding received from EDA • I6 grantee match funding (cost-share) • Technologies & ideas brought by clients/participants 	<ul style="list-style-type: none"> • # of events, participation, & satisfaction • # of boot camps/accelerators, participation, & satisfaction • # of entrepreneurs mentored • New facilities established • # of joint research projects conducted • # of SBIR proposals supported 	<ul style="list-style-type: none"> • # of technologies licensed or commercialized • # new business plans developed • # of new products launched by participants • # of employees with new skills • # of new business contacts made • # of new investment deals, loans, or grants 	<ul style="list-style-type: none"> • Improved capacity to access capital • Workforce skills development • Market diversification • Improved innovation/entrepreneurship ecosystem • Job, revenues, and/or business growth • Growth of target cluster • New economic activities in a distressed region
<u>Possible Direct and Indirect Data Collection Methods:</u>				
<ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals) • Third party data (through a standard set of regional and cluster indicators maintained by EDA) 	<ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Grantee site visits, interviews 	<ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Client/stakeholder surveys (standardized survey instrument) • Grantee interviews, site visits 	<ul style="list-style-type: none"> • Grantee self-reporting (e.g., grant proposals, reports) • Grantee/partner surveys (standardized survey instrument) • Client/stakeholder surveys (standardized survey instrument) • Grantee interviews, site visits • Third party data (to measure increased cluster, industry, community, and regional-level capacity and impacts over the long run) 	

Appendix A: i6 Grantee Profiles



The Bioscience Technology Commercialization project is a regional approach to identifying very early discoveries that, with the right assistance, can be advanced toward commercial viability.

Description

The objective of the Bioscience Technology Commercialization project is to create a more robust pipeline of new bioscience ventures in St. Louis that can potentially grow into significant employers in the future.

The project aims to demonstrate and validate the commercial viability of early discoveries from the region's research institutions, and it employs rigorous commercialization methods, executed and overseen by industry experts, to identify innovations with the most promising commercial potential.

Activities

- The BioGenerator conducted a competitive process to identify innovations with commercial market potential.
- The project included three rounds of applications for awards of \$50k each to validate innovations and narrow the field of commercial candidates to those with the greatest chance of seeding successful new ventures.
- Project awards were used to assist innovators with creating commercialization plans and provide counseling on the formation of a new company.
- The BioGenerator investment advisory core team, which consists of pharmaceutical and bioscience experts, inventors, and others, served as judges in the process and subsequently as mentors.

Clients & Partners

- Client companies received awards of up to \$50k, which were used to provide technology commercialization assistance.
- Companies receiving i6 funding generally were very small: mainly groups of 1 or 2 people, including entrepreneurs and university researchers.
- Approximately 12 companies received funding and assistance through the i6 grant.
- BioGenerator led the implementation of the i6 project, and the partner organizations provided clients assistance with technology commercialization activities.

i6 Grantee in 2010

Location

St. Louis, MO

Sector Focus

Bioscience

Geographic Focus

St. Louis MSA

Co-Grantees

- BioGenerator (subsidiary of BioSTL)
- Washington University in St. Louis
- University of Missouri - St. Louis
- Donald Danforth Plant Science Center
- St. Louis County Economic Council
- St. Louis Development Corporation

Contact Information

Benjamin Johnson, Program Director, BioSTL

(314) 880-8872

bjohnson@biostl.org

www.biogenerator.org/i6

Leveraging

- BioSTL provided a funding match of \$1 million for the i6 project.
- The i6 project allowed the BioGenerator and its partners to pilot and build capacity for this program, as well as to prove its effectiveness. The program has been successful in raising additional funds to continue the project, which is now known as the Spark Fund. The BioGenerator also has a Seed Fund, which provides larger investments for companies that are further along the funding continuum.
- The St. Louise region received a JIAC grant in 2011 for their bioscience cluster, which was used to support new company creation/development and entrepreneur development.

Key Outputs & Outcomes

- Approximately 12 companies were provided with technology commercialization funding through the i6 grant.
- Follow-on funding is the main measure for i6-funded companies. This is broadly defined as grants, investment, research and service contracts, and revenue growth.
- Project staff members feel that a long term successful outcome would be for 3 to 4 of the i6-funded clients to become successful bedrock regional companies, and for the unsuccessful entrepreneurs to continue their efforts to commercialize other technologies.

“[We were] able to complete proof-of-concept testing of [a] novel diagnostic technology.”
– Program client*

* Quote is drawn from an anonymous, online survey of i6 Challenge program clients and participants, administered by SRI International in March-April 2014.



The Global Center for Medical Innovation is a prototyping design and development facility that aims to accelerate the commercialization of next-generation medical devices and technology.

Description

This project facilitated the development of a new facility, the Global Center for Medical Innovation (GCMI), which aims to advance medical technology innovations that can be the basis for new products and new life-science companies. The Center provides a prototyping and design facility as well as a large network of experts in a variety of areas, such as intellectual property, regulation, and investing. By providing comprehensive support services in one location, the GCMI reduces the cost of developing and converting innovations into functional prototypes and clinical products.

Activities

The GCMI provides a variety of services to develop medical device innovations.

- Provides conceptualizing, design, prototyping and small scale manufacturing assistance to help early stage entrepreneurs prepare for clinical trials, and it provides space and support for conducting trials.
- Provides support for meeting regulatory requirements such as FDA approvals.
- Provides incubator space for medical device start-ups.
- Connects entrepreneurs with resources, such as contract manufacturing and access to early stage funding.
- Conducts educational events for the region's venture capital community on how to invest in the life sciences.
- Hosts an apprentice program for undergraduate Georgia Tech engineering students to volunteer at GCMI and gain experience.

Clients & Partners

- The GCMI closely works with local universities, and approximately 1/3 of their clients come from Georgia Tech or Emory University.
- Clients generally come from the Atlanta metro area, but others come from across the Southeastern portion of the U.S.
- Clients are diverse and include inventors, entrepreneurs, doctors, and early stage companies. The common link between clients is having an idea for a new medical device technology and the desire to test and commercialize it.
- Clients are required to bring some of their own funding to the process.

i6 Grantee in 2010

Location

Atlanta, GA

Sector Focus

Medical Devices

Geographic Focus

Atlanta, GA and the Southeastern U.S.

