The Evaluation of the U.S. Small Business Administration's Regional Clusters Initiative

Year Two Report

June 2013

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Year Two Report

Mark Turner, Ph.D.

Alexandre Monnard, M.P.P.

Laura Leete, Ph.D.

Prepared for:
U.S. Small Business Administration
409 3rd St, SW
Washington, DC 20416

Prepared by:
Optimal Solutions Group, LLC
5825 University Research Court, Suite 2800
College Park, MD 20740

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List of Acronyms and Abbreviations

Advanced Power Cluster: Advanced Power & Energy Cluster

ADT: Advanced Defense Technology

BEA: Bureau of Economic Analysis

BLS: Bureau of Labor Statistics

C4ISR: Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance

D&B: Dun and Bradstreet

Energy Storage Cluster: Northeast Electrochemical Energy Storage Cluster

FlexMatters: FlexMatters - Northeast Ohio Technology Coalition

IFCs: Institutions for Collaboration

Geospatial Cluster: Enterprise for Innovative Geospatial Solutions

Green Aviation Cluster: Upper Michigan Green Aviation Coalition

Huntsville Defense Cluster: Huntsville Advanced Defense Technology Cluster

MSA: Metropolitan Statistical Area

NAICS: North American Industry Classification System

OEM: Original Equipment Manufacturer

Project 17: Project 17 Agricultural Technology Cluster

R&D: Research and Development

RIC: Regional Innovation Clusters

San Diego Defense Cluster: San Diego Advanced Defense Technology Cluster

SBDC: Small Business Development Center

SBIR/STTR: Small Business Innovation Research/Small Business Technology Transfer Research

Smart Grid: Illinois Smart Grid Regional Innovation Cluster

SPAWAR: Space and Naval Warfare Systems Command

WBC: Women's Business Center

List of Exhibits

Executive Summary

The Regional Clusters Initiative is a pilot program launched in September 2010 by the U.S. Small Business Administration (SBA) to promote and support 10 regional industry clusters across the United States. Clusters act as a networking hub to connect large firms, university researchers, regional economic organizations, investors, and small businesses. They convene a number of resources to help navigate the funding, procurement, and supply chain opportunities in a specific industry. Through technical and legal assistance, cluster networks also help innovators commercialize promising technologies needed by government and industry buyers. Recognizing the challenges that small business innovators face in creating critical marketing, technical, and investor networks, SBA actively supports small business membership in emerging and mature industry clusters. The Regional Clusters Initiative provides funding to cluster organizing entities to increase opportunities for small business cluster participation, to promote innovation in focus industries, and to enhance regional economic development and growth in cluster regions. The Initiative incorporates two types of clusters: seven Regional Innovation Clusters (RIC) focused on innovative and leading technologies in a variety of industries, and three Advance Defense Technology (ADT) clusters focused on industries of interest to the U.S. Department of Defense.

The 10 pilot clusters make up the first set of clusters to receive financial and technical assistance from SBA. They have since been joined by 30 other clusters sponsored through the Jobs and Innovation Accelerator Challenge.[1] This program differs from the Regional Clusters Initiative in various ways, starting with its multi-agency collaborative structure. Furthermore, the Jobs and Innovation Accelerator Challenge focuses to a greater extent on integrating historically underserved businesses and communities in the clusters and on the implementation of a jobs training and placement program for American workers to replace foreign workers hired on H-1B visas.

Although traditional cluster evaluations focus on long-term impacts (e.g., 5-10 years out), SBA is also interested in what can be learned from outcomes demonstrated in the first 1-3 years, including the impact of cluster participation on small business alliances and their potential impact on economic activity. This evaluation is based on a mixed-methods approach using data collected from quarterly and annual reports, and surveys and interviews of cluster administrators, large organizations and small businesses participating in the SBA-supported clusters. Because not every small business and large organization participating in the 10 clusters provided a survey response, the survey results discussed below do not

[1] For a summary of the overall approach selected by the federal government in support of clusters, please see *Regional Innovation Clusters Begin to Add Up* by Mark Muro of the Brookings Institution at http://www.brookings.edu/blogs/up-front/posts/2013/02/27-regional-innovation-clusters-muro.

encompass every cluster participant. Additional details regarding data collection, evaluation design, and survey response rates are provided in the Methodology Appendix.

The evaluation described here aims to provide an understanding of how the Regional Clusters Initiative was implemented across the 10 clusters, to describe and assess the services provided by clusters to participating businesses and organizations, and to measure changes in key business and organizational outcomes. In particular, this evaluation focuses on both short- and intermediate-term outcomes that may be influenced by cluster activities and services (e.g., development of alliances among cluster participants, commercialization of new technologies, and improved export and marketing strategies) as well as on longer-term outcomes (e.g., employment and payroll growth, business revenue growth, and new business formation). These longer-term outcomes are compared with various benchmark measures for comparable region/industry combinations derived from alternative sources. Key findings in each of these areas are summarized below.

Central Features of Clusters in SBA's Initiative

The SBA-supported clusters vary along multiple geographic, structural, and organizational dimensions.[2] Although cluster structures and tactics continued to develop and mature in response to opportunities and challenges over the first 2 years of SBA's Initiative, changes in cluster operations have been relatively limited.

- SBA-supported clusters are located in different regions of the United States and have operationalized the concept of geographic scope in somewhat different ways; some clusters have strict geographic requirements for their members, while others are defined more by their industry than their geography. There has been some expansion to the geographic scope of a subset of clusters (although these clusters still retain their essential regional focus). The actual geographic reach of clusters currently ranges from four counties in a single state to 59 counties in 28 states. Actual geographic coverage of these clusters expanded from an average of five to an average of eight states per cluster during the second year of the Initiative.
- There is little overlap in the industry scope of the 10 clusters, even among the ADT clusters. All clusters focus on high-technology areas within their respective industrial sectors.
- Most clusters are in a mature life-cycle stage, though there is some variation in this dimension as well as in other aspects of their organizational development. Eight out of 10 clusters have relatively formal governance structures in place. Those without a formal structure, or with less formal structures, have been taking steps toward formalization. Overall, governance structures have changed little over the first 2 years of the Initiative.

[2] For a brief profile of each of the 10 clusters by a third party, please see the series of articles by Catherine Clifford under the title, *A Cluster of Clusters: Where the SBA Is Investing in Regional Economies*, published in the magazine *Entrepreneur*. This series is available at http://www.entrepreneur.com/slideshow/225398.

- All clusters provided some services to cluster members in-house while also relying on outside service providers. Clusters reported that they provided needed services in-house when these services were cluster-specific and difficult to deliver by outside service providers. About half of the clusters also reported minor changes to the list of service providers they utilized over the last year.
- Nearly all clusters have had at least some degree of interaction with SBA's resource partners: Small Business Development Centers (SBDCs), Women's Business Centers (WBCs), and SCORE chapters. The depth of these interactions, however, varied greatly across clusters.
- Clusters operate under several distinct business models that are tied both to their strategic goals and to their unique regional assets, opportunities, and constraints. The approaches taken have proven to be stable over the first 2 years of the Initiative, and most clusters fall within either a supply-chain integration approach or a network development approach. Unique developments include clusters working with institutional partners to create new regional assets.

Implementation

The scale of cluster membership and activity grew considerably over the first 2 years of SBA's Initiative:

- The complex networks of stakeholder organizations that compose clusters grew substantially along all dimensions. Growth in the number of participating organizations ranged from 50% to 300%.
- The most significant membership growth occurred among small businesses, increasing nearly four-fold since the beginning of the Initiative to a total of 859 at the end of the second year. Small businesses reported that their participation depends importantly on their ability to network with one another and their desire to access to cluster services. In contrast, large organization participation is tied to regional economic development, technology commercialization, and technology transfer goals.
- The number of foundations, nonprofit organizations, and public-sector agencies participating in clusters has more than tripled since the start of SBA's Initiative. The number of universities or other research institutions increased at nearly the same rate, and the number of participating business associations increased by 58%. By the end of the second Initiative year, the 10 clusters included a total of 84 universities and research institutions, 54 business associations, 98 public-sector agencies, and 69 nonprofit organizations. Growth in large organization participation varied considerably across clusters, however, with some clusters experiencing high rates of growth and others experiencing decline.
- Participating clusters provided various services designed to address the multifaceted needs of their member organizations while they work toward shared goals of business and regional economic development. Clusters provided extensive one-on-one counseling to member businesses as well as hosting significant numbers of group events and activities (e.g., networking events or training workshops).
- The share of cluster administration time spent on one-on-one counseling versus the facilitation of various kinds of group events ranged considerably across clusters. Some clusters spent as much as 64% of their time on one-on-one counseling and as little as 11% on group events, while other

clusters had a nearly opposite configuration of 65% of time spent on group events and as little as 5% of their time devoted to one-on-one counseling.

- During the second year of the Initiative, the 10 clusters reported a total of 265 training, networking, showcasing, and matchmaking events. Networking and training and workshop events each accounted for close to one-third of the group events sponsored, while matchmaking or showcasing events together accounted for the remaining third.
- Among small businesses that responded to the survey, a significant majority indicated that they participated at least occasionally in cluster-sponsored events, such as networking and showcase events. Nearly half of large organization members also reported that they often or always participated in cluster-organized events. This level of participation is consistent with that reported during the first year of the Initiative for small business and large organization participants alike.
- Three-quarters of small business participants reported being either "satisfied" or "very satisfied" with cluster services and activities. This value was slightly lower than reported during the first year of the Initiative, a change that was driven primarily by an increase in the number of small businesses reporting they were "not sure" about their level of satisfaction.
- Very few small business participants reported that they could obtain similar services from other providers, which suggests that cluster services are unique and fill a void in service provision from the perspective of small businesses.

Short- and Intermediate-Term Outcomes

Short- and intermediate-term outcomes reported by small businesses and larger organizations participating in SBA's Initiative clusters were indicative of the considerable level of cluster activity that occurred over the first 2 years of the Initiative.

- Two-thirds of cluster small businesses reported that working with their clusters facilitated the revision of their marketing plans, while nearly half indicated that cluster participation increased their integration into their industries' supply chains. One-third of participating large organizations similarly reported a cluster influence on their supply chain involvement.
- A majority of both small businesses and larger organizations participating in SBA-supported clusters reported having established one or more alliances with other cluster members, and nearly 80% reported that cluster activities led to increases in collaborative activity within their region. Nearly 40% of cluster small businesses reported either buying and/or selling goods or services to or from another cluster participant.
- More than 40% of cluster small businesses reported that cluster services had some influence on their access to capital. In all but one cluster, at least one small business reported that cluster activity had facilitated its receipt of a contract or subcontract award during the second year of the Initiative. Cluster administrators reported $633 million in new economic activity (e.g., grants, contracts, loans, and venture capital) accruing to affiliated small businesses during 2012. Although $370 million of this accrued to the Huntsville Advanced Defense Technology Cluster, the nine other clusters still reported new economic activity in excess of $263 million among their small businesses.
- A significant number of small businesses perceived that cluster activities and services led to new product development and commercialization of new technologies. Sixty percent reported that

cluster activity facilitated their development of new products or services during the second year of the cluster Initiative, and 42% agreed that their clusters facilitated commercialization and new technology development. Larger organizations largely concurred with this assessment.

- Small businesses involved with SBA-supported clusters reported filing 111 patent applications and receiving 76 patents during the second Initiative year. It should be noted, however, that only a minority of small businesses agreed that cluster activities contributed to the level of patent activity.

Long-Term Cluster Outcomes

Indicators of growth in cluster economic activity during the first 2 years of SBA's Initiative were generally quite robust and exceeded growth in regional benchmarks.

- Average total employment in participating small businesses increased at an annualized rate of 8.7% per year. This exceeded the annualized total employment growth measured in two comparable industry/region benchmark samples (Quarterly Census of Employment and Wages, and Dun & Bradstreet) over the same time period (2.3% and 3.4%, respectively). Total employment growth in individual clusters also exceeded relevant benchmarks in 9 out of 10 cases.
- Annual revenue in cluster-affiliated small businesses grew in 9 out of 10 clusters during this 2-year period. Across all clusters, annualized growth of 10.8% exceeded the 6.2% growth rate measured overall in comparable Dun & Bradstreet samples. Individually, revenue growth in 6 out of 10 clusters also exceeded the comparable Dun & Bradstreet benchmark growth rates.
- Average monthly payroll in cluster small businesses grew at an annualized rate of 3.7% per year during the first 2 years of the Initiative. Average payroll growth in 7 out of 10 clusters exceeded regional benchmarks measured in State Personal Income Account data for this time period. The growth rate, however, in payroll across all 10 clusters (3.8%) fell short of the overall regional benchmark (5.3%).
- Eighteen small businesses reported that they were established *after* their founders became involved with cluster organizations.

Conclusion

The initial findings suggest that these clusters have grown rapidly over the first 2 years of the Initiative in membership, scale and range of services provided, and engagement with small businesses. The outcomes presented suggest that cluster participation was correlated with higher than expected levels of economic growth and new business formation, and that clusters made strides towards promoting innovation in their respective industries.

1. Introduction

1.1. Overview of the Evaluation

The Regional Clusters Initiative of the Small Business Administration (SBA) is a pilot program, launched in September 2010, to promote and support 10 clusters—geographically concentrated groups of interconnected businesses, suppliers, service providers, and associated institutions in a particular industry or field—across the United States. Clusters act as a networking hub and they convene a number of resources to help navigate the funding, procurement, and supply chain opportunities in a specific industry. Through technical and legal assistance, cluster networks also help innovators commercialize promising technologies needed by government and industry buyers. Recognizing the challenges that small business innovators face in creating critical marketing, as well as technical and investor networks, SBA actively supports small business membership in emerging and mature industry clusters. The 10 pilot clusters make up the first set of clusters to receive financial and technical assistance from SBA. They have since been joined by 30 other clusters sponsored through the Jobs and Innovation Accelerator Challenge.[3] This program differs from the Regional Clusters Initiative in various ways, starting with its multi-agency collaborative structure. Furthermore, the Jobs and Innovation Accelerator Challenge focuses to a greater extent on integrating historically underserved businesses and communities in the clusters, in addition to the implementation of a jobs training and placement program for American workers to replace foreign workers hired on H-1B visas.

The Regional Clusters Initiative provides funding to the organizing entities of the 10 clusters in order to accomplish three primary goals. The first goal is to increase opportunities for small business participation within the clusters. Secondly, funding promotes innovation in the industries on which the 10 clusters are focused. The third goal is to enhance economic development and growth in the regions in which the 10 selected clusters are operating.

The Initiative is made up of two programs, each focusing on a subset of the 10 clusters in the overall initiative: Regional Innovation Clusters (RIC) and Advanced Defense Technologies (ADT). Of the 10 clusters, seven RIC clusters focus on innovative and leading technologies in a variety of industry areas. The three ADT clusters are focused on industries that are of interest to the U.S. Department of Defense (DoD). In accordance with one of the primary goals of the initiative, i.e., strengthening small business

[3] For a summary of the overall approach selected by the federal government in support of clusters, please see *Regional Innovation Clusters Begin to Add Up* by Mark Muro of the Brookings Institution at http://www.brookings.edu/blogs/up-front/posts/2013/02/27-regional-innovation-clusters-muro.

participation and growth within regional clusters, the clusters in SBA's Initiative were selected to receive funding partially on the basis of their ability and potential to assist small businesses within a specific industry and geographic scope.[4]

Optimal Solutions Group, LLC (Optimal), the evaluator of the Regional Clusters Initiative, was tasked with providing context and information about the 10 clusters, and assessing the progress and outcomes of the Initiative at the end of its second year. Although cluster evaluations often focus on long-term impacts (e.g., 5-10 years out), SBA is also interested in what can be learned in the first 1-3 years. The purpose of this evaluation is to provide an understanding of how SBA's Regional Clusters Initiative was implemented across the 10 clusters. This evaluation further aims to assess the services provided by the clusters to their small businesses as well as the changes in outcomes. To that end, the evaluation focused on the following questions:

1. What services and activities did clusters provide to their small businesses?
2. How did the key measures of business performance and growth change during the second year of the initiative among the small businesses participating in the clusters?
3. What has been the influence of small businesses' participation in the clusters (as perceived by the small businesses) on their key performance measures?
4. How do the changes in cluster key performance measures compare to employment, compensation, and establishment revenue benchmarks?

The evaluation design of SBA's Initiative is based on a mixed-method approach that uses data collected from cluster administrators, large organizations participating in the clusters, and the small businesses that were targeted and received cluster services under SBA's Cluster Initiative. These data have been collected through the following means:

- A Cluster Administrator Survey
- A Small Business Survey
- A Large Organization Survey
- Interviews with cluster administrators
- Clusters' proposals for SBA's Regional Clusters Initiative, their quarterly reports, and annual reports

The qualitative data, collected mainly through the interviews and the cluster quarterly and annual reports, are used primarily to understand the clusters' configurations, business models, types of services provided, and goals and strategies for implementing SBA's Initiative. The quantitative data, collected

[4] "Small business" is broadly defined here as a business with fewer than 500 employees. For a more comprehensive definition from SBA, see http://www.sba.gov/sites/default/files/files/Size_Standards_Table%281%29.pdf.

mainly through the three survey instruments (Cluster Administrator Survey, Small Business Survey, and Large Organization Survey) are used primarily to assess the outcomes of the Initiative. Because not every small business and large organization participating in the 10 clusters provided a survey response, the survey results discussed in this report do not encompass every cluster participant. Additional details on the data-collection methods, the evaluation design, and the surveys' response rates are provided in the Methodology Appendix.

Finally, this report incorporates a total of six text boxes containing selected success stories about small businesses participating in the 10 clusters in SBA's Initiative. Their names and other identifying details about these small businesses have been omitted to help protect their identities and privacy.

1.2. Report Roadmap

This report is composed of nine sections, including this introduction. Section 2 describes specific aspects of the 10 regional clusters for a better understanding of their operations and structures. Section 3 focuses on the implementation of the Regional Clusters Initiative and therefore covers the cluster stakeholders, the participation of small businesses in the clusters, and the services and activities provided by the clusters. Section 4 describes the outcomes of SBA's Initiative, which are the measures of effectiveness related to the implementation of the Initiative as described in Section 3. Section 5 presents lessons learned in cluster operations. Section 6 provides concluding remarks. Finally, the Methodology Appendix (Section 7) contains a more detailed description of the evaluation design as summarized in Section 1.1, while the Data Appendix (Section 8) contains additional analysis results, and Section 9 provides a brief overview of the various cluster initiatives supported by SBA as of the writing of this report.

2. Features of Clusters in SBA's Initiative

This section provides an in-depth look at the central features of the 10 clusters participating in SBA's Cluster Initiative and how these features have changed since the beginning of the Initiative. [5] The primary dimensions of these clusters—their geographic and industrial scope, level of organizational maturity, governance structures, service strategies, and business models—are outlined, providing a backdrop and context for the subsequent discussion of cluster activities and outcomes during the Initiative's first 2 years.

The clusters vary along multiple dimensions. They are located in different regions of the United States and have operationalized the concept of geographic scope somewhat differently. There is little overlap in the industry scope of the 10 clusters, even among the Advanced Defense Technology (ADT) cluster subset. The 10 clusters have implemented and developed a range of governance structures based on their respective histories and compositions. Most clusters are in a mature life-cycle stage but there is some variation in this dimension, as well as in other aspects of their organizational development. Clusters have adopted several distinct business models that are tied both to their strategic goals and to the unique regional assets they leverage.

Changes to these structural and organizational aspects of cluster operations have been relatively limited in the first 2 years of the Initiative. The most significant change has been some expansion to the geographic scope of a subset of clusters (although these clusters still retain their essential regional focus). In addition, a few clusters have been taking steps toward formalizing their governance structures as needed. As the organizational structures have matured, five clusters have progressed in their life-cycle stages, and one has reached the final stage of its organizational development. About half of the clusters have also reported minor changes to the list of service providers they contract with, while most clusters continue a steady reliance on SBA resource partners. The business models employed by clusters and their industrial scopes have, however, remained quite constant.

[5] For a brief profile of each of the 10 clusters by a third party, please see the series of articles under the title, *A Cluster of Clusters: Where the SBA Is Investing in Regional Economies* by Catherine Clifford, published in the magazine *Entrepreneur*. This series is available at http://www.entrepreneur.com/slideshow/225398.

2.1. Geographic Scope of the Clusters in SBA's Initiative

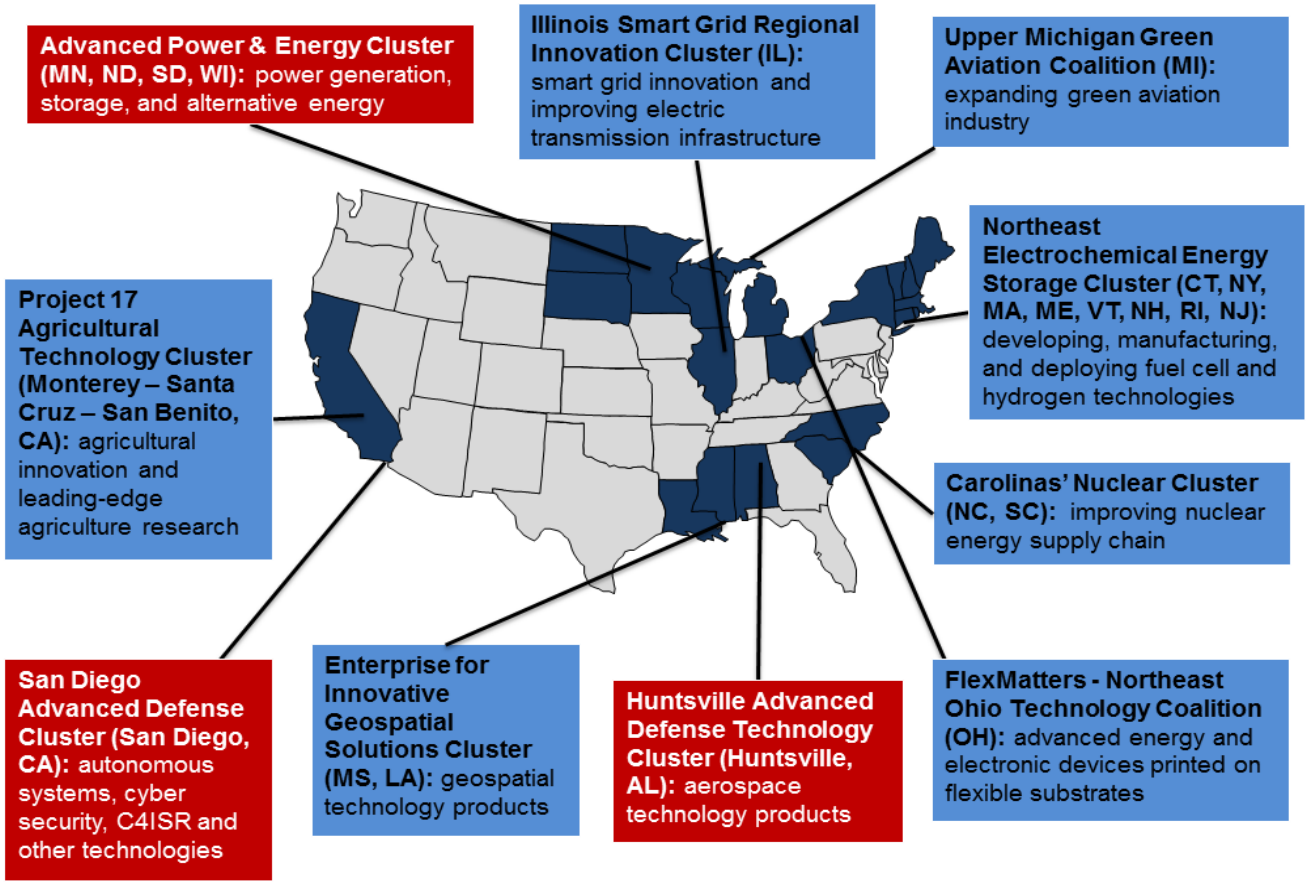
Each cluster participating in the Initiative typically has a regional geographic scope, which may (or may not) shift as the cluster develops and matures. The stated geographic scope of the clusters studied here remained relatively constant during the second year of the Initiative, while their actual geographic coverage (defined by the locations of actual cluster participants) expanded from an average of five to an average of eight states per cluster.[6]

Each cluster's current stated geographic scope is mapped in Exhibit 1.[7] Two clusters are located in California, three in the Southeast, one in the Northeast, and four in the Midwest. The stated geographic scope remained constant through the second year of SBA's Initiative for 9 of the 10 clusters. The remaining cluster, the Northeast Electrochemical Energy Storage Cluster (Energy Storage Cluster), added New Jersey to its stated scope while still looking for a partner in that state with which to formalize a relationship. The states included in each cluster's stated geographic scope, and the states and counties in which each actually has participating organizations, are listed in Exhibit 2. The actual geographic scope of clusters ranges from 4 counties in a single state for the Illinois Smart Grid Regional Innovation Cluster (Smart Grid), to 59 counties in 28 states for the Advanced Power & Energy Cluster (Advanced Power Cluster).

Five clusters reported having participants in a significantly greater number of states than those within their stated geographic scope. These clusters have enacted a hybrid approach to the geographic scope; it may be more fitting to consider these clusters' stated geographic scope as a general region of focus rather than a rigid geographic boundary within which they operate.

[6] Information on the actual locations of cluster participants was gathered from lists of small businesses participating in each of the clusters, and provided by cluster administrators.

[7] Information on the stated geographic scope of participating clusters was gathered from cluster proposals, quarterly and annual reports, and interviews conducted with cluster administrators.



Source: Cluster proposals

Exhibit 1. Map of the 10 clusters funded by SBA's Regional Clusters Initiative. The three clusters with white text and red background are the Advanced Defense Technology (ADT) clusters of the Initiative, while the remaining seven with black text and blue background are the Regional Innovation Clusters (RIC).

Hybrid Approaches to Geographic Scope

In a 2011 interview, Chip Laingen, Advanced Power Cluster administrator, discussed the hybrid approach to a cluster's geographic scope: "The idea [of cluster theory] is to grow technology-based economic development in a specific region, but we've viewed it in the sense that even with that regional emphasis, you can't do it without looking at all the resources that are available, especially in an age where you can connect very easily through all these other means that we have. So if there's a small company that needs another piece of their portfolio to advance their technology and they happen to be in Washington, D.C., why wouldn't we bring them into the mix?"

In 2012, the average number of states where clusters had participating organizations rose to eight per cluster (up from five in 2011). This increase has largely been driven by 4 out of the 10 clusters: the Advanced Power Cluster, the Huntsville Defense Cluster, the Energy Storage Cluster, and the Upper Michigan Green Aviation Coalition (Green Aviation Cluster). These clusters expanded their state coverage rapidly, adding participants in 11, 9, 5, and 8 new states, respectively. The average number of

counties in which clusters have participants is 24, a figure very similar to the one reported in 2011 (23). The average number of counties in 2011, however, was biased upward by the number of counties reported by the Energy Storage Cluster (106, compared to this year's 50).[8] Excluding this outlier, the 2011 average was slightly more than 13 counties per cluster, illustrating that, just like the average number of states, the average number of counties has also grown significantly.

Exhibit 2. Geographic scope of clusters, by number of counties and states

Cluster	Cluster's stated geographical scope	Number of counties where cluster has participants	Number of states where cluster has participants
Project 17	California: Monterey, Santa Cruz, and San Benito tricounty region	6	2
Carolinas' Nuclear Cluster	North and South Carolina	7	2
Advanced Power Cluster[a]	Minnesota, Wisconsin, South and North Dakota	59	28
Geospatial Cluster	Mississippi	20	5
FlexMatters	Northeast Ohio	11	2
Huntsville Defense Cluster	North Alabama	39	16
Smart Grid	Chicago, Illinois region	4	1
Energy Storage Cluster	Eight states in the Northeast, including New York, Connecticut, and Massachusetts	50	13
San Diego Defense Cluster	San Diego County	4	2

[8] This difference reflects the improvement in the quality of the information provided by cluster administrators in 2012 over that provided in 2011, due to the implementation of a significantly more robust approach to collecting cluster participant data from cluster administrators.

Cluster	Cluster's stated geographical scope	Number of counties where cluster has participants	Number of states where cluster has participants
Green Aviation Cluster	Six counties in Michigan's Upper Peninsula[b]	36	10
Clusters' average	**N/A**	**24**	**8**

Source: Cluster proposals, quarterly reports, interviews, and administrator surveys

[a] The Advanced Power Cluster was referred to as the Defense Alliance in the Year 1 evaluation report.
[b] The Green Aviation Cluster also reported several participants in Canada who are not reported in Exhibit 2.

2.2. Industrial Scope of the Clusters in SBA's Initiative

The clusters involved in SBA's Cluster Initiative are engaged in a broad range of industries, from nuclear energy to agricultural innovation. Exhibit 3 describes the industrial sector and focus of each of the 10 clusters. All clusters focus on high-technology areas within their respective industrial sectors. The three clusters focusing on defense procurement (the Advanced Power & Energy Cluster, the Huntsville Defense Cluster, and the San Diego Defense Cluster) are in the ADT component of SBA's Cluster Initiative. The other seven clusters are all in the RIC component. This split, however, does not prevent nondefense clusters from pursuing defense procurement, or vice versa.[9] The industrial scope and focus of these 10 clusters did not shift during the second year of the Initiative.

[9] For example, the Geospatial Cluster and its member companies have pursued a variety of defense-related grants and procurement opportunities with organizations including the U.S. Air Force. In addition, the San Diego Defense Cluster organized an event focused on emergency first-responders, including the San Diego Sheriff's Department, the San Diego Fire Department, the Public Health Hazardous Incident Response Team, and Customs and Border Protection.

Exhibit 3. Cluster industrial scope and focus

Cluster	Industrial sector	Focus
Project 17	Agriculture	Developing innovative agricultural methods and tools
Carolinas' Nuclear Cluster	Energy	Strengthening the nuclear industry and its supply chain
Advanced Power Cluster	Defense	Power and energy generation, storage, distribution, conservation, and supporting technologies
Geospatial Cluster	Geospatial	Developing geospatial technology products
FlexMatters	Electronics	Developing flexible electronic products
Huntsville Defense Cluster	Defense	Small spacecraft, environmental monitoring, intelligence-surveillance-reconnaissance, robotics, and cybersecurity
Smart Grid	Energy	Developing and promoting smart electrical grid equipment and technologies
Energy Storage Cluster	Energy	Strengthening the hydrogen and fuel cell industry and its supply chain
San Diego Defense Cluster	Defense	Autonomous systems, cybersecurity, and C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance)
Green Aviation Cluster	Aerospace	Creating an aviation ecosystem, including recycling, green manufacturing, and military testing and R&D (research and development)

Source: Cluster proposals, quarterly reports, and interviews

2.3. Structure of the Clusters in SBA's Initiative

Cluster governance and operational structures typically comprise four key components: an anchoring entity, a board of directors (or other board-like structure), an executive management team, and a network of service providers. Anchoring entities are the organizations responsible for the implementation and development of clusters. They play an important role in coordinating the various

stakeholders and, in the case of the Regional Clusters Initiative, in administering the contract with SBA. Six of the 10 clusters studied here have a nonprofit organization that serves as their anchoring entity, often with a mission related to regional economic development or small business assistance. Two of the remaining four clusters are organized around small businesses, and two are organized around a research university. Anchoring entities do not steer the clusters on their own, however. Eight of the 10 clusters participating in SBA's Initiative have relatively formal governance structures in place. Those without a formal structure, or with less-formal structures, have been taking steps toward formalization. All clusters provide some services to cluster members in-house while also relying on outside service providers. Although some minor shifts occurred in cluster/service provider relationships in the second year of the Initiative, these relationships have remained relatively stable over time, as has cluster usage of SBA resource partners.

Exhibit 4 presents a summary of governance components for the 10 clusters in SBA's Initiative. This summary illustrates a degree of cross-cluster heterogeneity in both governance structure design and in the inclusion of stakeholders for that structure. Most clusters have a formal governance structure in place, the exceptions being Project 17 Agricultural Technology Cluster (Project 17) and the Energy Storage Cluster. In the case of the Energy Storage Cluster, the lack of formalized structure results from the fact that each of its regional partners possesses its own structure, as does the managing entity (the Connecticut Center for Advanced Technology).[10] In contrast, the Green Aviation Cluster has a relatively complex governance structure due its inclusion of four different regional airports.

Variation across clusters extends to the number and types of stakeholders included on cluster board(s) or committees, as seen in Exhibit 4. Eight clusters report having private-sector companies on their board(s) and/or committees; these companies often include small businesses. Six clusters report the involvement of one or several universities and community colleges, and six report the inclusion of nonprofit organizations, service providers, and other institutions for collaboration. Three clusters report including all three types of stakeholders on their board(s) and/or committees. Although several clusters have ties with venture and angel capital entities, these actors are represented in the governance structure in only a few cases, for example, FlexMatters – Northeast Ohio Technology Coalition (FlexMatters).

[10] Source: December 2012 interview.

Cluster Governance and Operational Structures

- *Cluster boards of directors are typically tasked with strategic planning, developing the cluster, and maintaining continuous improvement processes.*
- *Executive teams are in charge of managing the cluster and its projects, with a designated cluster administrator responsible for day-to-day operations and management. The cluster administrators leading these teams tend to be experienced project managers with extensive knowledge of the cluster's industry and key participants. Their responsibilities generally include, but are not limited to, building relationships, moderating discussions between cluster stakeholders, providing internal and external communications, and allocating and distributing resources. Some administrators are also active in providing services such as business counseling to participants.*
- *Clusters typically maintain a network of service providers that are tasked with delivering services and activities to cluster participants.*

The governance structures reported in Exhibit 4 changed little during the second year of the Initiative. All clusters have retained their existing structures, although several (e.g., the Green Aviation Cluster and, to a lesser degree, Smart Grid) have taken steps to further solidify and formalize these structures. The Energy Storage Cluster reported making small but steady progress toward the creation of a formal regional governance structure while simultaneously working to ensure that regional partners do not perceive that they will be required to give up their independence and autonomy in the process.

Exhibit 4. Summary of the governance structure in place at each of the clusters

Cluster	Anchoring entity	Formal governance	Types of board(s)	Board(s) composition
Project 17	Small business	No	N/A	Cluster relies on the board of advisors of the Marina Technology Cluster, composed of subject-matter experts, small businesses, regional universities, etc.
Carolinas' Nuclear Cluster	Nonprofit organization	Yes	Five taskforces: • Economic development • Workforce development • Technology development • Public policy • Communications	Composed of Carolinas' Nuclear Cluster members, including large companies, universities, and representatives of Institutions for Collaboration (IFCs)
Advanced Power Cluster	Small business	Yes	Board of advisors	Composed of regional partners (e.g., Dakota Defense Alliance), private sector, angel capital, and business associations
Geospatial Cluster	Nonprofit organization	Yes (not fully staffed)	Board of directors and member committees as needed	Board of directors composed of representatives from the Geospatial Cluster and Magnolia Business Alliance (organizing entity); member committee composed of participating companies
FlexMatters	Nonprofit organization	Yes	Advisory committee	Composed of NorTech (organizing entity), universities, and private-sector representatives
Huntsville Defense Cluster	Nonprofit organization	Yes	Steering committee	Composed mostly of private-sector actors and some university representatives
Smart Grid	University	Yes	Steering committee	Composed of several Illinois Institute of Technology representatives and a representative from Clean Energy Trust, Illinois Science and Technology Coalition, and O-H Community Partners

Cluster	Anchoring entity	Formal governance	Types of board(s)	Board(s) composition
Energy Storage Cluster	Nonprofit organization	No	N/A	Representatives of the regional partners (e.g., Massachusetts Hydrogen Coalition) form an informal board
San Diego Defense Cluster	University	Yes	Executive board and advisory board	Executive board mostly composed of service providers, such as CONNECT and Space and Naval Warfare Systems Command (SPAWAR), business associations, and university representatives; advisory board composed of representatives of all cluster members, including service providers and small and large businesses
Green Aviation Cluster	Nonprofit organization	Yes	Board of directors, four steering committees, and five working groups	Board of directors composed of labor, Original Equipment Manufacturers (OEMs), small businesses, county representatives, and the chair of each working group; steering committees composed of each airport's stakeholders; working groups include primarily private companies, some economic development organizations, and community colleges

Source: Cluster proposals, quarterly reports, and interviews

Exhibit 5 outlines the extent to which each cluster's administration has provided services in-house, as well as each cluster's relationship with SBA regional resource partners, and the service providers with which it has contracted. These data shed light on two key aspects of cluster service provision. First, every cluster has provided some level of in-house service directly to its participants. Clusters frequently reported that this has been the case when the needed services were too specific to their industries of focus, membership needs, or overarching service strategies for delivery by outside service providers. For example, the San Diego Defense Cluster, which relies on one of the widest networks of specialized service providers among the 10 clusters, has provided direct services that are tailored to the industry-specific challenges of its cluster membership, including export counseling, proposal writing, and teaming. Only one cluster—the Green Aviation Cluster—can be classified as having provided only limited in-house services, largely because the cluster is still in the early stages of cluster formation and thus has been focusing primarily on issues related to cluster organization and capacity building.

A second key aspect of cluster relationships is that nearly all the clusters have had at least some degree of interaction with SBA resource partners—Small Business Development Centers (SBDCs), Women's Business Centers (WBCs), and SCORE chapters. The depth of these interactions, however, has varied greatly across clusters. Some clusters have made extensive use of these regional resources (e.g., the Huntsville Defense Cluster, the Green Aviation Cluster), while others have relied primarily on SBA resources to assist in identifying new small and large companies to target for cluster participation (e.g., the Carolinas' Nuclear Cluster). Exhibit 5 describes the extent to which clusters have relied on SBA resource partners for service provision. The clusters that are marked as making limited use of SBA resource partners are those that have had occasional workshops and/or events organized in collaboration with these organizations but have not otherwise made regular use of them.

While cluster administrators reported that the volume of services provided in-house (versus the volume delivered by primary service providers) has remained relatively stable over time, the list of primary service providers has changed only slightly for about half the clusters. These changes are marked in the rightmost column of Exhibit 5 (using bold font for the providers that were *added* during the second year of the Initiative and strikethrough font for those *deleted*).

Shifting Relationships With Outside Service Providers

- *FlexMatters reported working more closely with sister organizations and companies in the region, both small and large. This has allowed the cluster to provide highly specialized services that would otherwise be difficult to develop in-house, such as applied prototyping and manufacturing assistance, by relying on organizations in its area that already have these capabilities. The cluster reports that this has also had the added advantage of strengthening relationships and linkages within and outside the cluster.*
- *The Huntsville Defense Cluster reported that, as a result of limited funding and reduced participant need, it no longer relies on BizTech as a primary service provider and is reducing its involvement with Plosila Consulting. The cluster remains in contact with these organizations, however, and does not rule out future use of their services.*
- *Smart Grid and Project 17 each added a new service provider to fill specific gaps identified during the second year of the Initiative.*

Exhibit 5. Summary of the service provision structures in place within each of the clusters

Cluster	Services provided by cluster administration	Services provided by SBA resource partners	Other primary providers of services*
Project 17	Yes	Yes	Marina Technology Cluster, Agricultural and Land Based Training Association, Monterey Institute for International Studies, Monterey Bay International Trade Association, and **JL White International**
Carolinas' Nuclear Cluster	Yes	No	South Carolina Manufacturing Extension Partnership
Advanced Power Cluster	Yes	No[a]	Dakota Defense Alliance, Paradigm Positioning, Wisconsin Entrepreneurs Network, MilTech, and Techlink
Geospatial Cluster	Yes	Yes (limited)	Mississippi Technology Alliance, Mississippi Development Authority, and Mississippi Minority Business Enterprise Center, etc.
FlexMatters	Yes	Yes[b]	B&D Consulting, **and sister organizations (e.g., WIRE-Net) and companies in the region**
Huntsville Defense Cluster	Yes	Yes[c]	Procurement Technical Assistance Center, ~~BizTech~~, Plosila Consulting, and Defense Acquisition University
Smart Grid	Yes	No	Illinois Institute of Technology's Stuart Business School, Galvin Center for Electricity Innovation, O-H Community Partners, Clean Energy Trust, and **BBC Entrepreneurial Training & Consulting**

Cluster	Services provided by cluster administration	Services provided by SBA resource partners	Other primary providers of services*
Energy Storage Cluster	Yes	Yes (limited)[b]	New Energy New York, Clean Energy States Alliance, Hydrogen Energy Center, and Massachusetts Hydrogen Coalition
San Diego Defense Cluster	Yes	Yes	CONNECT, Foundation for Enterprise Development, SPAWAR, San Diego SBA District Office, San Diego State University Research Foundation[11]
Green Aviation Cluster	Yes (limited)	Yes	Michigan Aerospace Manufacturers Association, Procurement Technical Assistance Program, Michigan Works!, Telkite, Explorer Solutions, Northern Initiatives

Source: Cluster proposals, quarterly reports, and interviews

* Providers listed in **bold** typeface were added in the second Initiative year; those listed in ~~strikethrough~~ are no longer being used.

[a] Cluster used regional SBDCs as part of the process of identifying potential members.

[b] Cluster reported some contact with a SCORE chapter but did not rely on the organization as a service provider.

[c] Cluster also relied on WBCs as service providers to its participants.

2.4. Maturity Stages of the Clusters in SBA's Initiative

The 10 clusters involved in the Regional Clusters Initiative vary somewhat by measures of cluster development and maturity. Although 7 out of 10 clusters have reached a mature stage of life-cycle development, three other clusters have been transitioning in that direction during the first 2 years of the Initiative. Similarly, most clusters have reached a high level of organizational development with regard to service provision for members, but a few are still in a more developmental phase.

Exhibit 6 provides information on the chronological age of each cluster (year established), its life-cycle stage, and its phase of organizational development. Phases of organizational development are defined by a cluster's primary focus on services and assistance provision as opposed to planning and capacity building, while life-cycle stages are indicative of a cluster's structural development and accumulation of social capital.

[11] The SDSU Research Foundation's website states the Foundation's purpose as "to further the educational, research and community service mission of San Diego State University." Please see http://www.foundation.sdsu.edu/about/index.html.

Phases of Organizational Development

Because one of the goals of SBA's Initiative is to strengthen cluster assistance to small businesses, it is important to classify the 10 clusters based on their organizational capacity to provide services to their participants. Clusters can be categorized into three phases of organizational development based on their organizational capacity to reach out and deliver services to their participants:

- ***Phase 1:*** *The primary focus of the cluster administration is on planning and structuring the cluster.*
- ***Phase 2:*** *The primary focus of the cluster administration is on recruiting participants and building capacity.*
- ***Phase 3:*** *The primary focus of the cluster administration is on providing services and other forms of assistance to participants and on securing the sustainability of the cluster.*

Cluster "ages" range from 2 to 14 years—the youngest (Project 17, the Green Aviation Cluster, and the San Diego Defense Cluster) were formally established in 2010, while the longest-lived (Geospatial Cluster) has been in existence since 1998.[12] Despite these relatively short time frames, most clusters participating in this Initiative are considered to be at a mature life-cycle stage. During the second year of the Initiative, however, two clusters—Project 17 and the Green Aviation Cluster—showed signs of transitioning from an emerging to a developing stage. These clusters have been solidifying their internal structures, gaining visibility, adding new partners in their regions, and beginning to demonstrate significant linkages between actors. In addition, Smart Grid appears to be in transition from a developing to a mature life-cycle stage, exhibiting characteristics of both stages.[13]

[12] The more recently established clusters (including the San Diego Defense Cluster and Project 17) were spawned from organizing entities or IFCs in existence prior to the formal establishment of the cluster.

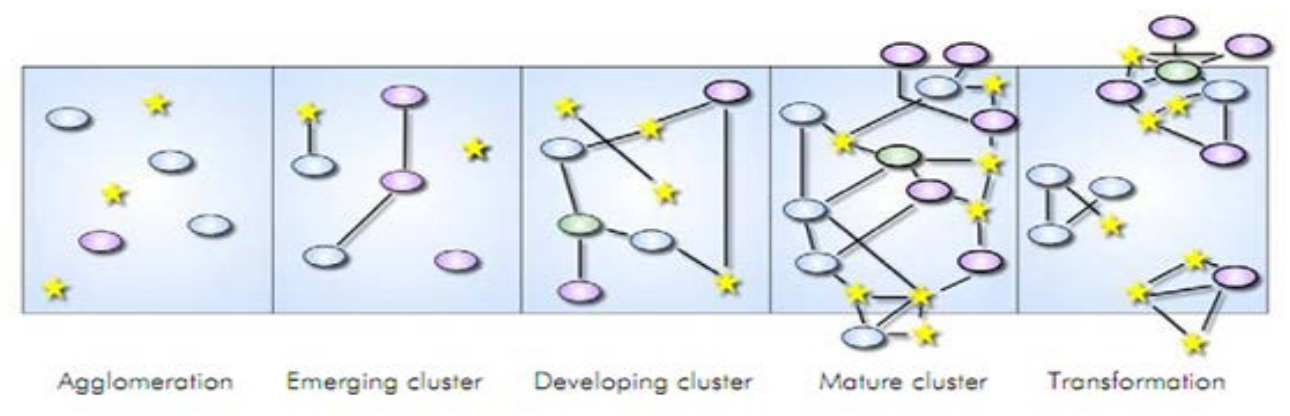
[13] For example, Smart Grid has been very adept at cultivating relationships outside its region and even outside the United States, a characteristic normally associated with mature clusters, yet the cluster has not reached the critical mass of small and large businesses that is normally expected in the mature life-cycle stage.

Cluster Life-Cycle Stages

Over time, clusters will pass through a number of stages that, although not experienced the same way by all clusters, are logically ordered and can be identified and classified as follows:

- ***Agglomeration:*** *The initial landscape before the emergence of a cluster, when small and large businesses as well as such organizations as universities, nonprofit organizations, and public-sector agencies are in close proximity but are not coordinated.*
- ***Emerging cluster:*** *Organizations and businesses initiate cooperation around a core activity and begin to understand the advantages afforded through further structuring.*
- ***Developing cluster:*** *New organizations and businesses involved in the same or related core activities begin to emerge or relocate in the cluster's region, and further linkages between organizations develop.*
- ***Mature cluster:*** *The cluster moves toward a critical mass and develops strong connections outside its region. New businesses are created through startups, spinoffs, and joint ventures, while more organizations and businesses are attracted to the region.*
- ***Transformation:*** *Markets, industries, and technologies change to the point that the cluster has to radically adapt and innovate to remain sustainable and to avoid stagnation.*

The figure below offers a visual representation of the five stages that clusters generally undergo.



Source: Andersson et al., The Cluster Policies Whitebook *(2004), IKED, 29*

Phases of organizational development are indicative of cluster involvement in providing services to their member organizations. At present, 9 of the 10 clusters have reached Phase 3 in this regard, meaning their primary focus has turned to providing services, activities, and events for their participants. Project 17 completed its transition from Phase 2 to Phase 3 during the second year of the Initiative. This cluster is now focusing on providing services and organizing events while seeking new ways to financially sustain these efforts. Only one cluster (the Green Aviation Cluster) has yet to reach Phase 3. Although this cluster has organized some services and events, its primary focus at present is to develop a coherent internal structure and to organize available resources in an effective manner.

Exhibit 6. Cluster maturity, by year of establishment, focus of activities, and stage of life cycle

Cluster	Cluster year of establishment	Cluster's life-cycle stage	Phase of organizational development
Project 17	2010	Developing cluster	Phase 3
Carolinas' Nuclear Cluster	2007	Mature cluster	Phase 3
Advanced Power Cluster	2004	Mature cluster	Phase 3
Geospatial Cluster	1998	Mature cluster	Phase 3
FlexMatters	2006	Mature cluster	Phase 3
Huntsville Defense Cluster	2006	Mature cluster	Phase 3
Smart Grid	2009	Developing/mature cluster	Phase 3
Energy Storage Cluster	2005	Mature cluster	Phase 3
San Diego Defense Cluster	2010	Mature cluster	Phase 3
Green Aviation Cluster	2010	Developing cluster	Phase 2

Source: Cluster proposals, quarterly reports, and interviews

"Life-cycle stage" and "organizational development phase" classifications identify somewhat different aspects of cluster development and maturity. For example, the two clusters in the same "developing" life-cycle stage (the Green Aviation Cluster and Project 17) are in different organizational development phases (Phase 2 and Phase 3, respectively). Smart Grid, another cluster yet to reach the mature life-cycle stage, is clearly in Phase 3 of organizational development. Clusters can be focused on providing services and events (Phase 3) while still consolidating, creating connections outside their regions or the country, and moving toward a certain critical mass (i.e., a developing life-cycle stage).

2.5. Different Business Models Used by the Clusters in SBA's Initiative

The clusters participating in the Initiative vary in one additional and critical dimension: *business model*. A cluster's business model is defined as its strategy for developing a regional competitive

advantage by effectively leveraging regional assets, such as universities, supporting industries, and human capital.[14] The 10 participating clusters have taken a number of different approaches in this regard, where the approaches have naturally been tied to their underlying assets, opportunities, and constraints. These approaches have proven to be stable over the first 2 years of the Initiative, although some interesting developments have emerged. For instance, some clusters are working with institutional partners to create new regional assets, which ultimately might be leveraged to shift the clusters' business models somewhat.

Exhibit 7 outlines in broad terms the business models of clusters in SBA's Initiative. There is considerable diversity in the specific approaches used by clusters, yet several common themes also emerge. First, although all clusters have a business model that incorporates supply-chain integration, network development, the resolution of industry challenges, and the enhancement of regional assets to some degree, the focus of each model aligns with the clusters' underlying strategies and characteristics:

- A number of clusters (e.g., the Carolinas' Nuclear Cluster, the Energy Storage Cluster, FlexMatters, and, to some extent, Smart Grid) are operating within a ***supply-chain integration approach***. This involves the provision of industry-specific training (e.g., nuclear quality and safety) and/or the provision of unique services (e.g., the creation of databases of supply-chain participants or the creation of test-beds to validate and improve technologies).
- A second group of clusters—especially the ADT clusters (the San Diego Defense Cluster, the Huntsville Defense Cluster, and the Advanced Power Cluster) and, to some extent, the Geospatial Cluster—are primarily focused on meeting the urgent and less-urgent procurement requirements of various federal agencies. They are, therefore, most concerned with ***developing extensive and robust networks*** with federal agencies and prime contractors.
- The remaining two clusters—Project 17 and the Green Aviation Cluster—are more idiosyncratic, with foci driven by the unique challenges of their industries. Project 17 operates in a region where the agricultural industry is facing increasing challenges tied to water conservation and food safety. Thus, its business model is focused on dealing with related issues, including water contamination by nitrates and tracking produce from the fields to the retailers. The Green Aviation Cluster is basing its business model on the use of its existing infrastructure (four airports currently in limited use) as the basis for regional economic development and renewal.