Grantee

The Global Center for Medical Innovation

Key Partner

- Georgia Institute of Technology

Contact Information

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www.devices.net

Leveraging

The GCMC received \$1.3 million in matching funding from the Georgia Research Alliance, a public-private partnership that supports development of the technology industry in Georgia. In addition, the GCMC operates on a fee-for-service model and receives funding through these fees. Many clients bring in funding through SBIR and STTR grants.

Key Outputs & Outcomes

Program staff track data on clients and their activities, such as the percentage of clients who are university researchers, university start-ups, community start-ups, and existing businesses. The Center is still in its early stages, but in the longer term it expects to see a variety of outcomes, including:

- Clients' successful proof of concept to raise follow-on funding.
- Completion of clinical trials and technology licensing.
- Formation of new companies.
- Elevating the status of the Atlanta region in the medical technology industry to recruit larger companies to the area.
- Location of medical device start-ups in Atlanta over the long term.
- Increased availability of investment for medical technology in Atlanta.



Igniting Innovation Cleantech Acceleration Network



The goal of the Igniting Innovation Cleantech Acceleration Network project is to accelerate the commercialization of innovative cleantech research.

Description

The Igniting Innovation Cleantech Acceleration Network (also referred to as the Florida Cleantech Acceleration Network: FL-CAN) links Florida-based universities, incubation networks, investors and industry resources together to create a network of Proof of Concept centers to accelerate the creation and commercialization of innovative clean technology research into new technology companies or to license it to existing firms. FL-CAN is designed to be a hub for connecting Florida’s most promising cleantech research with experienced entrepreneurs, entrepreneurial students, industry partners, venture capitalists, and other resources that can expedite the formation of new ventures. The center provides entrepreneurship education programs, industry contacts, mentorship by technology executives, and access to investors.

Activities

FL-CAN is involved in 4 primary activities:

- Coaching early to mid stage cleantech companies in areas such as obtaining grant funding, developing prototypes, and technology development.
- Conducting workshops, both in-person and webinar-based, on cleantech issues such as marketing, applying for grants, and workforce development.
- Public relations and the promotion of cleantech policy and work in the state of Florida.
- Strategic development of the cleantech sector by encouraging large companies to invest in Florida cleantech, and connecting large companies with start-ups and early stage companies to create partnerships. In addition, the project has hosted large events and expos.

Clients & Partners

The FL-CAN serves a large number of cleantech companies through its various activities.

- 33 companies have received free intensive coaching assistance, which consists of approximately 1-8 hours of coaching (mainly telephone based) per week.

i6 Grantee in 2011

Location

Orlando, FL

Sector Focus

Clean technologies

Geographic Focus

State of Florida

Grantee

University of Central Florida

Key Partners

- Space Coast Energy Consortium
- Florida Energy Systems Consortium
- Space Florida
- Florida High Tech Corridor Council
- Technological Research and Development Authority

Contact Information

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- Between 80 and 100 companies have received less intensive coaching assistance, such as proposal writing for an SBIR grant, assistance with a single sales campaign, etc.
- Approximately 1,700 companies in the state have attended webinars or workshops, and/or received the project's newsletter.

Leveraging

The FL-CAN project received matching funds from the University of Central Florida as well as Space Florida and the Florida High Tech Corridor Council. The University of Central Florida also received a Department of Energy grant to support companies working on renewable energy. Complementary activities of the i6 grant, the DOE grant, and other grants have been combined into the Innovation Concourse of the Southeast, which works in a larger multi-state regional area to connect high-tech start-ups, university researchers, corporations, and other resources.

Key Outputs & Outcomes

Project staff members collect a variety of metrics from their intensive coaching clients, such as job creation and grants and investment obtained, through phone calls and emails. Over the long term, FL-CAN project activities are expected to produce a variety of additional outcomes:

- Increases in the number of business development connections between start-ups and Fortune 1000 companies.
- Increases in grant proposals and funding for companies. 2 out of the 8 companies that attended the project's 6-week grant workshop won the SBIR for which they applied.
- Increases in licensing deals in the clean tech sector in Florida.
- Company revenue growth.

*"[We] received significant support in helping to develop a company that is now successfully selling products in the marketplace." – Program client**

* Quote is drawn from an anonymous, online survey of i6 Challenge program clients and participants, administered by SRI International in March-April 2014.



iGreen New England Partnership



The iGreen New England Partnership offers business, technical, marketing, and funding support to help form and accelerate new cleantech enterprises.

Description

The iGreen New England Partnership assists the formation and acceleration of new cleantech enterprises by providing inventors and early-stage entrepreneurs with business, technical, and marketing support. The project has connected more than 30 regional innovators, partners, state programs, and incubators. The Partnership aims to make it easier for entrepreneurs to locate and connect with partnering state programs, accelerators, incubators, mentors, technology development resources, and test sites. The project also provides awards to the most promising early-stage projects, leveraging federal and state funding and partner programs.

Activities

This project is large in scope and includes a variety of activities through the Clean Energy Foundation and its many partner organizations. The main activities of the project can be organized into three categories:

- **Facilitating connections:** A team of on the ground liaisons helps connect entrepreneurs to their program and other resources throughout the region, such as incubation networks and state economic development programs. An online network also connects entrepreneurs to regional expertise and infrastructure using a combination of online and personal interactions.
- **Cleantech innovation cluster research project:** Identified resources and members of the cleantech innovation community and assessed the early-stage support network for leading and emerging cleantech sectors.
- **Funding competitions:** The Partnership coordinated a series of challenges, competitions, and associated awards to help early-stage companies defray the cost of business and technology validation.

Clients & Partners

A key part of the iGreen project is the various partnerships between the Clean Energy Foundation and organizations in the partner states. Each state is represented on the project's steering committee. Organizations in partner states include the Massachusetts Clean Energy Center, the Maine Technology Institute, the Rhode Island Renewable Energy Fund, the Connecticut Clean Energy Fund, The Vermont Agency of Commerce and Community Development, and the New Hampshire Office of Energy Planning.

i6 Grantee in 2011

Location

Boston, MA

Sector Focus

Clean technologies

Geographic Focus

New England states - CT, ME, MA, RI, NH, VT

Grantee

New England Clean Energy Foundation

Key Partner(s)

- Association of Cleantech Incubators of New England
- Steering Committee Partners from each State

Contact Information

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Leveraging

The Partnership worked closely with the steering committee representatives from the represented New England States, and received additional funding from 4 of these organizations. They also received supplemental funding from the Department of Energy to provide grants for clean energy projects, and funds from the Environmental Protection Agency were leveraged to commercialize water technologies.

In addition to the resources that are available through Steering Committee member organizations, the Partnership aims to identify new funding streams that can support New England innovators over the long-term. Various funding sources have been considered, including support from foundations, the private sector, and expanded state programs.

Key Outputs & Outcomes

The Partnership tracks information on client companies including follow-on funding, business creation, and job creation. Specific outcomes of the project include:

- The Clean Energy Foundation provided \$381,000 in awards to support 15 companies and entrepreneurs.
- From these 15 awards, 6 new companies were formed, 25 new jobs were created, and \$15.5 million in follow on funding was secured.
- Taking in to account awards from both the Foundation and their partners, 31 companies and entrepreneurs received awards of over \$1 million.

“[The program] is great to work with! Very knowledgeable and a champion for our needs.” – Program client

* Quote is drawn from an anonymous, online survey of i6 Challenge program clients and participants, administered by SRI International in March-April 2014.



Innovative Solutions for Invention Xceleration



The Innovative Solutions for Invention Xceleration project aims to provide a systematic model for increasing innovation and minimizing the time from ideation to commercialization of new technologies.

Description

The Innovative Solutions for Invention Xceleration (ISIX) project aims to create an unprecedented capacity for successful commercialization in the biomedical field in the Akron region. The ISIX project is composed of a wide variety of related initiatives, with the overarching goals of increasing the quantity of invention disclosures and patents, increasing the quality of invention disclosures, and supporting entrepreneurial efforts. The project brings together world-class leaders in the biomedical device/product and polymer science industries to increase innovation and minimize the time from idea to commercialization of new technologies.

Activities

The ISIX project incorporates the Akron Model Innovation Process, which was created to help realize the project's goals. The process includes a number of interrelated activities.

- Idea generation and evaluation: providing collaborative research grants and creating an idea portal to competitively fund promising technologies.
- Facilitate proof-of-concept prototyping in the Austen BioInnovation Institute in Akron's (ABIA) Medical Device Development Center.
- Identify and resolve design, manufacturing, and regulatory issues for clients.
- Develop appropriate commercialization activities and marketing plans.
- Educational Initiatives: BioInnovation Design, BioInnovation Academy, Women's Entrepreneurship Program, Bridging Engineering, Science, & Technology (BEST) Medicine Engineering Fair.

Clients & Partners

The ISIX project is a partnership model between ABIA, which is itself a collaboration of public, private, and not-for-profit institutions, and the University of Akron Research Foundation, with support and collaboration from the State of Ohio, Summit County, the City of Akron, and various Ohio biomedical companies. This partnership has brought together scientists, physicians, engineers, researchers, and entrepreneurs in the biomedical/polymer science industries in Northeast Ohio.

i6 Grantee in 2010

Location

Akron, OH

Sector Focus

Biomedical and polymer science

Geographic Focus

Northeast Ohio

Grantees

- University of Akron Research Foundation
- Austen BioInnovation Institute in Akron (ABIA)

Contact Information

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Leveraging

The ISIX project receives additional support from the University of Akron Research Foundation, ABIA, the City of Akron's BioInnovation Fund, and the Knight Foundation. In addition, the project increased access to angel funding for client companies. The Akron Regional Change (ARCH) Angel Investment Network has grown to over 650 individuals, and more than 110 companies have presented and raised over \$450 million in follow-on funding. The ISIX project aims to increase funding to its partner institutions by \$150 million over ten years.

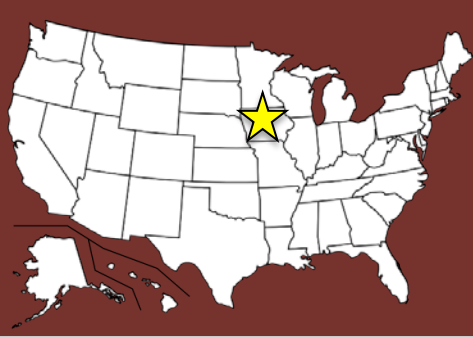
Key Outputs & Outcomes

The ISIX project produced a number of outcomes as of December 2013.

- Close to 300 ideas generated and evaluated.
- 36 ideas received technology development funding totaling almost \$500,000.
 - 15 of these have completed prototyping
 - 19 are actively pursuing the prototyping process
- \$800,000 in collaborative research grants awarded to client projects. These projects produced the following outcomes:
 - 26 extramural proposals totaling \$19.5 million
 - 6 awards totaling almost \$1 million, with 11 proposals still pending.
 - 7 invention disclosures
 - 9 peer reviewed papers
 - Over 25 conference presentations



Iowa Innovation Network



The goal of the Iowa Innovation Network project is to identify very early discoveries that, with the right assistance, can be advanced toward commercial viability.

Description

The focus of the Iowa Innovation Network project was to identify and quantify companies with the desire to grow and incorporate new technologies, and assist them in identifying and adopting new product and process improvements by providing technology acceleration solutions through education, mentoring and connecting to resources, including product development and commercialization services. The project helped entrepreneurs, both in and outside of Iowa's universities, advance very early discoveries with assistance from industry experts to commercial viability.

Activities:

- Project staff worked to improve connections between Iowa businesses, entrepreneurs and universities to expand the pool of relevant green technologies, facilitate company creation and expansion, and accelerate technology transfer and the commercialization of research.
- New technologies and products underwent a vetting process through the Iowa Innovation Network.
- A group of industry experts provided mentoring to entrepreneurs as well as evaluation of their concepts.
- Early stage companies that passed the review process received assistance with their business model, and winning applications were provided with funding from the i6 grant.

Clients & Partners

- The Iowa Innovation Council was created in 2010 from the state's economic development efforts to connect business leaders, university, and community college officials to develop strategies to encourage and support innovation in Iowa.
- The Innovation Network works with Iowa State University to help them choose research targets that have the potential for success in commercial markets.
- Four Iowa companies have successfully applied for and received funding through the project.

i6 Grantee in 2011

Location

Des Moines, Iowa

Sector Focus

Green technologies

Geographic Focus

State of Iowa

Co-Grantees

- Iowa Innovation Council
- Iowa State University

Key Partner

Iowa Economic Development Authority

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Leveraging

In addition to the funds provided by the EDA, the state contributed matching funds as part of its economic development efforts. The Innovation Network also worked closely with the Manufacturing Extension Partnerships and other regional economic development agencies, as well as state universities.