The second theme to emerge from Exhibit 7 is the overall similarity in the categories and types of regional assets leveraged by each cluster. All of the clusters in SBA's Initiative rely on region-specific strengths of the private sector, as well as the skilled labor associated with that sector and the

[14] Central to the definition of *business model* is the concept of *competitive advantage*, a concept closely tied to regional industrial clusters in Michael Porter's work. *Competitive advantage* asserts that countries aim at producing high-quality goods and services that garner a high price in the markets while maximizing the productive use of the needed inputs. This concept contrasts with *comparative advantage* (first noted by 18th-century political-economist David Ricardo), which asserts that countries should specialize in what they are most efficient at producing relative to other nations. The concept of *competitive advantage* is also tied to concepts of clusters because clusters are said to play an important role in enhancing the efficient use of inputs and fostering an environment where companies are encouraged to innovate. For more information on *competitive advantage*, please see *Competitive Advantage: Creating and Sustaining Superior Performance* by Michael Porter (1998).

specializations of their regional research communities.[15] A few clusters have also leveraged unique regional assets (e.g., underused regional airports, particularly strong venture-capital communities, or specialized testing facilities for new technologies). In the longer term, it will be important to assess whether these clusters have benefited from the leveraging of unique assets through faster-than-average development or greater sustainability.

Finally, the business models of the 10 clusters have remained essentially static through the first 2 years of the Initiative, although several clusters have adjusted their tactical approach (e.g., services mix and approach to commercialization promotion).[16] This is largely to be expected, as the strategic approach selected by clusters has been driven primarily by existing regional assets and the specific characteristics and structures of and gaps in their respective industries and markets.[17] It should be noted, however, that during the second year of SBA's Initiative, some clusters also worked with their partners to create new regional assets aligned with one or more of their focus areas. These assets may ultimately be leveraged to facilitate expansion into new industry segments and target markets. For example, FlexMatters played an important role in the creation of the bioFLEX Center at Kent State University, with the goal of gaining a unique position in the flexible-bioelectronics field.

[15] This is consistent with the principles of cluster theory and the importance of geographic and industry scope to clusters.
[16] Some of these adjustments are outlined in Section 5, *Lessons Learned*, as well as in Section 3, *Implementing SBA's Regional Clusters Initiative*.
[17] Furthermore, regional assets are generally the result of unique regional histories, including previous efforts to develop and retain specific industries and leadership in certain areas of research and development.

Exhibit 7. Summary of the business model selected by each cluster in SBA's Cluster Initiative

Cluster	Business model	Predominant cluster strategy
Project 17	Seeks to assist and support small businesses involved in the development of advanced agricultural technologies by leveraging the following regional assets: • An ideal crop-growing climate • A high concentration of well-established grower-shippers producing more than 50% of the fresh produce in North America • A technology- and information technology– (IT-) oriented mind-set • Regional research institutions with R&D and training in agriculture	Resolution of industry challenges
Carolinas' Nuclear Cluster	Seeks to integrate small businesses into the nuclear-energy supply chain to address identified gaps and to ensure that the region remains globally competitive in nuclear energy by leveraging the following regional assets: • The nuclear know-how and R&D of universities and national laboratories • 12 operating nuclear reactors in the region and 4 at the planning stage • A high concentration of well-established actors involved in the nuclear industry	Supply-chain integration
Advanced Power Cluster	Seeks to support high-technology small businesses and connect them with DoD and U.S. Department of Energy (DoE) to fulfill their priority requirements in power and energy by leveraging the following regional assets: • A high concentration of actors involved in power and energy defense procurement • The R&D and technology-transfer capabilities of universities and research centers • The intellectual and financial capital for high-technology innovation	Network development
Geospatial Cluster	Seeks to assist high-technology small businesses to develop and market innovative geospatial technologies by leveraging the following regional assets: • A high concentration of federal agencies and R&D facilities with a geospatial focus • A high concentration of prime contractors • A highly skilled workforce due to universities with strong geospatial expertise and R&D	Network development
FlexMatters	Seeks to accelerate the growth of the emerging flexible electronics industry by assisting small businesses developing innovative and commercializable technologies by leveraging the following regional assets: • Universities and research institutions largely responsible for the creation of the flexible-electronics industry • A strong manufacturing know-how • A high concentration of private-sector entities involved in the flexible-electronics industry	Supply-chain integration

Cluster	Business model	Predominant cluster strategy
Huntsville Defense Cluster	Seeks to assist small businesses with defense-procurement capabilities and to connect them to DoD, DoE, and the National Aeronautics and Space Administration (NASA) for the fulfillment of priority needs by leveraging the following regional assets: • A concentration of defense agencies seeking innovative solutions and defense-research institutions • A high density of private entities involved in defense procurement and R&D • Several universities that focus on high technology and engineering	Network development
Smart Grid	Seeks to assist small businesses through the development of a collaborative ecosystem and the acceleration of smart grid innovation and deployment by leveraging the following regional assets: • The availability of testing facilities • Universities and research laboratories focused on power engineering • A high concentration of private-sector entities in power engineering and distribution • A high concentration of venture-capital actors	Supply-chain integration
Energy Storage Cluster	Seeks to integrate small businesses into the hydrogen and fuel-cell supply chain and to improve their competitive positions by leveraging the following regional assets: • A high concentration of hydrogen and fuel-cell industries in the Northeast • A highly skilled labor force • A high concentration of research universities and incubators	Supply-chain integration
San Diego Defense Cluster	Seeks to support and promote small businesses with capabilities in one of four technology areas aligned with DoD procurement focus areas by leveraging the following regional assets: • The highest concentration in the world of DoD facilities involved in both R&D and operations • Multiple universities with a strong science and technology focus • A high concentration of prime defense contractors • A high concentration of innovative small businesses	Network development
Green Aviation Cluster	Seeks to assist and strengthen small businesses through the development of recycling, retrofitting, and R&D activities tied to the green-aviation industry by leveraging the following regional assets: • Four regional airports with suitable capacity and infrastructure • Universities and community colleges with strong aerospace focus and R&D capabilities • A concentration of capable private-sector entities	Repositioning of regional assets

Source: Cluster proposals

3. Implementing SBA's Regional Clusters Initiative

This section details the implementation of SBA's Regional Clusters Initiative during its second year, providing an overview of the composition of cluster member networks, the use of resources and provision of services and activities by clusters, and the participation in and satisfaction with those services and activities by member organizations. The survey data collected indicate that the complex networks of stakeholder organizations that compose clusters grew substantially along all dimensions in the first 2 years of the Initiative, with growth in the number of participating organizations ranging from 50% to 300%. The most significant membership growth occurred among small businesses, increasing nearly four-fold since the beginning of SBA's Initiative. Small business participation was importantly tied to the ability of businesses to network with one another and their desire to access cluster services. In contrast, large organization participation was tied to regional economic development, technology commercialization, and technology transfer goals.

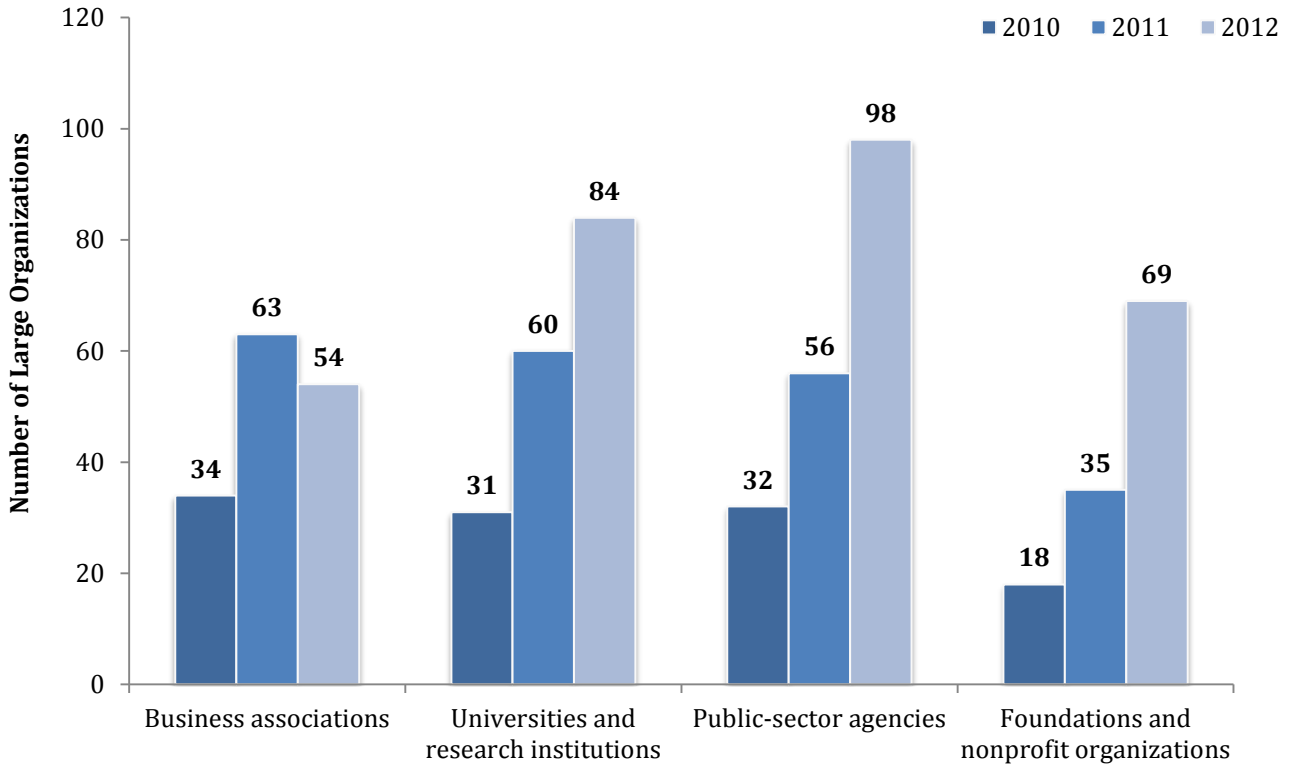
Clusters participating in SBA's Initiative provide various services designed to address the multifaceted needs of their member organizations while they work toward fulfilling shared goals both of business and regional economic development. All 10 clusters provided some services directly to their participants during the second year of the Initiative, while 7 out of 10 also relied (to varying degrees) on one or more regional SBA partners. Clusters variously provided extensive one-on-one counseling to member businesses as well as hosting significant numbers of group events and activities (e.g., networking events or training workshops). During the second year of the Initiative, the 10 clusters reported a total of 265 such events. Among small businesses reporting, a significant majority indicated that they participated at least occasionally in cluster-sponsored events, such as networking and showcase events. Nearly half the large organization members also reported that they often or always participated in cluster-organized events. This level of participation was consistent with that reported during the first year of the Initiative for small business and large organization participants alike. Very few small business participants reported that they could obtain similar services from other providers, suggesting that cluster services were unique and filled a void in service provision (from the perspective of the small businesses).

3.1. Cluster Stakeholders

Industry clusters participating in SBA's Cluster Initiative comprise a broad spectrum of stakeholders, including small businesses, larger companies, and supporting entities, such as universities and workforce education institutions, foundations, business associations, service providers, and public-sector agencies. These organizations work synergistically together to enhance and support the industries in which the clusters operate. This overview of the implementation of SBA's Initiative begins with a discussion of the interconnected networks composing each cluster, focusing in turn on various stakeholder groups. The complex networks of stakeholder organizations that compose clusters grew substantially along all dimensions in the first 2 years of the Initiative, with increases in the number of participating organizations ranging from 50% to 300%.

By the end of the second year of SBA's Initiative (2012), the 10 clusters included a total of 84 universities and research institutions, 54 business associations, 98 public-sector agencies, and 69 nonprofit organizations. (Participation of large and small businesses are discussed separately below.) The number of participating foundation and nonprofit organizations and the number of public-sector agencies more than tripled between the start of SBA's Initiative (2010) and 2012 (Exhibit 8). The number of universities or other research institutions increased at nearly the same rate, and the number of participating business associations increased by 58%.[18] This overall growth pattern holds for many but not all clusters and types of organizations. The Enterprise for Innovative Geospatial Solutions (Geospatial Cluster) and the Illinois Smart Grid Regional Innovation Cluster (Smart Grid) in particular had especially large increases across three types of large organizations (universities and research institutes, public-sector agencies, and foundations and nonprofit organizations). Individually, the Geospatial Cluster also added a large number of new business associations to its network as well. Three clusters, however, reported a small decrease in the number of large organization participants between 2010 and 2012. In particular, the Upper Michigan Green Aviation Coalition (Green Aviation Cluster) reported a decrease of four universities and research institutions, and five foundations and nonprofit organizations, while the San Diego Advanced Defense Technology Cluster (San Diego Defense Cluster) reported a decrease of three foundations and nonprofit organizations. Detail for individual clusters is provided in Exhibit B1 of the Data Appendix.

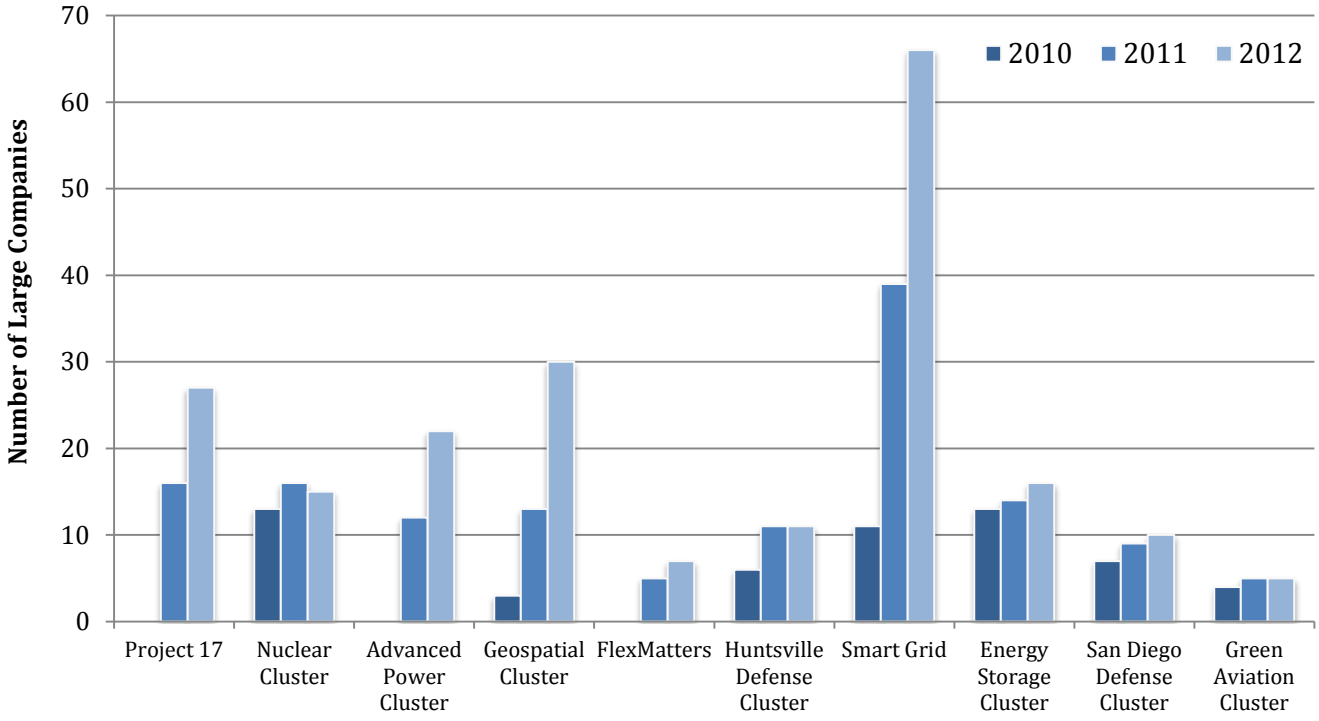
[18] Growth in this latter category was dampened by declines in just two clusters (Smart Grid and the Carolina's Nuclear Cluster).



Source: Cluster Administrator Survey; cluster-level data are available in Data Appendix Exhibit B1.

Exhibit 8. Number of large organizations participating in SBA's Cluster Initiative, 2010, 2011 and 2012

The number of large companies participating in the 10 clusters also steadily increased. In 2010, clusters averaged slightly fewer than six large company participants each. This number increased to 14 in 2011 and 21 in 2012. Seven out of 10 clusters added large company participants between 2011 and 2012; two reported no change, and one cluster (the Carolinas' Nuclear Cluster) reported a decrease as a result of a merger between two large utilities (Exhibit 9). Smart Grid, in particular, added a significant number of large businesses since the beginning of SBA's Initiative (going from 11 to 66 between 2010 and 2012).



Source: Cluster Administrator Survey

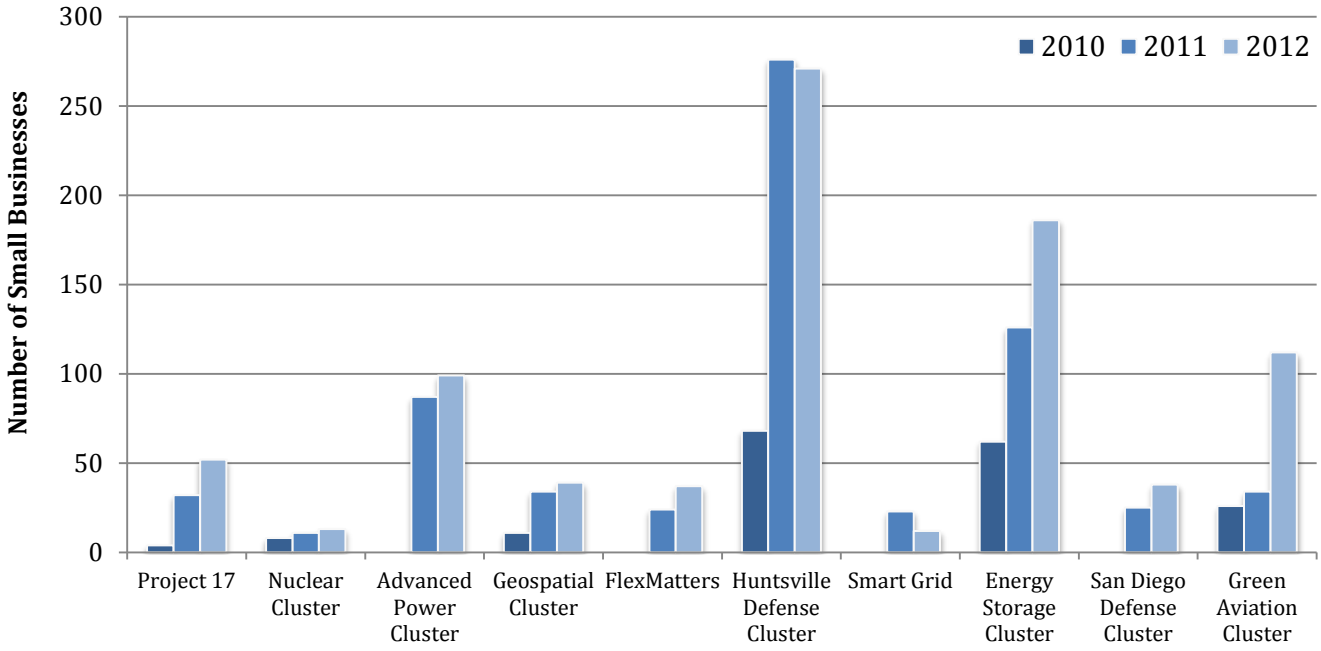
Exhibit 9. Number of large companies participating in SBA's Cluster Initiative

3.2. Small Business Participation in the Clusters

Although the 10 clusters established wider networks across all stakeholder categories, the most significant growth was in small business participation, which increased almost four-fold since the beginning of SBA's Initiative (from 179 small businesses in 2010 to 859 in 2012). Some clusters had extraordinary increases in small business participation, e.g., Project 17 Agricultural Technology Cluster (Project 17) increased small business membership twelve-fold since 2010, while small business participation in four other clusters grew between 200% and 330%. Even still, 7 out of 10 clusters also reported a decline in the number of small business participants with no employees during the second year of the Initiative. Less than 2% of all small businesses participating in the 10 clusters in 2012 had no employees, down from approximately 5% in 2010 and 2011. This was likely indicative of the growth and maturation of participating small businesses over this time period.

The number of small business participants in a cluster is reflective of both the approach that the cluster took in providing services to its small businesses and of its geographic scope. Small businesses participating in each cluster by year are shown in Exhibit 10. Clusters with a lower number of small business participants (e.g., Smart Grid, the Geospatial Cluster, and the Carolinas' Nuclear Cluster) typically had smaller geographic scopes and well-defined inclusion and exclusion criteria. Other clusters

had less stringent inclusion criteria or greater geographic scopes that allowed for a broader set of small businesses to meet their eligibility criteria.



Source: Cluster Administrator Survey; cluster-level data are available in Data Appendix Exhibit B2.

Exhibit 10. Number of small businesses participating in SBA's Cluster Initiative

Clusters With Less Restrictive Participation Criteria

- *The Huntsville Defense Cluster has a relatively open membership model. All businesses operating in Northern Alabama that are in the cluster industry and with which the cluster interacted are considered part of the cluster.*
- *The Energy Storage Cluster has partner organizations in eight states in the Northeast United States; this wider geographic scope leads to a large number of small business participants.*
- *The Advanced Power Cluster focuses on four states in the Midwest but has no geographic restrictions on participation and currently has members in 28 states across the United States.*

Although the overall growth in small business participation in clusters was rapid, it varied considerably across clusters. Project 17, for example, increased small business membership twelve-fold since 2010 (jumping from four small business members in 2010 to 52 in 2012), while participation in four other clusters grew between 200% and 330%. Four clusters that began the Initiative with zero small business participation added a total of 186 small business members by 2012: the Advanced Power & Energy Cluster (Advanced Power Cluster), FlexMatters – Northeast Ohio Technology Coalition (FlexMatters), Smart Grid, and the San Diego Defense Cluster.

The impressive growth in small business participation in Project 17 and in the Green Aviation Cluster could likely be attributed to their phase of organizational development; they currently remain focused on recruitment and capacity building. Above-average growth in the San Diego Defense Cluster partially resulted from an important contract award. This award from the SBA, the Network for Enabling Small Business Teaming (NEST), required renewed recruitment efforts, which were combined with regular attendance and presentations by the cluster at industry and trade events. Several San Diego Defense Cluster members were also NEST participants. FlexMatters focused its recruitment efforts on supply-chain integration and the inclusion of new capabilities and expertise that were intended to create synergies within the cluster and leverage its supply-chain mapping effort.

Only Smart Grid experienced a significant decline in the number of small business participants between 2011 (23 businesses) and 2012 (12 businesses).[19] This was, in part, a result of the withdrawal of two small businesses from the cluster due to relocation to a different region or a limited need for cluster services.

More than 98% of small businesses participating in 2012 (844 of the 859) were reported to have employees, while the balance is expected to be start-up companies that have only recently been created. This value increased somewhat compared to the approximately 95% reported in 2010 and 2011, suggesting the maturation of new start-up businesses that joined clusters over time. At the same time, 7 out of 10 clusters reported a decrease in the number of small business participants without employees during the second year of the Initiative, with the largest decreases reported by Project 17, the Advanced Power Cluster, and the Northeast Electrochemical Energy Storage Cluster (Energy Storage Cluster). Only Project 17 and the San Diego Defense Cluster reported a significant share of small business participants in 2012 that did not have employees (about 10% and 20%, respectively), and only the San Diego Defense Cluster reported an increase in the number of "no employee" businesses in 2012.

Cluster administrators reported that 23 small businesses had withdrawn from cluster participation by the end of the second year. Of these, one company was reported as having gone out of business, while another moved out of the cluster's region. One small business was bought by a larger company, and one was excluded due to dissatisfaction of the cluster leadership with the company. The remaining 19 small businesses were categorized as having withdrawn because they did not maintain active contact or

[19] Participation in the Huntsville Defense Cluster declined slightly, from 276 to 271.

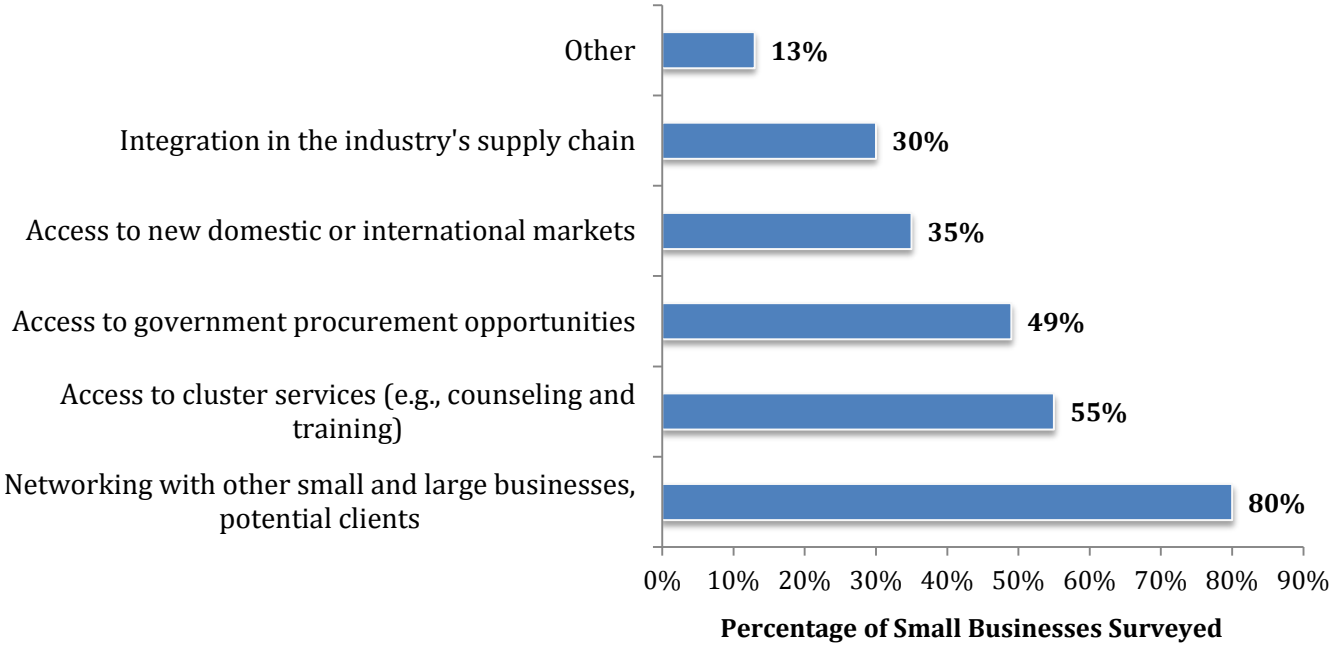
participate in cluster activities.[20] Overall, 96% of the small businesses that were active participants during the first year of SBA's Initiative remained so to the end of the second year.

3.3. Reasons for Participation in the Cluster

Clusters provide a complex and customized set of networking, coordinating, and assistance functions in a complex market environment. Thus, organizations can have any number of reasons for participation, and these reasons are likely to vary somewhat by type of organization. Both large organizations and small businesses participating in the Initiative clusters were queried regarding their reasons for cluster participation during the Initiative's second year. Small businesses reported two key reasons: networking with other small businesses and accessing cluster services. In contrast, large organizations reported the most important reasons for participating in a cluster to be spurring regional economic development, gaining access to new technologies with commercialization potential, and finding technology-transfer partners.

The ability to network with other small businesses and large organizations was selected by 80% of small businesses surveyed as a key reason for their cluster participation (Exhibit 11). Furthermore, this was the most commonly selected reason in 8 out of 10 clusters (cluster-level data are available in Exhibit B3 of the Data Appendix). In addition, slightly more than half of small businesses (55%) indicated that access to cluster services was an important reason for cluster participation while nearly half (49%) indicated access to government procurement channels as being significant. The latter reason was particularly prevalent among small businesses of the Advanced Defense Technology (ADT) clusters and the Geospatial Cluster, all of which operate in industries where government agencies are a principal customer (see Data Appendix Exhibit B3).

[20] The 19 small businesses were not excluded from the counts provided in Exhibit 10. Cluster administrators suspected that these businesses withdrew due to lack of contact with the cluster, although this status was not confirmed as it was for the others mentioned.



Source: Small Business Survey; cluster-level data are available in Data Appendix Exhibit B3.

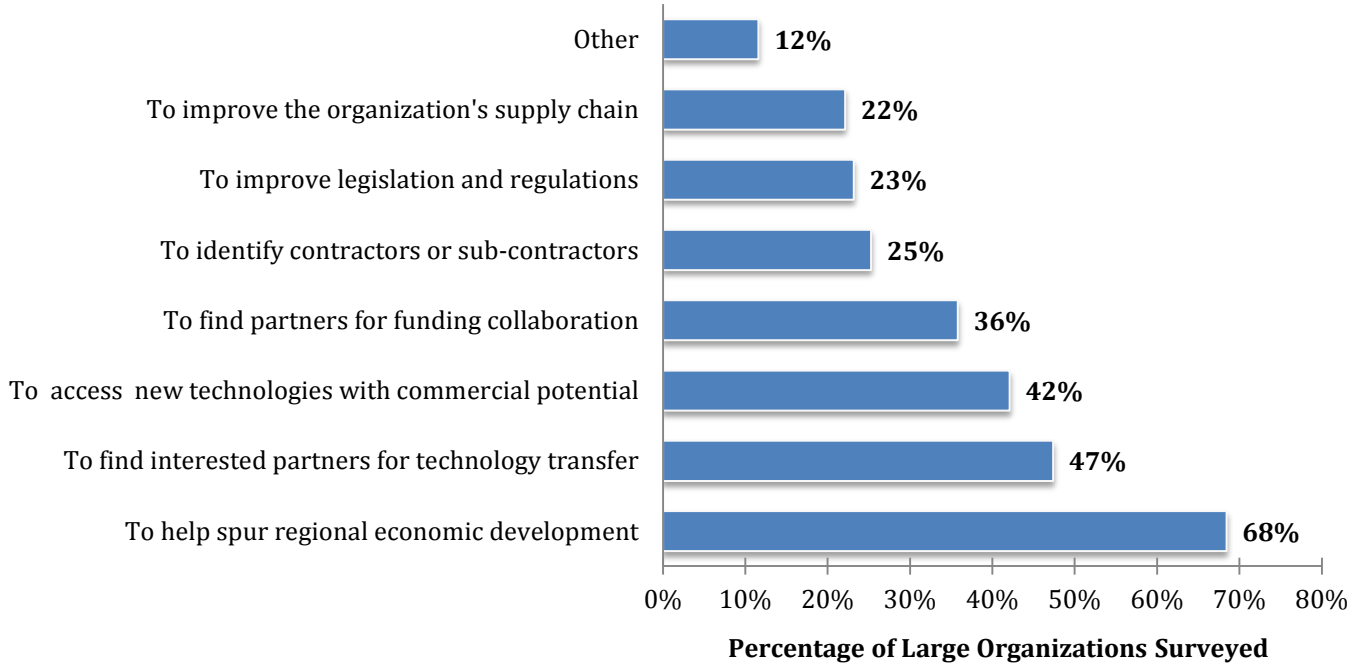
Exhibit 11. Reasons for small business participation in the clusters

Cluster-Specific Reasons for Small Business Participation

- FlexMatters participants selected integration in the industry's supply chain as the primary reason for participation in that cluster, reflecting the cluster's strategic focus on supply chain issues.
- Small business participants of the Carolinas' Nuclear Cluster selected access to new markets (domestic or international) as a key reason for cluster participation with greater than average frequency (57% versus 35%). No new nuclear plants have been constructed in the United States in more than 30 years, explaining why small businesses involved in the cluster are looking abroad and in related fields for opportunities.
- Green Aviation Cluster small businesses also selected access to new markets (domestic or international) as an important reason for cluster participation at a higher than average rate (67%). The cluster has strong ties to Canada, and its small business members seek to repair and retrofit airplanes belonging to airlines from all over the globe, as well as to explore related business fields, such as marine cockpits' refurbishing.

Some important differences in reasons for small business participation in clusters emerged between the first and second years of SBA's Initiative. Access to new domestic and international markets, for example, was cited significantly more as a reason for participating in 2012 than in 2011 (50% versus 35%), while the percentage citing integration in the industry's supply chain decreased from 45% to 30%. Large organizations were also queried about their motivation to join their clusters and predominantly cited a desire to help spur regional economic development. As shown in Exhibit 12, 68% cited a desire to help

spur regional economic development as a predominant factor. Other key reasons for participation included finding interested partners for technology transfer (47%) and gaining access to new technologies with commercialization potential (42%). There were some slight shifts in these responses between 2011 and 2012—the percentage of large organizations citing regional economic development decreased from 87% to 68%, and the percentage citing an interest in improving their supply chains decreased by about 10%.



Source: Large Organization Survey; cluster-level data are available in Data Appendix Exhibit B4.

Exhibit 12. Reasons for large organization participation in the clusters

3.4. Cluster Services and Activities

Clusters participating in SBA's Initiative provide various services designed to address the multifaceted needs of their member organizations while they work toward fulfilling shared goals of business advancement and regional economic development. Goals of service provision range from facilitating collaboration within the clusters and supporting the development of new technologies to improving small business marketing strategies and international export volume. All 10 clusters provided some services directly to their participants during the second year of the Initiative while 7 out of 10 also relied (to varying degrees) on one or more regional SBA partners. Clusters variously provided extensive one-on-one counseling to member businesses as well as hosting significant numbers of group events and activities (e.g., networking events or training workshops). During the second year of the Initiative, the 10 clusters reported a total of 265 such events, although the following three clusters sponsored two-thirds of

these: the Geospatial Cluster, the Energy Storage Cluster, and the Huntsville Advanced Defense Technology Cluster (Huntsville Defense Cluster).

Small businesses and large organizations both reported being active participants in cluster services/activities and events. Among small businesses reporting, a significant majority indicated that they participated in cluster-sponsored events, such as networking and showcase events, at least occasionally. Nearly half of large organization members also reported that they often or always participated in cluster-organized events. This level of participation was consistent with that reported during the first year of the Initiative for both small business and large organization participants. Very few small business participants reported that they could obtain similar services from other providers, suggesting that (from the perspective of small businesses) cluster services were unique and filled a void in service provision. Similarly, a significant majority of large organizations reported that the benefits that they had expected from cluster participation had at least "somewhat" materialized.

An overview of the types of services provided by clusters and characteristic examples of services provided during the second year of SBA's Initiative are listed in Exhibit 13, below, organized according to cluster goals. A detailed description of the methods used and resources devoted to service provision on the part of clusters, the types and frequency of services provided, and participation in and satisfaction with cluster services by member organizations is provided in Sections 3.4.1 through 3.4.4. Finally, a more extensive narrative detailing examples of cluster services and activities from the first 2 years of the Initiative is included in Section 3.5.

Exhibit 13. Examples of services provided by SBA's Initiatives

Types of Services	Cluster-Specific Examples
Goal: Facilitating alliances and collaborations among cluster participants	
• Targeted networking events that included cluster members or entities external to the cluster (e.g., foreign delegations of industry executives, representatives of various U.S. Department of Defense (DoD) agencies, or university faculty) • Referral of small businesses to appropriate large firms, organizations, or regional resources	• Huntsville Defense Cluster: *Ideation* event, Fall 2012—Brought together 60+ small businesses to work on identifying their strengths, current DoD Broad Agency Announcements (BAAs) and Rapid Innovation Funds (RIFs) that they sought to pursue, and the gaps in their applications they sought to fill. Event included question-and-answer sessions as well as one-on-one discussions. • Advanced Power Cluster: Referred a small business working on developing and commercializing phase change material to the U.S. Army Natick Soldier Center, with the goal of improving winter gear for soldiers.
Goal: Increasing small businesses' access to capital	
• Information provision: Listing of funding opportunities via cluster's website or newsletter • Technical assistance: Mentoring, application-writing assistance for various funding opportunities • Matchmaking: o Recommendation letters for small business funding applications o Assistance in finding partners to improve strength of funding applications o Introductions between investors (e.g., venture capital firms) and cluster participants	• San Diego Defense Cluster: Regular website posts of funding opportunities relevant to small businesses engaged in specific technology areas of interest to DoD. • Geospatial Cluster: E-mail alerts regarding Small Business Innovation Research (SBIR). • Geospatial Cluster: Mentoring to a small business regarding SBIR applications and review of final proposal before submission. • Huntsville Defense Cluster: Collaboration with Lockheed Martin to host Small Business Technology Transfer Summit, where participants were encouraged to develop agreements to write joint proposals for specific funding opportunities. • Energy Storage Cluster: Finance/Investment Forum, summer 2012—Small businesses met and networked with investors in a renewable energy space. • Advanced Power Cluster: Introduced two potential investors to a small business member in need of financing to fulfill two contractual agreements with Fortune 100 companies.

Types of Services	Cluster-Specific Examples
Goal: Enhancing small businesses' development or commercialization of new technology	
• Workshops on technology transfer and commercialization of new technology • Assistance with steps for developing or commercializing a new product • One-on-one counseling on business strategies for technology transfer • Connection of small businesses with universities or other research organizations that assist with key linkages for technology transfer	• Smart Grid Cluster: Assigned Ph.D. engineering students from a participating university to work with five small businesses, providing assistance with bench testing, algorithm development, and other technical support crucial to moving toward a final product. • San Diego Defense Cluster: Provided a small business with contacts to a university professor, which made possible a Department of Homeland Security (DHS) SBIR.
Goal: Improving small businesses' marketing strategies	
• One-on-one counseling or workshops on marketing strategies • Referrals to larger organizations that can serve as mentors or to other regional resources	• Advanced Power Cluster: Assisted small business with marketing counseling and DoD introductions, culminating in the business' providing lightweight armor samples to MilTech (a partnership between TechLink and the Montana Manufacturing Extension Center that focuses on hands-on product design, prototyping, and manufacturing assistance with the aim of a faster transition of technology to the market at a lower cost).
Goal: Increasing exports	
• Seminars, workshops, individual counseling • Referrals to regional resources specializing in exports	• San Diego Defense Cluster: Facilitated a meeting between the International Trade Administration and a small business cluster member interested in collaborating with an Israeli firm to design an unmanned helicopter system for India.
Goal: Assisting with intellectual-property issues and patent applications	
• Workshops on intellectual property and how to incorporate intellectual-property considerations into business plans and strategies • One-on-one assistance with patent application process • Connections with intellectual property specialists who can assist with patent applications	• Geospatial Cluster: Hosted Fall 2011 workshop on intellectual property rights. • Project 17: Facilitated assistance from intellectual property lawyer for small businesses seeking patents.

Types of Services	Cluster-Specific Examples
Goal: Services aimed at building small businesses' organizational capacity	
• One-on-one counseling, group workshops, and presentations by experts • Assistance with registration for various disadvantaged business statuses, e.g., 8(a)	• Geospatial Cluster: Hosted workshop on key elements of business operations in high-technology industries, including branding, government contracts, accounting, and human resources.

Source: Cluster quarterly reports and interviews

3.4.1. Provision of Services

Cluster administrators in SBA's Initiative have considerable flexibility in the mix of resources they use to assist participants. In particular, they can assist through the following activities:

- Provide in-house services.
- Utilize services provided by SBA resource partners, such as Small Business Development Centers (SBDCs), Women's Business Centers (WBCs), and SCORE chapters.
- Leverage the expertise of other resources or organizations, such as business schools, technological institutes, and the Manufacturing Extension Partnership.

Clusters considered their competitive advantage in each of these service-provision methods and selected a mix of in-house, SBA-affiliated, or third-party provisions based on their local and regional resources, along with the existence of groups with similar missions and the needs of their small businesses. Exhibit 4 in Section 2.3 shows that all 10 clusters provided some services directly to their participants and that 7 of the 10 clusters also relied to a varying extent on one or more SBA partners (e.g., SBDC, WBC, SCORE) for service provision to small businesses. This approach allowed those seven clusters to focus their own efforts on highly specific services that fell outside the scope of SBA partner capabilities while leveraging the existing SBA network of assistance, thus limiting the duplication of services offered. FlexMatters, for example, took this approach by focusing on highly specific flexible electronics assistance from experts in the field while also relying on the Manufacturing & Technology SBDC at Kent State University for manufacturing assistance and additional generalized services.

All 10 clusters also relied on third-party organizations, many of which provided advanced and specialized mentoring, counseling, and technical assistance:

- The Advanced Power Cluster relied on TechLink[21] and MilTech, both at Montana State University, to provide access to labs for research and development as well as technology licensing.
- Smart Grid used BBC Entrepreneurial Training & Consulting to provide expert advice on developing successful Small Business Innovation Research/Small Business Technology Transfer Research (SBIR/STTR) proposals.
- Project 17 relied on JL White International, a management consulting firm, to provide several *12 O'Clock High* business management and growth workshops.

Cluster administrators divide their time between management activities related to the general setup, management, and strategic planning of the clusters and service-provision activities, such as

[21] TechLink primarily assists companies with licensing new technologies from DoD but it also evaluates technology and fosters partnerships with DoD labs and other organizations for joint R&D.

counseling, training, and offering events to cluster participants. Accordingly, administrators must decide how to optimally allocate their funding between these two categories of activities.

Exhibit 14. Percentage of SBA funding spent on providing services vs. cluster management activities

Cluster	Percentage of SBA funding spent on providing services[a]	Percentage of SBA funding spent on cluster management[b]
Project 17	95%	5%
Carolinas' Nuclear Cluster	80%	20%
Advanced Power Cluster	64%	36%
Geospatial Cluster	88%	12%
FlexMatters	90%	10%
Huntsville Defense Cluster	90%	10%
Smart Grid	68%	32%
Energy Storage Cluster	90%	10%
San Diego Defense Cluster	71%	29%
Green Aviation Cluster	75%	25%
All clusters	**81%**	**19%**

Source: Cluster Administrator Survey

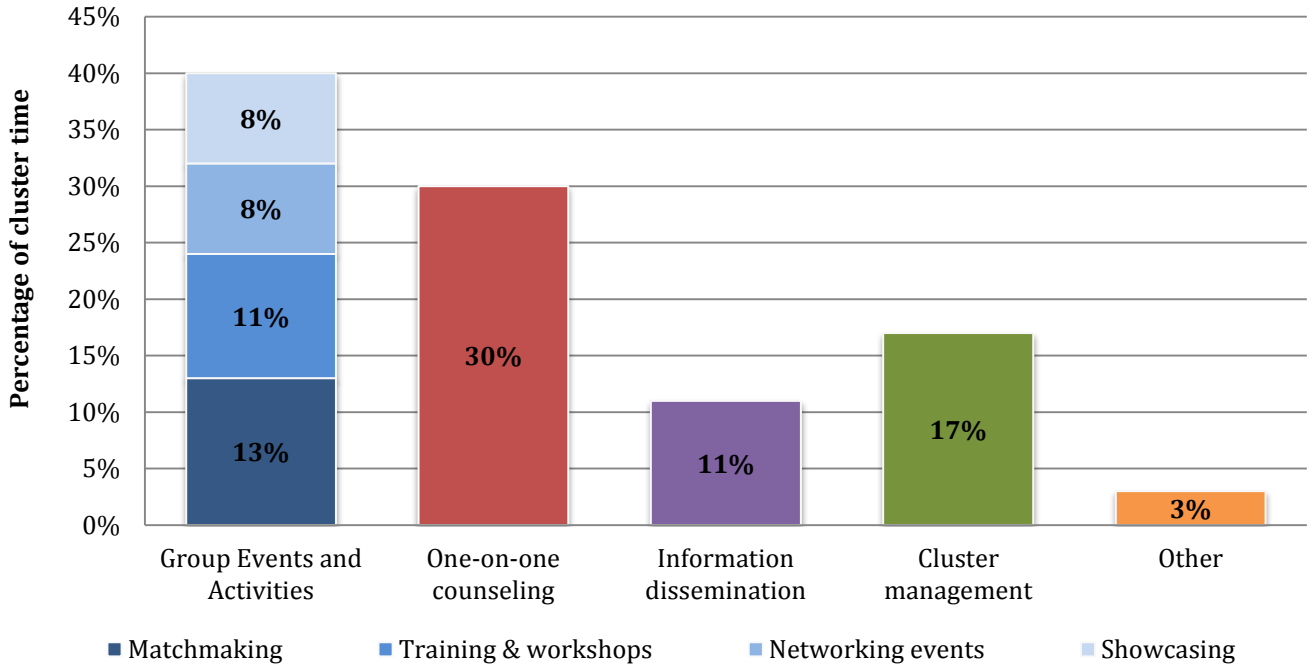
[a] Percentage of SBA funding spent on providing services to cluster participants (e.g., counseling, training, and events).
[b] Percentage of SBA funding spent on overall cluster setup, ongoing management, strategic planning, and other activities where there was no interaction with cluster participants.

As reported in Exhibit 14, the percentage of SBA funding spent on providing services in 2012 ranged from 64% for the Advanced Power Cluster to 95% for Project 17, averaging 81% across the 10 clusters. This 2012 average was markedly higher than in 2011 (61%). This was consistent with the idea that as clusters improved their organizational capacity and moved through their life cycles, they progressively focused more resources toward service provision. Nevertheless, there did not appear to be a direct relationship in 2012 as there was in 2011 between the percentage of SBA funding allocated to service provision and the age of the cluster. Some of the newer clusters (e.g., Project 17) reported an above-average percentage of funds used for service provision, while some of the older clusters were below average (e.g., the Advanced Power Cluster and the San Diego Defense Cluster). Comparing the percentage of funds used toward service provision in 2011 and 2012, however, made clear that many of

the more recently created clusters exhibited a much greater shift toward service provision during the second year. Project 17, Smart Grid, and the Green Aviation Cluster increased their percentage of funds used toward service provision by 44, 36, and 35 percentage points, respectively.

3.4.2. Cluster Services and Activities by Type and Frequency

The services and activities that clusters provide to small businesses can be classified in six categories: (1) one-on-one counseling, (2) networking events, (3) training events, (4) matchmaking events, (5) showcasing events, and (6) information dissemination.[22] On average, clusters dedicated a somewhat greater share of their time to group events and activities (matchmaking, training and workshops, networking, and showcasing events) than on one-on-one counseling (40% versus 30%; see Exhibit 15). The majority of time spent on group events went to matchmaking events (13%) and training and workshops (11%). Cluster management, which included strategic planning and cluster promotion, accounted for 17% of cluster time, while information dissemination accounted for slightly more than 10%.



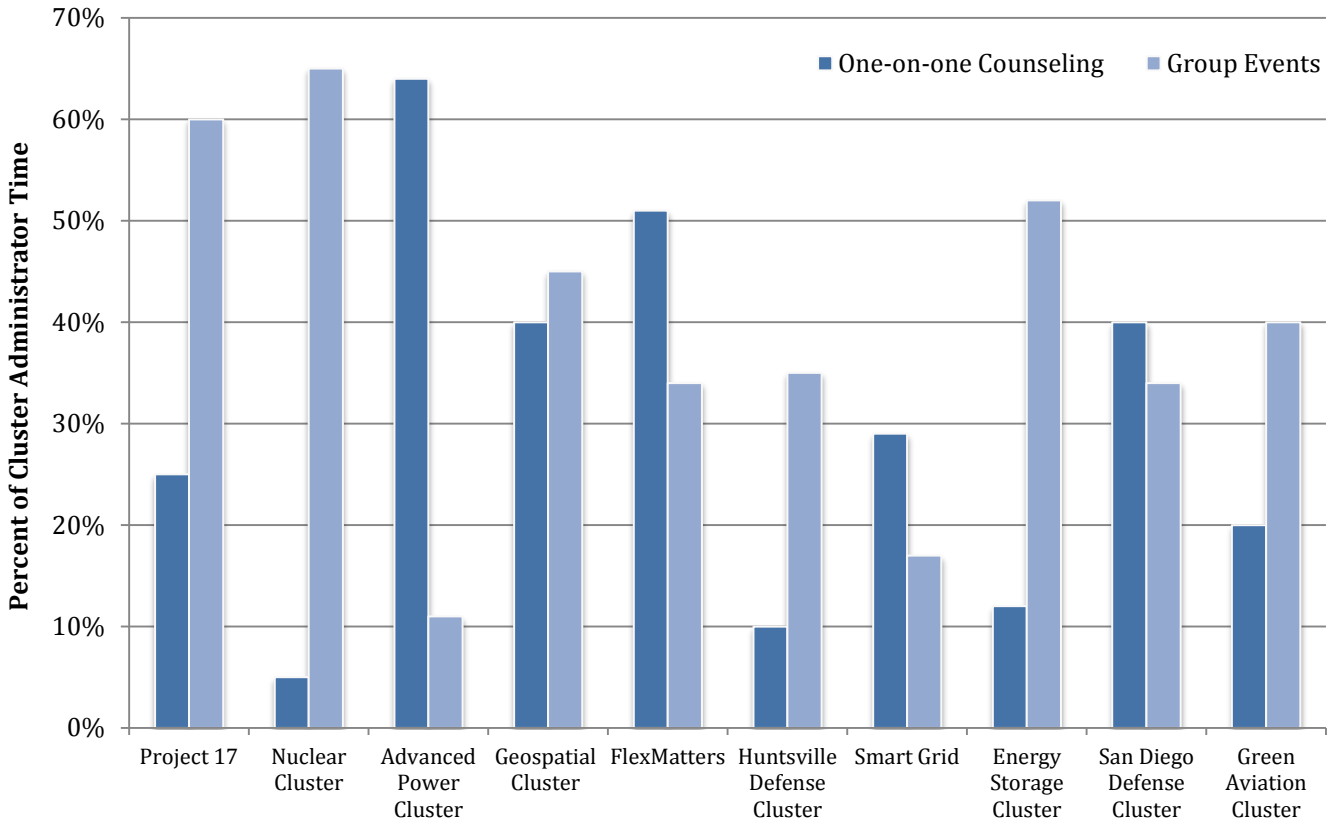
Source: Cluster Administrator Survey; cluster-level data are available in Data Appendix Exhibit B5.