Key Outputs & Outcomes

- 4 companies received grant funding through the extensive review process.
- Almost \$400,000 in grant funding was awarded.
- Funded companies are surveyed on an annual basis to assess metrics such as follow on funding, private capital accessed, and additional company investment in the project.
- The Innovation Network worked with Iowa State University to create connections between the university and the state business community.

*“The i6 has been very helpful and allowed us to build new tooling for our new products and enter the market much faster.” – Program client**

* Quote is drawn from an anonymous, online survey of i6 Challenge program clients and participants, administered by SRI International in March-April 2014.



Louisiana Tech Proof of Concept Center



The Louisiana Tech Proof of Concept Center focuses on increasing the speed with which new green technologies enter the market.

Description

This proof of concept center project, known as LA_i6, was housed at Louisiana Tech University's Enterprise Center. LA_i6 focused on accelerating the speed to market of new green technology innovations by partnering with a group of private companies and university researchers to drive new innovations from inside the university to the market. LA_i6 took projects with university intellectual property as well as projects from private sector partners, determined applicable regulatory and performance standards, field and site tested the products, and provided direct guidance for the final stage of product development. Projects received seed funding in addition to commercialization assistance.

Activities

- The LA_i6 project solicited project proposals from university-developed technologies that partnered with private companies who provided some level of funding for the project.
- The project focused on technologies at the alpha stage, where the next step was to build a version of the product that could be taken to the demo stage.
- An advisory board of three university staff was formed to vet and select projects to be funded, as well as monitor their progress.
- All projects included a significant green element as part of the i6 requirements.

Clients & Partners

- Clients of the LA_i6 project included companies and university researchers working with the center on a specific project.
- The project worked with a wide variety of firms in various industry sectors. Examples include a small local company who manufactured a new solar panel, a biofuels start-up that developed a pilot plant in the region, and a pipe manufacturing company from Toronto.
- A total of 12 projects were funded through the LA_i6, each receiving \$50-\$100k in funding; a subset received a second funding round of \$5-\$25k.

i6 Grantee in 2011

Location

Ruston, LA

Sector Focus

Green technologies

Geographic Focus

I-20 Innovation Corridor - North Louisiana, South Arkansas, West Central Mississippi, Northeast Texas

Grantee

Louisiana Tech University

Key Partners

Private companies co-investing in technologies

Contact Information

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latechenterprisecenter.com

Leveraging

- This project leveraged significant private investment as part of its operating model. Funded projects were required to partner with private companies that provided funding in addition to the i6 funds. In total, approximately \$5 million in private investment was leveraged through the i6 grant.
- In 2012, Louisiana Tech received a JIAC grant to support rural community development and create a business incubator and accelerator for approximately 20 companies. In some cases, a technology that came out of the LA_i6 project resulted in a start-up company currently being assisted through the JIAC grant work.
- The project is currently seeking additional sources of funds, including private funding.

Key Outputs & Outcomes

Project staff members utilize formal progress reports as well as informal phone calls and meetings to monitor their funded projects. A number of outcomes have resulted from the work of the LA_i6 project:

- Approximately \$5 million in funding has been leveraged by the i6 grant.
- Approximately 10 technologies have been licensed from approximately 6 of the completed projects.
- 2 new companies formed around funded technologies in the region.
- In the long term, project staff members expect to see new high-wage jobs created in the region.



New Mexico Technology Ventures



The New Mexico Technology Ventures Project aims to develop infrastructure for the successful maturation of technologies developed under the SBIR program into commercially viable enterprises.

Description

The New Mexico Technology Ventures project is an effort of the Technology Ventures Corporation to extend its technology commercialization program to companies that have received SBIR Stage I and II awards from the NIH and the NSF. The project implemented a number of technology nurturing and entrepreneurship development activities in order to create an innovative and collaborative environment where the research, institutional, and commercial components of technology commercialization can come together.

Activities

The Technology Ventures process for helping SBIR companies reach the next level of commercialization involves many steps.

- First, viable SBIR companies are identified and qualified for the program. The program originally planned to assist Stage II companies, but ultimately worked with Stage I companies as well.
- An advisory team is assembled for each company to assist with commercialization market research and identify promising technologies.
- Each company's commercialization assistance needs are assessed.
- Entrepreneurial skills development is achieved through the Corporation's established training programs.
- Companies are assisted with intellectual property development and receive assistance from patent attorneys and patent workshops.
- Each company's business case is built and strengthened, and the path to commercialization and the next phase of SBIR funding is clarified and refined.
- Companies are connected with private equity investment and assisted with pitches. Private investment leveraging workshops are also offered to companies.

i6 Grantee in 2010

Location

Albuquerque, New Mexico

Sector Focus

SBIR Phase I and II Companies

Geographic Focus

State of New Mexico

Grantee

Technology Ventures Corporation

Key Partners

- Lockheed Martin
- Sandia National Laboratories
- New Mexico Angels

Contact Information

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Clients & Partners

- The New Mexico Angels conducted a financial workshop for approximately 40 clients.
- The majority of clients are individuals at Sandia National Laboratories who want to commercialize a technology not being pursued by the lab, as well as external entrepreneurs who want to connect with the lab and its technologies.

Leveraging

- The Technology Ventures Corporation is a non-profit organization that was founded by Lockheed Martin. Lockheed provides the majority of funding for their programs.
- The corporation also has had grants from the DoD, the DOE, and NSF to work with other federal laboratories.

Key Outputs & Outcomes

- Overall, the Corporation works with approximately 300-400 entrepreneurs per year. About 75 of those become clients, 15 are ready to be commercialized, and 5 receive follow on funding.
- About 25% of these companies are SBIR funded and relevant to the i6 grant. Extrapolating from these figures, the corporation has contact with about 75 SBIR funded entrepreneurs, takes 10-12 on as clients, and about 3 are ready for commercialization. It is unclear at this stage how many of the SBIR funded clients will successfully secure further funding.
- The primary metrics tracked by the Corporation are job creation, company creation, and funding secured.



The Oregon Innovation Cluster project aims to address gaps in the technology commercialization continuum for the cleantech, nanoscience, and bioscience industries.

Description

The Oregon Innovation Cluster project is a collaboration of the state's three Signature Research Institutes – OTRADI, ONAMI, and Oregon BEST – to create Oregon's first comprehensive innovation infrastructure system and translate university research into viable commercial technologies. The project focuses on supporting the technology commercialization continuum by providing a range of services, including technical and business assistance services, proof of concept projects, internships and mentoring, and the development of a business incubator.

Activities

The Oregon Innovation Cluster project focused on three main activities.

- Technical Business Services and Entrepreneurs in Residence (EIRs): EIRs, hired with project funds, provide start-ups and spin-off companies with business assistance including business plans, human resources, grant applications, and connections with venture capital.
- Proof of Concept Grants: Funds are provided to university projects that spin out innovation companies. A commercialization advisory committee evaluates potential projects.
- Internships: Interns at the high school, college, and graduate student levels are placed in shared-resource laboratories and companies to educate and mentor future entrepreneurs.
- Business Incubator Development: Project funds were also used in part to help create the OTRADI Bioscience Incubator, Oregon's first and only bioscience-specific accelerator. The incubator provides facilities, resources, and expertise to assist scientists and start-up companies.

Clients & Partners

- A key aspect of the project is the overarching partnership between the three research institutes.
- State universities partnered with the project to host interns and provide projects for proof of concept funding.
- Client companies are typically very small, 1-2 person start-ups in the bioscience industry, while cleantech firm clients tend to average approximately 10 employees.

i6 Grantee in 2010

Location

Portland, OR

Sector Focus

Cleantech, nanoscience, and bioscience

Geographic Focus

State of Oregon

Grantees

- Oregon Translational Research & Drug Development Institute (OTRADI)
- Oregon Nanoscience & Microtechnologies Institute (ONAMI)
- Oregon Built Environment & Sustainable Technologies Center (Oregon BEST)

Contact Information

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www.otradi.org

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Leveraging

The i6 grant funding was matched by funds from the three research centers. The EDA funds also helped the project to move forward and secure other funding sources.

- The bioscience incubator is a very popular program, and the i6 project allowed the partners to develop the program to the point where state funding was secured to continue the incubator.
- The EIR program, initially funded through the i6, is now funded by the state. The i6 project provided a key means of proving the effectiveness of the model to secure this state funding.
- Project staff members are currently seeking foundation funding for the internship program.

Key Outputs & Outcomes

- 17 proof of concept projects at 5 universities were funded by the i6 grant.
- The EIR program has assisted approximately 85 companies across the state.
- 10 high school and undergraduate interns, as well as 2 graduate students, were funded and worked with university labs and small businesses.
- The project has created company and job growth, but the amount of this growth that is directly attributable to the i6 grant is difficult to determine.
- Enhanced collaboration between the state research institutes partnering on the i6 grant is another important outcome, helping to enhance synergies and achieve economies of scale for greater return on investment for the state of Oregon.



Proof of Concept Center for Green Chemistry Scale-Up



The Proof of Concept Center assists entrepreneurs and small businesses in the development of bio-based and environmentally friendly technologies within a supportive business environment.

Description

The Proof of Concept Center for Green Chemistry Scale-up is housed in the Michigan State University Bioeconomy Institute, located in a former pharmaceutical R&D and pilot plant facility in Holland, Michigan. The Center focuses on businesses in green technologies, both chemical and non-chemical, such as green concrete formulations. This facility is able to provide clients with expert assistance and facilities to scale-up their processes from the small lab-bench scale to a larger manufacturing scale, in addition to providing assistance with business planning and funding acquisition.

Activities

The Center provides two main types of services for clients: it offers a variety of business support services to a broad range of clients who are mainly located in their region, and it provides access to the chemical scale-up production facilities for a smaller, select group of firms from across the country. Services include:

- Business planning and market assessment
- Technology assessment and product/service design
- Grant writing aid (for example, for SBIR, STTR, and seed funding)
- Human factors consulting to assist with attracting customers
- Providing contacts with potential investors
- Intellectual property and legal clinics
- Access to university resources to assist clients in chemical scale-up activities, providing facilities, expertise, and regulatory assistance that would otherwise be time and cost-prohibitive.

Clients & Partners

Clients of the Center include a variety of companies from the Chicago region who receive business support services. A smaller group of client companies that receive assistance with chemical production scale-up activities come to the Center from across the country.

i6 Grantee in 2011

Location

Holland, Michigan

Sector Focus

Green chemical technologies

Geographic Focus

National

Grantee

Michigan State University (MSU)
Bioeconomy Institute

Co-Grantees

- Lakeshore Advantage
- The Prima Civitas Foundation
- NewNorth Center

Contact Information

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bioeconinst.msu.edu/i6-proof-concept-center

Approximately 2/3 of client companies are in the chemical technologies sector, while the other 1/3 come from a diverse group of industries, including dairy farming, electric and internal combustion engines, and concrete formulations.

The Center collaborates with four main partners to provide services:

- *Michigan State University* operates the chemical production plant at the Bioeconomy Institute. The university also assists with research and chemical manufacturing expertise.
- *Lakeshore Advantage* provides business development assistance to entrepreneurs.
- *The Prima Civitas Foundation* coordinates recruitment of clients for the Center and connects firms with potential funding sources.
- *NewNorth Center* assists firms with product development and marketing.

Leveraging

The Bioeconomy Institute has been assisting a wide range of clients since 2009. The broader client base includes companies that receive assistance outside of the i6 program. The total cost of the Bioeconomy Institute is over \$2 million annually, and the center receives funding from a variety of sources in addition to the i6 grant. Additional funding comes from the Michigan Strategic Fund and non-profit foundations, such as the Camille & Henry Dreyfuss Foundation.

Key Outputs & Outcomes

The clients of the Center experience a variety of outcomes as a result of their participation with Bioeconomy Institute activities. Chemical scale up production assistance was provided for about 9 clients; these activities require time, capital, and expertise that these companies would otherwise be unable to access.

Other outcomes include outside investment secured, new or increased product sales, the establishment of strategic partnerships, and new patents.



Washington Clean Energy Partnership



The Washington Clean Energy Partnership project aims to grow and accelerate the clean energy cluster in the state of Washington.

Description

The Washington Clean Energy Partnership project approaches accelerating the clean energy sector in the region by focusing on energy efficiency technology, especially in commercial buildings. The project utilizes innovative strategies to prove the viability and cost efficiency of new technologies to potential customers, helps move these technologies from the research stage to market, and provides workforce development strategies.