Exhibit 15. Percent of cluster administrator time spent on different service activities

Estimated time spent on group events and activities or one-on-one counseling varied considerably across clusters (Exhibit 16). The Advanced Power Cluster reported the highest percentage of time spent

[22] A detailed discussion on what each of these services entails (and how they were defined for the purposes of the surveys conducted for this evaluation) is included in Section A.2 of the Methodology Appendix.

on one-on-one counseling (64%), while the Carolinas' Nuclear Cluster reported the lowest share (5%) but also had the highest reported use of time for group events (65%), much of which was devoted to matchmaking events. Although these two clusters focused primarily on one or the other type of service provision, other clusters primarily fell into a few basic profiles: those that took a relatively balanced approach (e.g., FlexMatters, the Geospatial Cluster, and the San Diego Defense Cluster), spending significant amounts of time on both one-on-one and group events and activities; and those that spent considerably more time on group events, while their share of time spent on one-on-one activities was limited to between 10% and 25% (Project 17, the Green Aviation Cluster, the Energy Storage Cluster, and the Huntsville Defense Cluster).



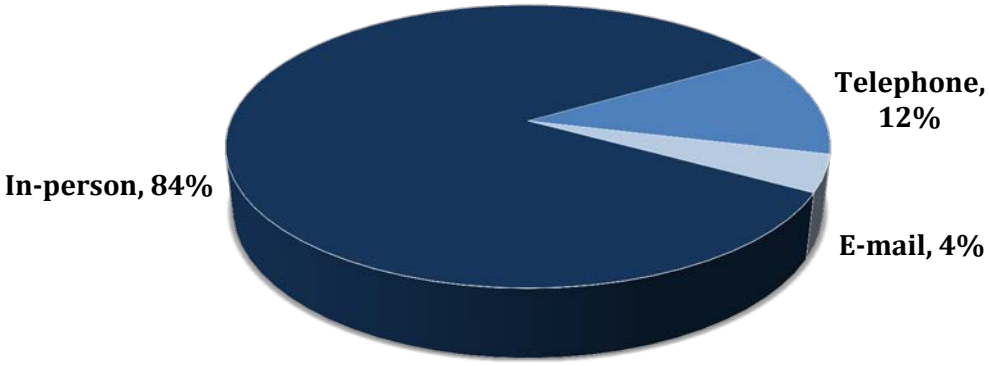
Source: Cluster Administrator Survey; see Data Appendix Exhibit B5.

Exhibit 16. Percent of cluster administrator time spent on one-on-one and group services

Only two clusters (Smart Grid and the Huntsville Defense Cluster) reported spending less than 60% of their time on one-on-one and group events and activities taken together. The Huntsville Defense Cluster reported spending 40% of its time managing the cluster, and the Green Aviation Cluster also reported putting a relatively high share of time toward cluster management, a function of its life-cycle stage and the internal capacity building process it was undertaking. The Energy Storage Cluster was the only cluster that reported dedicating a significant share of time to an activity outside the six main

categories: 26% of its total time was spent on maintaining and updating its website, conducting regional impact analysis, and creating and maintaining participant-accessible databases on the supply chain.

Clusters provided a significant amount of one-on-one counseling to their small business members during the second year of the Initiative. This counseling was typically delivered in person, although it was sometimes provided by phone or e-mail (Exhibit 17).[23,24] Across eight clusters that reported information on one-on-one counseling, 489 small businesses received an estimated total of 10,745 hours during the second year of SBA's Initiative, for a per-cluster average of 22 hours of counseling per recipient small business.[25]



Source: Cluster Administrator Survey

Exhibit 17. Primary mode of communication for one-on-one counseling

The distribution of counseling hours across clusters and across small businesses within a cluster was quite varied (Exhibit 18). The average number of hours of counseling per small business in a given cluster ranged from 2 to 100 (the Huntsville Defense Cluster and the Geospatial Cluster, respectively). Five clusters reported providing counseling to one or several small businesses in excess of 100 hours each while providing fewer hours to other small businesses (e.g., Green Aviation Cluster). In other clusters, the average and median numbers of hours provided were quite close, indicating a relatively uniform distribution of counseling across all member small businesses in those clusters (e.g., the Advanced Power Cluster and the Huntsville Defense Cluster). There was no significant relationship (positive or negative),

[23] No cluster indicated the use of video conference, and none opted to specify any other modes of communication.
[24] In contrast to the other clusters, the San Diego Defense Cluster and the Geospatial Cluster both reported doing about one-quarter of their one-on-one counseling primarily via e-mail, while the Advanced Power Cluster reported doing nearly half of its counseling by telephone.
[25] The Carolinas' Nuclear Cluster and Smart Grid did not provide this information.

however, between the number of small businesses receiving counseling and the average number of hours of counseling provided to businesses in that cluster.[26,27]

Exhibit 18. Summary information regarding one-on-one counseling provided

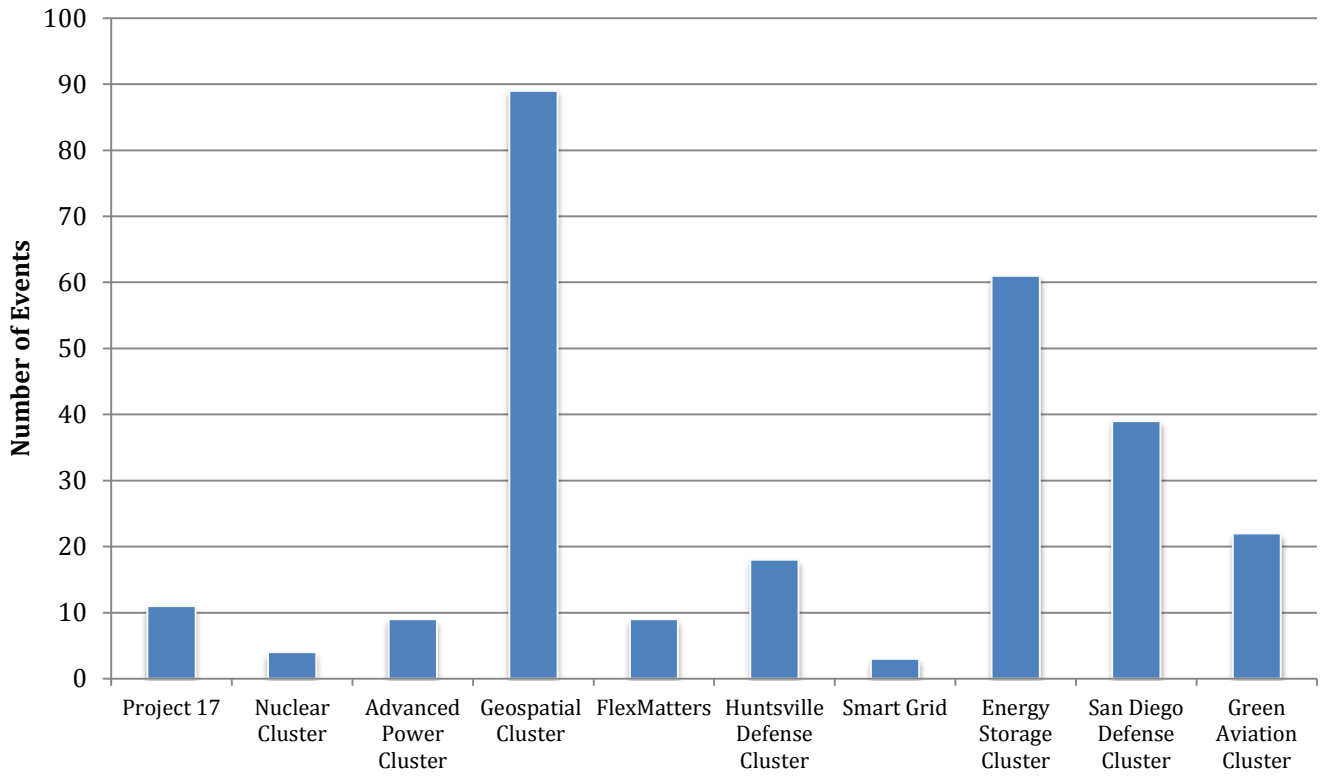
Cluster	Total recipient small businesses	Total hours provided	Average hours per recipient small business	Median hours	Maximum hours reported
Project 17	48	1,244	25.9	20.0	150
Carolinas' Nuclear Cluster	-	-	-	-	-
Advanced Power Cluster	100	570	5.7	2.0	60
Geospatial Cluster	33	3,323	100.7	60.0	285
FlexMatters	38	1,157	30.4	25.5	120
Huntsville Defense Cluster	54	116	2.1	2.0	6
Smart Grid	-	-	-	-	-
Energy Storage Cluster	74	1,325	17.9	5.0	183
San Diego Defense Cluster	30	425	14.2	7.0	82
Green Aviation Cluster	112	2,585	23.1	5.0	160
All clusters	**489**	**10,745**	**22.0**	**5.0**	**285**

Source: Data reported by cluster administrators for each small business participant present on their clusters' rosters that received any one-on-one counseling; the Carolinas' Nuclear Cluster and Smart Grid did not provide this information.

Clusters also conducted a significant number of group events during the second year of the Initiative, reporting a total of 265 such events across all 10 clusters. Of this total, 86 were classified as networking events, 80 as training and workshop events, 52 as showcasing events, and 47 as matchmaking events. Again, just the following three clusters sponsored two-thirds of group events—the Geospatial Cluster, the Energy Storage Cluster, and the Huntsville Defense Cluster—while other clusters hosted smaller numbers of events (Exhibit 19).

[26] The correlation coefficient (Pearson's R) for the relationship between number of small businesses counseled and number of hours of counseling provided is close to zero at .084.

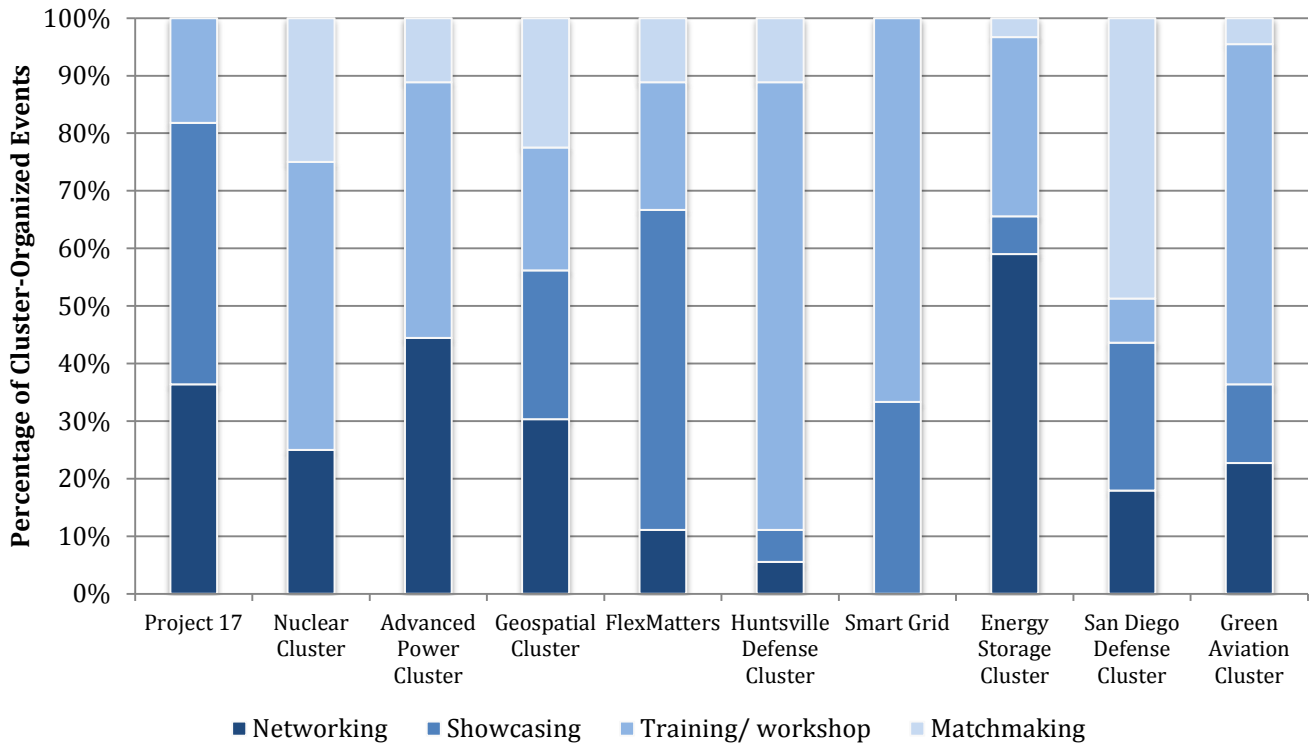
[27] For example, of two clusters that counseled an above-average number of small businesses, one provided an above-average number of hours of counseling, while the other provided an average number of hours. Similarly, among clusters that served a smaller number of businesses, some reported higher hours of counseling per business, while others did not (Exhibit 18).



Source: Cluster Administrator Survey; see Data Appendix Exhibits B6–B9.

Exhibit 19. Number of cluster-sponsored group events

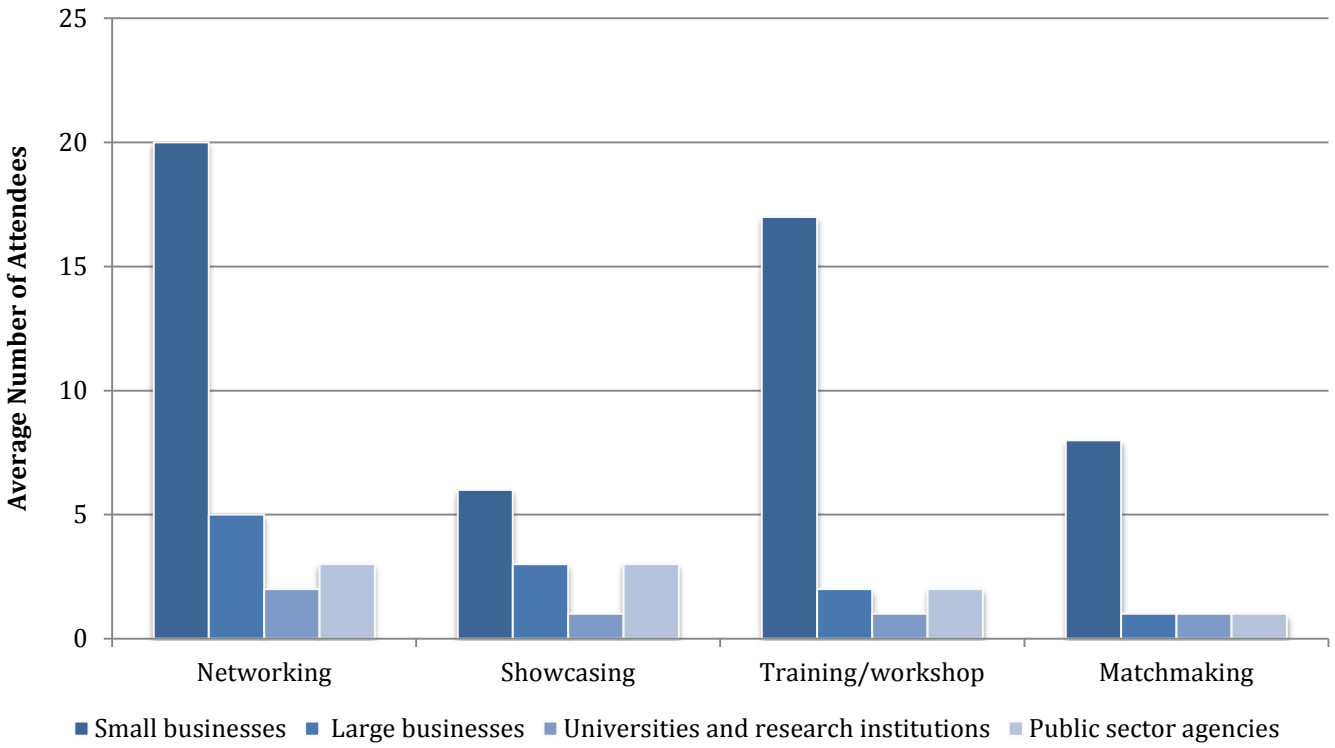
Networking and training and workshop events each accounted for close to one-third of total events sponsored across the 10 clusters, while matchmaking or showcasing events together accounted for the remaining third. There was significant variation across the 10 clusters, however, in the types of events sponsored. For example, the Geospatial Cluster sponsored significant numbers of events in each category, while the Energy Storage Cluster concentrated on networking and training and workshop events, and the San Diego Defense Cluster held a relatively higher number of matchmaking events (Exhibit 20).



Source: Cluster Administrator Survey; see Data Appendix Exhibits B6–B9.

Exhibit 20. Percentage of cluster-sponsored group events, by type of event

The attendance profile varied significantly by type of event. As might be expected, small businesses were far more likely than other types of organizations to attend every type of cluster event. Large organizations (large businesses, research institutions or universities, or public agencies) had some presence at both networking and showcasing events but somewhat lower attendance at training or matchmaking events (Exhibit 21). Large organizations were sometimes recorded as attending training events that were primarily targeted to small businesses; these organizations may have attended the events as presenters or service providers. An average of four and a median of two large organizations per matchmaking event suggested that many of these events were organized around a limited number of large organizations chosen on the basis of their relevance to the clusters' small businesses. That 75% of matchmaking events included five or fewer small businesses suggested that most were organized for a selected group of small businesses. A similar pattern emerged for showcasing events where 75% of events included six or fewer small businesses. Of the showcasing events, 75% included 14 or fewer large organizations, a significantly greater number than those present at matchmaking events.



Source: Cluster Administrator Survey; see Data Appendix Exhibits B6–B9.

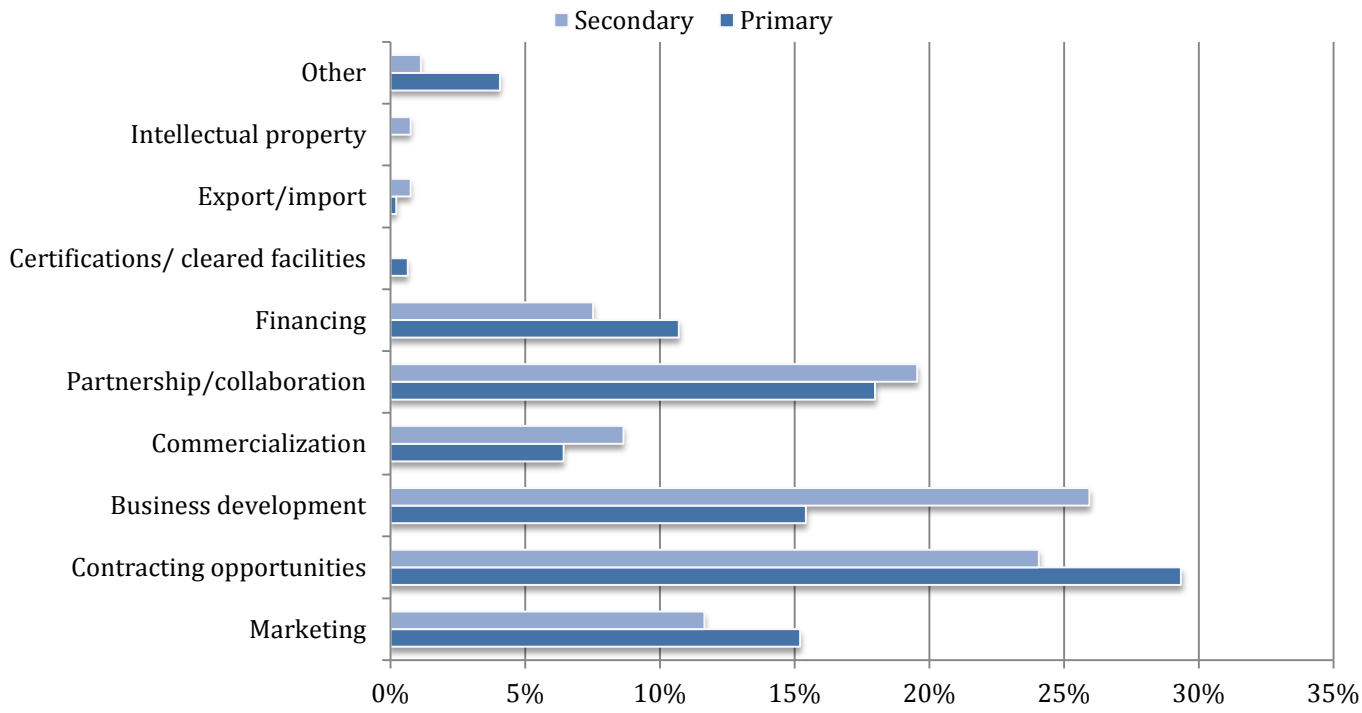
Exhibit 21. Average number of attendees at cluster events, by type of event and type of attendee

Counseling in addition to training and workshop events held during the second year of SBA's Initiative covered a range of topics (Exhibit 22 and 23).[28] Across the 10 clusters, the most common primary topic area for one-on-one counseling was contracting opportunities (29%), followed by partnerships, alliances, and collaboration (18%); business development and marketing tied for third (15% each). Intellectual property was never selected as a primary topic area, while export/import and certifications/cleared facilities were selected only one and three times, respectively.

Among training and workshop events, business development was the most common primary topic area (20%), followed by the "other" category (15%), with contracting opportunities and financing tied for third (13% each).[29] Descriptions provided by cluster administrators for "other" topics included various technology- and industry-specific topics, such as cyber threats, fuel cells in public transportation applications, and Federal Aviation Administration (FAA) training.

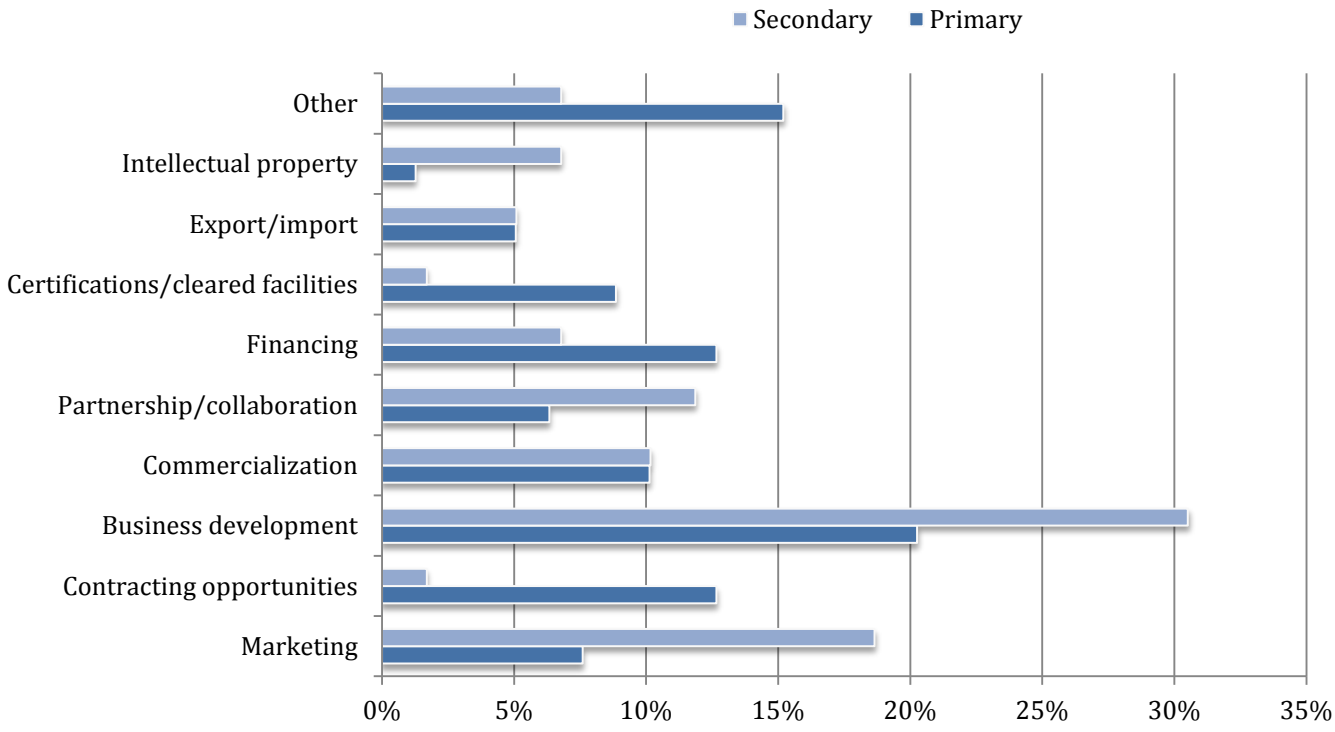
[28] For the 489 small businesses reported as having received one-on-one counseling sessions, cluster administrators provided primary topic areas for 467, secondary topic areas for 266, and tertiary topic areas for 192. This progressive decrease in the number of instances for which a topic area was specified between primary and tertiary topic areas is explained by the fact that not every instance of one-on-one counseling or training and workshop event covered multiple topic areas.

[29] Cluster administrators reported primary topic areas for 79 of the 80 training and workshop events offered during the second year of the Initiative, secondary topic areas for 59 such events, and tertiary topic areas for 37.



Source: Cluster Administrator Survey

Exhibit 22. Percentage of one-on-one counseling, by primary and secondary topic areas



Source: Cluster Administrator Survey

Exhibit 23. Percentage of training and workshop events, by primary and secondary topic areas

Clusters varied significantly in the topics on which they focused both their counseling and their training and workshop efforts (Exhibit 24 and 25):

- FlexMatters and Project 17 provided significantly more counseling on commercialization than did other clusters. Only Project 17 reported providing training and workshop events on the topic of intellectual property, while FlexMatters split its workshop efforts between marketing and financing.
- The Geospatial Cluster was the only cluster that provided one-on-one counseling on certifications/cleared facilities and on export/import. It was also one of two clusters to hold training and workshops events in both these areas (along with the Green Aviation Cluster).
- The Advanced Power and the Energy Storage Clusters focused much of their counseling on financing but also were the only two clusters to focus a significant share of their training and workshops on commercialization.
- The Energy Storage Cluster also provided one-on-one counseling on a variety of other topics, which it reported as business planning, workforce development, the refinement of business directories to enhance sales, and technology counseling revolving around technology transfer and technology applications.
- The Carolinas' Nuclear Cluster reported that its training and workshop events were entirely focused on partnership, alliances, and collaboration.

Exhibit 24. Percentage of one-on-one counseling sessions, by primary topic area

Cluster	Partnership/ collabora-tion	Contracting opportunities	Certifications / cleared facilities	Business develop-ment	Export/ import	Commercial-ization	Market -ing	Financ-ing	Intellectual property	Other
Project 17	19%	0%	0%	59%	0%	15%	7%	0%	0%	0%
Carolinas' Nuclear Cluster	--	--	--	--	--	--	--	--	--	--
Advanced Power Cluster	13%	37%	0%	4%	0%	6%	11%	29%	0%	0%
Geospatial Cluster	44%	13%	9%	3%	3%	3%	0%	25%	0%	0%
FlexMatters	23%	8%	0%	31%	0%	26%	0%	0%	0%	0%
Huntsville Defense Cluster	59%	0%	0%	0%	0%	0%	41%	0%	0%	0%
Smart Grid	--	--	--	--	--	--	--	--	--	--
Energy Storage Cluster	7%	0%	0%	24%	0%	3%	24%	16%	0%	26%
San Diego Defense Cluster	0%	20%	0%	47%	0%	3%	27%	3%	0%	0%
Green Aviation Cluster	5%	78%	0%	6%	0%	2%	9%	0%	0%	0%
All clusters	**18%**	**29%**	**1%**	**15%**	**0%**	**6%**	**15%**	**11%**	**0%**	**4%**

Source: Cluster Administrator Survey

Note: Percentages may not add to 100% due to rounding. No data were provided by the Carolinas' Nuclear Cluster or Smart Grid.

Exhibit 25. Percentage of training and workshop events, by primary topic area

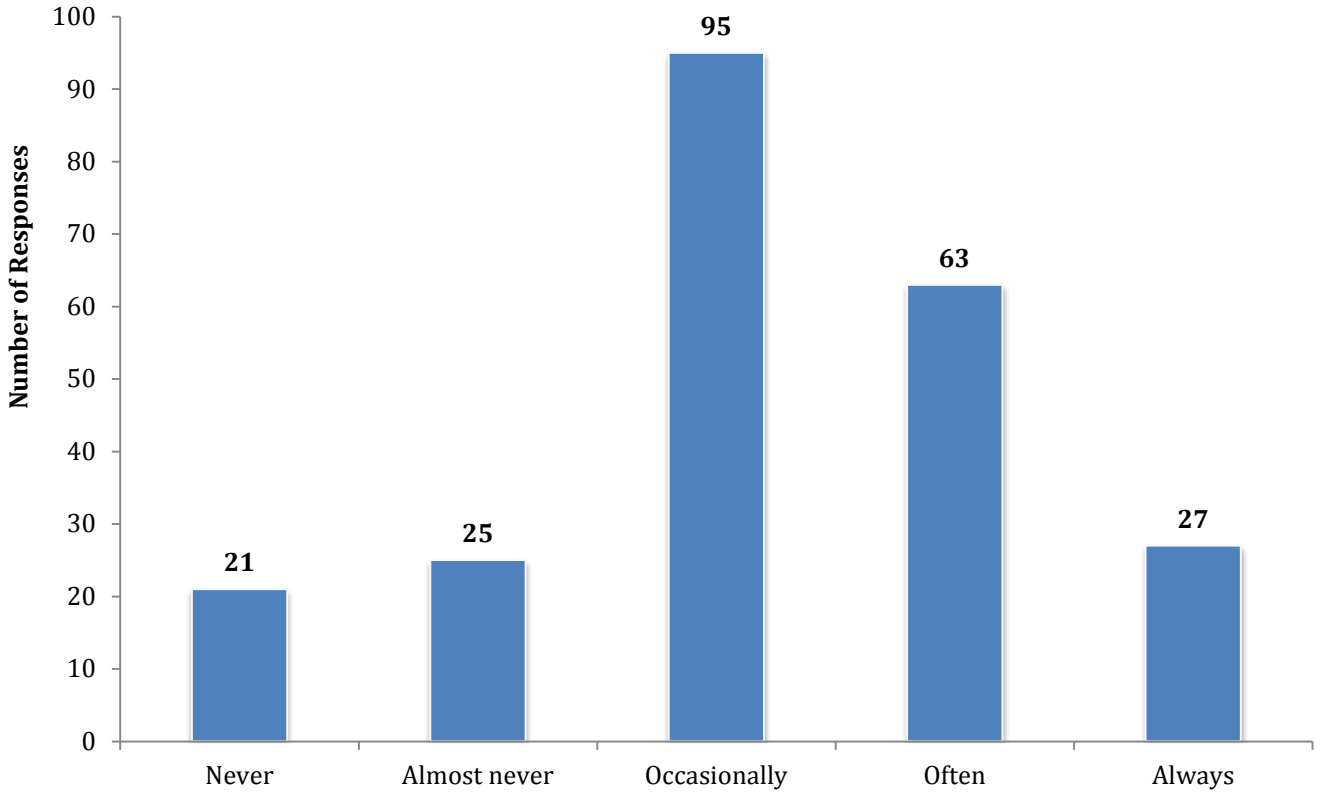
Cluster	Partnership / collaboration	Contracting opportunities	Certifications / cleared facilities	Business development	Export/ import	Commercialization	Marketing	Financing	Intellectual property	Other
Project 17	0%	0%	0%	0%	0%	0%	0%	50%	50%	0%
Carolinas' Nuclear Cluster	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Advanced Power Cluster	25%	0%	0%	0%	0%	25%	25%	0%	0%	25%
Geospatial Cluster	0%	0%	16%	26%	11%	5%	16%	16%	0%	11%
FlexMatters	0%	0%	0%	0%	0%	0%	50%	50%	0%	0%
Huntsville Defense Cluster	0%	29%	7%	43%	0%	7%	0%	7%	0%	7%
Smart Grid	50%	0%	0%	0%	0%	0%	0%	50%	0%	0%
Energy Storage Cluster	0%	0%	0%	11%	5%	32%	0%	16%	0%	37%
San Diego Defense Cluster	33%	33%	0%	33%	0%	0%	0%	0%	0%	0%
Green Aviation Cluster	0%	38%	23%	15%	8%	0%	8%	0%	0%	8%
All clusters	**6%**	**13%**	**9%**	**20%**	**5%**	**10%**	**8%**	**13%**	**1%**	**15%**

Source: Cluster Administrator Survey

Note: Percentages may not add to 100% due to rounding.

3.4.3. Frequency of Participation in Cluster Services and Activities

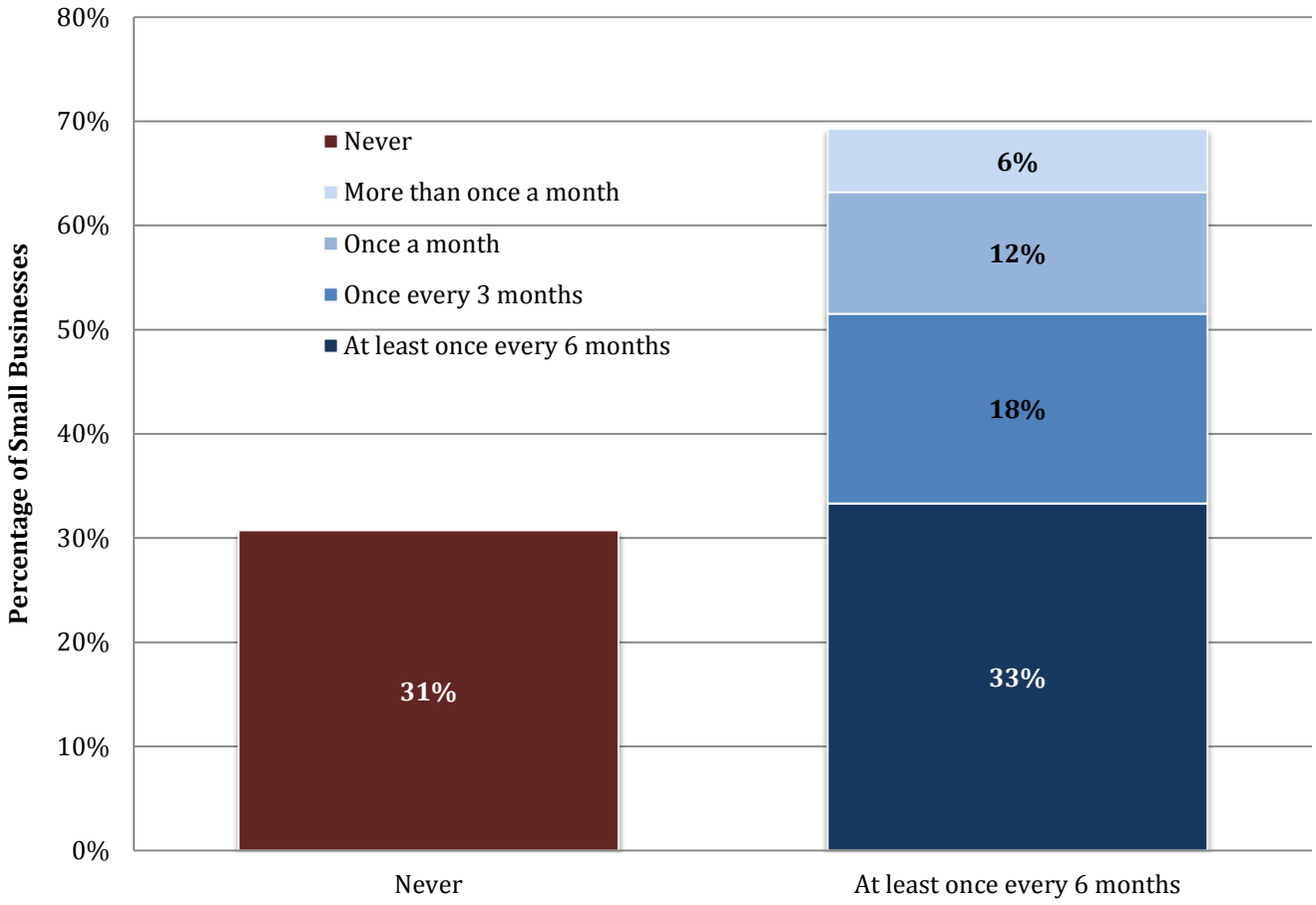
Small businesses and large organizations both reported being active participants in cluster services/activities and events.[30] Among small businesses reporting, 80% indicated that they participated in cluster-sponsored events, such as networking and showcase events, at least occasionally and 39% indicated that they participated in cluster-sponsored events often or always (Exhibit 26). Over two-thirds of the small businesses reporting responded that they participated in cluster services and activities, such as counseling or training sessions, at least once every 6 months. About one-third responded that they had participated in these services and activities at least once every 3 months (Exhibit 27). Overall, these values were consistent with those reported for the first year of the Initiative.



Source: Small Business Survey

Exhibit 26. Small business attendance frequency at cluster events

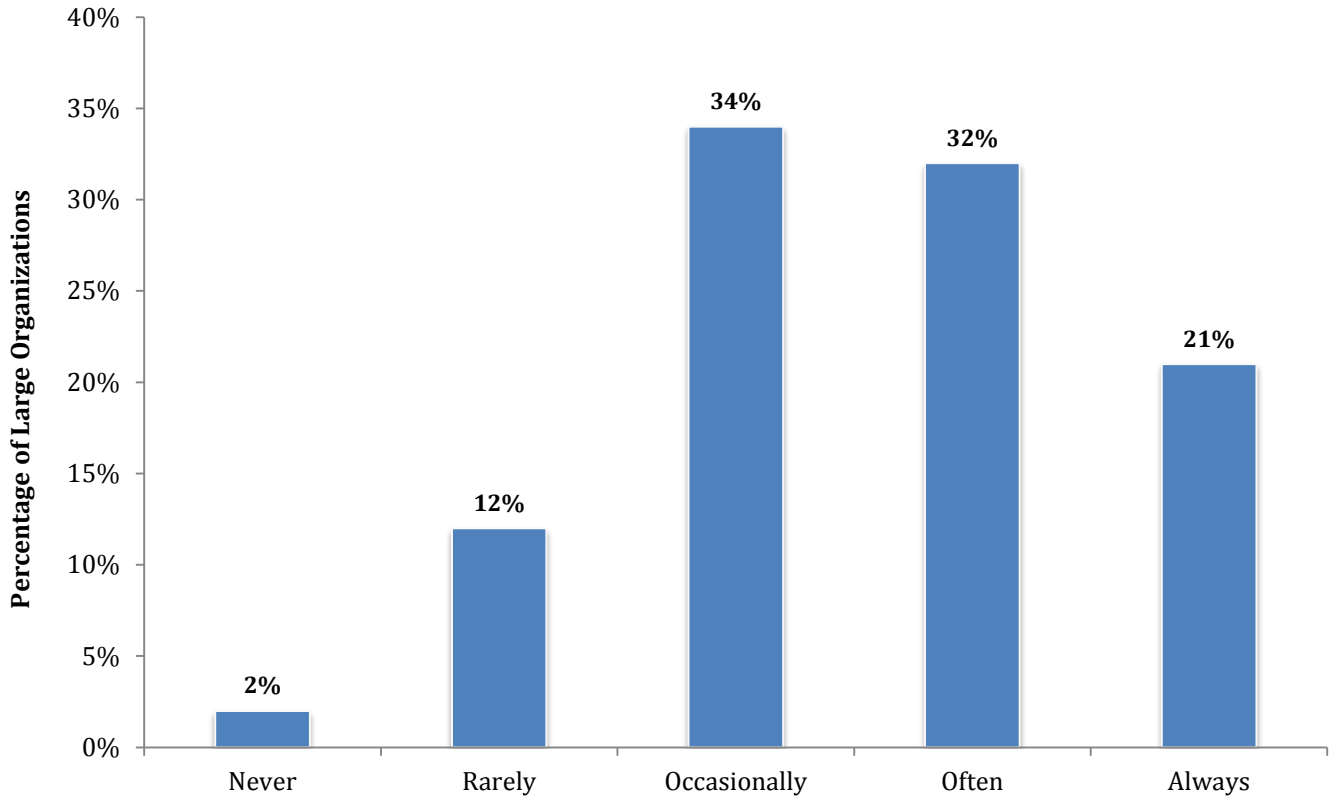
[30] These results are based on surveys completed by 231 small businesses and 95 large organizations participating in clusters. Cluster participants who completed the surveys can generally be expected to be more active cluster participants than those who did not complete the surveys. This limitation is discussed in more detail in the Methodology Appendix.



Source: Small Business Survey

Exhibit 27. Small business participation frequency at cluster services and activities

Among large organizations reporting, 53% reported that they often or always participated in cluster-organized events; 34% indicated that they occasionally participated (Exhibit 28). Smaller numbers reported that they did not participate or rarely participated in cluster events during the second year (2% and 12%, respectively). Overall, this distribution of attendance was comparable to what large organizations reported during the first year of SBA's Initiative. During the Initiative's second year, fewer large organizations reported attending cluster events "often" (32% in 2012 versus 46% in 2011), while a higher percentage of large organizations reported "always" participating (21% in 2012 versus 14% in 2011).



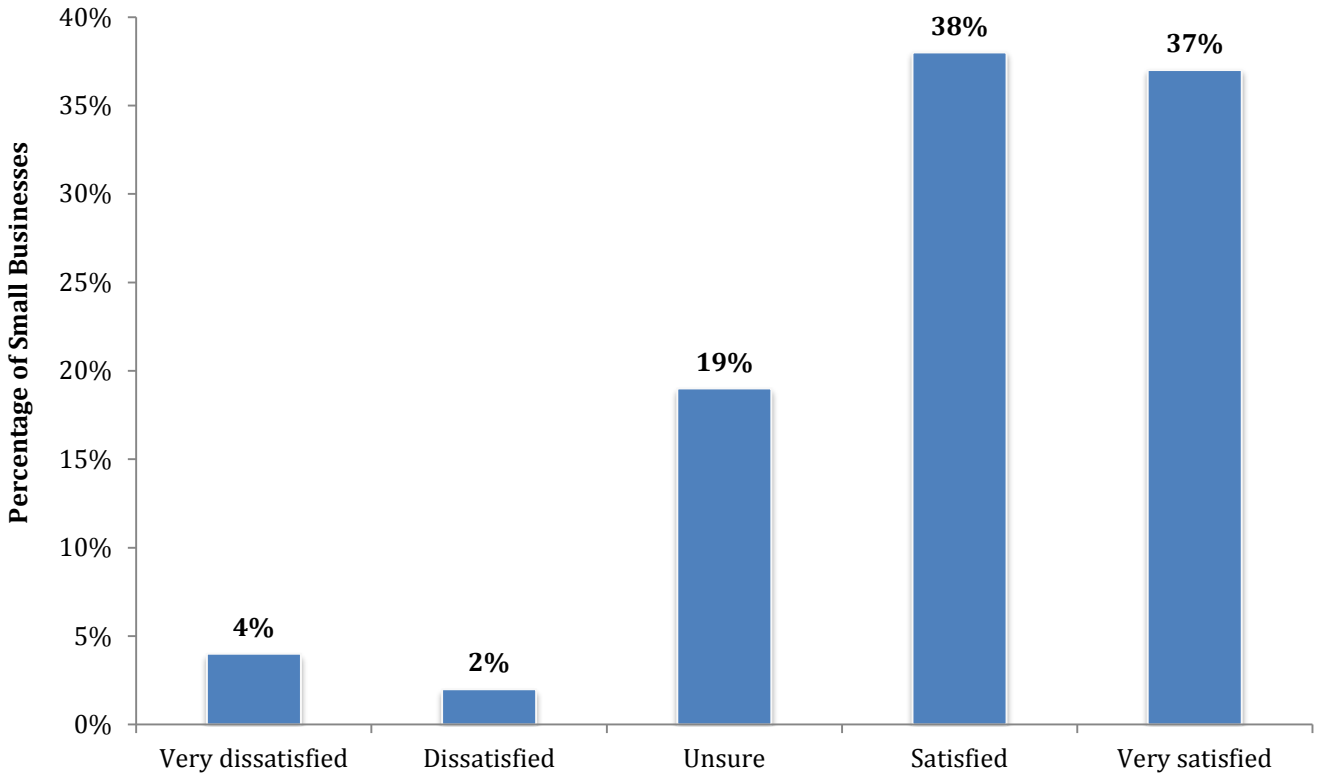
Source: Large Organization Survey

Exhibit 28. Large organization frequency of participation in cluster events

3.4.4. Participants' Satisfaction With Cluster Services and Activities

The majority of small business participants (74%) were either satisfied or very satisfied with cluster services and activities, although this value was slightly lower than the first year of the Initiative (Exhibit 29). The change was driven primarily by an increase in the number of small businesses that reported they were "unsure" about their level of satisfaction (19% in 2012 versus 12% in 2011) and by a small increase in the number of small businesses reporting that they were dissatisfied or very dissatisfied (6% versus 3%). The greater number of small businesses reporting that they were not sure about their satisfaction was probably tied to the fact that all cluster participants were surveyed in the second year of the Initiative, including some exhibiting lower levels of engagement.[31] The level of satisfaction with cluster services and activities suggested that clusters were generally successful in delivering services in line with small business participants' needs and expectations but that a share of participating small businesses had yet to decide how they perceived their clusters.

[31] The criteria for survey participation are discussed in more detail in the Methodology Appendix.



Source: Small Business Survey

Exhibit 29. Small business level of satisfaction with cluster services and activities

Nearly half of small businesses reporting (49%) indicated that they could not have received the services provided by their clusters elsewhere, while 38% responded that they did not know whether they could. With only 13% reporting that similar services could be obtained from other providers (at least from the perspective of small businesses), cluster services appear to be unique and fill a void in service provision (Exhibit 30). The percentage of small businesses answering that similar services were available elsewhere ranged from 0% (the Carolinas' Nuclear Cluster) to 33% (the Green Aviation Cluster). Some respondents provided brief explanations for their answers, including that some cluster services existed elsewhere but were not all housed under one roof, that clusters provided industry-specific knowledge and a higher quality of services, that comparable services may exist but would not be free, or that the respondents were not aware of other organizations offering such services.

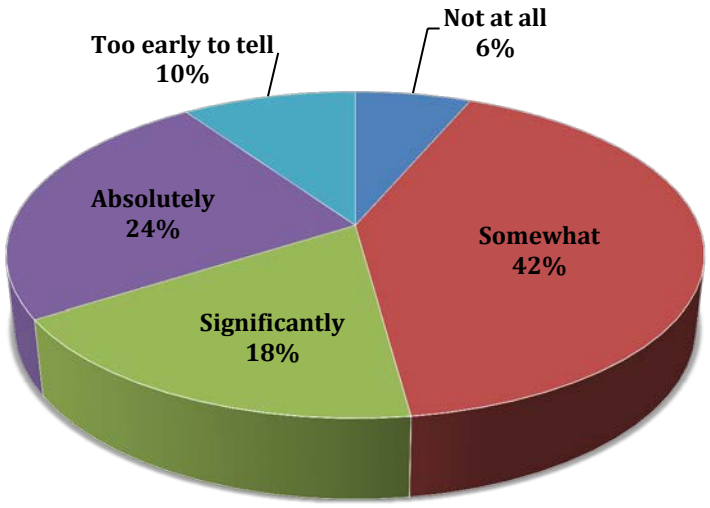
Exhibit 30. Percentage of small businesses reporting whether the same services were available elsewhere

Cluster	No, could not have received same or comparable services elsewhere	Yes, could have received same or comparable services elsewhere	Don't know
Project 17	53%	14%	33%
Carolinas' Nuclear Cluster	57%	0%	43%
Advanced Power Cluster	48%	10%	43%
Geospatial Cluster	67%	8%	25%
FlexMatters	83%	6%	11%
Huntsville Defense Cluster	39%	16%	45%
Smart Grid	27%	18%	55%
Energy Storage Cluster	32%	18%	50%
San Diego Defense Cluster	68%	0%	32%
Green Aviation Cluster	34%	33%	33%
All clusters	**49%**	**13%**	**38%**

Source: Small Business Survey

The question of whether the same services or comparable activities could be found elsewhere can be put in context by also looking at how many small businesses responded that they participated in one or more other business-support organizations not affiliated with their clusters. Of the small businesses reporting, 53% identified as being part of such an organization. Commonly mentioned organizations included the regional SBDC or WBC, local or regional chambers of commerce, and various regional business incubators. Other affiliations included professional organizations and industry associations. It was also relatively common for small businesses to mention organizations that were cluster partners or service providers, illustrating that some may not have been fully aware of the cluster stakeholders' identities.

Large organizations were asked whether benefits that they had expected from cluster participation had materialized. A significant number of respondents, 42%, reported that this was "somewhat" the case; another 42% thought that these benefits had either "absolutely" or "significantly" materialized (Exhibit 31).



Source: Large Organization Survey

Exhibit 31. Percentage of large organization responses to the question of whether the expected benefits from cluster participation had materialized

3.5. Highlights of Cluster Services

Below are highlights from the services that the clusters provided during the first and second years of SBA's Cluster Initiative:

1. **Propagation of information on industry supply chains**

   Due to their vantage points, clusters had an inherent advantage in identifying opportunities for small businesses in their industry supply chains, and in disseminating this information. Some of the clusters participating in the Initiative utilized supply-chain mapping and website portals to disseminate this market intelligence. The following examples were included:

   - Supply-chain mapping, including gap identification, economic impact of the industry, and demand forecasting for nuclear plants in collaboration with Clemson University (the Carolinas' Nuclear Cluster).
   - Supply-chain mapping to identify regional market targets, major regional Original Equipment Manufacturers (OEMs) and their suppliers, market barriers, and variations between the eight states of operation (the Energy Storage Cluster).
   - A website portal for members to gain access to contract and partnership opportunities. Data on contracts and partnerships were obtained from the Market Opportunity Mining Study, commissioned by FlexMatters in 2011. This study initially identified 25 of the most promising

applications and 50 potential customers for flexible electronics in Northeast Ohio but is updated regularly (FlexMatters).