Activities

The Partnership project consists of three main activities:

- Creation of the Northwest Building Energy Technology Hub and the Northwest Smart Building Center, a statewide proof of concept center where building owners and operators can learn what products and systems will be best for them and inventors can demonstrate how their products work in real buildings.
- Providing business mentorship for clean tech companies. The goal of this activity is to mentor energy efficiency innovators and companies to help them get their products tested and ready for market, and to create and grow sustainable companies.
- Developing training programs and internships to train people for jobs operating innovative energy efficiency technologies in commercial buildings.

Clients & Partners

- Innovate Washington, a partner on the grant, manages the Northwest Building Energy Technology Hub project activities.
- Clean Tech Open, a national mentoring organization, provides business mentorship and support for clean tech companies involved in the project.
- South Seattle Community College has developed training programs and an applied bachelor's degree in clean technologies to create a workforce ready to implement the innovative ideas coming out of the Partnership project.

i6 Grantee in 2011

Location

Seattle, WA

Sector Focus

Clean energy

Geographic Focus

State of Washington

Co-Grantees

- Puget Sound Regional Council (PSRC)
- Innovate Washington Foundation
- Clean Tech Open
- South Seattle Community College

Contact Information

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SLee@psrc.org

www2.cleantechopen.org/i6-overview/

www.innovatewashington.org/clean-energy-partnership

Leveraging

The project has leveraged substantial funding, especially for the Northwest Building Energy Technology Hub. The state provided approximately \$5 million to build the core program space and data platform, as well as to provide business mentorship and workforce development. The Northwest Energy Efficiency Alliance has also provided approximately \$5 million to highlight energy efficiency guidelines and best practices, build the data platform, and provide business mentorship. The project is also pursuing other sources of grant funding and continued state funding to continue the project after the i6 grant period ends.

Key Outputs & Outcomes

- Over 400 companies were recruited and vetted for business mentorship and technology commercialization assistance; more than 30 have been matched with mentors.
- The proof of concept work is in its early stages; but project staff members expect to complete an economic impact study to quantify the energy savings from using various technologies, among other goals. It is important to show the potential for innovative clean energy technologies to save companies money in the long run in addition to providing positive environmental impacts from energy savings.
- As the project continues, staff members expect to see new companies formed and associated job growth in the clean tech/energy efficiency industry, with a trained workforce available to fill job openings.

Appendix B: i6 Grantee Client/Participant Survey

The UNC-SRI team conducted a short web-based survey of i6 clients and participants to gather their direct inputs on experiences, outcomes, and impacts from their participation in the program. The survey instrument was designed based on findings from the i6 interviews and site visits. i6 Challenge grantees distributed the anonymous survey, on behalf of UNC-SRI, directly to their own clients via an invitation email and web link. The target population was defined businesses, start-ups, entrepreneurs, organizations, or other individuals that had received services from the i6 Challenge grantee programs.

The survey was distributed by eight i6 grantees and responses were received from clients/participants of seven grantees. There were a total of 47 valid responses, and while it is not possible to calculate an exact response rate due to the indirect distribution, we estimate that roughly one-fifth to one-quarter of clients/participants invited to participate responded to the survey. Given the modest response rate and the difficulties of interpreting non-response, especially in an anonymous survey, the findings of the survey provide a useful illustration of how the program can and often does work – but are not necessarily representative of the total i6 client/participant population. The survey was analyzed using R software. The survey instrument and descriptive statistics are included in this section.

i6 Grantee Client/Participant Survey Instrument & Descriptive Statistics

Introduction

Thank you for participating in our survey.

SRI International and the University of North Carolina (UNC) are administering this survey as part of a study of i6 and Jobs & Innovation Accelerator projects funded in FY 2010-2011.

This survey is short, with only 8 questions, and should take about 10 minutes of your time to complete.

This survey is anonymous. No personally identifiable information will be collected and there will be no individual attribution to any survey response. Any survey data provided to anyone outside of the SRI and UNC team, including to the i6 and Jobs & Innovation Accelerator Challenge grantee organizations, will be purged of information that could be used to identify individual responses.

Your participation in this survey is voluntary. If you begin the survey you can stop at any time.

The results of our study will inform economic development practitioners about effective approaches for metrics and data collection to potentially be incorporated into future program evaluations. This work will be an aggregate study of the outputs and outcomes of each program and will not evaluate any single project or grantee.

Please click “Next” at the bottom of this page to start the survey. If you would like to see detailed Survey Navigation Instructions select “Show Instructions” below before continuing.

If you have any technical questions about the web survey, please contact [technical manager]. If you have general questions about the study, please contact [survey team].

Please choose all that apply:

- Show Instructions

Instructions

Please use the onscreen navigation buttons while taking the survey, not your browser’s forward and back buttons.

The following options will be available to you while taking the survey:

- “Next” – will move you ahead to the next group of questions.
- “Previous” – will move you back to the previous group of questions.
- “Submit” -on the last page – submits your responses.

Please Click “Next” Below to Continue

Question 1. What kind of firm/organization do you belong to?

Please select only one answer.

- Entrepreneur/pre-startup (have not yet formed a legal business entity)
- Start-up company (legal business entity)
- Small business (not a start-up company)
- Medium or large business
- Economic development or workforce organization
- Government/public entity
- Other non-profit
- University (e.g., department, research center, tech transfer office)
- Individual (no organizational affiliation)

- Other, please describe: [TEXT BOX]

Question 1: What kind of firm/organization do you belong to?		
	Number of respondents	Percentage
Entrepreneur/pre-startup (have not yet formed a legal business entity)	2	4%
Start-up company (legal business entity)	30	64%
Small business (not a start-up company)	5	11%
Medium or large business	1	2%
Economic development or workforce organization	2	4%
Government/public entity	2	4%
Other non-profit	0	0%
University (e.g., department, research center, tech transfer office)	5	11%
Individual (no organizational affiliation)	0	0%
Other	0	0%
<i>Question viewed by 47 respondents.</i> <i>Question format: multiple choice, select only one.</i>		

Question 2A* One focus of the i6 program in your region is to support the growth and development of [Cluster/ Industry Group]. How does your business relate to this industry?