- An online and print catalogue of all cluster members showcasing each company's quad charts and capabilities and providing links to its white papers and contact information. The online version also includes audiovisual components, such as video clips of technology demonstrations (the Advanced Power Cluster).

2. Propagation of information about opportunities (funding, collaboration, sourcing)

Propagation of information regarding funding, sourcing, and teaming opportunities was another primary service provided by clusters to their members. Clusters relied on various approaches to relay this information:

- A newsletter delivered by e-mail or mail or a section on the cluster's website containing federal, state, and local requests for proposals and other announcements selected for their relevance to each cluster's participants (e.g., the San Diego Defense Cluster, FlexMatters, and the Geospatial Cluster).
- An online collaboration website where small and large companies created profiles and highlighted their capabilities, fostering collaborations around Small Business Innovation Research/Small Business Technology Transfer Research (SBIR/STTR) solicitations and facilitating the identification of suitable companies to fill a specific gap for these awards and other contracts (the Huntsville Defense Cluster).
- An online social platform for the clean energy community to share information, find potential partners and mentors based on capabilities, and explore economic opportunities offered through a proof-of-concept fund (Smart Grid).
- Events to discuss the latest opportunities identified by the clusters and to provide an environment where small businesses could initiate contact with potential partners in person (e.g., the Energy Storage Cluster).

3. Provision of industry-specific training and certifications

In some industries, certifications and highly specific training could be promoted and provided by clusters. This service significantly lowered an important barrier to entry in the industry, promoting both entry of companies in related industries and the creation of new businesses. Certain clusters in SBA's Initiative, especially those involved in nuclear technology and aircraft industries, provided this service in various ways:

- A "Vendor 101" quality-training program to understand and implement the nuclear industry's strict quality requirements, as well as the provision of a case-by-case commercial-grade quality-assurance survey (the Carolinas' Nuclear Cluster).
- A Program Management Professional (PgMP) boot camp for small businesses to prepare and pass the PgMP Certification Exam, offered at a 50% discount (the Geospatial Cluster).
- A series of two workshops focused on obtaining a personal security clearance and a DoD facility clearance (the Huntsville Defense Cluster).

- FAA training to obtain airplane Approved Repair Station Certification (the Green Aviation Cluster).

4. Networking opportunities

The 10 clusters connected small businesses with other businesses and government agencies through networking events and also through individual referrals:

- A Supply-Chain Exchange event for OEMs and supply-chain members to encourage sourcing and collaboration among cluster members (the Energy Storage Cluster).
- Structuring a team of cluster businesses with complementary capabilities and large prime contractors to jointly apply for contracts facilitated by the cluster through introductions and meetings with the Department of Energy and the energy office of DoD (the Advanced Power Cluster).
- The EIGS Geospatial Contractor Expo, where cluster small businesses interacted with regional prime contractors and networked among themselves (the Geospatial Cluster).

5. Provision of assistance with grants (e.g., SBIR/STTR, National Science Foundation)

The 10 clusters provided assistance to small businesses with grant applications in the following ways: (a) disseminating relevant funding opportunities to small businesses, (b) offering technical assistance in preparing and writing applications, (c) providing a forum through which businesses' grant proposals were reviewed by experts, and (d) connecting small businesses with other firms or academics that added value to the grant applications. The following examples were included:

- The implementation, in collaboration with a regional WBC, of a proposal writing grant worth up to $5,000 in matching funds to work with a professional grant writer. This grant targeted small businesses without experience writing proposals to help them in building capacity (the Huntsville Defense Cluster).
- Creation of a "Red Team," which consisted of a panel of experts to review grant proposals and to provide critiques and reviews before filing (the Geospatial Cluster).
- Connection of small businesses with university professors and computing resources for simulations to assist in the submission of SBIR and other grant applications (the San Diego Defense Cluster).
- Provision to small businesses of an integrated SBIR/STTR Technical Assistance Program that included a one-on-one initial assessment of capabilities, assistance in matching these capabilities with existing topics, and proposal-development coaching (Smart Grid).

6. Assistance with identification of financing opportunities

Clusters in SBA's Initiative assisted small businesses with financing opportunities through (a) workshops focused on external financing, (b) recruiting angel and venture capitalists to provide feedback on the investor pitches of small businesses, and (c) facilitating introductions between small

businesses and angel and venture capitalists. The following were some examples of cluster assistance provided to small businesses regarding financing opportunities:

- One-on-one new equity business consultations with the majority of cluster participants. These consultations resulted in a customized report for each small business, listing the most suitable financing options for the business given its preferences and needs, as well as the recommended steps to approach each financing option. The cluster then assisted in making the necessary introductions to suitable funding sources and in preparing a competitive application (Smart Grid).
- The organization and hosting of a Finance/Investment Forum, where small businesses could meet and network with venture capital investors and learn about the latest funding strategies (the Energy Storage Cluster).
- The creation of a "Critique Your Investor Pitch" workshop, where venture and angel capitalists gave feedback (Project 17).
- Efforts to create an early-stage "Aerospace & Defense Investment Fund" to assist pre-revenue and early-stage companies in the aerospace and defense sector in the Midwest with fundraising (the Advanced Power Cluster).

7. Showcase events for participants to gain exposure and to identify potential clients

Clusters used their networks and social capital in their regions and industries as well as their expertise in economic and business development to assist small businesses with showcasing their capabilities for other firms or government agencies. This service took the following forms: (a) business plan competitions, (b) showcase events open to members to which representatives from various stakeholder agencies were invited, and (c) white papers demonstrating the capabilities of small businesses to DoD and other federal agencies. The following examples were included:

- Cluster-sponsored participation of several small businesses in the 2012 Coalition Warrior Interoperability Exercise. This event offered the opportunity for small businesses to showcase and to demonstrate their technologies and products in a simulated set of operational scenarios that involved armed forces of the North Atlantic Treaty Organization (the San Diego Defense Cluster).
- The provision of assistance to a small business in developing a Joint Capabilities Technology Demonstration for its product in collaboration with the U.S. Navy and the U.S. Army Engineer Research and Development Center (the Advanced Power Cluster).
- A business plan competition, attended by venture and angel capital groups and regional entrepreneurs (Project 17).
- The Magnolia Business Alliance Technology Expo at Stennis Space Center, where cluster small businesses could showcase their products to government and private sector procurement specialists and other small businesses (the Geospatial Cluster).

8. Workforce development

Identifying the workforce needs of small businesses and assisting in the alignment of regional workforce resources with these needs was another important service provided by the clusters. The clusters executed this service in the following ways:

- Identification of suitable candidates for internships and full-time positions in high-technology industries (FlexMatters).
- Provision of Ph.D. engineering students to assist companies with testing, product development, and technical support (Smart Grid).
- Placement of students attending regional universities into internship positions at participating small businesses (Project 17).
- Leadership Energy Carolinas program, a hands-on training program for midcareer professionals entering the nuclear energy industry (the Carolinas' Nuclear Cluster).

9. "Think-tank" sessions at which participants can discuss problems facing the industry and small businesses can discuss how to mitigate these issues through their technology and products

Clusters brought together stakeholders in different regions and industries to exchange ideas in various forums:

- The organization of several "think-tank" sessions, which covered a range of topics, including water management and nitrate contamination of the soil (Project 17).
- Meetings organized by the cluster and attended by a large number of Connecticut OEMs as well as a U.S. Senator and a Connecticut State Representative to discuss state and federal policy, legislation, and initiatives regarding the energy industry at the federal level and for the state of Connecticut (the Energy Storage Cluster).
- Attendance at the Theater Update Bi-Weeklies, where the cluster could identify the most current needs of warfighters and forwardly deployed personnel before discussing possible ways to address these needs with cluster participants (the Huntsville Defense Cluster).

10. Export assistance

One focus area of cluster services was exporting. Cluster assistance in this area took the following forms: (a) workshops and (b) networking with potential industry partners abroad. The following examples were included:

- Presentation at the China Trade Day Conference on the topic of opportunities and challenges in exporting clean energy technologies and the state of the Chinese clean energy market (the Energy Storage Cluster).
- The development of a partnership with the Korean Smart Grid Institute to create the "Smart Cities USA" smart grid demonstration project in the Village of Oak Park, Illinois. This partnership is expected to include widespread participation among cluster small businesses (Smart Grid).
- A seminar on exporting that covered, among other topics, managing international orders, building an overseas infrastructure, growing an international business, and handling export regulations and international logistics (the Geospatial Cluster).
- Provision of personalized assistance via cluster matchmakers to a Carolinas-based company seeking to export a significant share of its production to France (the Carolinas' Nuclear Cluster).

11. Technology transfer

Clusters have been able to assist small businesses with technology transfer issues. The following examples of such assistance were included:

- The creation of an engineering and research expertise and capabilities database to facilitate the interaction of researchers with each other and with cluster businesses (the Carolinas' Nuclear Cluster).
- Assistance to a small business with licensing technology from the Space and Naval Warfare Systems Command and with the production scale-up of its product to respond to a U.S. Army purchase order (the Advanced Power Cluster).
- A workshop for cluster small businesses on technology transfer strategies, including approaches to leveraging state and federal technology programs, such as SBIR/STTR, Dual-Use, and others (the Geospatial Cluster).
- Assistance to a small business in developing a non-disclosure agreement with the University of South Carolina on structural health monitoring of concrete and steel structures (the Carolinas' Nuclear Cluster).

12. Provision of testing and development facilities

Clusters utilized their wide networks of regional assets and their social capital built on trust and prior collaborative history to find opportunities for small businesses to test and to prove their new technologies. The following examples were included:

- Encouraging and assisting small businesses to install and test their products together on the cluster-provided Microgrid test bed both to prove their technology and to identify synergies before getting further assistance from the cluster in obtaining access to Commonwealth Edison's on-grid test bed, which is the next stage after the cluster-provided Microgrid test bed (Smart Grid).
- Assisting a small business with access to independent validation of products through various cluster partners and outside organizations, such as the National Institute of Standards and Technology and the Picatinny Army Arsenal (the Advanced Power Cluster).
- Hosting a 1-day Prototype Symposium, where cluster members learned about approaches to prototyping and pilot manufacturing from other small businesses and university researchers, and then connected with these small businesses for hands-on assistance (FlexMatters).

13. Promotion of the region and its industrial base

Clusters were uniquely positioned to promote their regions of focus and the features and strengths of the industries of focus that resided within those regions. This promotion took the form of assistance to firms seeking to relocate in the region or the dissemination of information to target demographics about the industry and its strengths. The following examples were included:

- Mailing to about 50,000 influential leaders in the Carolinas an annual industry publication highlighting recent developments in the regional nuclear industry, its strengths, and its impact on the region (the Carolinas' Nuclear Cluster).

- Traveling to the Urban Tec Conference in Beijing, China, to present success stories and details about cluster activities and to promote the Chicago, Illinois area as the hub of smart grid technology (Smart Grid).
- Accepting an interview for regional newspapers about the state of the defense industry in Minnesota and the Midwest, which led to a front-page story in the Minneapolis *Star Tribune* (the Advanced Power Cluster).
- Providing assistance to a foreign company that was considering building and operating new facilities in South Carolina, including researching the most suitable locations and facilitating connections with actors in the region of focus (the Carolinas' Nuclear Cluster).

14. Developing and formalizing industry standards

Some clusters elected to play a role in developing, formalizing, and propagating new or improved industry standards, based on their positions at the intersection of the public and private sectors. The following examples were included:

- Hosting and participating in the Electric Power Research Institute Supplier Quality Management task force to produce the Nuclear Supplier Improvement Guidelines and then organizing training sessions for cluster members (the Carolinas' Nuclear Cluster).
- Promoting a medium-weight electric vehicle classification at the federal level to allow certain electric vehicles to attain a speed of 35 miles per hour on roadways (the Advanced Power Cluster).

15. General business assistance

The 10 clusters provided assistance to small businesses in various areas of organizational capacity, including marketing and branding, leadership, accounting, and incorporation. The following examples were included:

- Providing customized business leadership and teamwork coaching to a small business (the Advanced Power Cluster).
- Assisting several small businesses with conducting market research and analysis, developing a business plan, and performing a competitive analysis (Smart Grid).
- Organizing a workshop that outlined key steps in starting and growing a business, including incorporation, business-plan development, contracting, intellectual property, and accounting and financial management (the Geospatial Cluster).
- Organizing a free, invitation-only interactive workshop provided by a public relations specialist about working with the media, raising awareness about a company, and protecting a company's reputation in a crisis situation (FlexMatters).

4. Outcomes of the Regional Clusters Initiative

4.1. Overview

This section provides a detailed description of outcomes experienced by organizations participating in regional clusters during the first 2 years of SBA's Cluster Initiative. This analysis examines both the short- and intermediate-term outcomes that are relatively direct measures of the success of cluster activities and services (e.g., development of alliances among cluster participants, commercialization of new technologies, and improved export marketing strategies) as well as longer-term outcomes likely to be indicative of sustained economic development among cluster organizations (e.g., employment and payroll growth, business revenue growth, and new business formation).

Short-, Intermediate-, and Long-Term Outcomes of the Regional Clusters Initiative

The outcomes of the Regional Clusters Initiative can be divided into two categories based on time frame: (1) short- and intermediate-term outcomes and (2) long-term outcomes. Short- and intermediate-term outcomes are directly and immediately linked to cluster services, activities, and events, and thus are expected to be observed during the period of SBA's Initiative and soon thereafter. These are the outcomes that cluster services directly aim at improving, such as the success of small businesses in obtaining capital and increasing exports. In contrast, long-term outcomes, such as increased revenue and total payroll, are expected to be observed in subsequent time periods. Exhibit 32 illustrates the short-, intermediate-, and long-term outcomes evaluated in this study, showing the linkages between cluster services and these outcomes as well as the metrics used to assess them. In particular, it portrays the chain of events that starts with services provided by the clusters to small businesses, which are designed to directly influence the short- and intermediate-term outcomes. As the small businesses attain the short- and intermediate-term outcomes, long-term outcomes are expected to materialize at both the business and regional levels. Thus, the achievement of long-term outcomes is partially dependent on the achievement of the short- and intermediate-term outcomes.

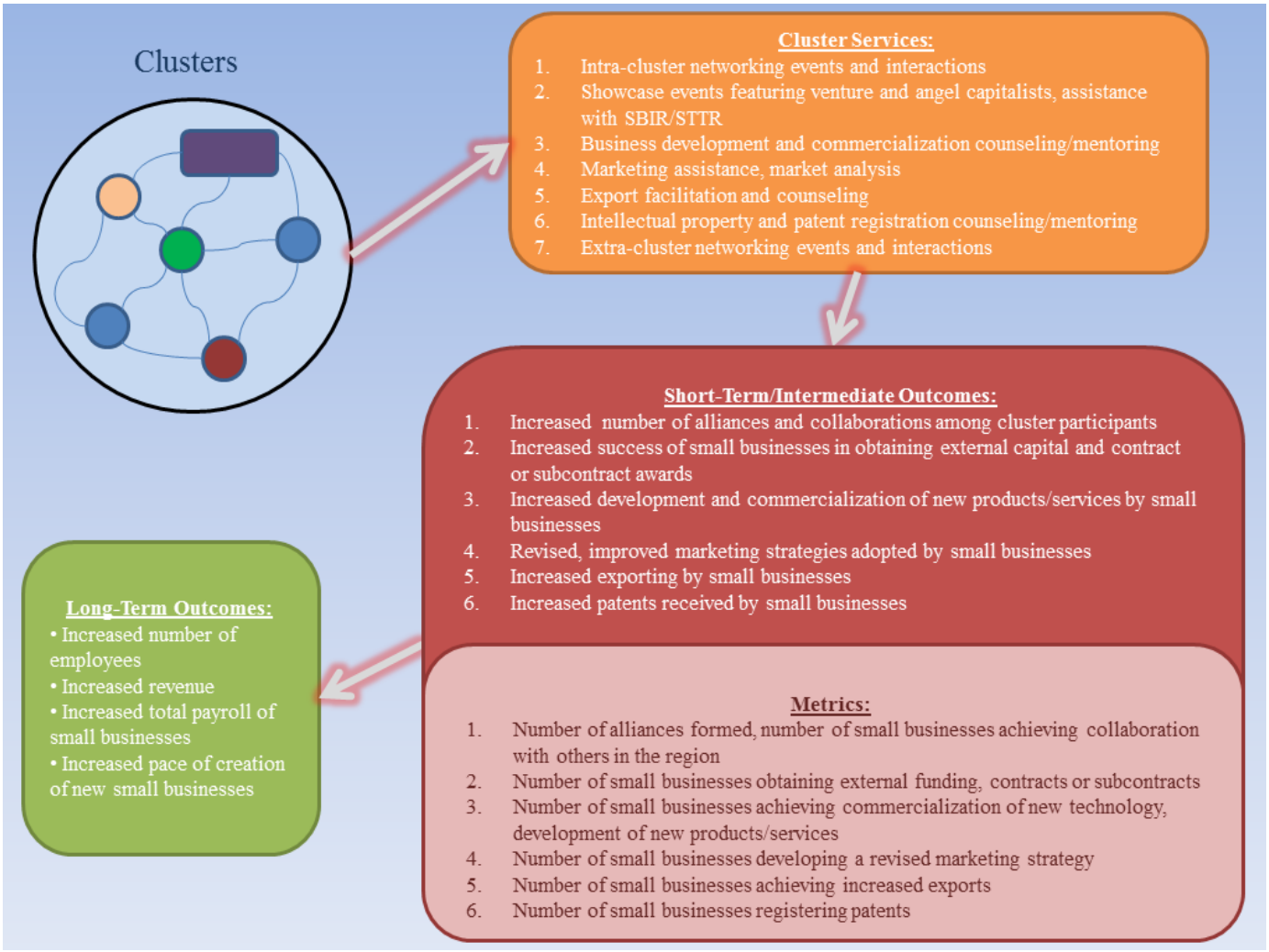


Exhibit 32. The outcomes of the Regional Clusters Initiative

The short- and intermediate-term outcomes reported by small businesses and larger organizations participating in the Initiative's clusters were indicative of a considerable level of cluster activity and growing strength among cluster-affiliated businesses and organizations. Two-thirds of cluster small businesses reported that working with their clusters facilitated the revision of their marketing plans, while nearly half indicated that cluster participation increased their integration into their industries' supply chains. One-third of participating large organizations similarly reported a cluster influence on their supply chain involvement.

Cluster activity has clearly strengthened organizational alliances and collaboration within clusters. A majority of both small businesses and larger organizations participating in SBA-supported clusters reported having established one or more alliances with other cluster members. Nearly 80% reported that cluster activities led to increases in collaborative activity within their regions. Furthermore, more than 40% of cluster small businesses reported that cluster services had some influence on their access to

capital, and nearly as many reported either buying and/or selling goods or services to or from another cluster participant. In all but one cluster, at least one small business reported that cluster activity had facilitated its receipt of a contract or subcontract award during the second year of the Initiative. Cluster administrators reported $633 million in new economic activity (e.g., grants, contracts, loans, and venture capital) accruing to affiliated small businesses during 2012. Although $370 million of this accrued to the Huntsville Defense Cluster alone, the nine other clusters still reported in excess of $263 million in new economic activity among their small businesses.

A significant number of small businesses also perceived that cluster activities and services would lead to new product development and commercialization of new technologies. Among small businesses, 60% reported that cluster activity facilitated their development of new products or services during the second year of the Initiative, while 42% agreed that their clusters facilitated commercialization and new technology development. Larger organizations largely concurred with this assessment. Significantly, small businesses involved with SBA-supported clusters reported filing 111 patent applications and receiving 76 patents during the second Initiative year. It should be noted, however, that only a minority of small businesses agreed that cluster activities contributed to their levels of patent activity.

The short- and intermediate-term outcomes discussed above largely pertained to the immediate effects of cluster activities on business activity (e.g., financing, strategies, alliances, product development, and technologies). A longer-term question is whether this business activity will result in significant economic development, as evidenced by business formation, revenue, employment, and payroll. Although it is generally expected these long-term outcomes will become evident only after a number of years of established cluster activity and the consolidation of its effects, indications of emerging economic activity among cluster businesses and organizations is nonetheless being appraised.

Indicators of growth in cluster economic activity during the first 2 years of SBA's Cluster Initiative were generally quite robust and exceeded reasonable, constructed regional benchmarks. Average *full-time* employment in participating small businesses increased at an annualized rate of 6.5% per year, while average *total* employment (full- and part-time) increased at a rate of 8.7% per year. Revenue and average monthly payroll in these small businesses grew at annualized rates of 10.8% and 3.7% per year, respectively. Eighteen small businesses reported that they were established *after* their founders became involved with cluster organizations. Rates of employment and revenue growth in cluster businesses overall exceeded benchmarks for comparable non-cluster businesses; payroll growth exceeded regional benchmark measures in 7 of the 10 clusters.

4.2. Short-Term/Intermediate-Term Outcomes

The short-term/intermediate-term outcomes of the Regional Clusters Initiative evaluation are expected to directly and immediately result from the services and events offered by the clusters to their participating small businesses, manifesting themselves during the period of SBA's Cluster Initiative or soon thereafter. The following short- and intermediate-term outcomes are reported here and discussed in turn below:

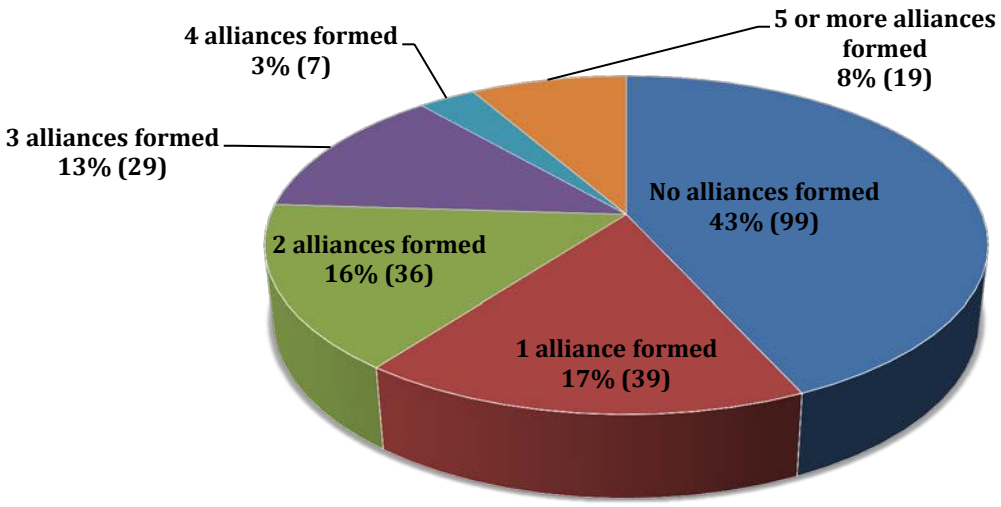
- Alliances and collaborations among cluster participants
- Small businesses' access to capital
- Small businesses' contract and subcontract awards
- The development of new products and the commercialization of new technologies
- Assistance regarding intellectual property issues and patent applications
- Assistance with small businesses' marketing strategies
- Assistance with increasing exports
- Assistance gaining access to cleared secure facilities and integration into the industry supply chain

4.2.1. Alliances and Collaborations Among Cluster Participants

Clusters organized networking events and activities focused on forming alliances among small businesses and connecting small businesses with large businesses or organizations. The short- and intermediate-term outcome associated with these services and activities is increased alliances formed by small businesses participating in clusters.[32] This information was collected via surveys of small businesses and large organizations participating in clusters.

Alliances formed between small businesses and other entities could take the form of project collaboration, joint product development and sales activities, sourcing agreements and licensing, and joint ventures. Of the 229 small businesses reporting, 57% indicated having formed *at least* one alliance as a result of cluster participation during the second year of the Regional Clusters Initiative; 40% reported that their clusters helped them forge two alliances or more during the previous year (Exhibit 33).

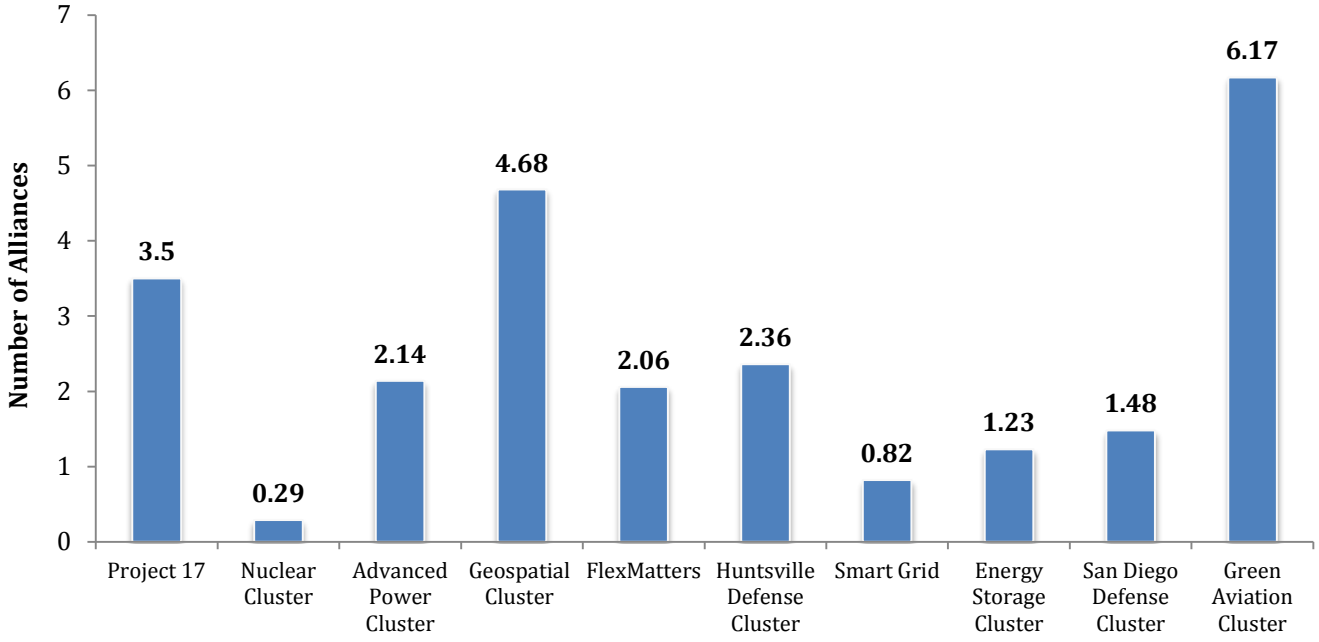
[32] An alliance is defined here as an ongoing business relationship between two or more independent organizations that strive to achieve common goals. Alliances include a wide spectrum of relationships, from information-sourcing agreements and licensing to acquisition.



Source: Small Business Survey

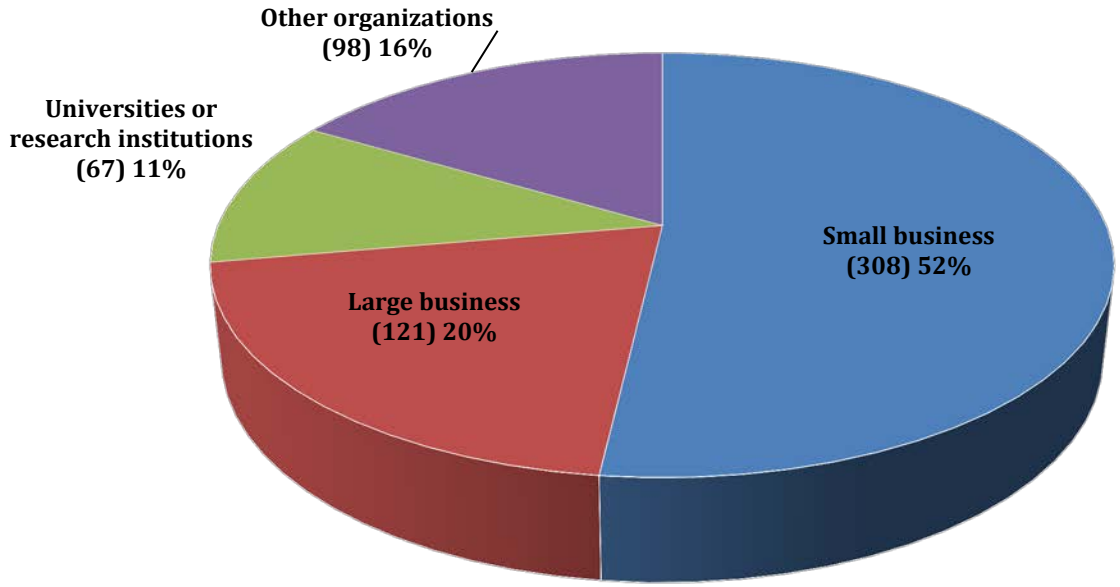
Exhibit 33. Reported number of alliances formed as a result of cluster participation during the second year of SBA's Cluster Initiative

Small businesses reported forging an average of 2.5 new strategic alliances during the second year of SBA's Cluster Initiative; the average number of new alliances ranged from 0.29 to 6.2 per cluster (Exhibit 34). Among new alliances reported by small businesses, 52% were with other small businesses, 20% were with large businesses, and the remainder was with universities, research organizations, or other types of organizations affiliated with the clusters (Exhibit 35).



Source: Small Business Survey

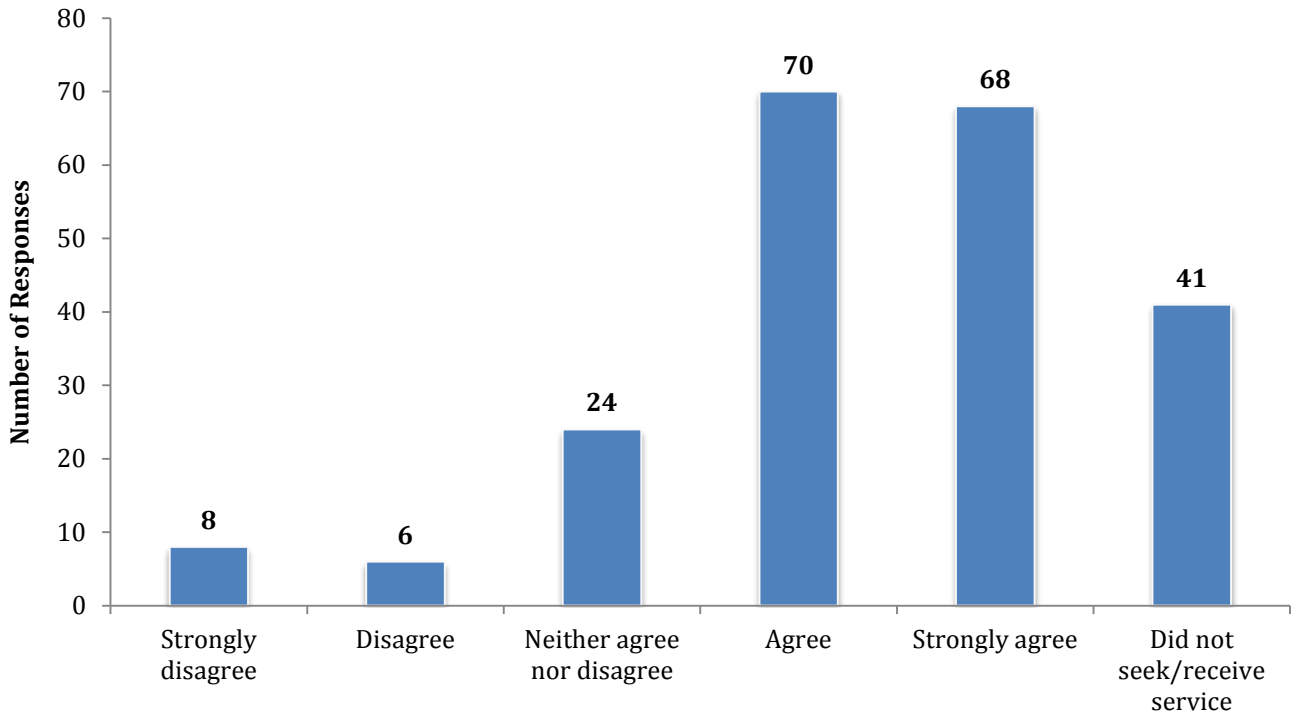
Exhibit 34. Average number of alliances formed by cluster small businesses



Source: Small Business Survey

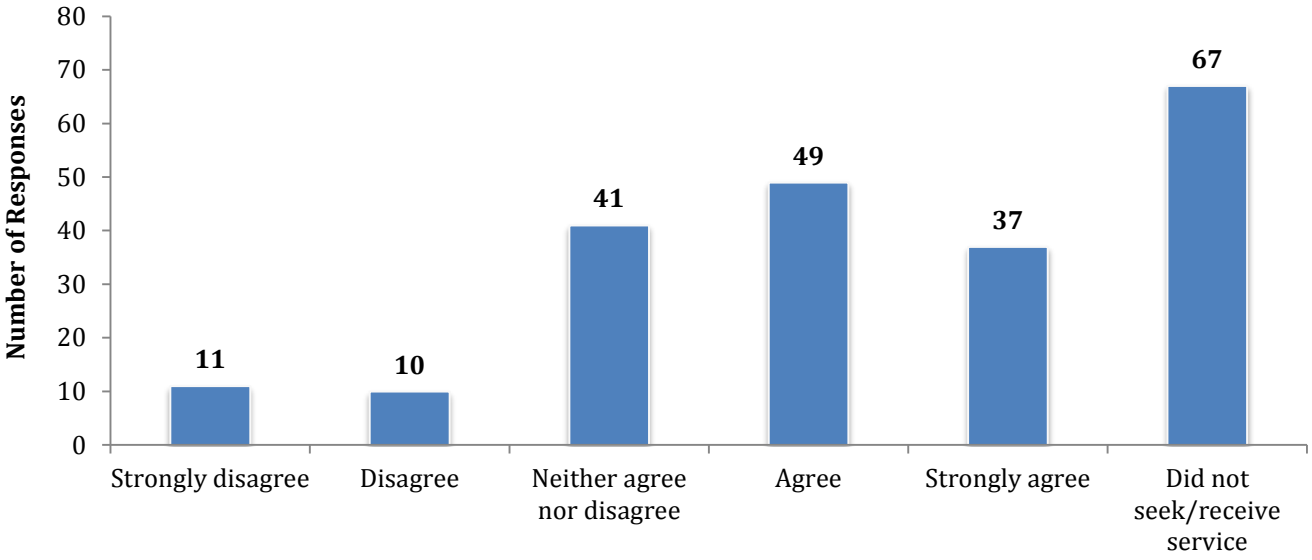
Exhibit 35. Number of new alliances reported by small businesses, by type of allied organization

Of responding small businesses that sought or received relevant cluster services, 79% either "agreed" or "strongly agreed" that cluster participation resulted in collaborations with other businesses and/or organizations *within their regions of operation* (Exhibit 36). This percentage varied across clusters but was above 70% for 7 out of 10 clusters, ranging from a high of 94% for FlexMatters – Northeast Ohio Technology Coalition (FlexMatters) to a low of 50% in both the Carolinas' Nuclear Cluster and the Illinois Smart Grid Regional Innovation Cluster (Smart Grid). In addition, 58% of small businesses reported that they "agreed" or "strongly agreed" that cluster participation resulted in collaborations *outside their regions of operation* (Exhibit 37). Answers to this question varied across the 10 clusters to a greater extent than in the prior question: 88% and 75% of small businesses in the Enterprise for Innovative Geospatial Solutions (Geospatial Cluster) and the Northeast Electrochemical Energy Storage Cluster (Energy Storage Cluster) agreed with this statement, respectively, while the percentage for the Carolinas' Nuclear Cluster was 17%. These answers are consistent with the discussion of cluster geographic scope above, where it is noted that the Carolinas' Nuclear Cluster and Smart Grid are the two clusters with the most precisely defined geographic scopes.



Source: Small Business Survey

Exhibit 36. Cluster participation resulted in collaborations within small businesses' regions of operation

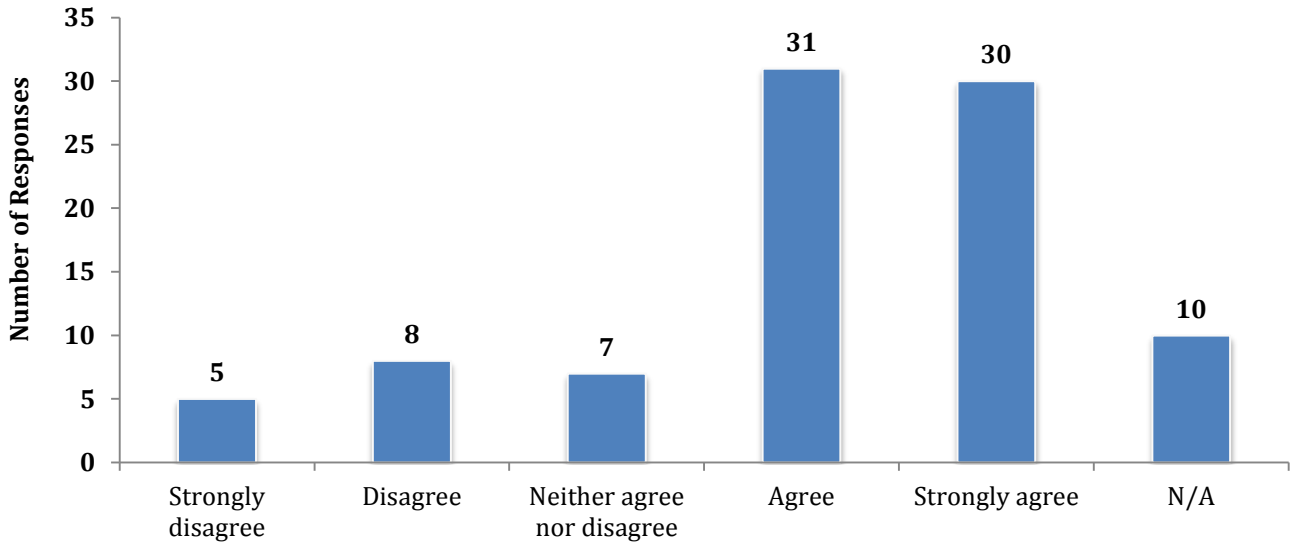


Source: Small Business Survey

Exhibit 37. Cluster participation resulted in collaborations outside small businesses' region of operation

Large organizations also reported creating connections with companies and organizations located *outside their regions of operation*; 75% reported that cluster participation helped create connections (as distinct from collaborations) with companies and organizations located outside their regions of operation (Exhibit 38). All large organizations participating in the Advanced Power & Energy Cluster (Advanced

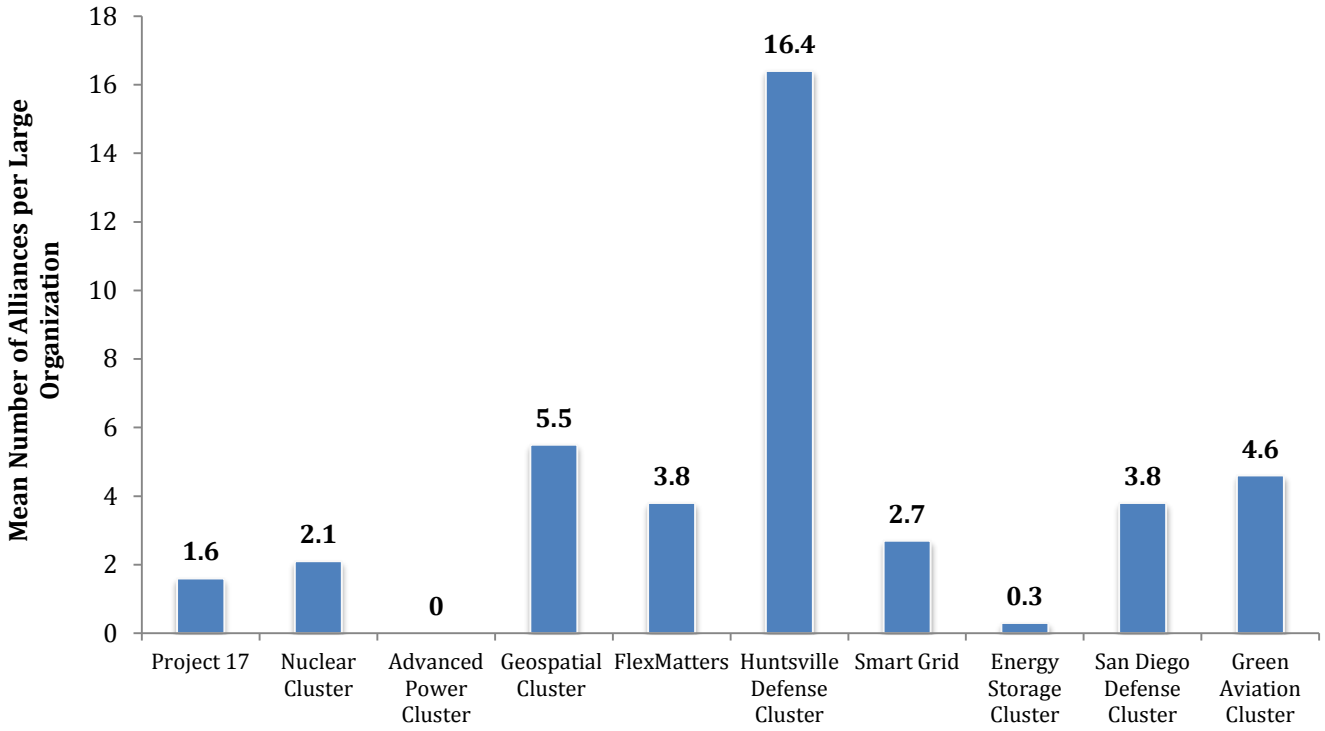
Power Cluster) and in the San Diego Advanced Defense Technology Cluster (San Diego Defense Cluster) agreed, and this percentage was above the 10-cluster average for seven clusters, although it was only 25% for FlexMatters.



Source: Large Organization Survey

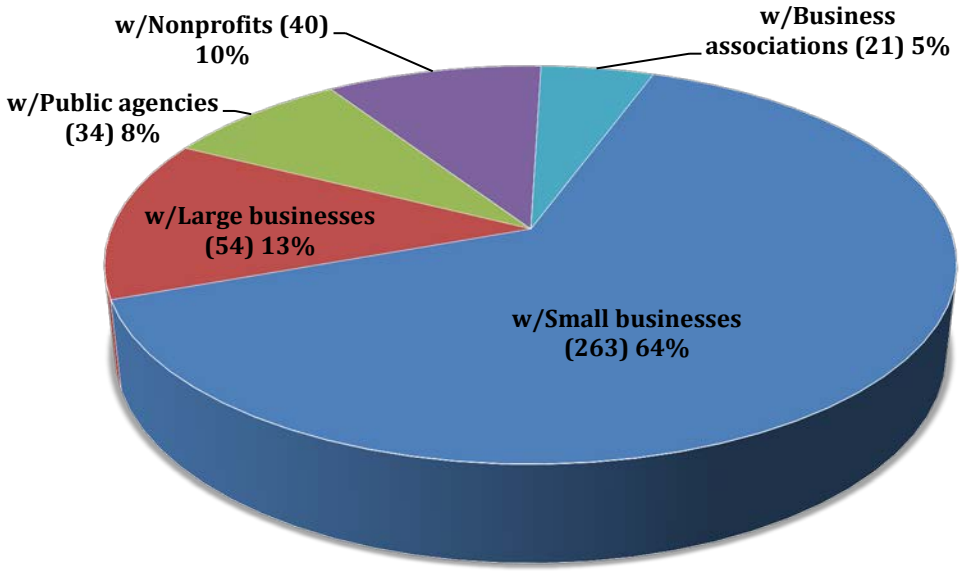
Exhibit 38. Cluster participation helped create connections outside large organizations' regions of operation

The clusters were also instrumental in facilitating new alliances among cluster partners other than small businesses, including large businesses, universities, research institutions, public sector agencies, foundations, and nonprofit organizations (referred to here as "large organizations"). Of the large organizations reporting, 51.6% formed a total of 412 new alliances with other organizations or businesses as a result of cluster participation. Large organizations affiliated with the Huntsville Advanced Defense Technology Cluster (Huntsville Defense Cluster) in particular reported a large number of new alliances, averaging 16.4 alliances across the 10 large organizations reporting in that cluster (Exhibit 39). Among new alliances reported by large organizations, 64% were with small businesses, with the remainder spread across other types of organizations affiliated with the clusters (Exhibit 40).



Source: Large Organization Survey

Exhibit 39. Mean number of new alliances reported by large organizations



Source: Large Organization Survey

Exhibit 40. Number of new alliances reported by large organizations, by type of allied organization

Survey questions also inquired about joint ventures, a more formal type of alliance defined as a formal business agreement between two or more organizations to develop a new entity and new assets, generally for a finite time frame. Cluster small businesses indicated their involvement in a total of 47 joint

ventures during the second year of the Initiative. Seven small businesses reported more than one joint venture each, with one small business reporting its involvement in 10 and another in four ventures. The highest numbers of joint ventures, six and five, were reported by small businesses participating in the Huntsville Defense Cluster and the Energy Storage Cluster, respectively. Only the Carolinas' Nuclear Cluster did not have small business participants reporting a joint venture. Large organizations were also asked to report on their involvement in joint ventures specifically with small businesses. Four large organizations reported entering into such agreements with one or more small businesses.

Success Story #1

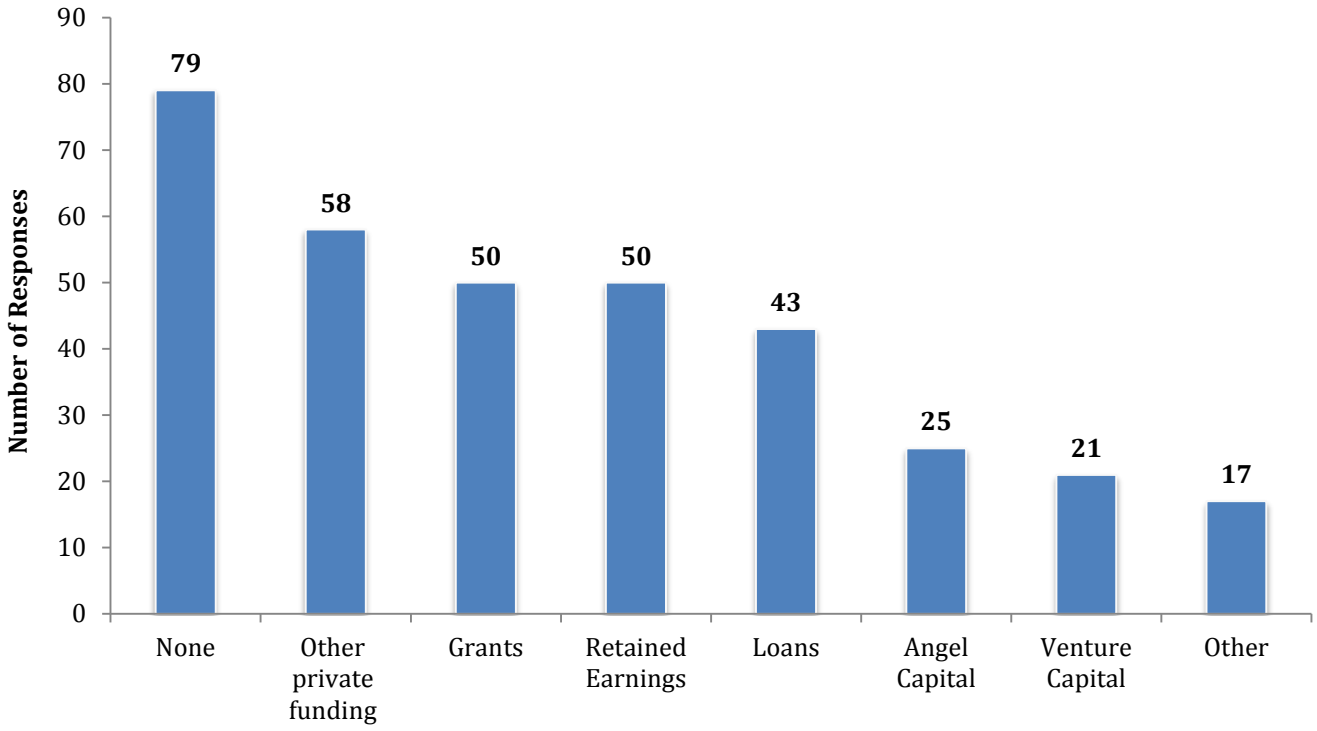
The small business specializes in geospatial technology solutions and is a founding member of its cluster. The firm demonstrated a remarkable ability to incorporate other cluster members in its contract awards with the cluster's help. In 2011, the company was contracted by the U.S. Army Corps of Engineers and subcontracted a portion of the work to another business in the cluster. In 2012, the company was awarded a $3-million multiyear contract with the U.S. Navy and included yet another cluster member as a subcontractor. The company further teamed up with a large prime contractor and two cluster small businesses to provide technical services to the National Oceanic and Atmospheric Administration at the Data Buoy Center. The three cluster small businesses will receive 25% of this multiyear contract initially worth $250 million. Also in 2012, the company teamed up with two cluster members to perform engineering and geospatial services for the U.S. Naval Observatory, a contract valued at more than $6 million. These successful teaming efforts were complemented by multiple contract awards to the company from organizations including NASA and the National Geospatial Intelligence Agency.

4.2.2. Small Business Access to Capital

Access to external financing and capital is a small business need identified as important by many cluster participants. Clusters in the Initiative facilitated small businesses' access to capital in three different ways: (1) by disseminating information on funding opportunities that were relevant to cluster participants; (2) by providing technical assistance, including mentoring and assistance in writing applications, for various funding opportunities; and (3) by holding matchmaking and networking activities, ranging from assisting small businesses in finding partners to improve the strength of their funding applications to actively seeking investors, such as venture capital firms.

The success of such activities can be measured in terms of improved access to financing for small businesses as well as in the types of financing obtained. Of the 239 small businesses responding, 67% reported using one or more of the following sources of financing: angel capital, venture capital, grants, loans, retained earnings, and/or other sources of financing (including private financing from friends and

family, crowd funding, and private equity); 46% reported using sources of external financing other than retained earnings (Exhibit 41).[33]

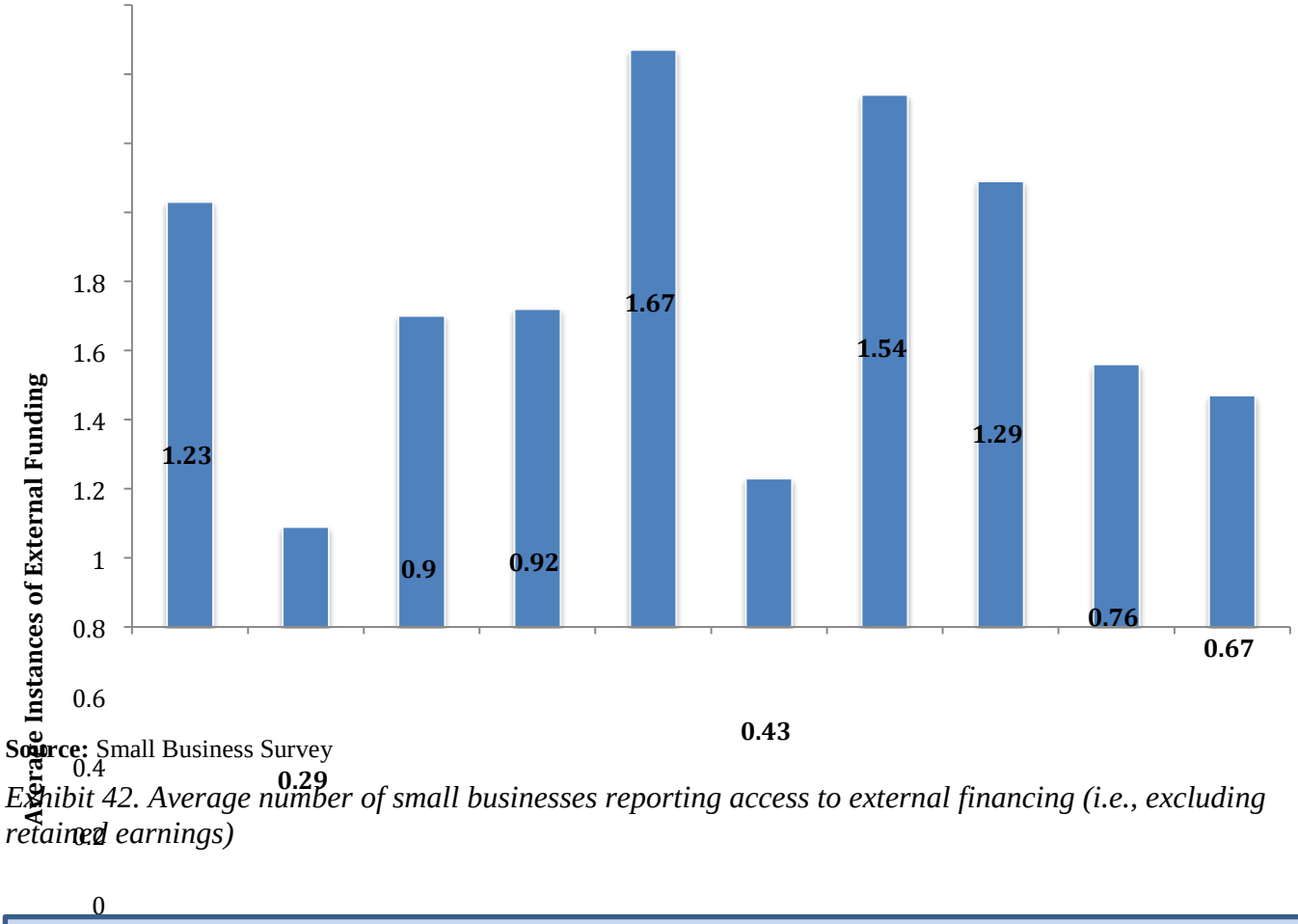


Source: Small Business Survey

Exhibit 41. Number of instances of financing reported by type of financing, including retained earnings

Across clusters, small businesses affiliated with both the Huntsville Defense Cluster and the Energy Storage Cluster reported the highest degree of access to external financing (excluding retained earnings), while businesses in the Carolinas' Nuclear Cluster reported very few instances of financing (Exhibit 42).

[33] The total number of responses reported in Exhibits 42, 43, and 44 exceeds the total number of firms surveyed because a single firm could have used multiple sources of financing.



Source: Small Business Survey

Exhibit 42. Average number of small businesses reporting access to external financing (i.e., excluding retained earnings)

Success Story #2

This small business has developed a revolutionary electric motor technology that permits the conversion of standard internal combustion vehicles into hybrid electric vehicles using electric motors built without rare earth metals. Despite its advanced technology, the company lacked a structured market approach and the capital to thrive in a highly competitive automotive market. In 2012, the cluster in which the company participates conducted a market analysis that identified a new, less-competitive market to which the firm could introduce its product. The cluster also mentored the small business in preparation for several local and national competitions, through which the company raised $250,000 in seed capital. Furthermore, the company's consistent performance in competitions led to increased product exposure and additional networking opportunities. The business won a $3-million Advanced Research Projects Agency-Energy (ARAP-E) award, in collaboration with a university in another region, and received cluster support for several SBIR/STTR applications.

The number of businesses in each cluster reporting access to each *type* of financing is reported in Exhibit 43. The Energy Storage Cluster was home to the largest number of small businesses reporting access to grants (11) as well as the largest number reporting access to loans (9), while small businesses

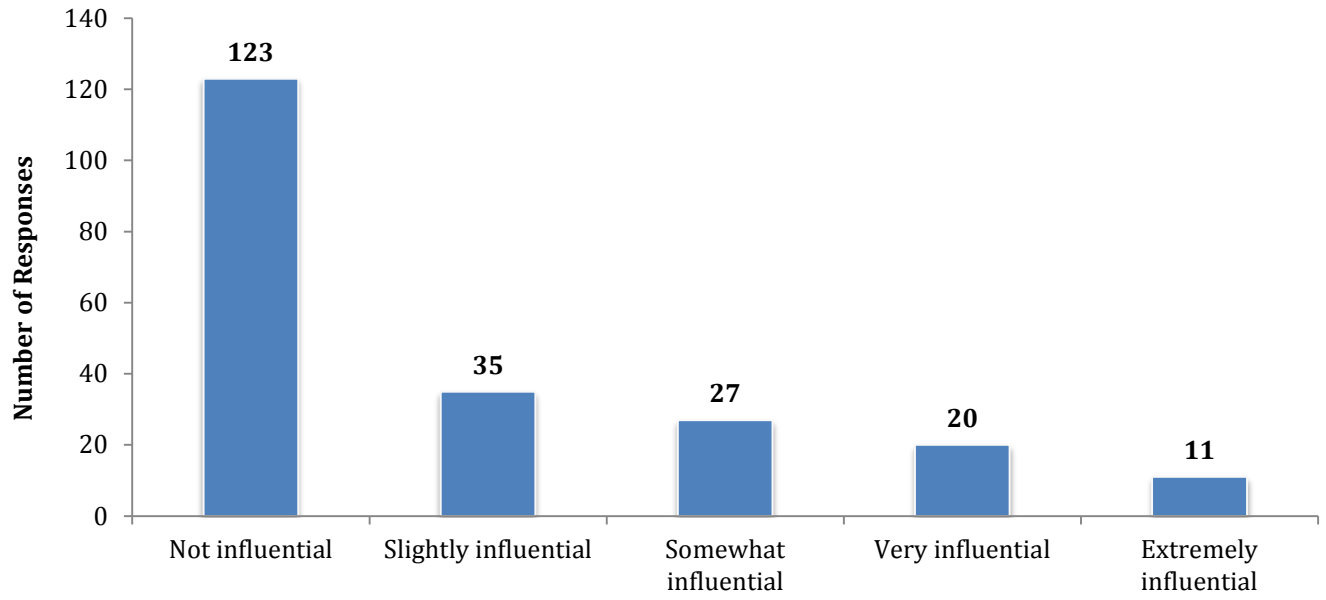
affiliated with the Huntsville Defense Cluster were more likely to report either the use of retained earnings for financing (15) or no use of the types of financing listed (32).

Exhibit 43. Number of small businesses reporting access to financing, by type of financing and cluster

Cluster	None	Other private funding	Grants	Retained earnings	Loans	Angel capital	Venture capital	Other external financing	Total
Project 17	6	10	5	3	3	5	2	2	36
Carolinas' Nuclear Cluster	3	1	0	3	0	0	0	1	8
Advanced Power Cluster	6	6	4	1	3	4	0	2	26
Geospatial Cluster	10	6	6	6	6	0	4	1	39
FlexMatters	3	6	9	6	7	3	5	0	39
Huntsville Defense Cluster	32	7	8	15	7	1	1	5	76
Smart Grid	1	5	2	2	2	5	2	1	20
Energy Storage Cluster	6	9	11	7	9	2	5	4	53
San Diego Defense Cluster	8	6	4	6	3	5	1	0	33
Green Aviation Cluster	4	2	1	1	3	0	1	1	13
All clusters	**79**	**58**	**50**	**50**	**43**	**25**	**21**	**17**	**343**

Source: Small Business Survey

The Small Business Survey also asked small businesses to rate the influence that cluster participation had on their access to financing during the second year of SBA's Cluster Initiative. Of the 216 small businesses reporting, 43% indicated that their participation in the clusters was at least slightly influential in their access to capital (Exhibit 44).



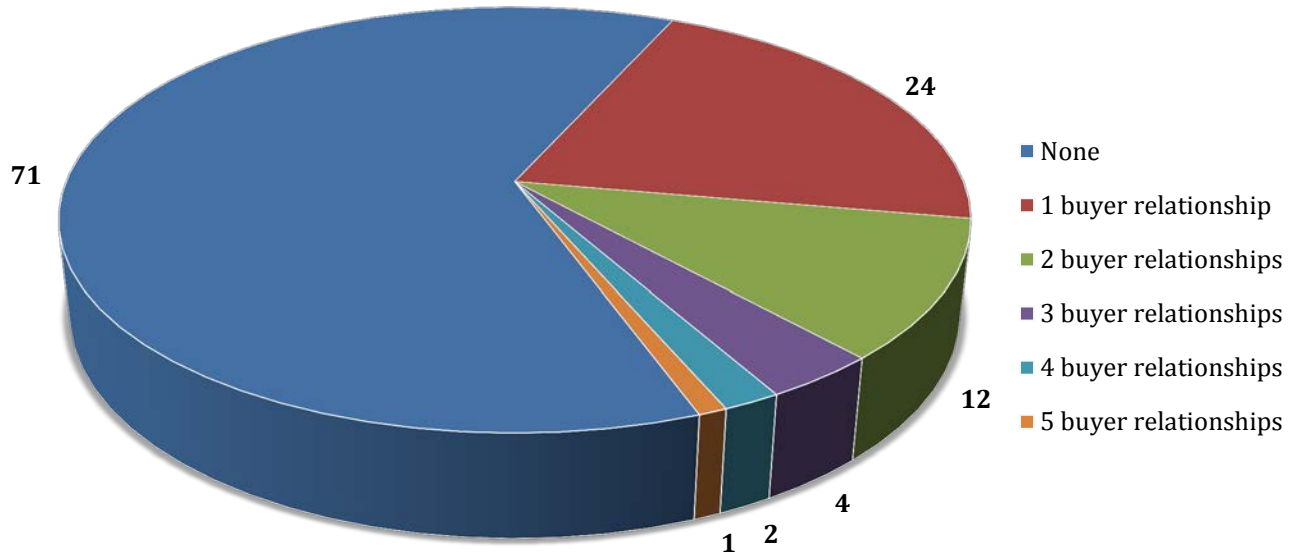
Source: Small Business Survey

Exhibit 44. Reported influence of small business cluster participation on access to financing

Certain types of funding can be obtained by a group of organizations. For example, certain Small Business Innovation Research/ Small Business Technology Transfer Research (SBIR/STTR) solicitations are difficult to win by small businesses alone and typically require that multiple organizations each bring their know-how to a project. Large organizations were asked whether they collaborated with one or several small businesses on such a joint funding application during the second year of the Initiative. This was not a common occurrence; only 3 of 95 large organizations reported such collaborations. Several large organizations, however, did report that they contributed advice and even matching funds for STTR proposals in support of small businesses seeking grants.

4.2.3. Small Business Contract and Subcontract Awards

Contract awards represent an important source of business activity for cluster small businesses. The Small Business Survey asked participating businesses several questions about business transactions with other cluster participants, both large and small, including the sale or purchase of goods or services, receipt of contracts or subcontracts, external financing (angel, venture, and other private equity), and grants and loans. Of the 114 small businesses reporting, 38% indicated buying goods and services from one or more cluster participants, 21% indicated having a buyer relationship with one cluster participant, 11% indicated having a buyer relationship with two cluster participants, and 7% indicated having a buyer relationship with three or more cluster participants (Exhibit 45). On average, each small business had 0.64 buyer relationships within its cluster.

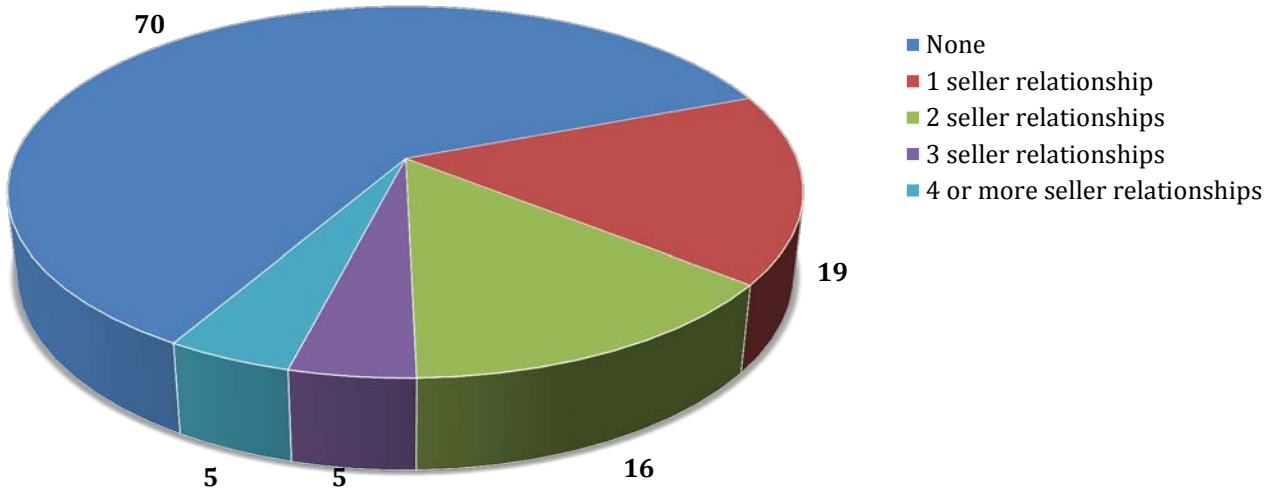


Source: Small Business Survey

Exhibit 45. Number of small businesses reporting buyer relationships within their clusters

The number of buyer relationships varied across the 10 clusters, ranging from 0% for Smart Grid to 67% of the businesses in the Upper Michigan Green Aviation Coalition (Green Aviation Cluster). Of reporting small businesses in the Energy Storage Cluster and the Geospatial Cluster, 58% indicated establishing a buyer relationship with one or more participants.

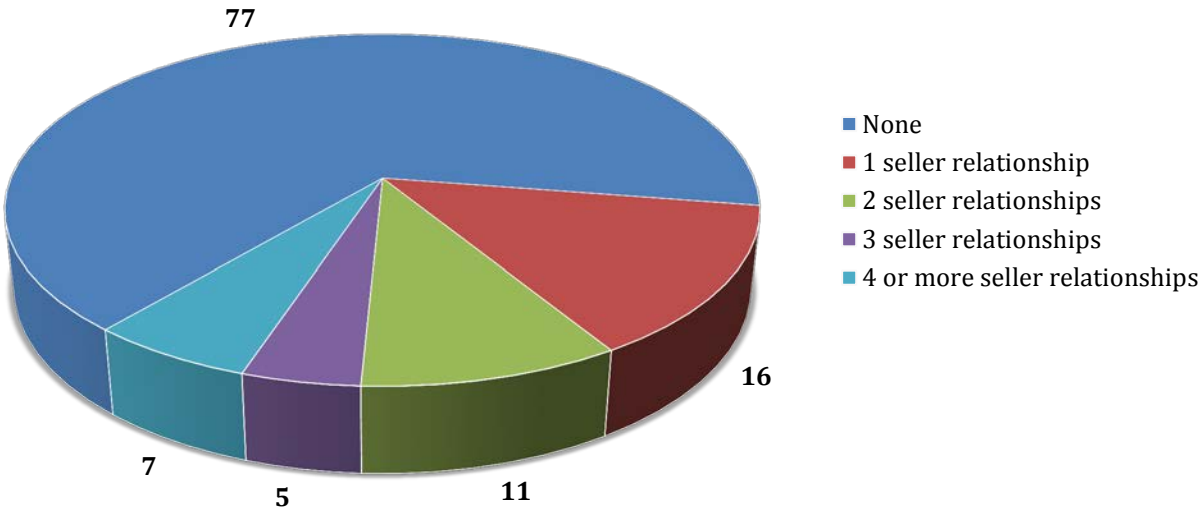
Small businesses were further asked about any seller relationships they may have had within their clusters. On average, reporting small businesses indicated 1.4 seller relationships with other cluster small businesses, and 0.82 seller relationships with cluster large organizations. Among reporting small businesses, 39% had one or more seller relationships with other small businesses in their clusters (Exhibit 46). More than 50% of small businesses in the Geospatial Cluster, the Energy Storage Cluster, and the Green Aviation Cluster had one or more seller relationships with cluster small businesses. This percentage was between 40% and 50% for the Huntsville Defense Cluster and the Project 17 Agricultural Technology Cluster (Project 17), while it was 0% for Smart Grid and the Carolinas' Nuclear Cluster.



Source: Small Business Survey

Exhibit 46. Number of small businesses reporting seller relationships with cluster small businesses

About 34% of reporting small businesses indicated having one or more seller relationships with large organizations participating in their clusters (Exhibit 47). The prevalence of these relationships varied across clusters, however. All reporting small businesses in the Carolinas' Nuclear Cluster had one or more seller relationships with large organizations, while 40% to 50% of small businesses in the Green Aviation Cluster, the Energy Storage Cluster, the Huntsville Defense Cluster, the Geospatial Cluster, and the San Diego Defense Cluster indicated having this type of relationship with one or more cluster large organizations. Only 7% of FlexMatters' small businesses reported having a seller relationship with one or more cluster large organizations.

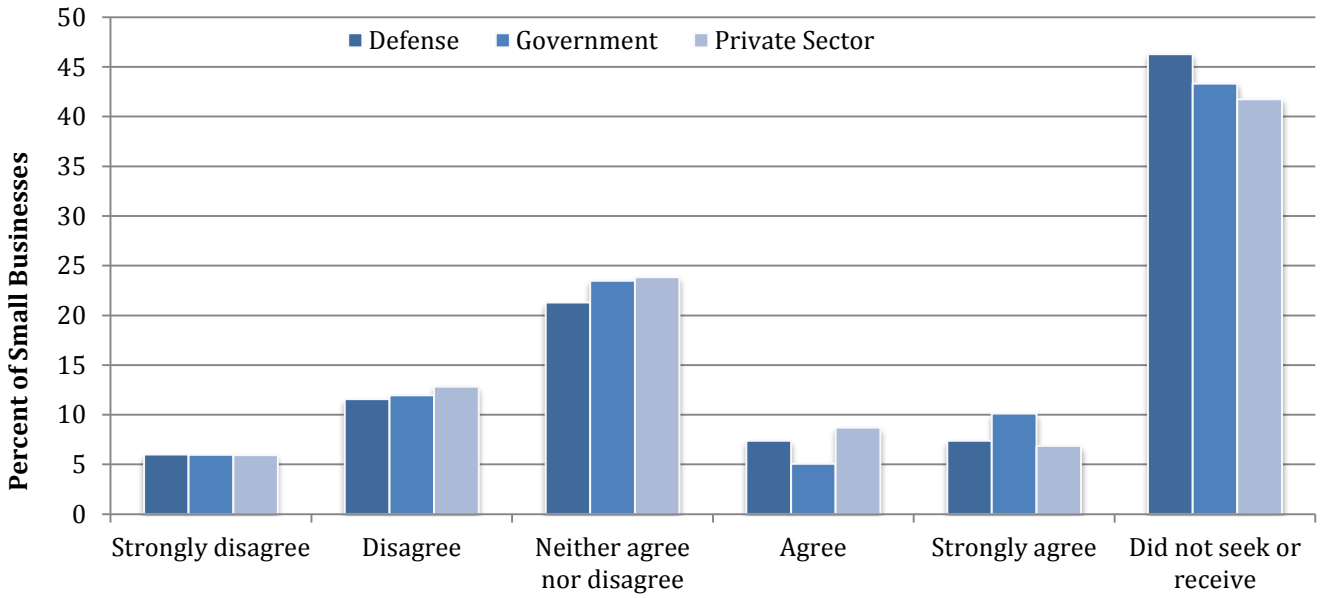


Source: Small Business Survey

Exhibit 47. Number of small businesses reporting seller relationships with cluster large organizations

Overall, the percentage of reporting small businesses indicating involvement in intracluster buyer-seller relationships ranged from 34% for seller relationships with one or several cluster large organizations to 39% for buyer relationships with one or several cluster small businesses. Large organizations were also queried regarding their involvement in joint contracts with one or several small businesses. Only 4 of 95, however, reported being part of such an arrangement.

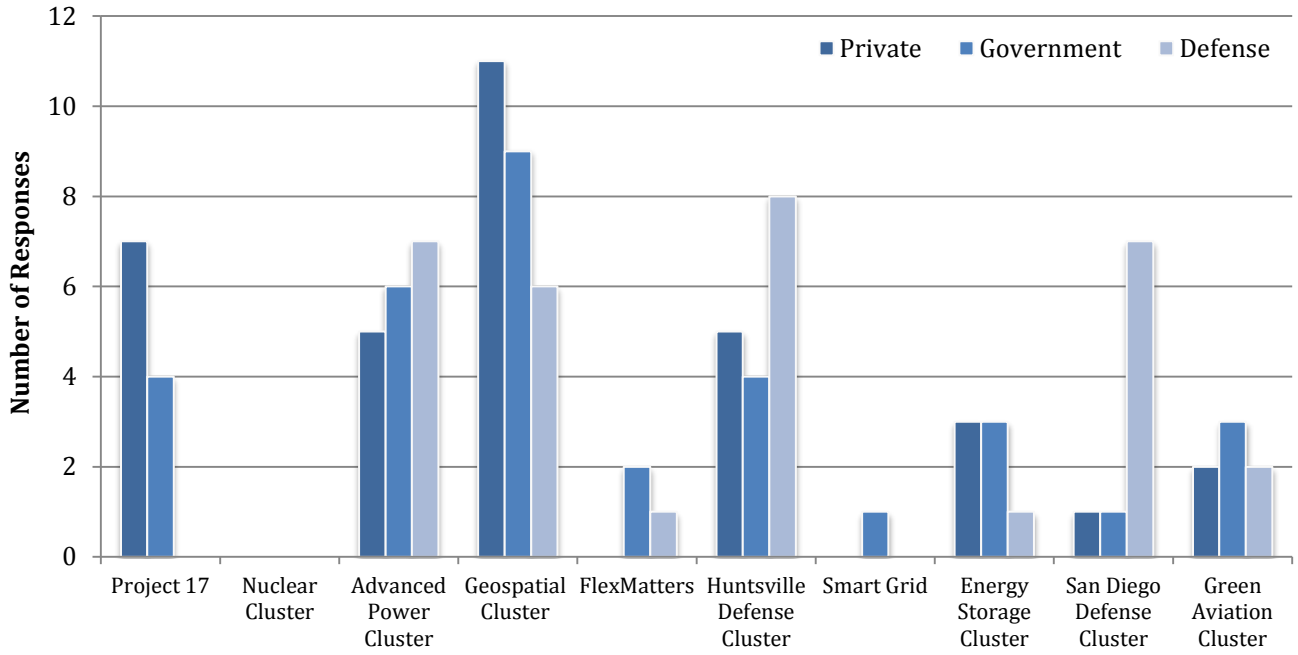
Small businesses were asked whether their participation in cluster activities had resulted in the awarding of contracts or subcontracts from private sector organizations, civilian government agencies (federal, state, or local), or the U.S. Department of Defense (DoD). Between 45% and 50% responded that they neither sought nor received private, government, or defense contracts. About 15% responded that they either "agreed" or "strongly agreed" that cluster participation facilitated their receipt of such contracts (Exhibit 48).



Source: Small Business Survey

Exhibit 48. Percentage of small businesses responding regarding relationship between cluster participation and receipt of a contract or subcontract award from a defense, civilian government, or private sector organization

All clusters except the Carolinas' Nuclear Cluster had at least one small business reporting that cluster participation facilitated receipt of a contract or subcontract award. Small businesses in six clusters reported getting one or more contract awards from each type of awarding agency (defense, civilian government, or private sector) (Exhibit 49).



Source: Small Business Survey

Exhibit 49. Number of small businesses responding that cluster participation resulted in a contract or subcontract award from a defense, civilian government, or private sector organization

Cluster administrators reported on the value of economic activity, such as contracts and subcontracts awarded; angel, venture, and other private equity obtained; and grants and loans accruing to participating small businesses.[34] These values for the second year of SBA's Initiative are reported in Exhibit 50, according to the type of activity and funding source. The value of economic activity reported for the second year of the Initiative totaled over $632 million, a figure dominated by more than $370 million in contracts and subcontracts reported by Huntsville Defense Cluster firms. The remainder is largely accounted for by contracts and subcontracts, with the majority going to small businesses in three clusters—the Geospatial Cluster, the Energy Storage Cluster, and the San Diego Defense Cluster. Economic activity reported in each of the other four financing categories (private equity, grants, loans, and SBIR/STTR) totaled between $4.7 and $16.9 million per funding source. At nearly $ 17 million, grants accounted for the highest value among these four financing categories but were only reported by businesses in three clusters and were dominated by grants received by Energy Storage Cluster small businesses. Access to private equity was reported by five of the nine reporting clusters, totaling more than $13 million. The data reported here serve only as a lower-bound estimate of actual activity because cluster administrators did not consistently provide dollar amounts for some types of activity (e.g., the Carolina's

[34] Cluster administrators were asked only to include economic activity for small business participants classified as "active" and for whom the cluster had at least some influence on obtaining the funding. For more information about the definition of active participant, please refer to footnote 55 in the Methodology Appendix.

Nuclear Cluster reported that it did not collect any data of this kind from participating firms.) Possible differences in levels of reporting between the first and second years of the Initiative make it difficult to compare these figures with those reported in the previous year.

Exhibit 50: Value of external funding and contracts/subcontracts awarded to small business participants

Cluster	Contract/ subcontracts	Angel capital, venture capital, or other private equity	Grants	Loans	SBIR/STTR	Total
All clusters	**$589,675,929**	**$13,680,000**	**$16,484,500**	**$4,700,000**	**$8,328,410**	**$632,868,839**

Source: Cluster Administrator Survey

4.2.4. Development of New Products, Commercialization, and Licensing

The clusters in SBA's Cluster Initiative assist small businesses with challenges faced in developing new products and/or commercializing and licensing new technology. This year's evaluation collected a number of metrics that measured cluster activity and outcomes in this area, including the following counts:

- Technologies licensed by cluster small businesses *to* other businesses
- Licensing rights obtained by cluster small businesses *from* other businesses
- Small businesses licensing new technology, developing new products or services, or commercializing new technology as a result of cluster activity
- Large organizations collaborating with cluster small businesses to license new technology
- Large organizations innovating with regard to new products, processes, or markets, transitioning technologies in research or development into marketable products, and discovering or identifying unanticipated applications for technologies currently under research and development as a result of cluster activity

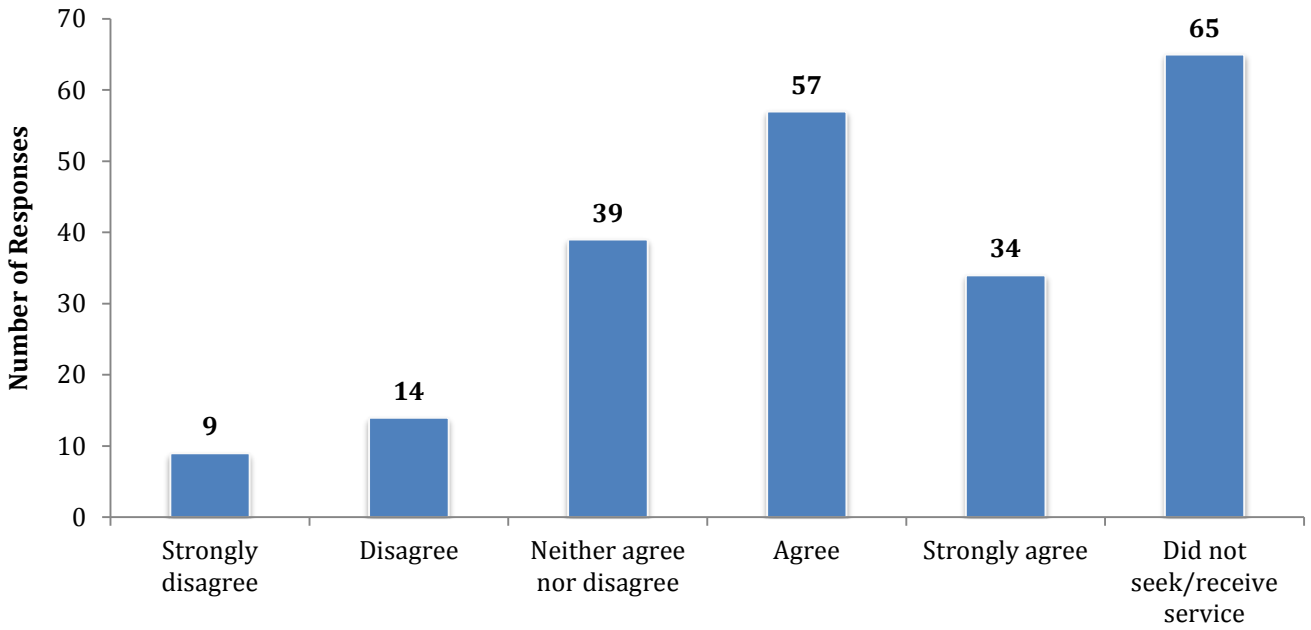
The evaluation of these items for the second year of the Initiative is discussed here. Closely related long-term outcomes, such as intellectual property issues, patent applications, and patents granted, are discussed in Section 4.2.5, below.

Of responding small businesses that sought or received assistance with the development of new products or services, 60% denoted that cluster participation had benefited them in this regard (Exhibit 51), although the level of agreement with this statement was slightly lower than the level reported during the first year of the Initiative. The level of reported influence varied somewhat across clusters (Exhibit 52). In all but two clusters, at least 40% of small businesses "agreed" or "strongly agreed" that this was the case. This figure reached as high as 78% in the San Diego Defense Cluster. Only in the Carolinas' Nuclear

Cluster and Smart Grid did relatively few businesses agree that this was the case (20% and 14%, respectively).

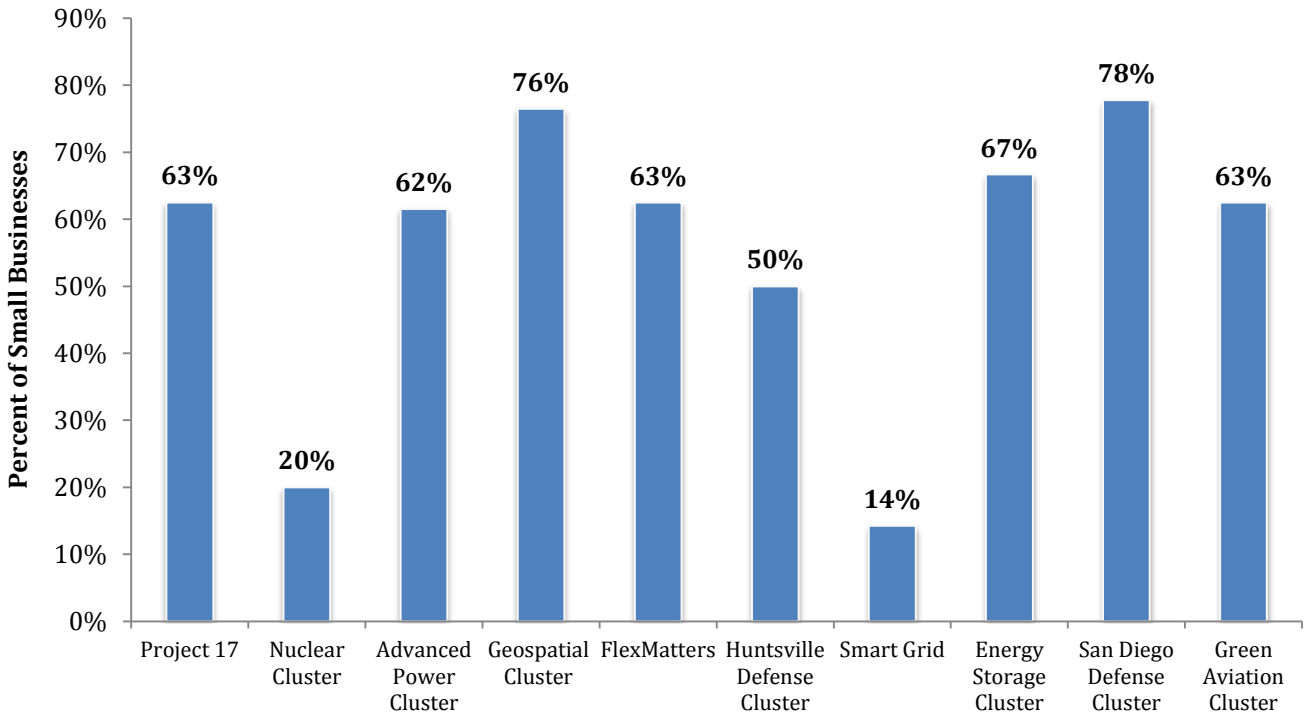
Success Story #3

A small business participating in one of the 10 clusters developed a patented technology allowing eyewear products to instantaneously adapt their tint to changing ambient light conditions. The company originally developed this technology for military applications (e.g., fighter pilot visors) and later released this technology to consumers in the motorcycle visor market with limited success. As a result, the company conducted a significant redesign of the product but faced issues with the adhesion of visor layers and the design of the electronic pod that controls the tint. These issues threatened the planned launch of the revised product at a major international motorcycle trade show. A cluster partner specializing in manufacturing worked with the company to quickly redesign the prototype to address these issues. As a result, the small business was able to display production-quality samples of its technology at the trade show and was approached by 10 OEMs interested in carrying this product.



Source: Small Business Survey

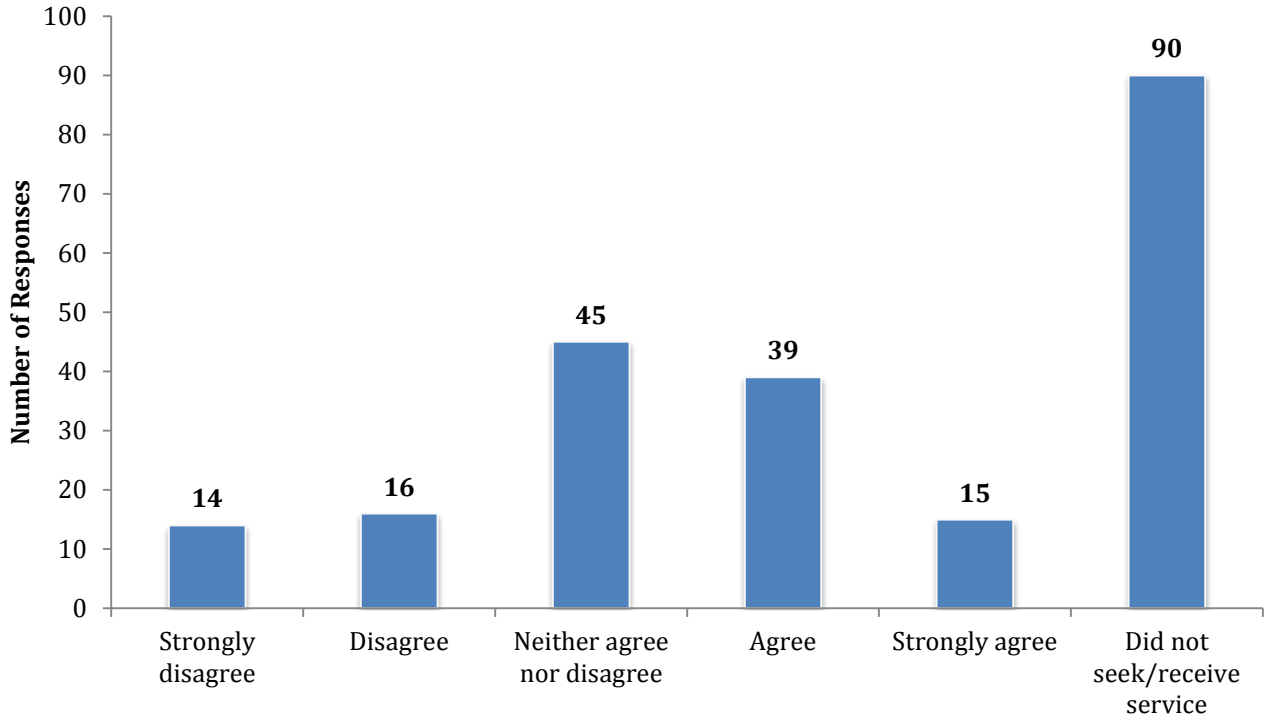
Exhibit 51. Small business developed new products or services as a result of cluster participation



Source: Small Business Survey

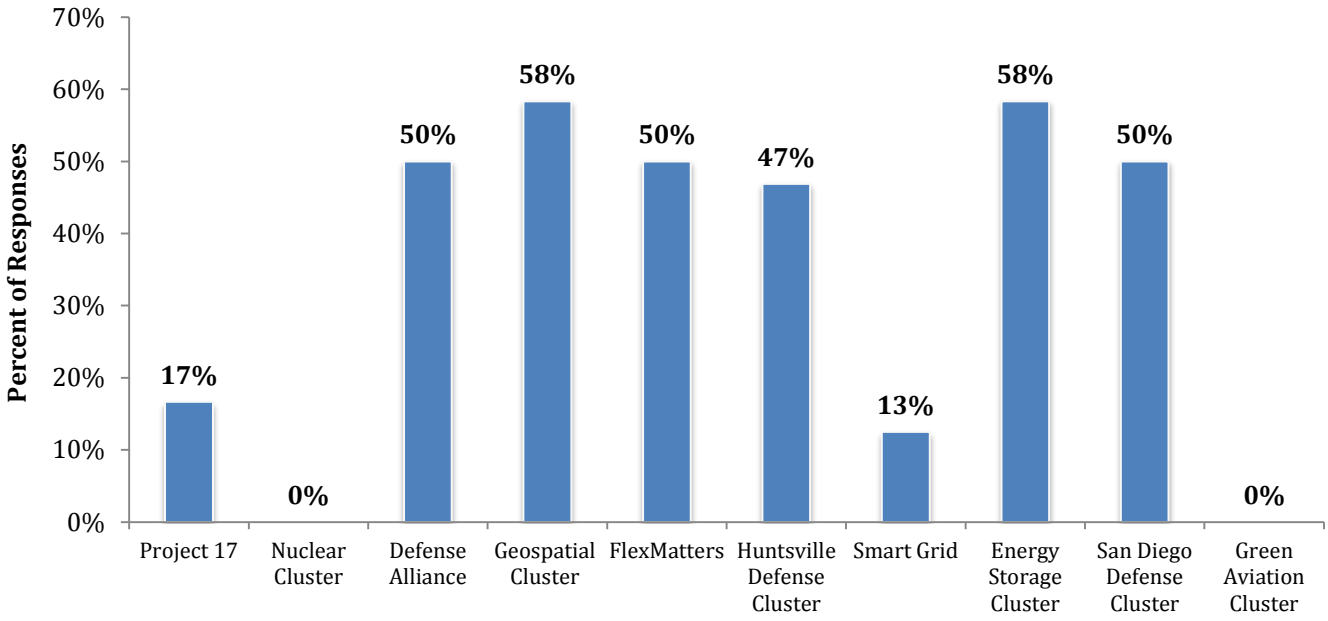
Exhibit 52. Percentage of small businesses reporting new products or services developed as a result of cluster participation

The data shown in Exhibit 53 suggest similar (if slightly dampened) results for the influence of cluster activity on commercialization and new technology development. Although 41% of respondents answered that they had not "sought nor received" such cluster services, 42% of those remaining "agreed" or "strongly agreed" that cluster participation had assisted them in this regard, while 14% "disagreed" or "strongly disagreed." Again, this level of agreement was comparable to, if slightly lower than, the level reported during the first year of SBA's Cluster Initiative. Reported cluster influence varied, however. In 6 of 10 clusters, a significant share of small businesses (45% to 55%) reported that they either "agreed" or "strongly agreed" that cluster participation had contributed to their commercialization of new technology. That share shrank substantially in the remaining four clusters (the Carolinas' Nuclear Cluster, Smart Grid, Project 17, and the Green Aviation Cluster) (Exhibit 54).



Source: Small Business Survey

Exhibit 53. Small business commercialized new technology as a result of cluster participation

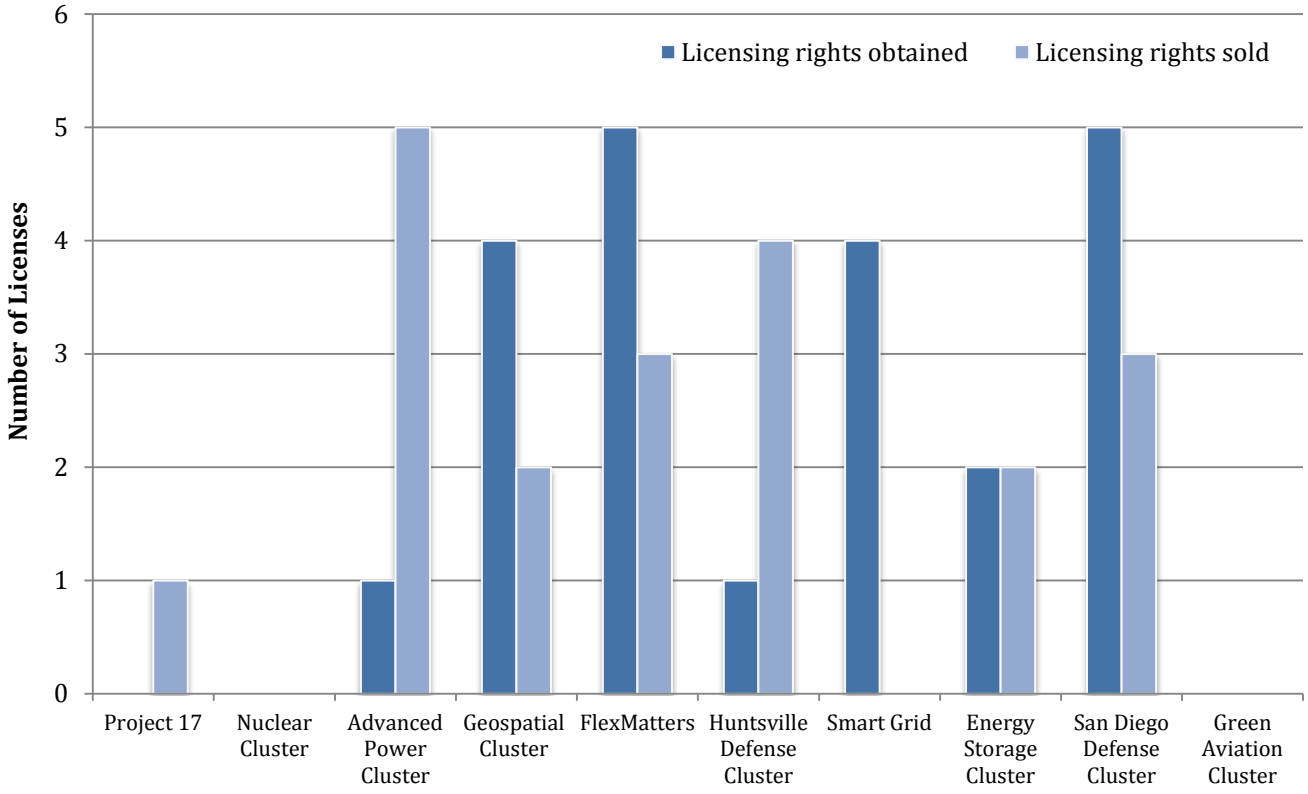


Source: Small Business Survey

Exhibit 54. Percentage of small businesses reporting increased commercialized new technology as a result of cluster participation

During the second year of SBA's Clusters Initiative, small businesses reported a total of 20 technologies licensed *to* other businesses and 22 technology licenses received *from* other businesses.

These were distributed across different clusters (Exhibit 55). Seven of the 10 clusters shared significantly in this licensing activity (with a total of four to eight licenses reported per cluster during this year), while three clusters reported less activity in this area. No small businesses from the Carolinas' Nuclear Cluster or the Green Aviation Cluster reported licensing activity. One instance of licensing was reported in Project 17.



Source: Small Business Survey

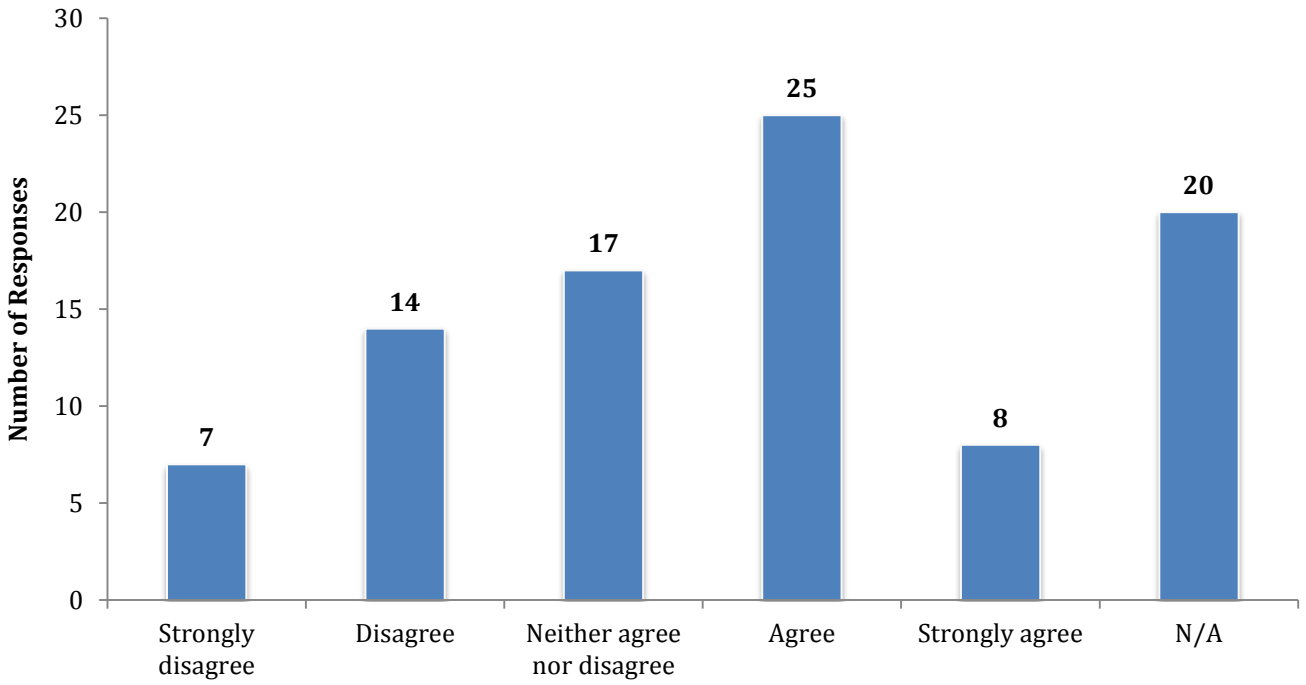
Exhibit 55. Number of new technology licenses issued to small businesses or received from other small businesses

Commercialization and licensing of new technologies and new product development are also key outcomes for larger organizations collaborating with clusters. These organizations (primarily large businesses, nonprofit organizations, universities and research centers, and business associations) were queried regarding the extent to which they collaborated with cluster small businesses to license new technology. Of the 95 organizations responding, 22 reported that they collaborated with a cluster small business in the second year of the Initiative. Only three organizations, however, reported that such a collaboration resulted in technology licensing: Geospatial Cluster, FlexMatters, and the San Diego Defense Cluster.

Success Story #4

A small business that creates cutting-edge digital signal processing solutions used in a wide range of systems—including RADAR, signal intelligence, and electronic warfare—reached out to its regional cluster in March 2011. The three-person company was diagnosed as lacking a sufficient understanding of its market, a viable business plan, and corporate branding and strategy. In an effort to address these weaknesses, the cluster provided the company with a business advisor and a mentor who assisted in the creation of new financial and business plans. Cluster partners at a local university also conducted market research, connected the small business with three of the top power amplifier suppliers in the country, and created a new company branding strategy. Following the cluster's assistance, the company sold a $500,000 license for its technology and was awarded a SPAWAR contract valued at $1.5 million. The marketing materials created by the cluster continue to support the small business in its efforts to establish business relationships with power amplifier suppliers.