*Answered only by respondents who identified in Question 1 as: Entrepreneurs/pre-startups; Start-up companies; Small businesses; Medium or large businesses

Please select all that apply, and comment on the precise nature of your business:

- My core business is in this industry
- My business is a supplier of this industry
- My business is a service provider to this industry
- My business is a downstream customer of this industry
- My business is in a related industry
- My business is seeking to enter this industry
- My business has no relationship to this industry
- Other
- I don't know

Question 2A: One focus of the i6 program in your region is to support the growth and development of [Cluster/ Industry Group]. How does your business relate to this industry?	
	Number of respondents
My core business is in this industry	31
My business is a supplier of this industry	7
My business is a service provider to this industry	3
My business is a downstream customer of this industry	1
My business is in a related industry	2
My business is seeking to enter this industry	1
My business has no relationship to this industry	0
Other	0
I don't know	0
<p><i>Question viewed by 38 respondents.</i></p> <p><i>Question format: multiple choice, select all that apply.</i></p>	

Question 2B* One focus of the i6 program in your region is to support the growth and development of [Cluster/ Industry Group]. How does your organization relate to this industry?

*Answered only by respondents who identified in Question 1 as: Economic development or workforce organizations; Government/public entities; Other non-profits; University; Individuals; or Other

Please select all that apply, and comment on the precise nature of your business:

- It is a primary focus of my organization (e.g., a target cluster)
- It is a secondary focus of my organization
- It is not a focus of my organization, but we do some work with the industry
- We do not work with this industry
- Other
- I don't know

Question 2B: One focus of the i6 program in your region is to support the growth and development of [Cluster/ Industry Group]. How does your organization relate to this industry?

	Number of respondents
It is a primary focus of my organization (e.g., a target cluster)	3
It is a secondary focus of my organization	2
It is not a focus of my organization, but we do some work with the industry	3
We do not work with this industry	0
Other	1
I don't know	0

Question viewed by 9 respondents.

Question format: multiple choice, select all that apply.

Question 3. How did you hear about the i6 program?

Please select all that apply.

- Word of mouth - I know another client of the program
- Word of mouth - general knowledge
- Program website
- Referral from an economic development organization, MEP, or similar organization
- Referral from university faculty/staff
- Direct outreach by the program
- Program presentation or booth at an event
- Other source (please describe): [TEXT BOX]

Question 3: How did you hear about the i6 program?	
	Number of respondents
Word of mouth - I know another client of the program	5
Word of mouth - general knowledge	7
Program website	5
Referral from an economic development organization, MEP, or similar organization	15
Referral from university faculty/staff	5
Direct outreach by the program	13
Program presentation or booth at an event	2
Other source (please describe):	8
<p><i>Question viewed by 46 respondents.</i></p> <p><i>Question format: multiple choice, select all that apply.</i></p>	

Question 4. Please describe your level of engagement with the i6 program:

[HELP SECTION]

Definitions:

Light: received minor services, isolated or infrequent interaction. *For example, participated in a seminar or informational event.*

Moderate: received minor services on a periodic or ongoing basis, or a more substantial service of short duration. *For example, a series of brief consultations with an entrepreneur-in-residence or technical expert, or received support in applying for a grant or award.*

Intensive: received substantial services or support, typically over a sustained period. *For example, participated in an accelerator or incubation program, or performed a collaborative research project.*

Question 4: Please describe your level of engagement with the i6 program:		
	Number of respondents	Percentage
Light	5	11%
Light-to-Moderate	5	11%
Moderate	16	35%
Moderate-to-Intensive	8	17%
Intensive	12	26%
<p><i>Question viewed by 46 respondents.</i></p> <p><i>Question format: multiple choice, select only one.</i></p>		

Question 5. What type(s) of service(s) or support have you received through the i6 program?

Please select all that apply.

Events, Networking, & Referrals

- Participated in an educational, training, or networking event
- Participated in a conference, showcase, or exhibition
- Received a referral (e.g., to a researcher, business contact, investor, etc.)

Mentoring, Coaching, & Technical Assistance

- Participated in a boot camp or accelerator program
- Business/entrepreneurship mentoring and coaching
- Product development, supply chain, or operational assistance or advice
- Marketing, sales, or market research assistance or advice
- Exporting assistance or advice

Facilities & Equipment

- Physical space for operating my business or project
- Access to shared equipment, laboratory, clean rooms, etc.

R&D and Technology Development

- Joint research project with a university partner or federal lab
- Assistance with research and development (e.g. proof-of-concept, prototyping, testing, technology scale-up, etc.)
- Technology commercialization/licensing assistance
- Assistance with patenting or regulatory/government approvals

Financing

- Received support or assistance to obtain seed money for a start-up business
- Received support or assistance for a grant proposal or award application
- Participated in an Angel/VC/seed funding competition

Other service(s) or support

- Other (please describe): [TEXT BOX]

Comments on services or support received (optional): [TEXT BOX]

Question 5: What type(s) of service(s) or support have you received through the i6 program?	
	Number of respondents
Events, Networking, & Referrals	
Participated in an educational, training, or networking event	23
Participated in a conference, showcase, or exhibition	21
Received a referral (e.g., to a researcher, business contact, investor, etc.)	24
Mentoring, Coaching, & Technical Assistance	
Participated in a boot camp or accelerator program	11
Business/entrepreneurship mentoring and coaching	19
Product development, supply chain, or operational assistance or advice	15
Marketing, sales, or market research assistance or advice	11
Exporting assistance or advice	2
Facilities & Equipment	
Physical space for operating my business or project	9
Access to shared equipment, laboratory, clean rooms, etc.	10
R&D and Technology Development	
Joint research project with a university partner or federal lab	10
Assistance with research and development (e.g. proof-of-concept, prototyping, testing, technology scale-up, etc.)	19
Technology commercialization/licensing assistance	5
Assistance with patenting or regulatory/government approvals	4
Financing	
Received support or assistance to obtain seed money for a start-up business	12
Received support or assistance for a grant proposal or award application	13
Participated in an Angel/VC/seed funding competition	5
Other service(s) or support	
Other (please describe):	5
<i>Question viewed by 46 respondents.</i>	
<i>Question format: multiple choice, select all that apply.</i>	

Question 6. What direct results would you attribute (wholly or in part) to the services or support you received through the i6 program?

Please select all that apply.