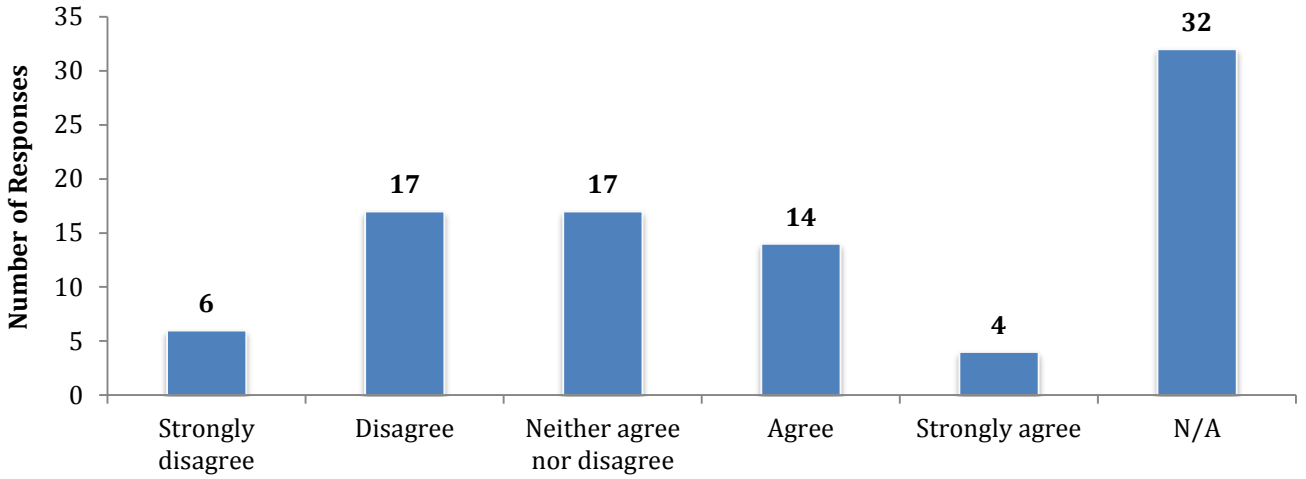
Large organizations were also asked whether cluster participation had enhanced their ability to (1) innovate with regard to new products, processes, or the development of new markets; (2) transition technologies in research or development into marketable products; and (3) discover or identify unanticipated applications for technologies currently under research and development. Among respondents, 46% reported that they "agreed" or "strongly agreed" that cluster participation enhanced their ability to innovate with regard to new products, processes, and the development of new markets (Exhibit 56). Large organizations in the Geospatial Cluster, FlexMatters, and the San Diego Defense Cluster in particular reported a level of agreement between 60% and 75%, whereas 50% and 43% participating in the Energy Storage Cluster and Smart Grid, respectively, reported that they "disagreed" or "strongly disagreed."



Source: Large Organization Survey

Exhibit 56. Enhanced ability of large organizations to innovate as a result of cluster participation

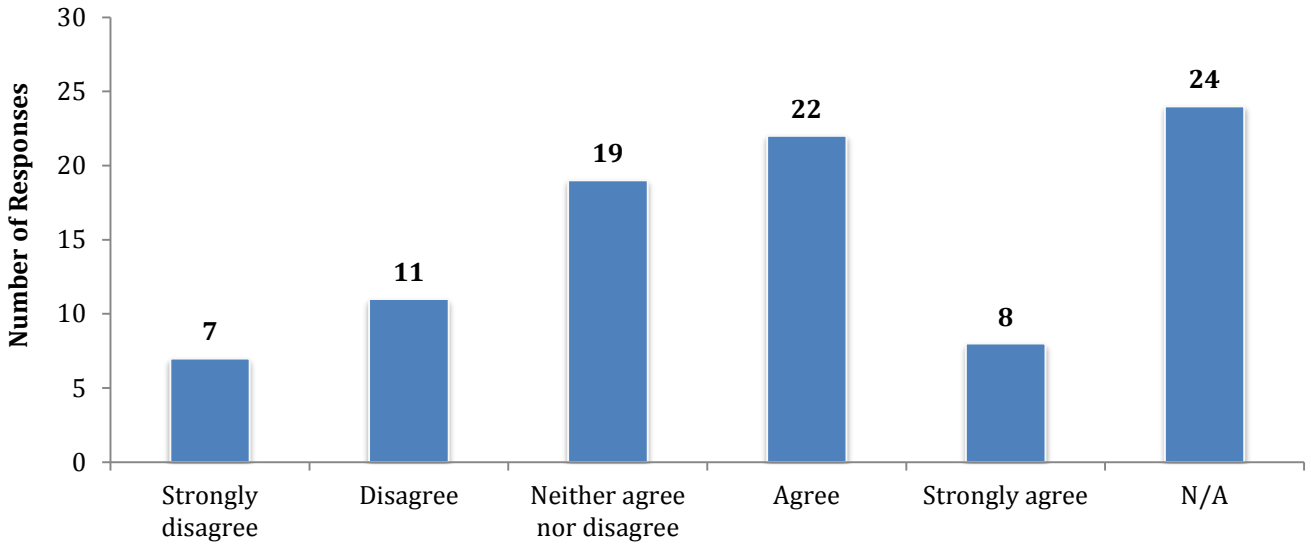
Of large organizations for which the question was applicable, 31% reported that they "agreed" or "strongly agreed" that cluster participation helped them transition technologies in research or in the early stages of development into marketable products (Exhibit 57). There was significant variation among clusters, however; 75% of large organizations participating in FlexMatters reported they "agreed" or "strongly agreed," whereas 50% and 39% in the Energy Storage Cluster and the Carolinas' Nuclear Cluster, respectively, reported that they "disagreed" or "strongly disagreed."



Source: Large Organization Survey

Exhibit 57. Enhanced ability of large organizations to transition technology into marketable products as a result of cluster participation

Finally, 45% of large organizations "agreed" or "strongly agreed" that cluster participation helped them identify or discover new and unanticipated applications for technologies currently under research and development (Exhibit 58). Once again, the large organizations participating in FlexMatters reported they "agreed" or "strongly agreed" the most (75%), followed by those in the San Diego Defense Cluster (60%). Overall, fewer large organizations reported "disagreeing" or "strongly disagreeing" than in their responses to the questions about innovation and technology transition.



Source: Large Organization Survey

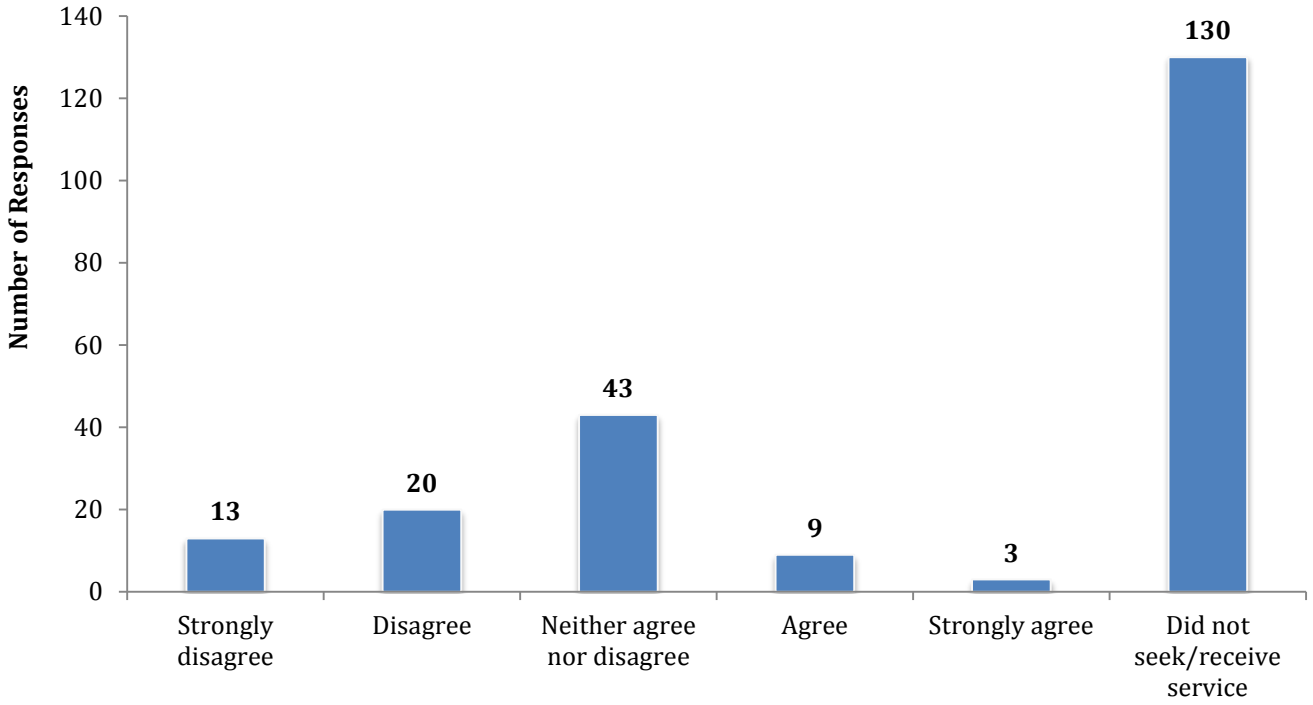
Exhibit 58. Enhanced ability of large organizations to discover unanticipated applications for technology as a result of cluster participation

4.2.5. Intellectual Property and Patent Applications

Development of intellectual property and patents both have the potential to be key outcomes of cluster activity. These aspects of business operations can be especially important for industries involving new and innovative technologies. Small businesses in SBA-supported clusters reported *filing* a total of 111 patents during the second year of the Initiative, an average of one patent filed for each small business responding. Seven small businesses reported filing five or more patents during this period, including two that reported filing more than 10 patents. The San Diego Defense Cluster and FlexMatters had the highest number of small businesses reporting one or more patents filed. During the same period, 109 small businesses reported *being granted* a total of 76 patents. Three small businesses reported being granted five or more patents, including one that reported receiving 30 patent awards. The San Diego Defense Cluster and FlexMatters again had the highest number of small businesses reporting one or more patents granted.

Of responding small businesses that sought/received services in this area, 13% indicated that their cluster participation contributed to their *filing* for patents (Exhibit 59). Among the 10 clusters, the San

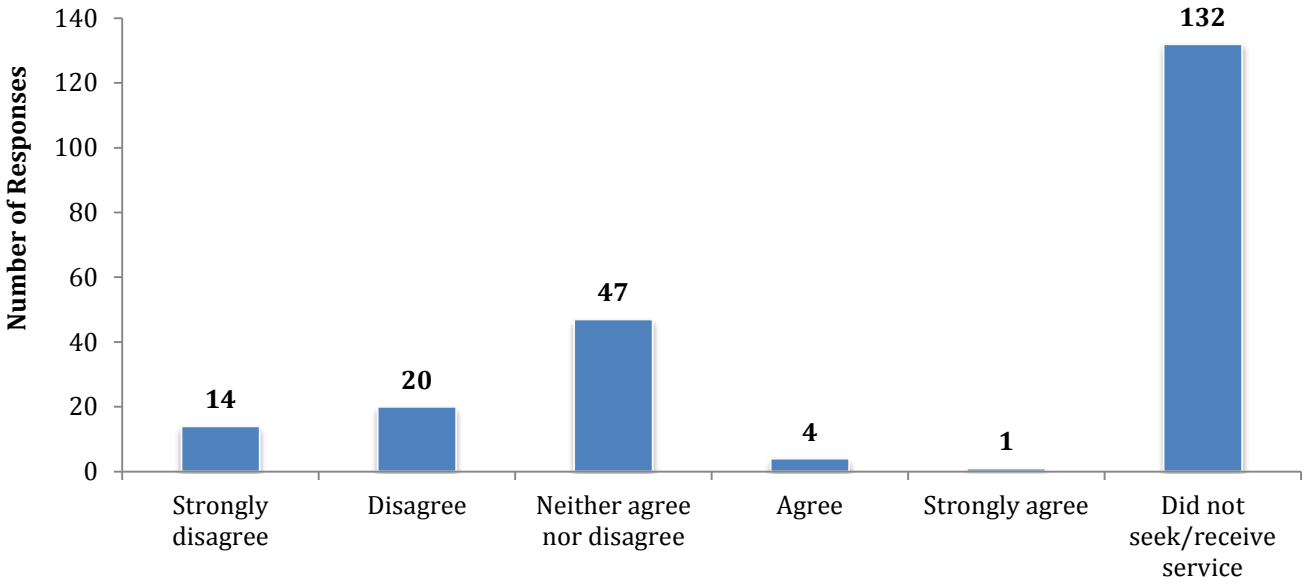
Diego Defense Cluster had the highest number of small businesses (four firms) that reported filing patent applications as a result of cluster participation; the Energy Storage Cluster and FlexMatters also had three and two, respectively. Three clusters had one small business each that reported having pending patent applications as a result of cluster participation. Of those small businesses that sought/received assistance with filing patent applications, 38% reported that cluster participation did not result in their filing.



Source: Small Business Survey

Exhibit 59. Applications for patent(s) as a result of cluster participation

Small businesses were also asked whether cluster participation helped them *receive* one or more patents. As shown in Exhibit 60, the distribution of answers was similar to that of the prior question about patent applications: only 6% of small businesses indicated that cluster participation helped them in their receipt of patents. Among the 10 clusters, the Energy Storage Cluster had the highest number of small businesses (three firms) that reported being granted patents as a result of cluster participation; two other clusters also each had one small business. Of small businesses that sought/received assistance with patents, 39% reported that cluster participation did not result in patent awards.



Source: Small Business Survey

Exhibit 60. Grant of patent(s) as a result of cluster participation

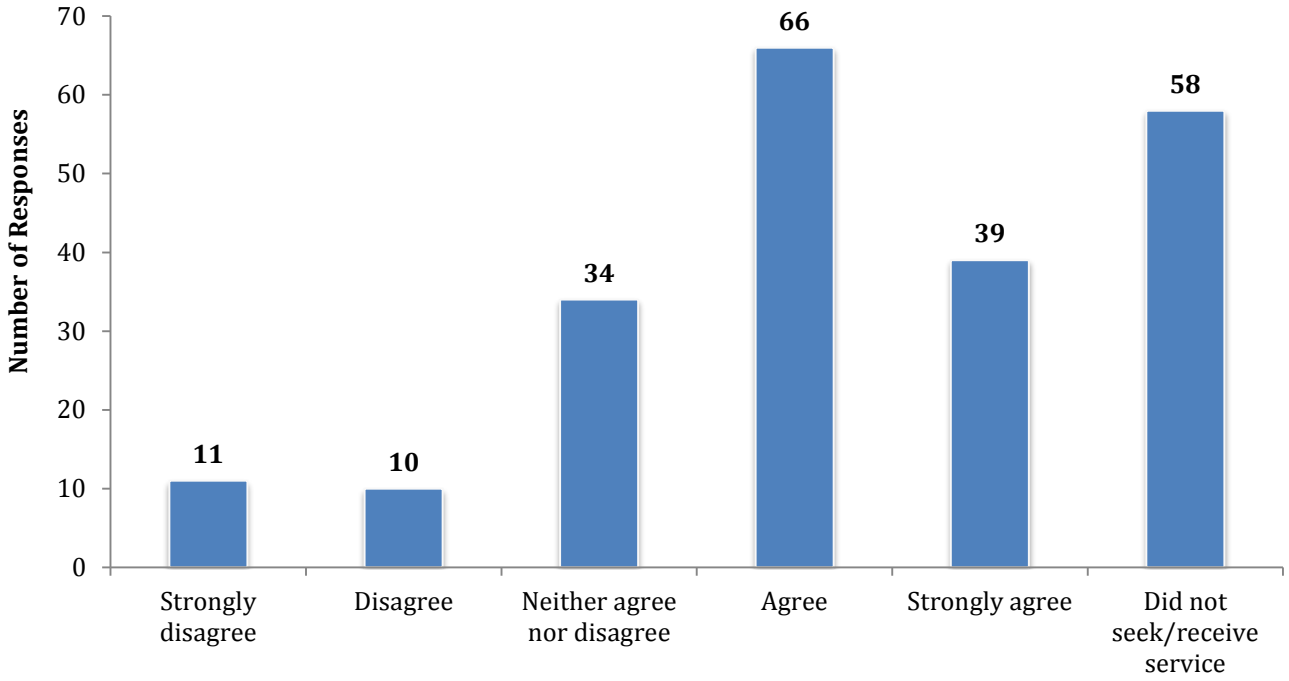
Success Story #5

Founded by a former NASA employee, the start-up company in profile offers a greenhouse hydroponic system for growing fresh fruits and vegetables in hot and dry climates with significantly reduced water quantity and quality requirements compared to existing solutions. Since the start-up was discovered at a business plan competition organized by the cluster, it has received a wide range of services from the cluster and its service providers, including legal assistance with the registration of two patents and the implementation of a franchising strategy for its products, and fund-raising and marketing assistance to better position its offerings in the marketplace. In addition, the cluster organized two separate showcasing events for the business to demonstrate its technologies to potential regional buyers. As a result, the start-up has received more than $600,000 in investment capital since October 2010 and has secured several franchise agreements, including one overseas. Furthermore, the company is making progress in developing two retail agreements with large growers supplying multi-national customers and several new franchise agreements and is now seeking a Series A venture round.

4.2.6. Assistance With Small Business Marketing Strategies

Many clusters assisted small business participants with their marketing strategies. A successful marketing strategy can be a key element in increasing sales and profit. Some 66% of responding small businesses that sought/received services indicated that they revised their marketing strategies as a result of their cluster participation (Exhibit 61). All 10 clusters had numerous small businesses reporting that this was the case. In particular, 81% of Geospatial Cluster small businesses, along with 70% to 74% of small businesses in the Energy Storage Cluster, the San Diego Defense Cluster, and the Huntsville Defense

Cluster reported the same. Only in Smart Grid did fewer than 50% of small businesses report that cluster activity assisted them with their marketing strategies.

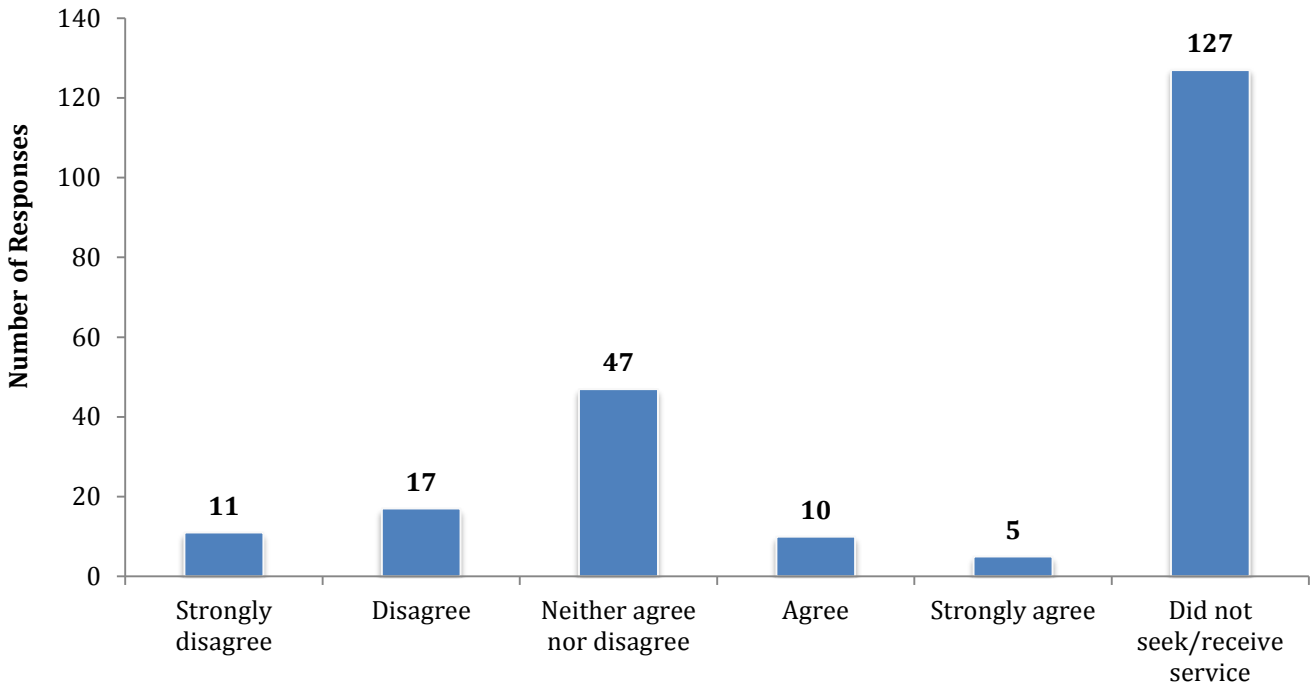


Source: Small Business Survey

Exhibit 61. Revision of marketing strategy as a result of cluster participation

4.2.7. Assistance With Increasing Exports

Some clusters provide assistance to small businesses in support of their ability to export goods and services. Nearly 17% of small businesses reported that they were able to export goods and/or services during the second year of the Initiative as a result of their cluster participation (Exhibit 62). These small businesses were participants in 9 of the 10 clusters. The Geospatial Cluster and FlexMatters each had three small businesses reporting success with exports as a result of participation, while the Energy Storage Cluster and Project 17 each had two. Even still, of the small businesses that sought/received assistance with exporting, 31% reported that cluster participation did not result in additional successful exporting.



Source: Small Business Survey

Exhibit 62. Achievement of exports during the second year as a result of cluster participation

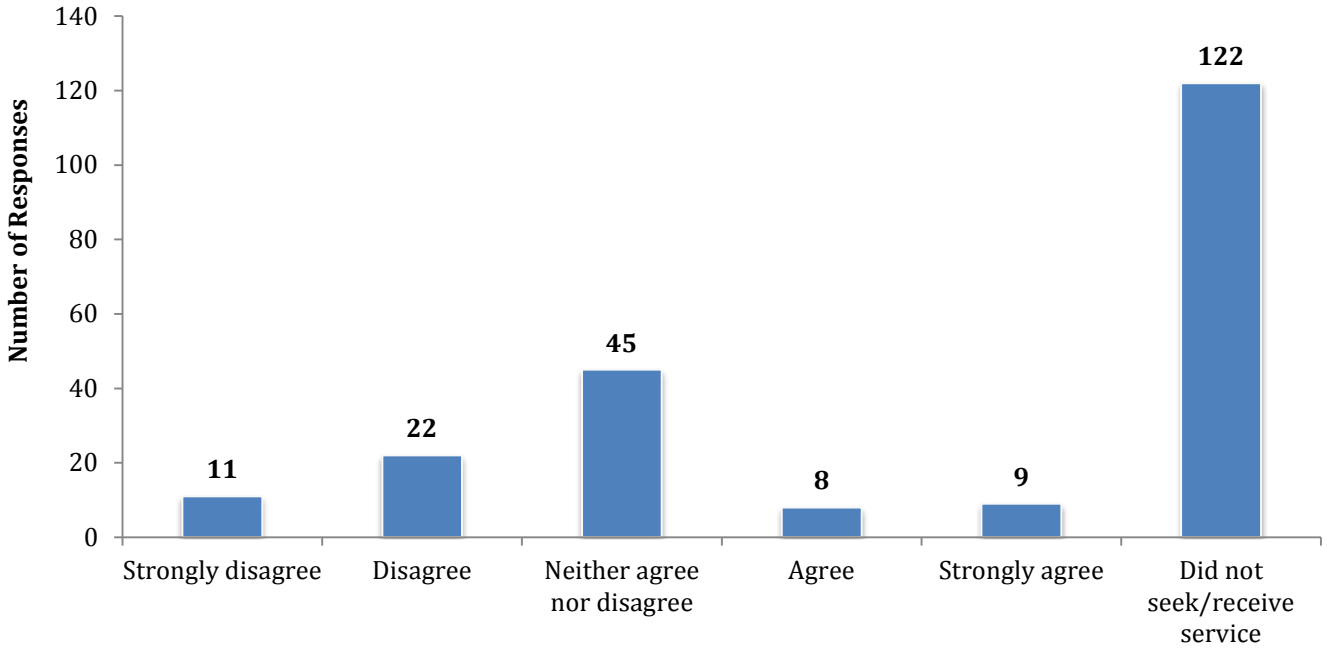
Success Story #6

A woman-owned, 8(a)-certified small business specializing in providing numerical meteorological services as well as forecasting and forensic analysis of storm surges encountered several challenges in growing its business. Limited market knowledge and access to industry decision makers prevented the company from effectively marketing its forensic analysis capabilities and from growing its business despite its unique expertise and ownership of the most powerful supercomputer in the region. The company also identified an opportunity to export its products and services overseas but had no prior experience in exporting potentially trade-restricted technology. The small business received cluster assistance in building credibility and in identifying and connecting with a company interested in utilizing its technology to supply flood modeling and claim-analysis support for insurance companies. The cluster also worked with the small business to take advantage of recent legislation requiring federal agencies to develop capacity in settling indeterminate loss claims following hurricanes and to secure the necessary licenses and agreements to export its product. Largely due to sustained cluster assistance, the small business has increased its revenue, has received a $400,000 SBIR award, and remains on a path to substantial growth.

4.2.8. Other Short- and Intermediate-Term Outcomes

Cluster activity may promote two other important short- and intermediate-term outcomes: the number of small businesses that gain access to cleared secure facilities as a result of their cluster participation, and the number of small businesses that participate in their industry supply chains as a result of their cluster participation. Clusters identified “gaining access to cleared secure facilities” as an

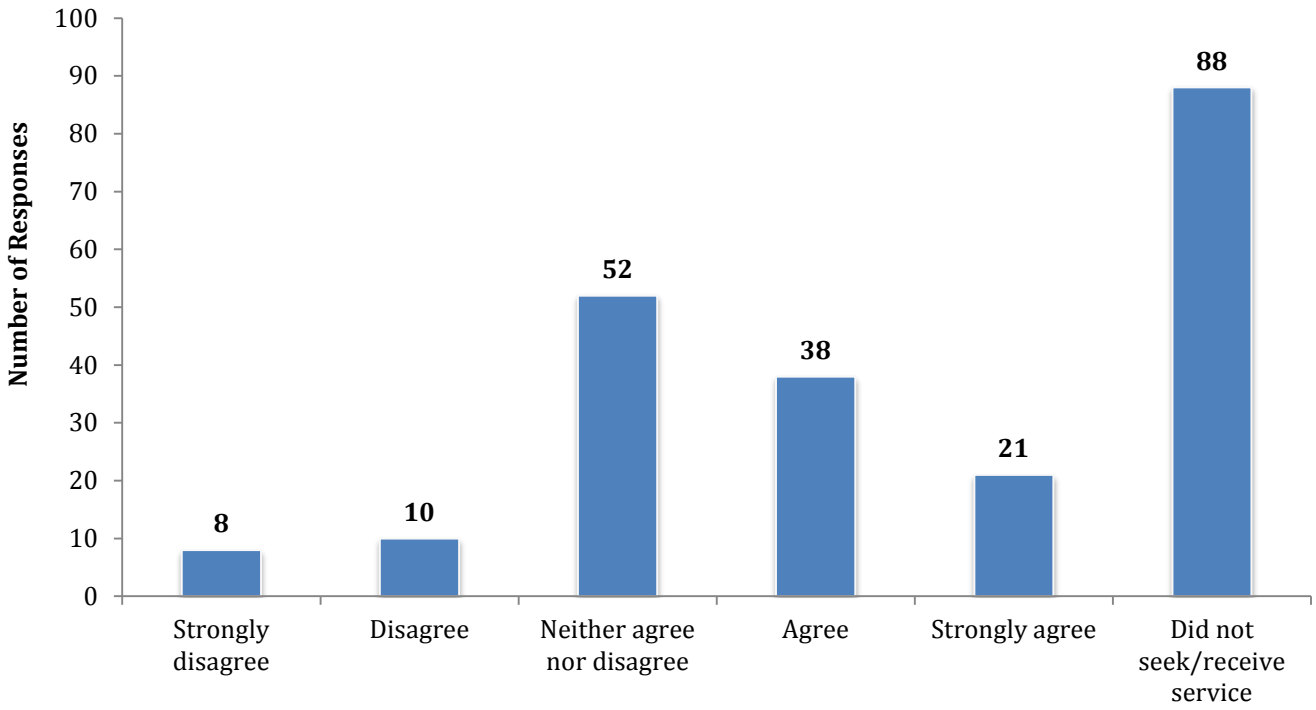
important step in the development of small businesses, particularly for those that worked in industries tied to defense or other highly secure applications. Of small businesses that responded and sought/received services, 18% reported having obtained access to cleared secure facilities as a result of their cluster participation (Exhibit 63). The Geospatial Cluster had the highest number of small businesses (6 of 23) that reported gaining access. Smart Grid had four firms, while the Energy Storage Cluster and the Huntsville Defense Cluster had three and two firms, respectively. FlexMatters and Project 17 each had one firm that indicated gaining access to cleared secured facilities. The remaining clusters did not have firms reporting increased access to such facilities.



Source: Small Business Survey

Exhibit 63. Acquisition of access to cleared secure facilities as a result of cluster participation

Several clusters focused on identifying opportunities for small businesses to become integrated into the supply chains for their industries and regions. Results from the Small Business Survey suggested that these activities were fruitful to some degree. Some 46% of small businesses indicated that their involvement in the clusters led them to participate in their industry supply chains (Exhibit 64).

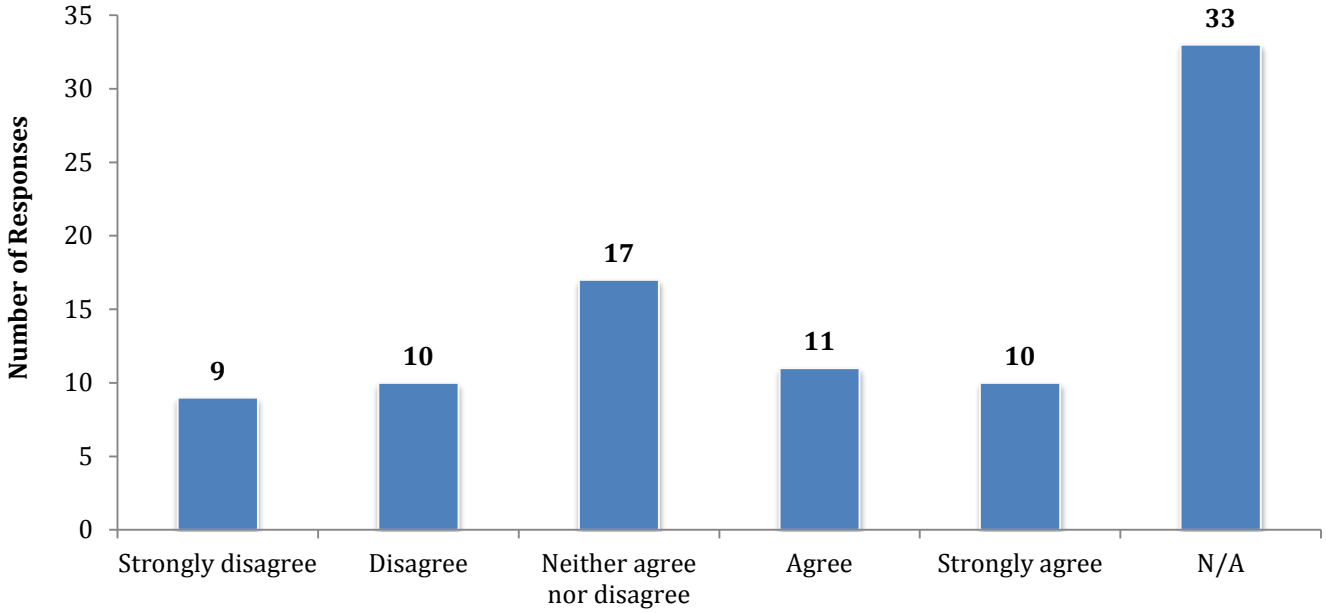


Source: Small Business Survey

Exhibit 64. Small business participation in industry supply chain as a result of cluster participation

The Green Aviation Cluster, the Energy Storage Cluster, and the Geospatial Cluster had between 65% and 71% of their small businesses reporting successful integration. Other clusters ranged from 56% for FlexMatters to 9% for the San Diego Defense Cluster.

Large organizations were also asked to report whether they agreed that cluster participation strengthened their supply chains. This was a somewhat different question, as it did not focus on their industries as a whole but on their specific supply chains. Among respondents, 37% indicated that cluster participation did strengthen their supply chains, while 33% disagreed (Exhibit 65). In particular, four large organizations in the Carolinas' Nuclear Cluster, the Huntsville Defense Cluster, and Project 17 reported that participation strengthened their supply chains. Three clusters did not have any large organizations reporting that participation strengthened their supply chains: Smart Grid, the Energy Storage Cluster, and the Geospatial Cluster.



Source: Large Organization Survey

Exhibit 65. Large organization participation in industry supply chain as a result of cluster participation

4.3. Long-Term Outcomes

The short- and intermediate-term outcomes of SBA's Cluster Initiative largely pertain to the immediate effects of cluster activities on business activity (e.g., financing, strategies, alliances, product development, and technologies). A longer-term question is whether this business activity will result in significant economic development, as evidenced by business formation, revenue, employment, and payroll. To a large extent, it is expected that these long-term outcomes become evident only after a number of years of established cluster activity and the consolidation of its effects. Nevertheless, these outcomes are immediately tracked, if only to consider tentative short-term trends emerging as a result of the first 2 years of the Initiative. The current evaluation of SBA's Initiative focuses on these outcomes for cluster-affiliated businesses and organizations during the federal fiscal year ending September 30, 2012; on changes in these outcomes during the first 2 years of the Initiative (between 2010 and 2012); and on a comparison of cluster performances in these areas with the performances of benchmark (i.e., non-cluster) organizations.

In fact, indicators of growth in cluster economic activity during the first 2 years of SBA's Initiative were generally quite robust and exceeded regional benchmarks. Average *full-time* employment in participating small businesses increased at an annualized rate of 6.5% per year, while average *total* employment (full- and part-time) increased at a rate of 8.7% per year. Revenue and average monthly payroll in these small businesses grew at annualized rates of 10.8% and 3.7% per year, respectively.

Eighteen small businesses reported that they were established *after* their founders became involved with one of the Initiative's clusters. Rates of employment and revenue growth in cluster businesses overall exceeded benchmarks for comparable non-cluster businesses; payroll growth exceeded regional benchmark measures in 7 out of 10 clusters.

4.3.1. Small Business Employment

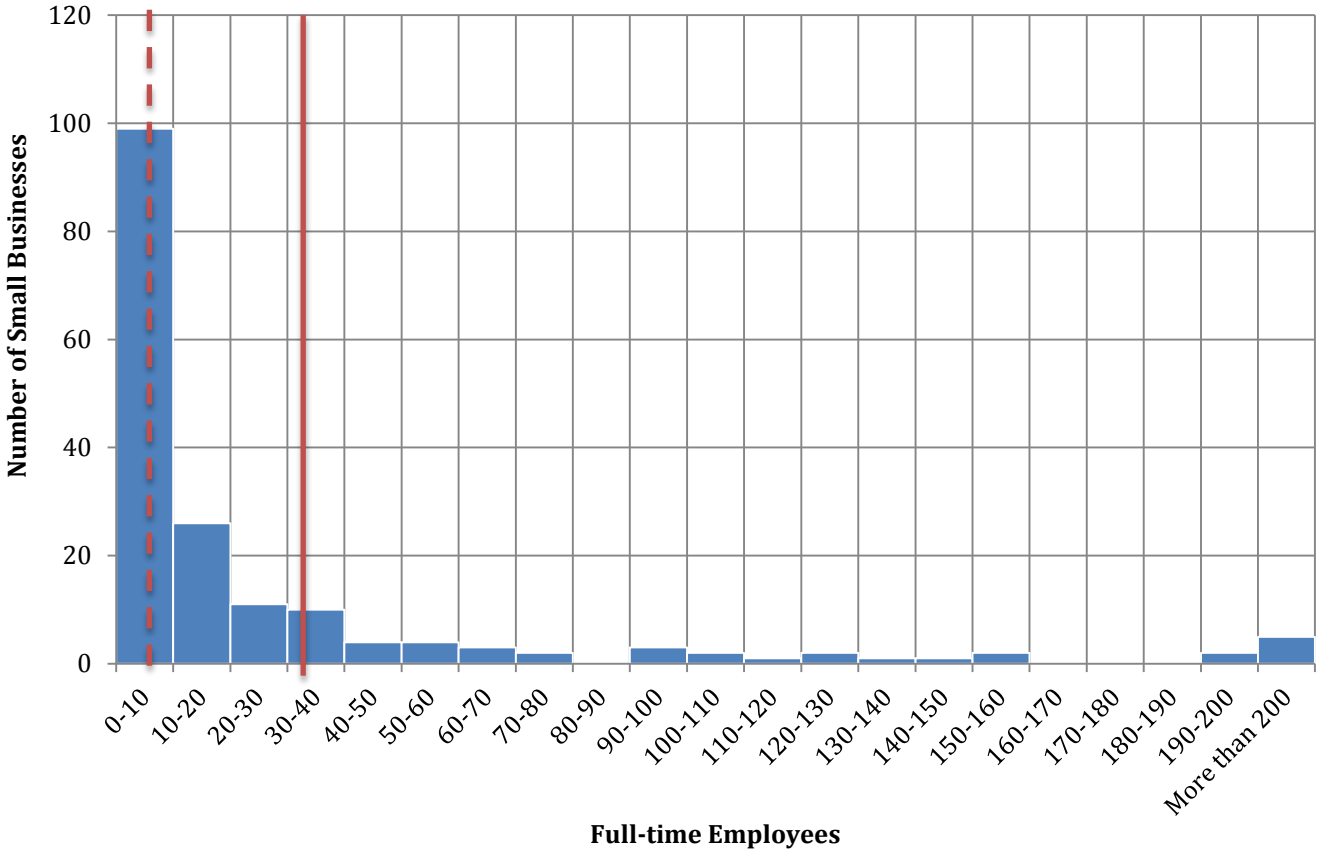
A key long-term outcome of SBA's Initiative is increased employment within cluster small businesses. Such growth not only signals the advancement of the cluster and its small business participants but is also suggestive of regional job growth. In 2012, cluster small businesses ranged in size from 0 to 485 full-time employees, with an average of 33.9 and a median of six full-time employees (Exhibit 66).[35] Business size varied considerably across clusters. The average number of full-time employees in 2012 ranged from 3.1 in Smart Grid to 125.4 in the Carolinas' Nuclear Cluster (Exhibit 68). Despite the presence of some larger businesses in this group (particularly in some clusters), a significant share of these businesses were quite small: 55% of those reporting had 10 or fewer full-time employees. Exhibit 67 illustrates the size distribution of these smaller firms. The representation of *very* small firms in this group declined, however. Of 178 small businesses, 30 reported that they had no full-time employees in 2010, while only 12 indicated that this was the case in 2012.

Across all clusters, average small business full-time employment increased by 6.5% per year in the first 2 years of the Initiative (rising from 29.9 to 33.9).[36] Median full-time employment also increased (from 4 to 6%), suggesting that this expansion was not limited to the "larger" small businesses associated with these clusters. Employment grew over the 2-year period in *each* of the 10 clusters as well, with annual employment growth rates ranging from a low of 3.2% (the Advanced Power Cluster) to a high of 28.3% (Smart Grid) (Exhibit 68).[37]

[35] The median indicates the center of the distribution; half the firms in the sample had employment above this level, while half had lower employment levels.

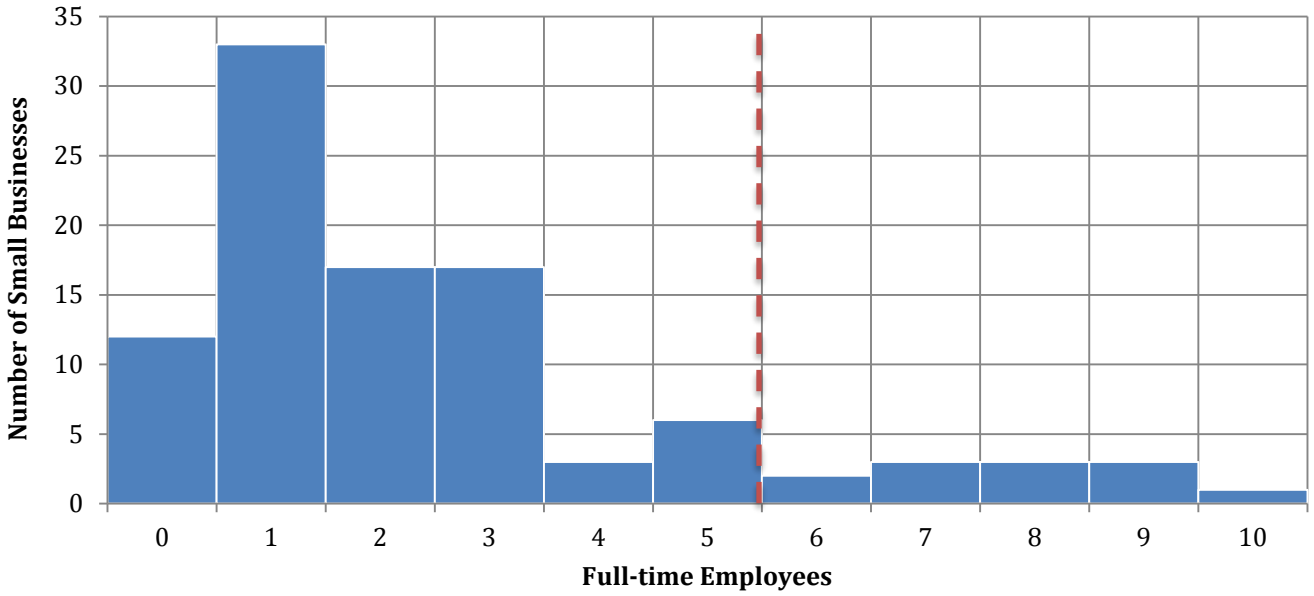
[36] These data were derived from the sample of small businesses completing surveys in Fall 2012. Because survey participation rates varied from year to year, this was necessarily a different (but overlapping) sample from those reporting in Fall 2011. As such, employment figures for 2010 and 2011 were comparable to, but not exactly the same as, those reported in the previous (Year 1) evaluation of this program. Data comparisons drawn entirely from the same sample, as presented here, however, allowed for the only valid statistical measure of changes over time in the performance of cluster businesses.

[37] Higher percentage rates of growth were often partly a result of employment increases from an initial low level in the first year measured.



Source: Small Business Survey

Exhibit 66. Distribution of full-time employment in cluster small businesses; the solid vertical line indicates the average number of jobs, while the dashed vertical line indicates the median number of jobs.



Source: Small Business Survey

Exhibit 67. Distribution of full-time employment in cluster small businesses among businesses with fewer than 10 employees; the dashed vertical line indicates the median number of jobs across all cluster businesses.

Exhibit 68. Average and median full-time employees of small businesses

Cluster	Number of small businesses reporting	Average full-time employment			Annualized percent change 2010–2012	Median full-time employment		
		Sept 2010	Sept 2011	Sept 2012		Sept 2010	Sept 2011	Sept 2012
Project 17	18	9.9	10.7	10.8	4.1%	1	1	1
Carolinas' Nuclear Cluster	5	114.4	119.2	125.4	4.7%	25	20	35
Advanced Power Cluster	17	19.3	19.9	20.5	3.2%	3	6	8
Geospatial Cluster	22	18.2	22.4	23.0	12.6%	2.5	3.5	5
FlexMatters	16	16.7	20.3	24.3	20.7%*	10	10	12.5
Huntsville Defense Cluster	38	33.6	35.5	38.5	7.0%**	8	10	8
Smart Grid	9	1.9	2.4	3.1	28.3%*	2	2	3
Energy Storage Cluster	24	53.2	55.2	58.0	4.4%**	9.5	9.5	9.5
San Diego Defense Cluster	20	14.9	16.0	16.4	4.9%	3.5	5	6
Green Aviation Cluster	9	78.0	81.7	83.2	3.3%	34	25	24
All clusters	**178**	**29.9**	**32.0**	**33.9**	**6.5%*** **	**4**	**6**	**6**

Source: Small Business Survey

Asterisks indicate levels of statistical significance based on the results of a paired two-tailed *t*-test with the null-hypothesis that the 2010 and 2012 averages are equal.
(***) The difference between 2010 and 2012 averages is statistically significant at the 1% level.
(**) The difference between 2010 and 2012 averages is statistically significant at the 5% level.
(*) The difference between 2010 and 2012 averages is statistically significant at the 10% level.

Part-time employment in cluster small businesses followed similar patterns. In the 2 years of the Initiative, average part-time employment across all firms rose 30% per year (from 2.7 to 4.5 part-time employees), and the median number of part-time employees rose from 1 to 2 (Exhibit 69). Part-time employment, however, was much smaller in scale than full-time employment: 27% of firms reported zero part-time employees in 2012, and another 29% reported either one or two. This smaller scale accounted, in part, for the higher percentage annual growth rates. Nevertheless, increases in part-time employment were indicative of overall cluster employment growth and were apparent in all 10 clusters, with cluster growth rates ranging from 7.7% per year (Project 17) to 102% per year (FlexMatters).

Exhibit 69. Average and median part-time employees of small businesses participating in the clusters

Cluster	Number of small businesses reporting	Average part-time employment			Annualized percent change 2010–2012	Median part-time employment		
		Sept 2010	Sept 2011	Sept 2012		Sept 2010	Sept 2011	Sept 2012
Project 17	13	1.9	2.7	2.2	7.7%	0	1	1
Carolinas' Nuclear Cluster	4	1.3	1.3	4.5	89.7%	0.5	0	4
Advanced Power Cluster	15	1.5	1.8	2.1	20.6%*	1	1	1
Geospatial Cluster	20	1.6	2.2	3.2	43.7%**	1	1	1
FlexMatters	12	1.0	1.7	4.1	102.1%	0	1	2.5
Huntsville Defense Cluster	32	4.1	5.2	6.2	22.2%	2	2	2
Smart Grid	7	2.3	2.9	3.9	29.9%	3	3	3
Energy Storage Cluster	20	4.3	4.9	6.6	23.9%	1.5	1	2
San Diego Defense Cluster	19	2.0	3.2	4.2	44.3%***	1.5	2	3
Green Aviation Cluster	8	3.9	5.0	5.8	21.8%	2	1	1
All clusters	**150**	**2.7**	**3.4**	**4.5**	**30.0%*** **	**1**	**1**	**2**

Source: Small Business Survey

Asterisks indicate levels of statistical significance based on the results of a paired two-tailed *t*-test with the null-hypothesis that the 2010 and 2012 averages are equal.
(***) The difference between 2010 and 2012 averages is statistically significant at the 1% level.
(**) The difference between 2010 and 2012 averages is statistically significant at the 5% level.
(*) The difference between 2010 and 2012 averages is statistically significant at the 10% level.

Levels and changes in total employment (full- and part-time) for small business cluster participants reinforced the results discussed above. Total employment rose an average of 8.7% per year across all 10 clusters since SBA's Initiative was launched, with every cluster experiencing at least 4% or more employment growth per year (Exhibit 70). Annual growth rates ranged from lows of 4.1% and 4.3% (the Green Aviation Cluster and the Advanced Power Cluster, respectively) to highs of nearly 30% (FlexMatters and Smart Grid).

Exhibit 70. Average employment (full- and part-time) of small businesses participating in the clusters

Cluster	Number of small businesses reporting	Average employment (full-time and part-time)			Change 2010–2012	Annualized percent change 2010–2012	Median employment (full-time and part-time)		
		Sept 2010	Sept 2011	Sept 2012			Sept 2010	Sept 2011	Sept 2012
Project 17	18	11.3	13.5	13.5	2.2	9.1%	1	2.5	2.5
Carolinas' Nuclear Cluster	5	115.4	120.2	129.0	13.6	5.7%	25	20	45
Advanced Power Cluster	17	20.6	21.5	22.4	1.8	4.3%	4	8	10
Geospatial Cluster	22	19.6	24.4	26.0	6.4	15.1%	5	5.5	8.5
FlexMatters	16	17.4	21.6	29.3	11.9*	29.7%*	11.5	10.5	13.5
Huntsville Defense Cluster	38	37.1	39.8	43.7	6.6**	8.5%**	10.5	11.5	12
Smart Grid	9	3.6	4.4	6.0	2.4	29.9%	3	5	6
Energy Storage Cluster	24	56.8	59.3	63.5	6.8**	5.8%**	11.5	11.5	11.5
San Diego Defense Cluster	20	16.5	18.6	19.9	3.4	9.8%	5	9	10.5
Green Aviation Cluster	9	81.4	86.1	88.3	6.9***	4.1%***	37	26	27
All clusters	**178**	**32.1**	**34.9**	**37.9**	**5.8*** **	**8.7%*** **	**6**	**10**	**10.5**

Source: Small Business Survey

Asterisks indicate levels of statistical significance based on the results of a paired two-tailed *t*-test with the null-hypothesis that the 2010 and 2012 averages are equal.
(***) The difference between 2010 and 2012 averages is statistically significant at the 1% level.
(**) The difference between 2010 and 2012 averages is statistically significant at the 5% level.
(*) The difference between 2010 and 2012 averages is statistically significant at the 10% level.

Comparison With Regional Benchmarks. Although small businesses participating in SBA's Cluster Initiative reported adding employees over the past 2 years, a remaining question concerned the size of this employment growth relative to growth in otherwise comparable firms not involved with the Initiative. Two data sources were used to compute comparison employment statistics for businesses in comparable industries and geographic areas: the Quarterly Census of Employment and Wages (QCEW)

and the Dun & Bradstreet (D&B) Database. Both sets of comparison statistics corresponded to total employment—the sum of full-time and part-time employees—per firm.[38]

The QCEW sample included firms that were located in the same counties and had the same industrial classifications as cluster small businesses. It suffered, however, from the limitation that it was not restricted to small businesses but rather consisted of a full range of firm sizes. To the extent that employment growth was higher in small firms, the percentage change in employment in the QCEW sample was expected to be lower. The QCEW sample was also restricted in not reporting data when too few establishments were in a given county and detailed industry classification (thereby not meeting data disclosure standards). Thus, the industry code comparison between the QCEW sample and the sample of cluster small businesses was imperfect.[39,40] In addition, the D&B sample was limited to small businesses that matched the size, age, and geographic and industrial profiles of businesses in the cluster sample.[41]

Although the QCEW and D&B samples represented important benchmarks for businesses in the Regional Clusters Initiative, factors that affected a small business's inclusion in the cluster posed limitations when comparing sample statistics. To the extent that small businesses participating in the Initiative differed from those in the QCEW and D&B sample with respect to characteristics other than geography and industry (and size and age), these characteristics may have been responsible for observed differences between sample statistics. As indicated above, clusters varied with respect to their inclusion criteria. Some, such as the Huntsville Defense Cluster, had relatively broad inclusion criteria, while others, such as the San Diego Defense Cluster, had relatively stringent guidelines. Additionally, businesses that agreed to be part of the 10 clusters may have been different in terms of their performance indicators than those that did not.

Small businesses across the 10 clusters experienced more annualized employment growth than did comparable firms in the QCEW sample (8.7% vs. 2.3%) and in the D&B sample (3.4%) (Exhibit 71). In

[38] Please see Section A.3 of the Methodology Appendix for a detailed description of how comparison statistics were computed.
[39] This latter limitation will not bias the resulting employment growth measure for the QCEW sample as long as firms in missing industrial classifications did not have systematically higher or lower employment growth than those in included industrial classifications.
[40] An additional limitation in the QCEW comparison is that growth in this sample was computed between September 2010 and June 2012, a period that was 3 months shy of the period measured in the Regional Clusters Initiative sample. Because U.S. economic growth between July and September 2012 was comparable to growth in the preceding 21 months, the omission of this last quarter of data from the QCEW sample is not likely to introduce systematic bias. (*U.S. Bureau of Economic Analysis, Gross Domestic Product*, http://www.bea.gov/newsreleases/national/gdp/gdp_glance.htm, accessed January 31, 2013.)
[41] D&B data covered a 3-year period, from December 2009 through December 2012. An annualized percentage change over this time period incorporated, but extended somewhat beyond, the September 2010 to September 2012 period represented in the Regional Clusters Initiative sample. The additional months in the D&B sample that preceded the Regional Clusters Initiative (December 2009–August 2010) represented a period of economic growth comparable to what followed and thus should not significantly bias the data comparison (*U.S. Bureau of Economic Analysis, Gross Domestic Product, op. cit.).*

all but one case, this was also true at the level of the individual cluster (firms reporting from the Carolinas' Nuclear Cluster reported a growth rate that was 0.2 percentage point lower than in the comparable QCEW sample). And, in many clusters, the employment growth rate of reporting cluster businesses was considerably above the rate measured for comparable firms in either the QCEW or the D&B sample. Of course, as discussed in the Methodology Appendix, the limitations of these comparisons have to be considered when interpreting the statistics.

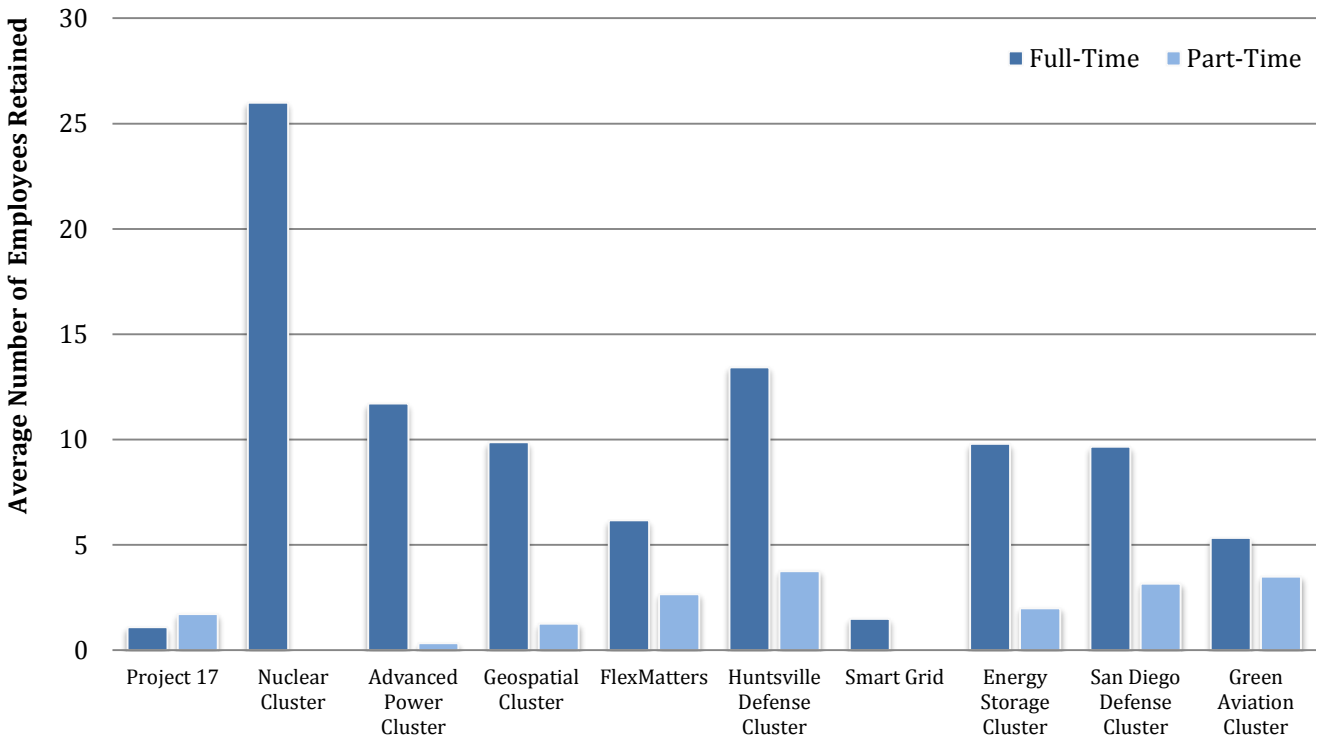
Exhibit 71. Comparison of annualized percent change in employment (full-time and part-time) across three samples, 2010–2012

Cluster	Annualized percent change in total employment, 2010–2012			Percentage point difference	
	Regional Clusters Initiative sample	QCEW sample	D&B sample	Regional Clusters Initiative – QCEW	Regional Clusters Initiative – D&B
Project 17	9.1%	7.5%**	9.6%***	1.6%	–0.5%
Carolinas' Nuclear Cluster	5.7%	5.9%	2.9%**	–0.2%	2.8%
Advanced Power Cluster	4.3%	1.8%**	3.1%**	2.5%	1.2%
Geospatial Cluster	15.1%	3.9%**	4.7%***	11.2%*	10.4%
FlexMatters	29.7%*	4.4%**	3.3%***	25.2%**	26.4%**
Huntsville Defense Cluster	8.5%**	5.6%***	3.8%***	2.9%	4.7%
Smart Grid	29.9%	2.1%***	12.4%***	27.8%	17.5%
Energy Storage Cluster	5.8%**	1.8%**	5.2%***	4.0%	0.6%
San Diego Defense Cluster	9.8%***	0.6%	4.6%**	9.2%**	5.2%*
Green Aviation Cluster	4.1%	2.6%**	–2.4%	1.5%	6.5%
All clusters	**8.7%*** **	**2.3%*** **	**3.4%*** **	**6.3%*** **	**5.2%*** **

Source: Small Business Survey, QCEW data, and D&B data

Asterisks indicate levels of statistical significance based on the results of a paired two-tailed *t*-test with the null-hypothesis that the 2010 and 2012 averages are equal or that the annualized percent change in the Initiative sample is equal to that of the D&B or the QCEW sample.
(***) The difference between 2010 and 2012 averages is statistically significant at the 1% level.
(**) The difference between 2010 and 2012 averages is statistically significant at the 5% level.
(*) The difference between 2010 and 2012 averages is statistically significant at the 10% level.

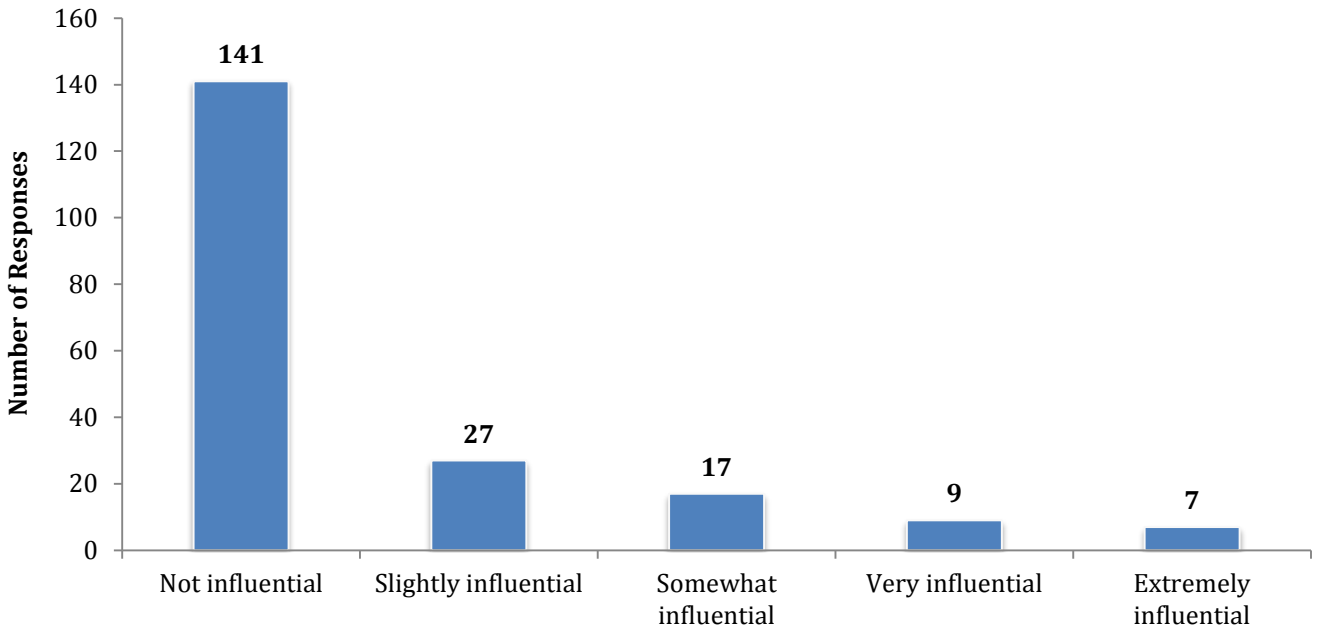
Employment Growth and Retention. The Small Businesses Survey also collected information regarding the number of employees retained during the previous 12 months and whether cluster participation influenced staff size, the change in the number of employees, or employee retention.[42] Cluster small businesses reported retaining an average of 10.2 full-time and 2.3 part-time employees; the number of full-time employees retained ranged from about 1 (Project 17) to 26 (the Carolinas' Nuclear Cluster) across the 10 clusters (Exhibit 72). Of the 201 small businesses responding, 29.9% reported that cluster participation was at least slightly influential in affecting employment changes or retention in the previous year (Exhibit 73). The same businesses were also queried regarding whether their cluster participation had led to increased staff size in their business; 19% either "agreed" or "agreed strongly" with the premise. Thus, some evidence suggests that cluster activity is supportive of employment growth and retention, at least among some cluster small businesses.



Source: Small Business Survey

Exhibit 72. Average number of full- and part-time employees retained by small businesses participating in clusters

[42] A retained employee is a current employee whom the business initially considered laying off but then decided to keep under employment.



Source: Small Business Survey

Exhibit 73. Reported influence of small business cluster participation on employment change and retention

Estimated Number of Jobs Created During Second Year of the Initiative. The data discussed so far with regard to employment levels, growth, and retention relied on data collected in the Small Business Survey. These data enable an analysis of the change in the average and median number of positions per small business, along with a comparison to changes in a larger group of businesses. Yet, because the survey was not completed by all cluster small businesses, these data do not permit an accurate estimation of the total number of jobs created within the 10 clusters.43 To this end, we report data provided by cluster administrators in their quarterly reports regarding the total number of jobs created within their cluster (Exhibit 74).

Exhibit 74. Reported number of jobs created during the second year of the Initiative

Cluster	Number of jobs created during the second year of the Initiative
Project 17	6
Carolinas' Nuclear Cluster	385
Advanced Power Cluster	17

[43] Any method used to extrapolate the total number of jobs created during the second year from survey data requires the assumption that the subset of cluster small businesses that responded to the Small Business Survey is representative of those that did not respond, an unverifiable assumption.

Cluster	Number of jobs created during the second year of the Initiative
Geospatial Cluster	95
FlexMatters	45
Huntsville Defense Cluster	*
Smart Grid	7
Energy Storage Cluster	305
San Diego Defense Cluster	33
Green Aviation Cluster	*
All clusters	**893**

Source: Cluster quarterly reports
* No data reported

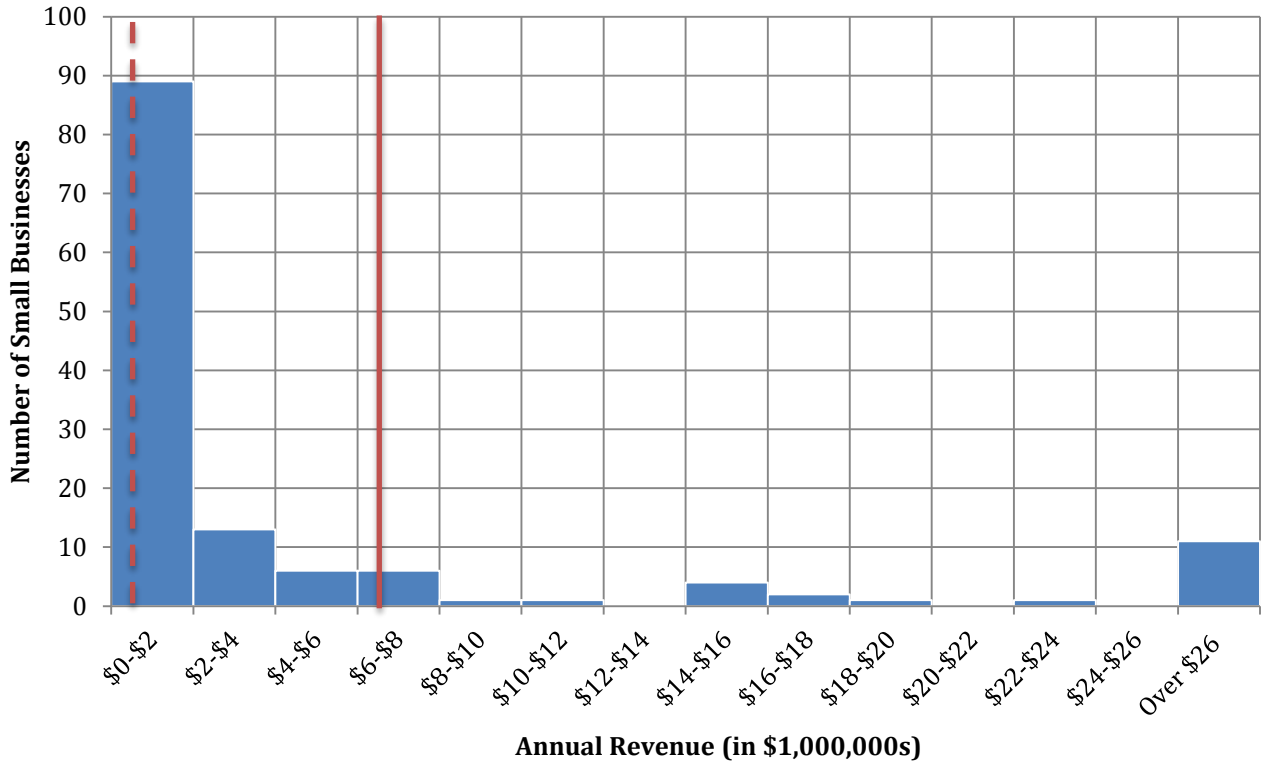
Most cluster administrators based the data reported in Exhibit 74 on information collected during their interactions with cluster small businesses. There is still significant discrepancy across clusters in how "jobs created" is defined, rendering a comparison across clusters challenging. Most cluster administrators did not specify whether the values they provided are only full-time positions or are the result of combining full-time and part-time positions. Additionally, it is generally not clear whether jobs created outside the cluster's region of focus by companies with multiple sites is included in reported numbers. Despite these limitations, the values provided in Exhibit 74 should be viewed as a lower-bound estimate of the actual number of jobs created because the vast majority of cluster administrators reported job numbers from companies with which they interacted or received updates, not the full set of cluster small businesses.[44] In addition, several clusters did not report a total number of jobs created, and the number reported here for the Advanced Power Cluster is only the number of confirmed jobs created, not the total estimated number of jobs based on contract and grants, which is significantly greater but less

[44] The exception to this is the cluster administrator for the Energy Storage Cluster, who relied on the number of open positions filled at OEMs within the cluster's region to infer jobs created. This metric has inherent flaws; for example, it counts positions that are open because the prior employee left or retired instead of counting the number of newly created positions.

reliable.[45] Furthermore, the Carolinas' Nuclear Cluster reported only the number of jobs created in the nuclear industry, not those created in the energy industry overall.[46]

4.3.2. Small Business Revenue

A second important long-term outcome of SBA's Cluster Initiative is business revenue growth because robust increases in revenue are usually accompanied by increases in employment and production. In 2012, cluster small businesses reported annual revenue averaging $6.2 million per business, with a median value of $460,000 (Exhibit 75). Of 135 small businesses reporting, 30 indicated $0 in revenue, while the very largest reported annual revenue of $100 million. The majority of small businesses participating in the 10 clusters had revenue less than $2 million per year. Variation in annual revenue among these smaller businesses is illustrated in Exhibit 76.

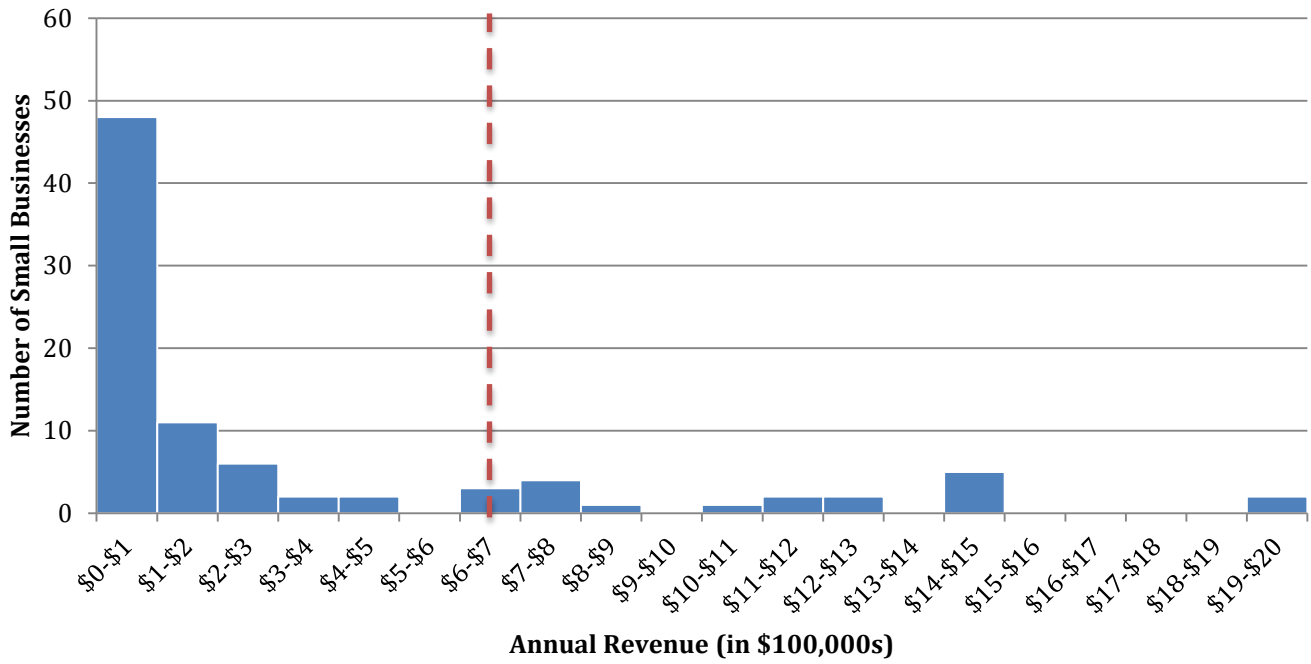


Source: Small Business Survey

Exhibit 75. Distribution of annual revenue of cluster small businesses for the year ending in September 2012; the dashed vertical line represents the median revenue.

[45] The Advanced Power Cluster reported two numbers for jobs created: the confirmed number of jobs created based on interactions with cluster firms, and an estimated number of jobs created (431) based on the U.S. Defense Logistics Agency metric for high technology contracts that estimates a job created per $50,000 in contracts and awards.

[46] This is important to note, because the cluster has been assisting multiple small businesses to enter or progress in the energy industry while they build up their quality assurance program to comply with nuclear requirements. More details on this approach can be found in entry 3 of Section 5.5.



Source: Small Business Survey

Exhibit 76. Distribution of annual revenue for the year, ending in September 2012, among cluster small businesses with annual revenue less than $2 million; the dashed vertical line represents the median revenue.

Average annual revenue per firm varied considerably across the 10 different clusters. Small businesses in Smart Grid reported the lowest average annual revenue in 2012 ($596,000), while those participating in the Carolinas' Nuclear Cluster had the highest average annual revenue ($35,800,000) (Exhibit 77). Median revenue was considerably lower than average revenue in all clusters, indicating that in each cluster, more than half the small businesses had annual revenue below the average.

Annual revenue among small businesses participating in the 10 clusters increased an average of 10.8% per year during the first 2 years of the Regional Clusters Initiative (Exhibit 77).[47] Increases were observed in all clusters except the Green Aviation Cluster, where revenue declined at an annual rate of 7.5% over these 2 years. On average, small businesses in the Advanced Power Cluster, FlexMatters, Smart Grid, and the Energy Storage Cluster reported higher than average revenue growth during this time period.[48] The overall revenue growth reported among cluster small businesses exceeded that measured in the D&B sample (6.2%). Individually, revenue growth in 6 out of 10 clusters exceeded the comparable D&B benchmark growth rate, while 4 out of 10 clusters (the Geospatial Cluster, Project 17, the San Diego Defense Cluster, and the Green Aviation Cluster) fell short (Exhibit 78).

[47] This growth rate is measured only for small businesses that reported revenue for all 3 years (2010, 2011, and 2012).
[48] Changes in revenues between 2010 and 2012, either overall or at the level of the individual cluster, could not be identified as being statistically significant due to the small sample sizes available.

Exhibit 77. Average and median annual revenue and percent change in revenue of cluster small businesses, 2010–2012

Cluster	Number of small businesses reporting	Average annual revenue, year ending Sept 30			Annualized percent change 2010–2012	Median annual revenue, year ending Sept 30		
		Sept 2010	Sept 2011	Sept 2012		Sept 2010	Sept 2011	Sept 2012
Project 17	13	$ 1,482,837.42	$1,695,657.82	$ 1,648,847.68	5.4%	$ 134,445.48	$ 141,486.69	$ 135,000.00
Carolinas' Nuclear Cluster	5	$30,000,000.00	$32,006,000.00	$35,800,000.00	9.2%	$ -	$ 30,000.00	$4,000,000.00
Advanced Power Cluster	10	$ 1,665,000.00	$ 1,781,100.00	$ 5,708,900.00	85.2%	$ 212,500.00	$ 234,000.00	$ 244,500.00
Geospatial Cluster	18	$ 5,723,784.72	$ 7,834,286.33	$ 6,001,759.61	2.4%	$ 527,900.00	$ 1,067,402.50	$1,114,881.50
FlexMatters	10	$ 1,428,382.90	$ 2,409,641.80	$ 2,613,961.28	35.3%	$ -	$ 100,000.00	$ 1,500.90
Huntsville Defense Cluster	29	$ 8,424,133.69	$ 8,744,841.81	$ 9,279,833.22	5.0%	$ 500,000.00	$ 800,000.00	$1,102,653.00
Smart Grid	5	$ 150,000.00	$ 262,000.00	$ 596,000.00	99.3%	$ -	$ -	$ 180,000.00
Energy Storage Cluster	16	$ 2,759,781.56	$ 4,525,000.00	$ 5,210,612.75	37.4%	$ 299,252.50	$ 327,500.00	$ 450,000.00
San Diego Defense Cluster	20	$ 2,750,607.50	$ 2,894,011.80	$ 3,056,855.65	5.4%	$ 650,000.00	$ 483,500.00	$ 532,800.00
Green Aviation Cluster	5	$ 7,088,300.00	$ 6,183,200.00	$ 6,060,250.00	–7.5%	$4,300,000.00	$ 2,800,000.00	$2,600,000.00
All clusters	**131**	**$ 5,212,968.49**	**$ 5,962,631.85**	**$ 6,401,516.31**	**10.8%****	**$ 319,210.00**	**$ 600,000.00**	**$ 650,000.00**

Source: Small Business Survey

Asterisks indicate levels of statistical significance based on the results of a paired two-tailed *t*-test with the null-hypothesis that the 2010 and 2012 averages are equal.
(***) The difference between 2010 and 2012 averages is statistically significant at the 1% level.
(**) The difference between 2010 and 2012 averages is statistically significant at the 5% level.
(*) The difference between 2010 and 2012 averages is statistically significant at the 10% level.

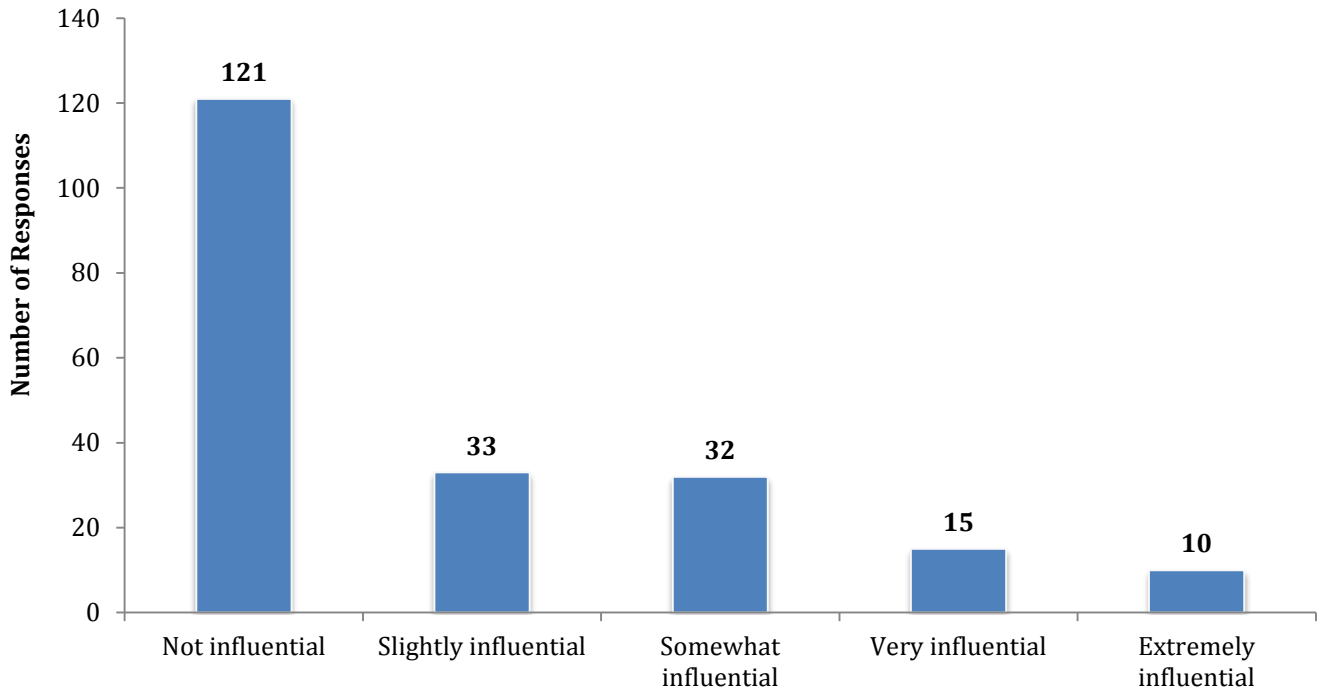
Exhibit 78. Percentage change in revenue among small businesses participating in the 10 clusters, compared to the percentage change in revenue in the D&B sample

Cluster	Annualized percent change in average firm revenue, 2010–2012		Percentage point difference (Regional Clusters Initiative – D&B)
	Regional Clusters Initiative sample	D&B sample	
Project 17	5.4%	7.1%	–1.6%
Carolinas' Nuclear Cluster	9.2%	2.6%	6.6%
Advanced Power Cluster	85.2%	13.2%**	72.0%
Geospatial Cluster	2.4%	2.7%	–0.3%
FlexMatters	35.3%	3.3%**	31.9%
Huntsville Defense Cluster	5.0%	4.0%***	1.0%
Smart Grid	99.3%	5.5%**	93.8%
Energy Storage Cluster	37.4%	8.7%**	28.7%
San Diego Defense Cluster	5.4%	15.1%*	–9.6%**
Green Aviation Cluster	–7.5%	5.0%**	–12.5%
All clusters	**10.8%****	**6.2%*****	**4.6%**

Source: Small Business Survey, D&B data

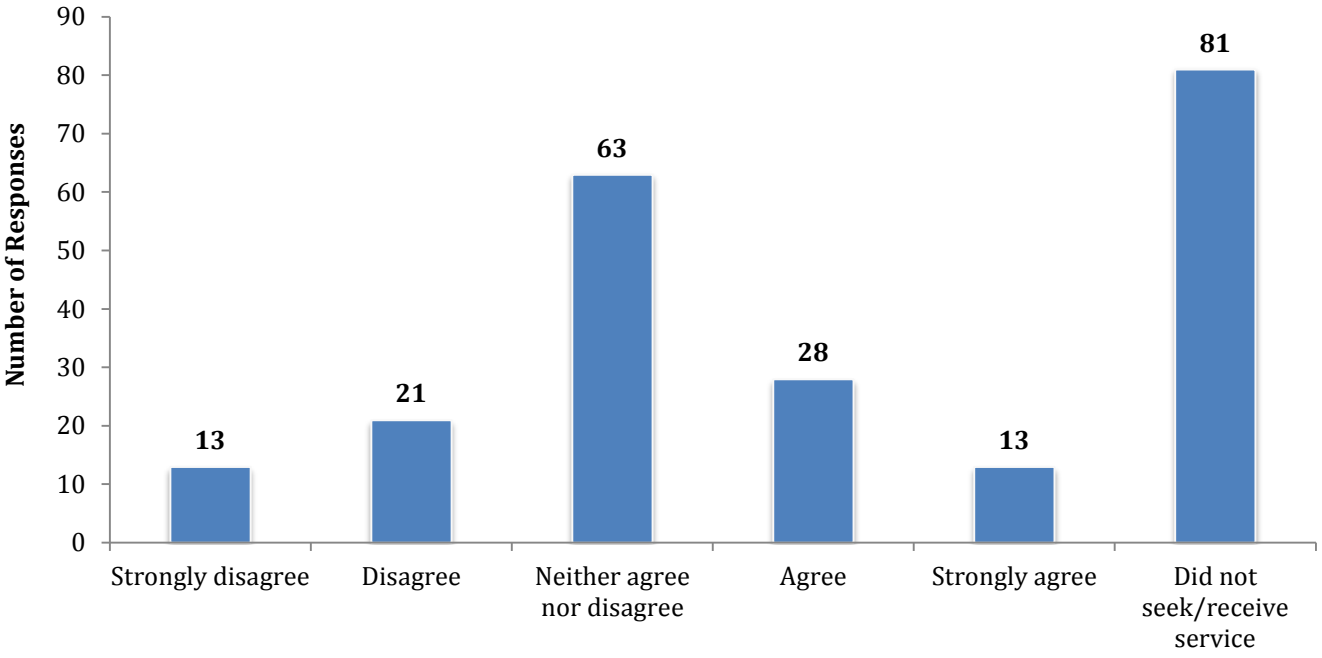
Asterisks indicate levels of statistical significance based on the results of a paired two-tailed *t*-test with the null-hypothesis that the 2010 and 2012 averages are equal or that the annualized percent change in the Initiative sample is equal to that of the D&B sample.
(***) The difference between 2010 and 2012 averages is statistically significant at the 1% level.
(**) The difference between 2010 and 2012 averages is statistically significant at the 5% level.
(*) The difference between 2010 and 2012 averages is statistically significant at the 10% level.

Small businesses were queried regarding the extent to which their participation in clusters influenced their revenue during the second year of the Initiative and how they perceived the impact of cluster participation on their profit margins. Among respondents, 43% reported that their participation in cluster activities and services at least slightly influenced their revenue (Exhibit 79), and 30% reported that they "agreed" or "strongly agreed" that increased profit margins resulted from cluster participation (Exhibit 80).



Source: Small Business Survey

Exhibit 79. Influence of cluster participation on small business revenue

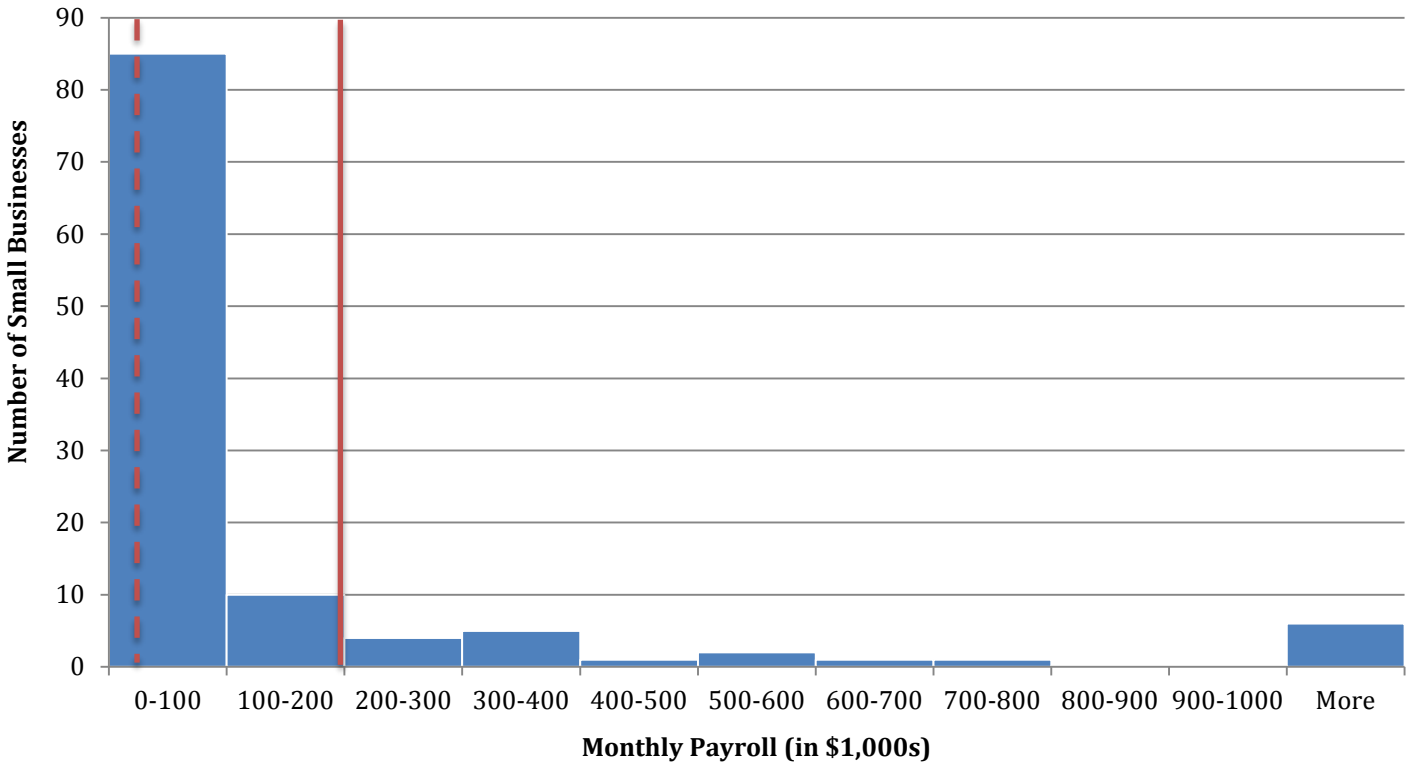


Source: Small Business Survey

Exhibit 80. Increased profit margin as a result of cluster participation

4.3.3. Small Business Payroll

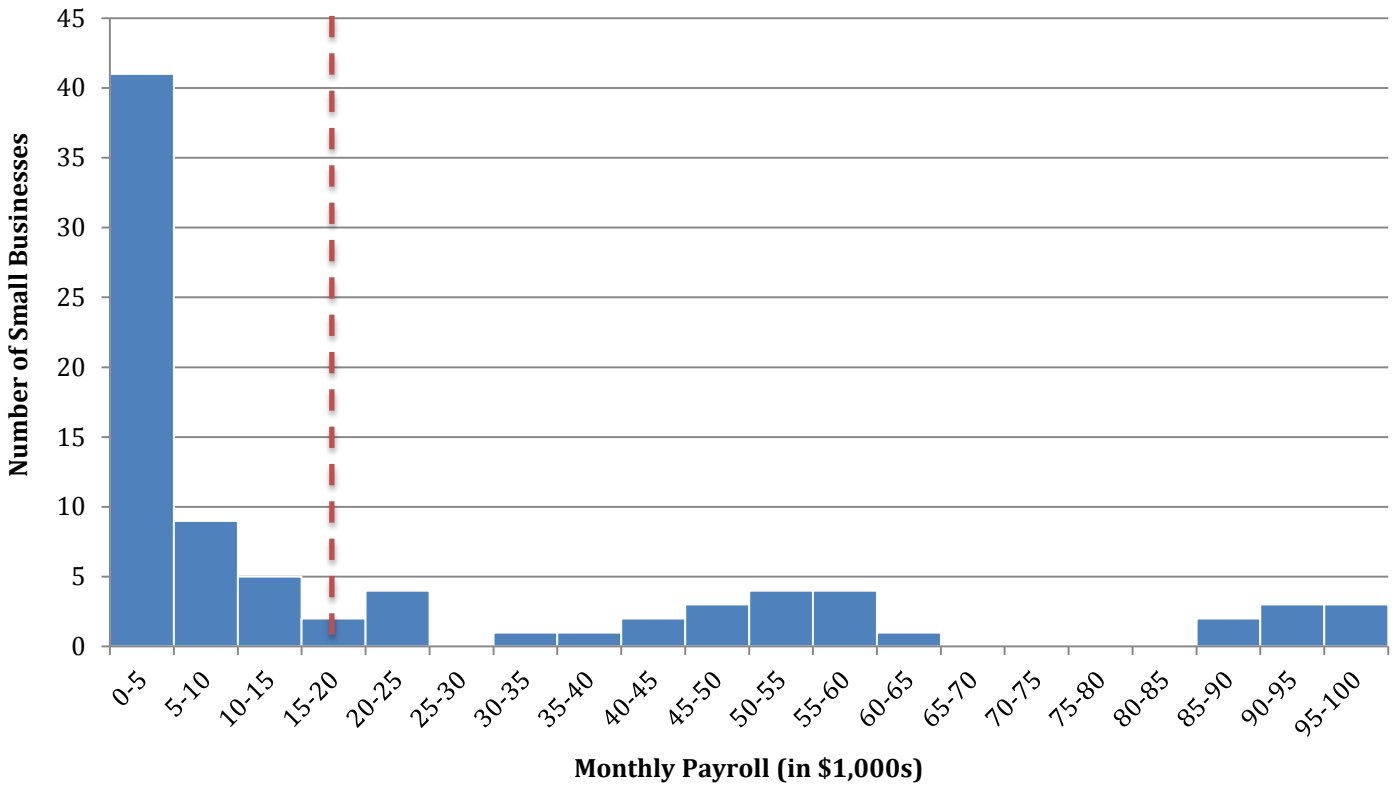
A potentially important long-term outcome of the Regional Clusters Initiative is increased small business payroll. Including fringe benefits and bonuses, total payroll represents the total compensation paid by a firm to its employees and serves as an additional indicator of business size and production levels. One-month payroll among cluster small businesses in 2012 ranged between $0 and $4.4 million across the 108 businesses reporting, averaging $196,915.[49] Average payroll also varied widely across clusters, from $43,800 for Smart Grid businesses to nearly $1.5 million for businesses participating in the Carolinas' Nuclear Cluster (Exhibit 83). The majority of cluster-participating small businesses, however, had payrolls less than $100,000 in 2012 (Exhibit 81 and 82).



Source: Small Business Survey

Exhibit 81. Distribution of monthly payroll of small businesses in September 2012; the plain vertical line indicates the average payroll, while the dashed vertical line indicates the median monthly payroll.

[49] Statistics were only computed for small businesses reporting payroll for 2010, 2011, and 2012.



Source: Small Business Survey

Exhibit 82. Distribution of monthly payroll in September 2012 in small businesses with monthly payroll less than $100,000; the dashed vertical line indicates the median monthly payroll

Average monthly payroll grew 3.8% per year during the first 2 years of SBA's Cluster Initiative, while median monthly payroll increased by 8.4% per year, suggesting that payroll increases were experienced by businesses across the size spectrum. At the cluster level, payroll increased over this time period in 8 out of 10 clusters (Exhibit 83). The most rapid increase was observed in Smart Grid, where average payrolls more than doubled during the first 2 years of the Initiative. This increase was partially due to an increase in employment, as Smart Grid also experienced the highest employment growth among cluster businesses over this time period (Exhibit 68).[50]

[50] Payroll changes between 2010 and 2012, either overall or at the level of the individual cluster, could not be identified as being statistically significant due to the small sample sizes available.

Exhibit 83. Monthly payroll of small businesses participating in the clusters, 2010–2012

Cluster	Number of small businesses reporting	Average monthly payroll			Change 2010–2012	Annualized percent change 2010–2012	Median monthly payroll		
		Sept 2010	Sept 2011	Sept 2012			Sept 2010	Sept 2011	Sept 2012
Project 17	9	$ 27,694.1	$ 31,698.6	$ 45,714.0	$ 18,019.9	28.5%	$ 1,500.0	$ 2,300.0	$ 5,000.0
Carolinas' Nuclear Cluster	4	$1,011,899.8	$ 1,336,142.8	$1,479,272.5	$ 467,372.8	20.9%	$ -	$ 5,000.0	$750,000.0
Advanced Power Cluster	9	$ 111,150.0	$ 106,055.6	$ 101,577.8	$ (9,572.2)	–4.4%	$ -	$ 500.0	$ 500.0
Geospatial Cluster	14	$ 473,939.9	$ 399,257.6	$ 276,799.9	$(197,140.0)	–23.6%	$14,500.0	$22,500.0	$ 20,050.0
FlexMatters	11	$ 88,588.1	$ 71,403.5	$ 116,685.2	$ 28,097.1	14.8%	$ 6,000.0	$ 7,500.0	$ 91,000.0
Huntsville Defense Cluster	20	$ 108,525.0	$ 103,500.0	$ 137,200.0	$ 28,675.0**	12.4%**	$15,000.0	$12,000.0	$ 10,000.0
Smart Grid	5	$ 16,200.0	$ 27,800.0	$ 43,800.0	$ 27,600.0	64.4%	$ 9,000.0	$20,000.0	$ 50,000.0
Energy Storage Cluster	12	$ 145,698.7	$ 156,540.3	$ 173,243.8	$ 27,545.2	9.0%	$28,642.5	$26,192.5	$ 26,500.0
San Diego Defense Cluster	18	$ 138,081.9	$ 157,792.5	$ 189,709.4	$ 51,627.4*	17.2%*	$21,668.0	$22,693.0	$ 17,937.5
Green Aviation Cluster	6	$ 59,954.8	$ 63,347.5	$ 68,117.0	$ 8,162.2	6.6%	$26,164.5	$40,742.5	$ 43,851.0
All clusters	**108**	**$ 182,888.1**	**$ 187,659.6**	**$ 196,915.3**	**$ 14,027.2**	**3.8%**	**$14,500.0**	**$14,700.0**	**$ 17,050.0**

Source: Small Business Survey

Asterisks indicate levels of statistical significance based on the results of a paired two-tailed *t*-test with the null-hypothesis that the 2010 and 2012 averages are equal.
(***) The difference between 2010 and 2012 averages is statistically significant at the 1% level.
(**) The difference between 2010 and 2012 averages is statistically significant at the 5% level.
(*) The difference between 2010 and 2012 averages is statistically significant at the 10% level.

The State Personal Income Accounts quarterly data on total compensation of employees by industry from the Bureau of Economic Analysis (BEA) were used as a benchmark for the cluster payroll growth reported here. The BEA data are aggregate statistics computed at the state level and collected on all businesses, small and large (as compared to firm-level statistics on small businesses only in the Regional Clusters Initiative sample). The selection issues discussed previously also apply in this case. Differences other than industry and geographic scope may account for the differences observed between cluster and BEA data.

Average payroll growth in 7 out of 10 clusters exceeded the BEA regional benchmarks for this time period (Exhibit 84).[51] Businesses in the Advanced Power Cluster and the Geospatial Cluster, however, reported declining average payrolls over this time period, while their regional benchmarks showed close to average rates of growth. Green Aviation Cluster businesses reported positive payroll growth over this period (6.6% per year) but fell just short of the benchmark standard for businesses with a comparable geographic and industrial distribution (7.3%). Because of the dampening effects of negative payroll growth in the Advanced Power Cluster and the Geospatial Cluster, the growth rate in payroll across all 10 clusters (3.8%) fell short of the overall regional benchmark (5.3%).

[51] For clusters that span multiple states, a weighted average across the states was computed based on the number of small businesses that the clusters had in each state.

Exhibit 84. Percentage change in payroll among the small businesses participating in the clusters compared to the percentage change in payroll computed using the BEA State Personal Income Accounts

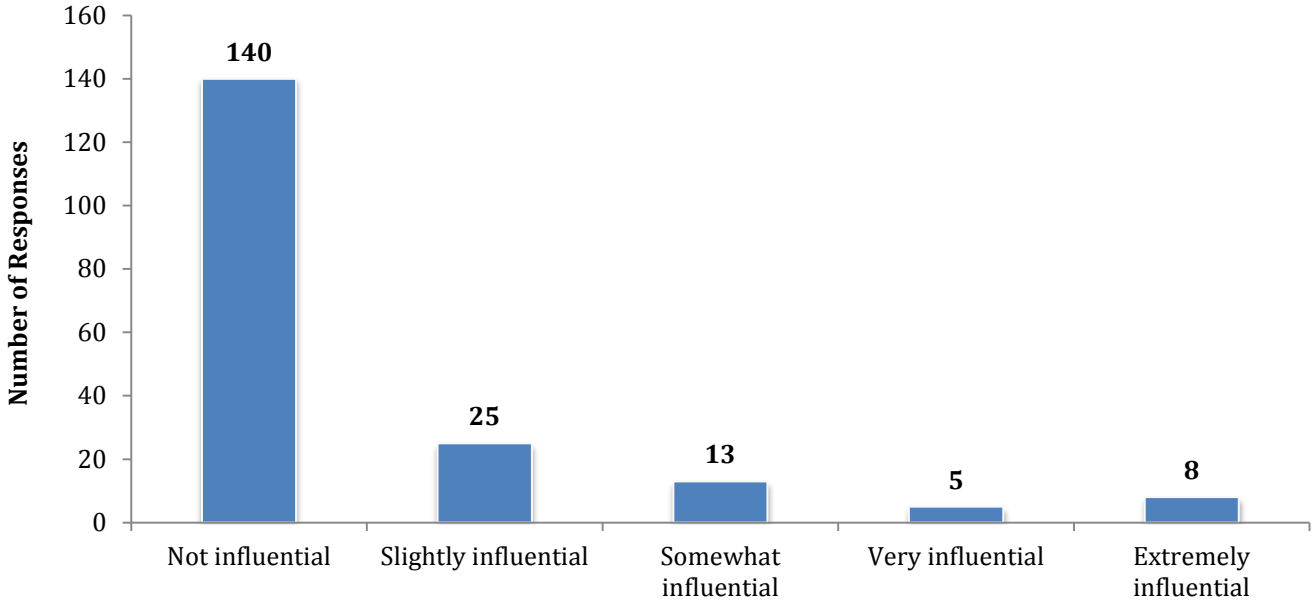
Cluster	Annualized percent change, 2010–2012		Percentage point difference (Regional Clusters Initiative – BEA)[a]
	Regional Clusters Initiative sample	BEA regional sample	
Project 17	28.5%	4.5%**	24.0%
Carolinas' Nuclear Cluster	20.9%	5.0%***	15.9%
Advanced Power Cluster	–4.4%	4.7%***	–9.1%
Geospatial Cluster	–23.6%	4.0%*	–27.6%
FlexMatters	14.8%	5.1%**	9.7%
Huntsville Defense Cluster	12.4%**	3.7%***	8.7%
Smart Grid	64.4%	6.2%**	58.2%
Energy Storage Cluster	9.0%	4.4%***	4.6%
San Diego Defense Cluster	17.2%*	6.4%***	10.8%
Green Aviation Cluster	6.6%	7.3%***	–0.7%
All clusters	**3.8%**	**5.3%*** **	**–1.5%**

Source: Small Business Survey

[a] Statistical significance of the differences presented in this column could not be determined due to insufficient information.

Asterisks indicate levels of statistical significance based on the results of a paired two-tailed *t*-test with the null-hypothesis that the 2010 and 2012 averages are equal or that the annualized percent change in the Initiative sample is equal to that of the BEA sample.
(***) The difference between 2010 and 2012 averages is statistically significant at the 1% level.
(**) The difference between 2010 and 2012 averages is statistically significant at the 5% level.
(*) The difference between 2010 and 2012 averages is statistically significant at the 10% level.