Technology Development

- New technology or concept was developed, tested, or taken to next stage of development
- Technology commercialized/licensed
- Intellectual property developed or government approval received
- Realized an idea/technology wouldn't work and changed my idea/approach

Product & Business Development

- Legally registered my company (federal/state registration, permitting, etc.)
- Developed a business plan or strategic plan
- Developed a new or improved product
- Identified new markets/customers
- Cost reduction, operational efficiency, or quality improvement/certification

Human Capital

- Employee/management skills development
- New employees hired
- Knowledge about how to access outside assistance, services or sources of financing

Networking/Marketing

- New networking contact(s)
- New professional/business partnership(s)
- Developed new advertising, sales, marketing, or branding strategies and/or materials
- Developed a new export strategy

Financing

- Received a government award or grant
- Received funding from an Angel/VC investor
- Received funding/investment from another source

Other direct results

- Other (please describe): [TEXT BOX]

Comments on direct results (optional): [TEXT BOX]

Question 6: What direct results would you attribute (wholly or in part) to the services or support you received through the i6 program?

	Number of respondents
Technology Development	
New technology or concept was developed, tested, or taken to next stage of development	26
Technology commercialized/licensed	9
Intellectual property developed or government approval received	5
Realized an idea/technology wouldn't work and changed my idea/approach	3
Product & Business Development	
Legally registered my company (federal/state registration, permitting, etc.)	7
Developed a business plan or strategic plan	11
Developed a new or improved product	14
Identified new markets/customers	12
Cost reduction, operational efficiency, or quality improvement/certification	9
Human Capital	
Legally registered my company (federal/state registration, permitting, etc.)	7
Developed a business plan or strategic plan	11
Developed a new or improved product	14
Networking/Marketing	
New networking contact(s)	24
New professional/business partnership(s)	15
Developed new advertising, sales, marketing, or branding strategies and/or materials	7
Developed a new export strategy	0
Financing	
Received a government award or grant	17
Received funding from an Angel/VC investor	6
Received funding/investment from another source	10
Other direct results	
Other (please describe):	1
<i>Question viewed by 44 respondents.</i>	
<i>Question format: multiple choice, select all that apply.</i>	

Question 7A* What impacts would you attribute (wholly or in part) to the services or support you received through the i6 program?

*Answered only by respondents who identified in Question 1 as: Entrepreneurs/pre-startups; Start-up companies; Small businesses; Medium or large businesses

Please select all that apply.

- Started a new business
 - Business stabilization and/or survival
 - Business acquisition or merger
 - Established a new location/moved business into the region
 - New or increased sales/revenues
 - Increased employment
 - Increased productivity/efficiency
 - Increased profitability
 - Diversification, entering new markets, reaching new customers
 - Improved access to capital/investment
 - Growth in management/employee capabilities and knowledge
 - Expanded technical and business networks
 - Environmental and/or energy efficiency improvements
 - Other, please describe: [TEXT BOX]
- Comments on impacts (optional): [TEXT BOX]

Question 7A: What impacts would you attribute (wholly or in part) to the services or support you received through the i6 program?	
	Number of respondents
Started a new business	6
Business stabilization and/or survival	12
Business acquisition or merger	1
Established a new location/moved business into the region	5
New or increased sales/revenues	4
Increased employment	8
Increased productivity/efficiency	12
Increased profitability	3
Diversification, entering new markets, reaching new customers	8
Improved access to capital/investment	11
Growth in management/employee capabilities and knowledge	8
Expanded technical and business networks	15
Environmental and/or energy efficiency improvements	2
Other	5
Question viewed by 34 respondents.	
Question format: multiple choice, select all that apply.	

Question 7B* What impacts would you attribute (wholly or in part) to the services or support of the i6 program?

*Answered only by respondents who identified in Question 1 as: Economic development or workforce organizations; Government/public entities; Other non-profits; University; Individuals; or Other

Please select all that apply.

- Environmental and/or energy efficiency improvements
- Improved innovation and entrepreneurship ecosystem in my region
- Growth and development of a key or targeted industry/cluster in my region
- Improved opportunities for small businesses in my region
- Improved opportunities for disadvantaged/minority groups in my region
- A distressed region/neighborhood gained new economic activities
- Workforce skills development in my region
- Growth of higher skill/wage job opportunities in my region
- Growth of existing businesses and/or startup of new businesses in my region
- Other, please describe:

Comments on impacts (optional): [TEXT BOX]

Question 7B: What impacts would you attribute (wholly or in part) to the services or support of the i6 program?	
	Number of respondents
Environmental and/or energy efficiency improvements	1
Improved innovation and entrepreneurship ecosystem in my region	7
Growth and development of a key or targeted industry/cluster in my region	5
Improved opportunities for small businesses in my region	2
Improved opportunities for disadvantaged/minority groups in my region	0
A distressed region/neighborhood gained new economic activities	0
Workforce skills development in my region	1
Growth of higher skill/wage job opportunities in my region	3
Growth of existing businesses and/or startup of new businesses in my region	4
Other, please describe:	0
Question viewed by 9 respondents. Question format: multiple choice, select all that apply.	

Question 8. How satisfied or dissatisfied were you with:

Comments (optional): [TEXT BOX]

Question 8: How satisfied or dissatisfied were you with:						
	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied	Not Applicable
Events, training, networking, and referral services	1	0	5	10	17	9
Mentoring, coaching, and technical assistance services	1	0	5	14	14	8
Facilities and equipment provided	1	1	2	9	11	18
R&D and technology development assistance	2	1	3	9	11	16
Financing assistance	3	1	4	7	15	12
<p><i>Question viewed by 43 respondents.</i> <i>Question format: multiple choice, select only one.</i></p>						

Appendix C: List of Abbreviations

ARC	Appalachian Regional Commission
BED	Bio Entrepreneur Development Program
CMS	Client Management System
DRA	Delta Regional Authority
EDA	Economic Development Administration
EPA	Environmental Protection Agency
ETA	Employment and Training Administration
FFO	Federal Funding Opportunity Announcement
GCMi	Global Center for Medical Innovation
i6	i6 Challenge
ISIX	Innovative Solutions for Invention Xceleration
IT	Information Technology
IWP	Integrated Work Plan
JIAC	Jobs and Innovation Accelerator Challenge
MEP	Manufacturing Extension Partnership
MSA	Metropolitan Statistical Area
NAICS	North American Industry Classification System
NIH	National Institutes of Health
NSF	National Science Foundation
RAAN	Rockford Area Aerospace Network
SBA	Small Business Administration
TARIC	Taskforce for the Advancement of Regional Innovation Clusters
TRLs	Technology Readiness Levels
UNC	University of North Carolina
USPTO	U.S. Patent and Trade Office
VC	Venture Capital