Cluster small businesses were queried regarding the extent to which their cluster participation influenced their payroll growth during the second year of SBA's Initiative. Among these businesses, 27% indicated that cluster participation had at least slightly influenced payrolls over the past 12 months (Exhibit 85).

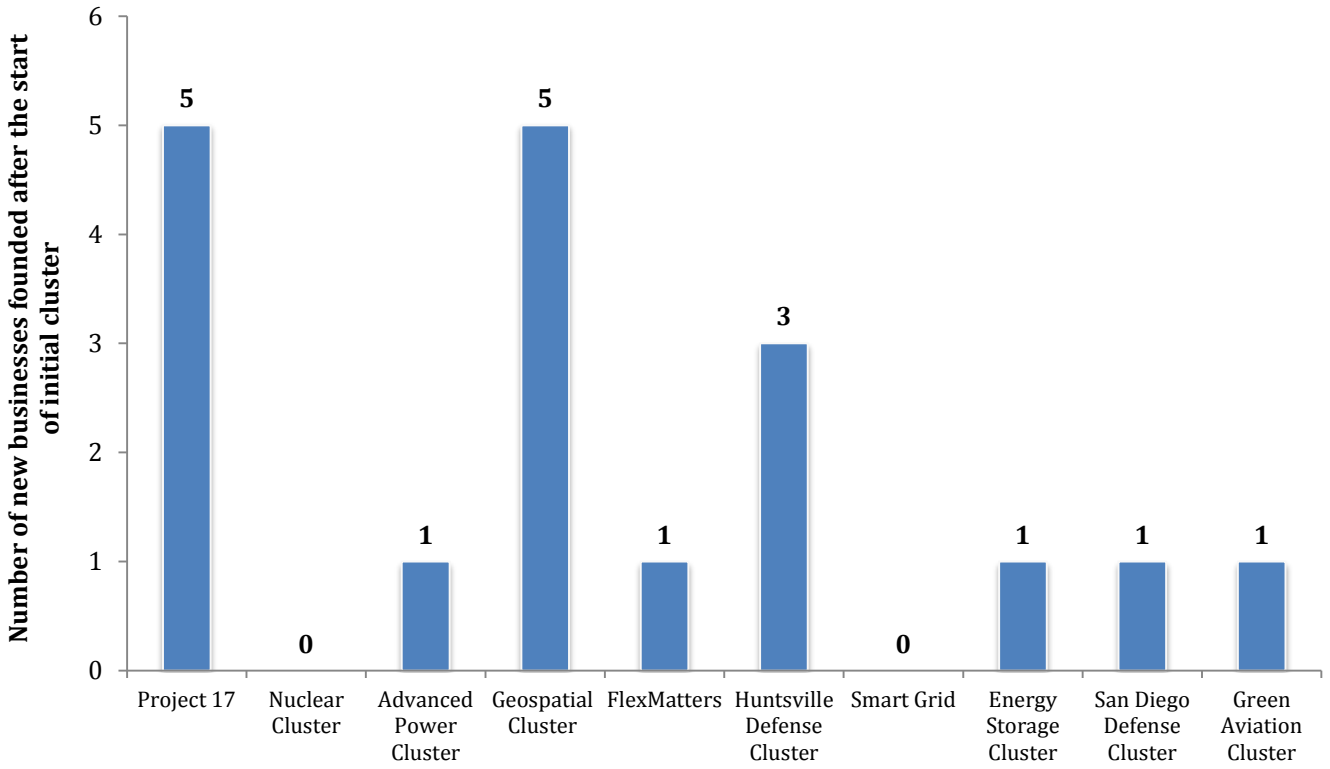


Source: Small Business Survey

Exhibit 85. Reported influence of small business cluster participation on payroll during the second year of SBA's Initiative

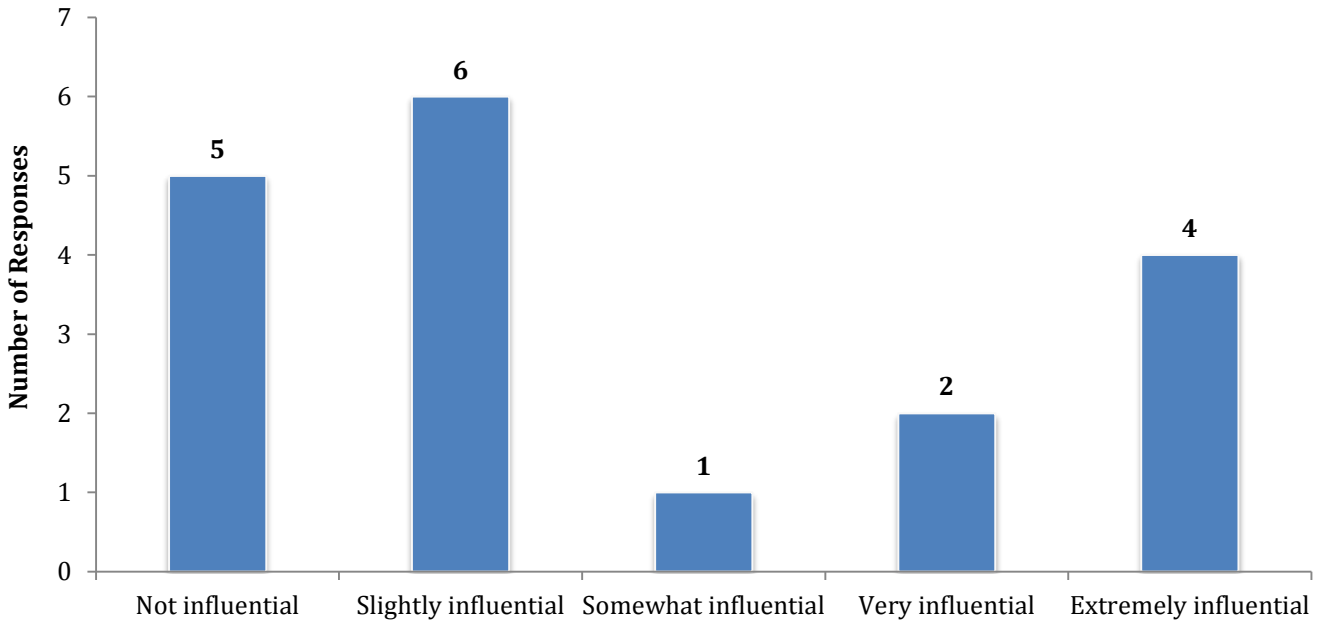
4.3.4. Creation of New Businesses Within the Clusters

The Small Business Survey also collected information on whether businesses were established before or after they started participating in the clusters. Of the 217 businesses that responded, 18 reported that they were established after their founders became involved with their clusters. The distribution of these businesses across clusters is shown in Exhibit 86. The Geospatial Cluster and Project 17 were each home to five new small businesses, while three belonged to the Huntsville Defense Cluster. The Advanced Power Cluster, FlexMatters, the Energy Storage Cluster, the Green Aviation Cluster, and the San Diego Defense Cluster each had one new business established during the first 2 years of the Initiative. Thirteen of these businesses indicated that their cluster participation was at least "slightly influential" in their being founded (Exhibit 87).



Source: Small Business Survey

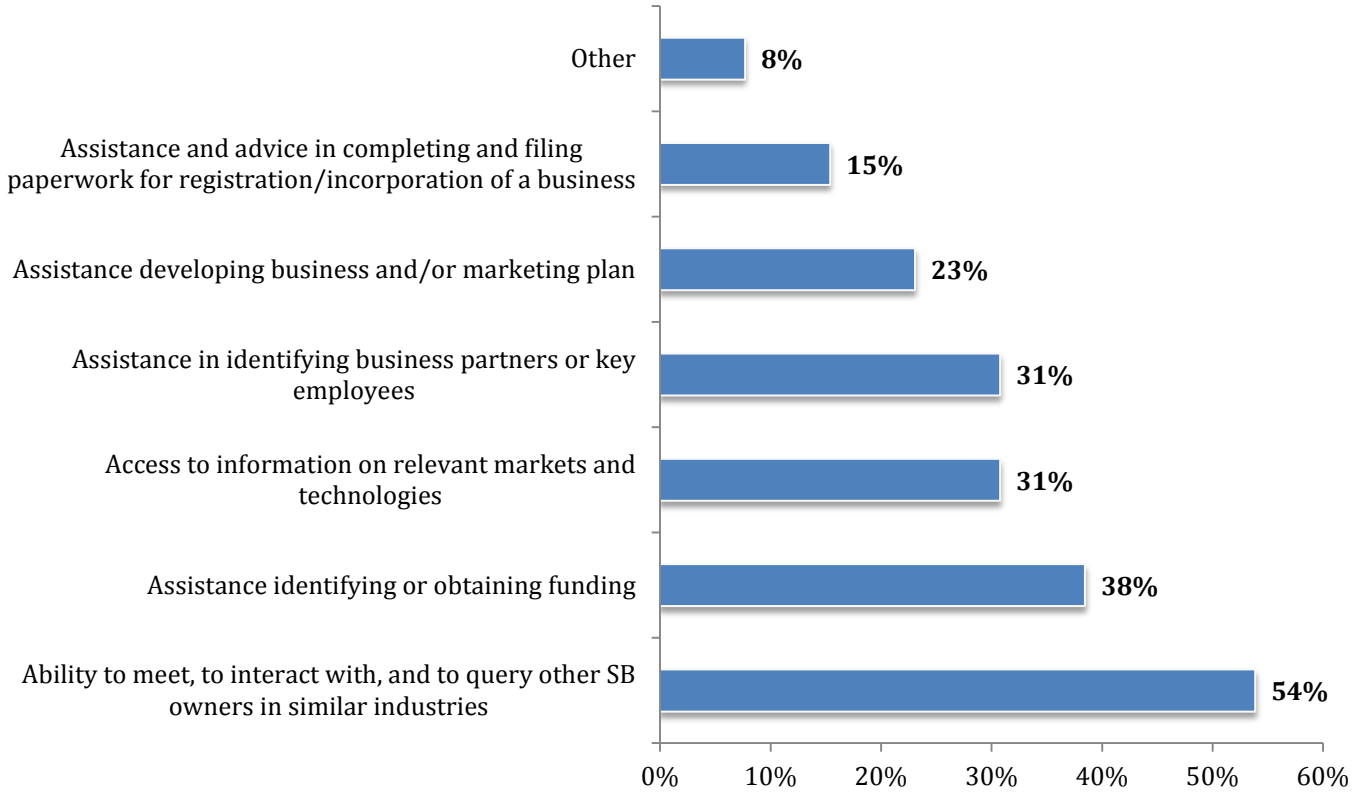
Exhibit 86. Number of new businesses that were established after their founders' first cluster participation



Source: Small Business Survey

Exhibit 87. Reported influence of cluster participation on starting a business

When the same businesses founders were asked which aspects of cluster participation were instrumental in the formation of their businesses, they were most likely to point to the ability to meet and interact with other small business owners (53%). Other aspects of cluster participation were important as well, however, such as assistance in identifying or obtaining funding (38%), access to information on relevant markets or technology (31%), and assistance with identifying business partners or key employees (31%) (Exhibit 88).



Source: Small Business Survey

Exhibit 88. Aspects of cluster participation influential in starting a business

5. Lessons Learned in Cluster Operations

Over the first 2 years of SBA's Cluster Initiative, the 10 clusters reported a significant number of "lessons learned". These lessons varied across clusters due to the different challenges each faced, their individual expectations, and the use of resources reported by the cluster management teams. The different challenges and experiences that led to these lessons learned can in turn be partially attributed to the different developmental stages of the clusters and the idiosyncratic differences between the industries in which they operate.

A compilation of the lessons learned is presented below. The sources for this compilation are the clusters' quarterly reports and the in-depth interviews of cluster administration teams conducted in November 2011 and December 2012. Some of the lessons learned were identified by cluster administration teams as they faced challenges related to administrative or service-delivery activities. Others resulted from the cluster management's observation of gaps between the needs of small businesses and the resources available to them.

5.1. Lessons Learned Regarding Service Selection and Delivery to Small Businesses

The lessons learned in subsection 5.1 cover the following topics:

1. Third-party technology validation, the testing of technology in realistic operating conditions, and comparison to technical targets for commercialization
2. The need to go beyond dissemination of information about opportunities by actively marketing opportunities
3. Preconceived ideas among small businesses about stringent requirements when working with regional Small Business Development Center (SBDC)
4. Greater-than-expected demand for one-on-one counseling and mentoring by cluster small businesses
5. A small event registration fee reducing the number of individuals who registered but did not show

Each of the five topics is explained in detail with examples below.

1. Several clusters identified and aimed to address small businesses' need for third-party technology validation, i.e., the process of testing technology in realistic operating conditions and comparing its performance with technical targets expected or known to be required for commercialization.

Such validation is a required step for the commercialization of cluster small businesses' technology.

- The Project 17 Agricultural Technology Cluster (Project 17) recognized that small businesses find it difficult to get their technology validated by an independent third party, a process that the cluster notes to be highly valuable when small businesses pitch their technology to potential clients and investors. Project 17 is looking to address this need in the near future.
- Chip Laingen of the Advanced Power & Energy Cluster (Advanced Power Cluster) mentioned that third-party technology validation was one of the services frequently requested by his cluster's participants; it constitutes a requirement to become a candidate for U.S. Department of Defense (DoD) procurement. The Advanced Power Cluster already provides technology validation and testing services through some of its partner organizations.
- The Illinois Smart Grid Regional Innovation Cluster (Smart Grid), which also acknowledged concerns surrounding technology validation, devised a two-step process for its participants. Based on an understanding that smart grid technology needs to be proven on systems progressively closer to a large-scale electrical grid to gain interest from utilities and other customers, Smart Grid provided its small businesses with access to the Illinois Institute of Technology microgrids. These microgrids, which cover the Illinois Institute of Technology's main campus and were implemented in collaboration with cluster large companies, have been leveraged by several small businesses during the second year. To enable testing on larger-scale systems more representative of realistic operating conditions, cluster small businesses have access to Commonwealth Edison's on-grid test bed. This large-scale test bed is composed of portions of nine municipalities in the Chicago area and maintains characteristics similar to the entire Commonwealth Edison grid with respect to its composition of residential, commercial, and industrial customers.

2. At least two clusters have identified that simply disseminating information about contract and award opportunities to cluster small businesses via traditional means, such as newsletters and the clusters' websites ("passive marketing") did not yield the expected level of engagement.
    - FlexMatters – Northeast Ohio Technology Coalition (FlexMatters) found that, despite posting searchable opportunities on its website, many small businesses did not have the time to look through them and identify the most relevant entries. As a

result, FlexMatters hired flexible electronics consultants to work directly with small businesses to help them select applicable opportunities. This choice, combined with the supply-chain mapping and development work undertaken by the cluster, was validated during the second year as more small companies successfully engaged large companies and made progress towards commercialization.

- The Advanced Power Cluster diagnosed a similar problem during the second year of the Initiative. The passive marketing of such opportunities as DoD collaborations, or Small Business Innovation Research/ Small Business Technology Transfer Research (SBIR/STTR) to small businesses expected to aggressively pursue them, was met with limited success. As a result, the cluster elected to shift its focus to active marketing (i.e., directly pitching specifically relevant opportunities by the cluster and its partners to some or one of its small businesses). The cluster notes that this strategy is effective only when a cluster and its partners know members' capabilities and when trust exists between the cluster and the small business.

3. FlexMatters learned that when it offered seminars on grants and government funding via the Kent State SBDC and the cluster's Washington, D.C. consultants during the same cluster meeting, small businesses were more interested in working with the D.C. consultants than in going through the SBDC for grant identification and assistance. One reason mentioned for this preference was that small businesses had the perception that working with SBA would mean meeting stringent requirements.
4. Several clusters, including the Enterprise for Innovative Geospatial Solutions (Geospatial Cluster) and the Carolinas' Nuclear Cluster, reported that they had underestimated the amount of time they would spend on counseling and mentoring. The extended time needed for counseling and mentoring activities, though, allowed the cluster management teams to develop stronger ties with their members.
5. The San Diego Advanced Defense Technology Cluster (San Diego Defense Cluster) reported that charging a small registration fee to defray the costs of organizing one of its workshops on teaming and collaboration did not reduce the number of workshop participants, however the number of individuals who registered but did not attend the workshop decreased by 35 percentage points.
6. Several clusters involved in a wide range of industries ranging from agricultural technologies to smart grid and defense noted that most of their participating small businesses have promising innovations but no experience in running a business and no knowledge of their value propositions or how their

technologies fit in the broader markets. It is therefore critical for clusters to assist these small businesses in developing tailored strategies and to devise services focused on business management, market research, and sales that will enable them to cross the “valley of death”.

5.2. Lessons Learned Regarding Cluster Promotion in the Region

The lessons learned in subsection 5.2 cover the following topics:

1. The importance of cluster promotion and marketing, especially earlier in the cluster life cycle
2. The challenge for clusters in this earlier phase in creating their cluster identities, both internally and externally

Each of the topics is explained in detail below.

1. The Geospatial Cluster reported that one of its miscalculations was to underestimate the importance of cluster promotion and marketing, especially during the first year of the Initiative. The cluster reported that this led to having little to no funds allocated for this activity and contributed to low outreach and participation. The cluster employed a creative strategy to mitigate this problem: developing formal relationships with chambers of commerce in the region based on mutual benefit. The chambers advertised for the cluster, and the cluster provided them with technical assistance. The cluster also attended a great variety of events and conferences where it had the opportunity to showcase its accomplishments.
2. Smart Grid highlighted the difficulty of creating a cluster identity during the first year of the Initiative, both among participants and outside the cluster, while diverting a minimal amount of resources that could otherwise be used for direct services and assistance. The cluster implemented several steps to address this challenge, which are still ongoing. The first step taken by the cluster was to develop a website and marketing materials to improve visibility and to establish an identity. The second step was to increase the interactions between small and large businesses in the cluster to improve cohesion among cluster participants. Finally, the cluster organized the annual Great Lakes Symposium that was held in October 2011 and 2012, where top policymakers, power companies, and various nonprofit groups, including consumer and environmental protection groups, discussed key topics in smart grid innovation. Multiple participating small businesses presented their products, and the cluster was showcased.

5.3. Lessons Learned Regarding the Outreach and Recruitment of Small Businesses

The lessons learned in subsection 5.3 cover the following topics:

1. The importance of devising a clear, concise, and compelling value proposition
2. Membership fees and differing experiences with them across the 10 clusters
3. The importance of understanding the value chain and supply chain in recruiting and in cluster development

Each of the three topics is explained in detail with examples below.

1. Several clusters underscored the importance of devising a clear, concise, and compelling value proposition for small businesses.
    - The San Diego Defense Cluster reported a disappointingly low number of applications by small businesses in the first quarter of SBA's Cluster Initiative, especially when considering the Center for Commercialization of Advanced Technologies' (CCAT's) track record and notoriety in the region.[52] The cluster attributed this problem to two primary factors: (1) the technology focus areas were not sufficiently defined to allow companies to effectively relate their technology to the stated requirements, and (2) the cluster's value proposition was not sufficiently defined to allow companies to determine the benefits of cluster participation. In particular, the San Diego Defense Cluster noticed that it approached recruitment in the same way that CCAT did, but it lacked CCAT's ability to provide direct funding to small businesses, thus removing a critical incentive that enhanced the value proposition. To address the first factor, the cluster—in consultation with the Space and Naval Warfare Systems Command (SPAWAR) and other DoD stakeholders—added a new, broader area of focus: Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR). As a result, a much larger cross-section of technology-focused small businesses in the San Diego area became eligible for cluster participation. To address the second factor, the cluster reworked its marketing pitch, created an open application on its website, and explored an expanded number of channels for recruitment. These expanded channels included greater discussions with prime contractors and leveraged the SPAWAR's Systems Center Pacific (SSC) Small Business

[52] Please see the case study on the San Diego Defense Cluster in the Regional Clusters Initiative Year One Report for more details.

Office. By the end of the first year of SBA's Cluster Initiative, the cluster reported significantly improved solicitation and new companies applying for membership nearly every day. This momentum was sustained during the second year of the Initiative, as the cluster added a significant number of small businesses to its membership.

- The Advanced Power Cluster reported that small business owners are often skeptical when told about the cluster because they have previously dealt with middlemen in defense procurement and did not get the expected value from their services. The Advanced Power Cluster experienced, therefore, an initial reticence on the part of small businesses to get involved in the cluster until the value proposition and a proven track record of success had been outlined.
- The Huntsville Advanced Defense Technology Cluster (Huntsville Defense Cluster) noted that a virtuous cycle can be created around the value provided by clusters and the information provided by participants to the cluster. Offering value to participants enables clusters to request information, which then provides more value to clusters through networking and intelligence, enabling clusters to be more effective, to increase participation, and to improve recruitment. Therefore, a clear articulation by the cluster of its value proposition leads to stronger engagement of participants in the cluster and further strengthens its value proposition.

The importance of a clearly defined and demonstrated value proposition remained a frequently mentioned topic during the interviews conducted at the end of the second year of the Initiative. Several clusters, including the Northeast Electrochemical Energy Storage Cluster (Energy Storage Cluster), mentioned that it played a role not just in attracting new participants but also in retaining existing cluster participants.

2. Views differ among the clusters in SBA's Initiative about the role of membership fees in outreach and recruitment. The Carolinas' Nuclear Cluster, for example, reported that a small membership fee significantly helped in securing the participation of truly motivated and committed small businesses. Membership fees can act as a type of screening process because they require small businesses to commit funds that would be wasted if the businesses were not proactive or seriously willing to become engaged in the cluster. On the other hand, FlexMatters cautioned that charging membership fees can create the perception that the cluster is not being an honest broker and is only offering assistance for money. The Upper Michigan Green Aviation Coalition (Green Aviation Cluster) devised a membership fee structure based on the type of organization seeking membership because it

will not receive SBA funding in the third year. One of the cluster's large businesses did not feel that the value proposition of the cluster was strong enough, while a small business and a university felt they could not afford the fee. These responses are likely the consequence of the cluster's life cycle and organizational capacity, presenting a challenge in creating and refining its value proposition.

3. Understanding the value chain and supply chain of the cluster's industry of focus is important in recruiting high-impact participants. FlexMatters conducted an assessment of the cluster's value chain and identified two specific types of capabilities that would greatly strengthen it: (1) providing prototyping services that many clusters members are seeking, and (2) assisting flexible electronics companies in getting their products to market. The first type is design houses, which specialize in inventing new products, devising a market strategy for them, developing the design, engineering, structural packaging, and prototyping before handling production aspects, such as quality control and global sourcing. The second type is Electronics Manufacturing Services (EMS) companies, which used to be focused on placing electronic components on circuit boards for Original Equipment Manufacturers but now provide value-added services, including design, prototyping, testing, and custom production. As a result, the cluster actively targeted businesses in these two categories for recruitment using a two-pronged approach. First, the cluster targeted the top of the value chain, recruiting EMS and design houses outside its geographic scope; second, it assisted regional businesses in expanding their portfolio of capabilities to help them capture a greater portion of the value chain. In addition, FlexMatters categorized, documented, and leveraged the prototyping resources available at these design houses and EMS companies to fulfill its members' needs for certain types of prototyping services that could not be met via the sharing of regional and intracluster facilities, machinery, and know-how. The cluster is also looking at ways to subsidize these prototyping services or using such strategies as group orders to reduce costs.

5.4. Lessons Learned Regarding Small Business Funding and Sales

The lessons learned in subsection 5.4 cover the following topics:

1. Some small business owners are not comfortable giving up an equity stake in exchange for venture or angel capital.
2. Responding to DoD and government procurement requests in a timely manner is difficult for small businesses because they do not always understand the needs and rarely have technology that is a direct fit.

3. Certain industries, such as nuclear energy, have very high barriers to entry that the cluster must effectively lower if it is to integrate small businesses in the supply chain.
4. Proof-of-concept funding is extremely important in enabling small businesses to grow.
5. Sustaining small businesses' interest and motivation in the SBIR/STTR award process is difficult.

Each of the five topics is explained in detail with examples below.

1. FlexMatters implemented workshops on venture and angel capital after identifying its' members high demand for funding opportunities. Through the organization of these workshops, FlexMatters found that many small businesses were hesitant to consider venture and angel capital because of their perception that working with venture capitalists could result in loss of control over their companies through dilution of equity. As a result, the cluster changed course in two ways: first, it worked to highlight the advantages of venture and angel capital, such as expert business guidance and expanded connections; second, it incorporated other sources of funding in its workshops. In particular, FlexMatters brought a regional bank on board to provide loan opportunities and to discuss small business loans available from SBA. In the second year, these two approaches were complemented by a focus on services in support of functional prototyping as a way to attract and to persuade investors, partners, and customers.
2. The Huntsville Defense Cluster indicated that one of the challenges facing Advanced Defense Technology small businesses is the difficulty of responding to DoD or government procurement requirements in a timely fashion. According to this cluster, the problem stems from two sources. First, small businesses may have difficulty understanding the needs stated in various requests for procurement by government agencies. Second, in many instances, small businesses have developed technologies with characteristics that are similar to but not exactly matching the specifications demanded in the procurement request. The Huntsville Defense Cluster believes that there should be a focus on appraising such businesses on the basis of the capabilities that enable them to develop the near-match product. The cluster is working to mitigate these challenges, according to Markeeva Morgan, the cluster administrator during the first year of the Initiative, who advises DoD agency personnel to, "engage that company and explain to them what you actually need, so that they can employ the same capabilities to develop widget B that you actually need. And we're starting to have those conversations with federal government persons that, hey, these guys don't know what you want; if you vector them in the right direction, they probably can give it to you."

3. The Carolinas' Nuclear Cluster reported difficulties regarding the integration of suppliers into the supply chain and industry procurement networks. Because of the extremely stringent quality assurance requirements and intense oversight in the nuclear energy industry, purchasers of goods and services tend to rely on well-known and frequently used suppliers with whom they have existing sourcing relationships. This situation, although more acute in the nuclear industry, is commonplace in various other industries and remains an important obstacle to overcome. The Carolinas' Nuclear Cluster is working to reduce this constraint by providing quality assurance workshops given by experts and encouraging cluster participants to network and collaborate to increase their ability to demonstrate their proficiency. The cluster also provided independent commercial-grade surveys of the facilities of several of its participating small businesses and offered advice regarding how to resolve any issues identified.

4. Smart Grid reported that the complete lack of proof-of-concept funds available to small businesses involved in the smart grid industry has prevented most of them from obtaining private capital, especially venture or angel funds. Proof-of-concept funding is often the very first funding stage of a small business. For example, proof-of-concept enables the creation of a very basic prototype to then attract subsequent capital. The cluster is working actively on resolving this lack of availability through a cluster partner, Clean Energy Trust, which will be launching a multi-million-dollar grant fund with an "evergreen" structure through which funds are re-granted once they have been repaid. O-H Community Partners, another cluster partner and service provider, is also seeking additional funds to provide proof-of-concept grants to cluster members. This issue is expected to become somewhat less significant during the upcoming years of SBA's Initiative due to the passing of the Energy Infrastructure Modernization Act by the state of Illinois during the second year of the Initiative, which will allocate $22.5 million in funding to support high-technology energy businesses in the state.

5. Several clusters have reported that their small businesses expressed discouragement or a limited sustained interest in SBIR/STTR opportunities.
    - The Huntsville Defense Cluster attributed this attitude to a lack of familiarity with the SBIR/STTR award process ahead of application, including its length and the difficulties involved. The cluster is investigating the best ways to resolve this issue but believes that advising small businesses before they start the SBIR/STTR award process increases their motivation and adjusts their expectations, especially when partnerships are involved.
    - Smart Grid also noted that small businesses that had attended its SBIR/STTR technical assistance program expressed a limited sustained interest in SBIR/STTR awards. After

collecting data from program participants, the cluster identified several reasons, including the need for a more tailored, one-on-one technical assistance program that would help navigate the cumbersome application process.

- The Advanced Power Cluster also noted that the newly mandated fraud, waste, and abuse scrutiny for the SBIR/STTR program is negatively affecting some of its members and may deter others from even applying. To mitigate this issue, the cluster is organizing events to explain the changes and providing one-on-one assistance to prepare its members for the arduous process, beyond the application, of complying with strengthened time-keeping, documenting, and accounting requirements.

5.5. Lessons Learned Regarding Cluster Development

The lessons learned in subsection 5.5 cover the following topics:

1. The challenge of ensuring the initial buy-in and subsequently the sustained participation of various cluster stakeholders and some mitigation strategies
2. The challenge of coordinating and integrating service providers and large organization stakeholders, especially for clusters with a wide geographic scope
3. The importance of having an effective "plan B" and mitigation strategies when shocks affect the industry of focus of clusters

Each of the three topics is explained in detail with examples below.

1. A major concern of less-established clusters is ensuring the buy-in and sustained participation of various stakeholders. This concern was addressed in various ways by the 10 clusters during the first 2 years of the Initiative:
    - To maximize the buy-in of small businesses, the Carolinas' Nuclear Cluster involved the cluster small businesses in the strategic planning stage of the cluster and encouraged them to voice their views on the plan and their role in it. As a result, the Carolinas' Nuclear Cluster administrator noted during his interview that there had been no "clear demarcation of the end of the plan and the beginning of the cluster." This suggests that the cluster small business participants' involvement in the strategic plan seamlessly led to their involvement in the cluster activities after the strategic planning phase.
    - The Carolinas' Nuclear Cluster highlighted the importance of reflecting the corporate and industry culture of the cluster participants to make them feel more comfortable in their interactions with the cluster and with each other.

- The Geospatial Cluster and the Huntsville Defense Cluster mentioned the importance of respecting the valuable time of cluster participants and planning events accordingly, keeping in mind such considerations as the duration of the event (e.g., it is difficult for small business owners to attend a full-day event).
- Other clusters, including the Huntsville Defense Cluster and the Energy Storage Cluster, raised the importance of building trust among cluster participants through unwavering neutrality in interactions and the provision of counseling to cluster participants and through demonstrated expertise in the cluster's industry of focus.
- An even greater number of clusters, including the Advanced Power Cluster, the Green Aviation Cluster, and the Carolinas' Nuclear Cluster, have noted that the key to sustaining the participation and engagement of small businesses and other cluster stakeholders is effective communication, which can be broken down into two equally important components: (1) listening to the participants and remaining readily accessible to them, and (2) staying in touch with cluster stakeholders and small businesses, in particular through regular communication that clearly provides value for the participants, and getting to know each one of them, including their strengths, weaknesses, and goals.

2. The Energy Storage Cluster reported difficulties during the first year regarding the integration of some of the existing state-based organizations into the cluster's activities. The Energy Storage Cluster is trying to integrate these preexisting state-based organizations into the cluster to create a regional cluster covering the northeast United States. Although the cluster reported that it was particularly difficult to negotiate the integration of the Massachusetts Hydrogen Coalition into the cluster, difficulties also emerged in the integration of some of the other organizations. The cluster noted that some of these organizations were reluctant to give up autonomy and their identities to enter the cluster or that they were reluctant to accept responsibilities inherent in cluster participation. To resolve the problem, the cluster took several steps: (1) It highlighted the value offered by the regional cluster and included representatives of the organizations at speaking engagements and other events; (2) it continued to use each organization's identity and name in various contexts, such as in marketing materials; (3) it made sure the meetings were spread evenly around the region and that even the states with a lower level of activity received fair representation; and (4) it did not attempt to reduce or otherwise subordinate each organization's autonomy or identity, instead working on coordination and working by consensus. At the end of the second year, the cluster reported that these difficulties in

integrating state-based partners were less prominent and that there were discussions on developing a formal regional governance structure that would include these state-based partners.

3. The Carolinas' Nuclear Cluster recognized during the first year of the initiative that the Fukushima Daiichi earthquake and subsequent tsunami in Japan have affected the public perception of the nuclear industry around the world and in the United States. The cluster identified this perception as a short-term concern and is looking at market opportunities that may have emerged as a result. In particular, the Carolinas' Nuclear Cluster is considering possible opportunities resulting from potential nuclear safety upgrades and the need to "on-shore" the nuclear energy supply chain. At the end of the second year, the cluster noted that, as predicted, the impact of the disaster in Japan on the industry had significantly diminished. Even still, the cluster noted that other important factors, such as the state of the economy, a lack of policies encouraging the nuclear industry in the United States, and the consequently limited domestic nuclear market were concerning. One foreign company with which the cluster had interacted and that had been looking to locate some of its operations in the region changed its mind because of the weak domestic market and the need to ship most of its production abroad where many more nuclear plants are being built. To mitigate the impact of low domestic demand, the cluster leveraged the fact that all the companies that serve the nuclear industry can also profitably serve other energy interests. The cluster further promoted the involvement of small businesses in other energy interests so they could still develop and find a stable market until the conditions are more suitable for a transition toward serving the nuclear industry. Additionally, during the second year of the Initiative, the Nuclear Regulatory Commission granted a license to build and operate several nuclear reactors in South Carolina and Georgia, which will likely help the cluster and its members. The cluster still noted that these licenses had been in the pipeline for a long time and that no more nuclear reactor licenses were currently waiting for approval.

5.6. Lessons Learned Regarding Teaming and Collaboration

The lessons learned in subsection 5.6 cover the following topics:

1. Overcoming the preconceived ideas regarding the role of small businesses in government procurement through effective teaming
2. Dealing with a high demand for partnerships and the importance of large "prime" contractors in teaming and partnerships
3. Monitoring the success of an existing approach to collaboration and being ready to make significant course corrections quickly

Each of the three topics is explained in detail with examples below.

1. The Huntsville Defense Cluster mentioned that in government procurement, it is commonly assumed that large companies in partnerships or collaborations should automatically be the prime contractors. The cluster also noted that this mind-set is somewhat present in small businesses themselves. The cluster suggested an alternative approach in which small businesses would partner with each other to pursue larger government contracting opportunities instead of pursuing only small business–specific opportunities or accepting a subcontractor role by default. Such integration between small businesses would not only allow them to pursue larger opportunities at DoD but also provide them with valuable experience in dealing with DoD agencies. Markeeva Morgan, the Huntsville Defense Cluster administrator during the first year of the Initiative, has encouraged these collaborations: "We've identified cases where integration between two or more small businesses enables them to provide a fairly unique, high-quality solution, and those businesses had never talked to one another before, had never considered doing business together."

2. The Advanced Power Cluster noted a greater-than-expected demand for partnerships and collaborations. As a result, the Advanced Power Cluster sought to connect small businesses with each other or, in some cases, with large contractors. Chip Laingen, the Advanced Power Cluster administrator, reported, "We're hearing that more than what we thought we would in terms of companies not wanting to necessarily go it alone. We're looking for other small companies and even prime defense contractors to take technology forward with them." Mr. Laingen also explained that the major contractors can bridge the gap between small businesses and DoD agencies largely due to their extensive experience, specialization, and resources in dealing with DoD agencies. For example, major contractors can utilize their extensive network of DoD contacts as well as their small-business liaison staff to identify small businesses that are the most relevant to DoD contract needs. The informational advantage of the large contractors was also noted by Mr. Morgan, who reported that the same large contractors can be found at all the large DoD conferences, whereas the small businesses that are present are rarely the same from one conference to the other.

3. FlexMatters changed its approach to fostering collaboration among cluster members during the first year of the Initiative. Initially the cluster had a top-down approach to teaming and collaboration that involved the cluster's sourcing workshops. During these workshops, small and large businesses would meet and brainstorm on needs and capabilities. Several of these workshops were held, but the results did not live up to expectations. In particular, the needs listed by large companies were too broad, and concerns regarding intellectual property issues arose. Consequently, during the spring of 2011, the

cluster drastically changed its approach and began focusing on smaller-scale, shorter-term projects, termed “quick hits,” for which intellectual property concerns were minimized. In addition, the cluster reversed its previous top-down approach by assigning flexible electronics experts to cluster members. These experts helped cluster members realistically assess their capabilities, strengths, and weaknesses and identify large companies whose needs could be effectively addressed.

6. Conclusion

In September 2010, SBA launched the Regional Clusters Initiative, a pilot program to promote and support 10 clusters across the United States. Clusters act as a networking hub to connect large firms, university researchers, regional economic organizations, investors and small businesses. Recognizing the challenges that small businesses face in creating critical marketing, technical and investor networks, SBA actively supports small business membership in emerging and mature industry clusters. The 10 pilot clusters make up the first set of clusters to receive financial and technical assistance from SBA. They have since been joined by 30 other clusters sponsored through the Jobs and Innovation Accelerator Challenge.[53] This program differs from the Regional Clusters Initiative in various ways, starting with its multi-agency collaborative structure. Furthermore, the Jobs and Innovation Accelerator Challenge focuses to a greater extent on integrating historically underserved businesses and communities in the clusters and on the implementation of a jobs training and placement program for American workers to replace foreign workers hired on H-1B visas.

The Regional Clusters Initiative provides funding to the organizing entities of the 10 clusters to increase opportunities for small business participation within them, promote innovation in their focus industries, and enhance regional economic development and growth. This report presents the findings and outcomes of an evaluation of the Initiative following the second year of operation.

The evaluation comprises two key components: (1) an implementation evaluation and (2) an outcome evaluation. The implementation evaluation focused on how the Initiative was implemented across the 10 clusters and on the services that each cluster provided to its small businesses. The outcome evaluation focused on short- and intermediate-term outcomes linked directly to the cluster services provided, as well as on longer-term economic outcomes that might reasonably be expected to result from the short- and intermediate-term outcomes achieved. The evaluation methodology included the analysis of data from several primary sources, such as surveys, interviews, and quarterly and annual reports, in addition to secondary sources, which were primarily used for the comparison of several outcome measures.

An analysis of the 10 clusters suggests that there is considerable variation among them across key dimensions. Each cluster has a specific industrial focus, ranging from flexible electronics to agricultural technology. Each has a unique approach in attempting to deliver value to cluster participants, dictated in

[53] For a summary of the overall approach selected by the federal government in support of clusters, please see *Regional Innovation Clusters Begin to Add Up* by Mark Muro of the Brookings Institution at http://www.brookings.edu/blogs/up-front/posts/2013/02/27-regional-innovation-clusters-muro.

large part by the competitive advantage of the private sector in the cluster's region, the skilled labor pool, and the specializations of the research community. The 10 clusters also vary in their age/length of time established, geographic scope, stage of development, and governance structures. Nonetheless, one feature that all of the clusters have in common is a focus on emerging and high technology.

The services, activities, and events that clusters provided to small business participants during the second year focused on several key areas, ranging from facilitating targeted connections and networking between small businesses, large companies, and public sector agencies, to creating key linkages between businesses and academic institutions in the transfer of new technology or concepts into the marketplace. Clusters saw the highest small business participation in one-on-one counseling sessions focused on contracting opportunities, followed by partnerships, alliances, and collaboration, along with training sessions focused on business development. This study also found that a majority of the clusters consistently leveraged one or more of SBA's resource partners (e.g., Small Business Development Centers, Women's Business Centers, and SCORE chapters) while utilizing the expertise of third-party organizations, such as university-based technology centers. Nearly half of the small businesses surveyed reported that the services and activities provided by their clusters were unique and could not be found elsewhere.

The evaluation of the Initiative's second year revealed that the 10 clusters grew rapidly and developed their networks across a wide spectrum of stakeholders, ranging from universities/research institutions and foundation/nonprofit organizations to business associations and public sector agencies. The most marked growth has been in small business participation, which has grown four-fold since the beginning of the Initiative. Survey results suggested that small businesses joined the clusters primarily to network with other small businesses and to gain access to cluster services. Large organizations, including large businesses, universities, research institutions, and nonprofit organizations, reported that their primary motivation for participating in the clusters was to help spur regional economic development.

Among the key outcomes observed during the first 2 years of the Initiative was the establishment of 18 new businesses after their founders became involved with their clusters. Over those 2 years, average full-time employment in participating small businesses increased at an annual rate of 6.5%. Average *total* employment (full-time plus part-time) grew at a rate of 8.7% per year. The small businesses that participated in the clusters also experienced growth in revenue and payroll over the first 2 years of the Initiative. The average revenue of small business participants increased by 10.8% per year, with 9 out of the 10 clusters experiencing an increase in the average revenue of small business participants. The

average payroll of small business participants also increased by 3.7%, with 8 out of 10 clusters experiencing an increase in average small business payroll over the 2 years.

Small businesses also reported that the clusters played a role in spurring innovation. Approximately 60% of the small businesses that indicated having sought or received cluster services reported having developed new products or services as a result of their cluster participation, while 42% reported having commercialized new technology as a result of cluster participation. Cluster small businesses reported filing 111 patent applications and receiving 76 patents during the second year of the Initiative.

Additionally, clusters provided services during the second year of the Initiative to assist small businesses in obtaining contracts and subcontracts, private capital and loans, Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) awards, and other grants. Cluster administrators, who estimated the dollar value of economic activity generated by active small business participants in their cluster, reported that these small businesses obtained contracts or subcontracts totaling nearly $590 million, in addition to external funding through private funding sources (venture capital, angel capital, loans) totaling over $18 million, SBIR/STTR awards totaling more than $8 million, and grants totaling nearly $17 million.

The initial findings suggest that these clusters have indeed grown rapidly over the first 2 years of the Initiative—in membership, scale and range of services provided, and through engagement with small businesses. The outcomes presented suggest that cluster participation was correlated with higher than expected levels of economic growth and new business formation, and that the clusters made evident strides towards promoting innovation in their respective industries.

To conclude this discussion, Exhibit 89 below provides an overview of key Regional Clusters Initiative metrics between the end of its first year and its second year.

Exhibit 89. Summary table of the change in key Initiative metrics between Year 1 and Year 2

Metric	End of Year 1	End of Year 2	Percentage change
Small business participants^	672	859	28%
Large organization participants^	354	514	45%
Contracting/subcontracting activity ($)^	$217,852,252	$589,675,929	171%
Private funding (loans, venture and angel capital, private equity) ($)^	$47,966,760	$18,380,000	-62%
SBIR/STTR awards ($)^	$6,557,966	$8,328,410	27%
Grants ($)^	$1,700,000	$16,484,500	870%
Total economic activity ($)^	$274,076,978	$632,868,839	131%
Average Revenue	$5,962,631.85	$6,401,516.31	7%
Average Payroll	$187,659.60	$196,915.30	5%
New business established	7	11	57%
Average employment	34.9	37.9	9%
Estimated total jobs created^	281	893	218%

^ The data underpinning this metric were provided by the cluster administrators.

7. Methodology Appendix

As summarized in Section 1, the evaluation design for this report is based on a mixed-method approach that uses both quantitative and qualitative data collected from cluster administrators, large organizations, and the small businesses participating in the cluster. These data are collected from the following sources:

- A Cluster Administrator Survey
- A Small Business Survey
- A Large Organization Survey
- Interviews with cluster administrators
- Clusters' proposals for SBA's Cluster Initiative, their quarterly reports, and annual reports

The use of multiple sources of data allows for a comprehensive assessment of the cluster services provided under the Initiative as well as the performance outcomes of the small businesses. The use of various quantitative and qualitative data also allows for cross-checking among different sources of data, increasing the validity of findings and generating a stronger and more reliable evaluation. Because the qualitative data provide an understanding of each cluster's background, they are further used to guide the interpretation of the quantitative findings and to understand the variation in program outputs and outcomes across clusters. The following subsection provides a description of the data collection activities.

A.1. Description of Data Sources

A.1.1. Survey Instruments

Most of the quantitative data were collected through the following survey instruments:

- *Cluster Administrator Survey:* This survey was completed by the administrator of each cluster. Its purpose was to gather information on the different cluster stakeholders, the various types of activities and events offered by the cluster to small businesses, the frequency of these events during the second year of SBA's Cluster Initiative, and the various contracts and awards received by small businesses during SBA's Cluster Initiative.

- *Small Business Survey:* This survey was sent to those small businesses that the cluster administrators identified as having been targeted by the cluster and having received services under SBA's Initiative from October 1, 2010, through September 30, 2012. The survey collected information on key outcomes of small businesses, including revenue, number of employees, and total compensation. It also gathered information on outcomes that were closely

linked to cluster services, such as achieving access to external capital, forming strategic alliances and collaborations, obtaining patents, and commercializing new technology. In addition, the survey included questions on small businesses' reasons for cluster participation, their satisfaction with cluster services and activities, and their assessment of the influence of their clusters' participation on their selected performance outcomes. The Small Business Survey was sent to the 804 small businesses identified by the cluster administrators. Of these, 239 businesses completed the survey.

- *Large Organization Survey:* This survey was designed to collect information from a broad spectrum of large organizations participating in the clusters, including large businesses, universities, public sector agencies, nonprofit organizations, and business associations. The survey gathered information on these organizations' reasons for cluster participation, their interactions with small businesses in the cluster, the types of partnerships that they created with small businesses, and the influence of their clusters' participation on various outcomes. Due to the multitude of large organizations that were surveyed, the survey collected information on a wide spectrum of outcomes, ranging from each organization's ability to transition new research technologies into marketable products to the organization's hiring of new employees. The Large Organization Survey was sent to 265 large organizations that were identified by the clusters as cluster participants. Of these, 91 organizations completed the survey.

The Small Business Survey and the Large Organization Survey were somewhat updated for the second year of SBA's Cluster Initiative compared to the instruments used in the first year of the Initiative, but these updates were conducted with a focus on maintaining compatibility of surveys across time periods to permit the comparison of results across years of the Initiative. These two surveys were provided to cluster participants as either a Web survey or an interactive PDF form, depending on the cluster administrators' preferences. The second-year surveys were administered from October 11, 2012 to November 18, 2012. Responses to the surveys were monitored regularly, and cluster administrators were provided with regular updates on their response rates and any e-mail addresses that could not be reached. Cluster administrators used this information to send reminders to participants to fill out the surveys.

A.1.2. Survey Response

The Cluster Administrator Survey was completed by all 10 of the cluster administrators participating in SBA's Cluster Initiative. The Small Business Survey was sent to those small businesses

that the cluster administrators identified as having been targeted by the cluster and that received services[54] under SBA's Initiative from October 1, 2010, through September 30, 2012. Overall, the Small Business Survey was sent to 804 small businesses identified by the cluster administrators and was completed by 239 of these businesses, yielding a response rate of 29.7%. The response rate was above 40% for 5 of the 10 clusters, with 3 clusters achieving a response rate above 80%.

The Large Organization Survey was sent to the large organizations that were identified by the clusters as cluster participants. Large organizations include large businesses, universities, public sector agencies, nonprofit organizations, and business associations. Of the 265 large organizations that were sent the Large Organization Survey, 95 completed the survey, generating a response rate of 35.8%.

Exhibit A1, below, shows the number of responses received for the Small Business and Large Organization Surveys for each cluster.

[54] Specifically, the survey was sent to all cluster small business participants termed "active" which is defined as a small business that (1) has either gone through the cluster intake/screening process and has become a cluster member or operates/is actively seeking to operate in the cluster's industry of focus AND (2) has received one-on-one counseling/technical assistance or attended a cluster training/networking/matchmaking/showcase opportunity at least once between October 1, 2010, and September 30, 2012.

Exhibit A1. Survey response rate for the second year of SBA's Cluster Initiative

Cluster	Total number of surveys sent		Total number of surveys received		Response rate	
	Small Business Survey	Large Organization Survey	Small Business Survey	Large Organization Survey	Small Business Survey	Large Organization Survey
Project 17	44	47	22	18	50.0%	38.3%
Carolinas' Nuclear Cluster	40	38	7[a]	19	17.5%	50%
Advanced Power Cluster	90	6	21	3	23.3%	50%
Geospatial Cluster	31	14	25	13	80.6%	92.9%
FlexMatters	37	9	18	4	48.6%	44.4%
Huntsville Defense Cluster	343	37	67[a]	10	19.5%	27%
Smart Grid	14	34	11	7	78.6%	20.6%
Energy Storage Cluster	69	24	31	4	44.9%	16.7%
San Diego Defense Cluster	30	12	25	5	83.3%	41.7%
Green Aviation Cluster	106	44	12	12	11.3%	27.3%
All clusters	**804**	**265**	**239**	**95**	**29.7%**	**35.8%**

[a] Although 9 participants from the Carolinas' Nuclear Cluster and 69 from the Huntsville Defense Cluster returned the Small Business Survey, two surveys for each of these two clusters were dropped from the analysis because the businesses were not classified as a small business based on SBA's definition for the associated North American Industry Classification System (NAICS) industry code. As a result, the number of small businesses included in the analysis sample is 7 for the Carolinas' Nuclear Cluster and 67 for the Huntsville Defense Cluster.

As in any analysis using survey data, limitations on inferences that are brought about by how the respondent sample is determined should be considered. In the case of the Small Business Survey, if the set of businesses that responded to the survey differ systematically from the entire set of businesses that received cluster services, then the survey results may not be representative of the whole set of cluster small businesses' experiences.[55] For example, it is plausible that the small businesses that responded to the survey are more likely to be active and engaged in the cluster. In that case, caution should be applied in interpreting the survey results as being representative of all small businesses participating in the cluster. In other words, the results may be partially driven by the responding firms' level of engagement in the cluster and thus may not represent the experiences of an average small business participant in the cluster. This potential limitation of the analysis is considered in the discussion of the results in Sections 3 and 4.

A.1.3. Interviews

The evaluation also used qualitative data collected through annual and intermediary interviews with the cluster administrators. The annual interviews were designed to gather information on cluster operations and small businesses' cluster participation that is difficult to capture through surveys, while the shorter intermediary interviews with cluster administrators were focused on the content of the quarterly reports provided by the cluster administrators. All annual interviews were conducted in December 2012, while the intermediary interviews were held in July and October 2012.

Annual interviews with cluster administrators included questions that concerned the following:

- Cluster governance
- Cluster operations
- Cluster recruitment strategies and membership
- Networking and collaboration activities
- Innovation and technology transfer activities
- Sources of funding
- Lessons learned

The annual interview questions were designed to fill in the informational gaps that remained after reviewing cluster proposals and quarterly reports. In addition, questions served to confirm the quarterly information with cluster administrators through the intermediary interviews. The questions were provided to the cluster administrators at least 48 hours before the annual interviews. Cluster administrators were

[55] The statistical bias that can be generated by the way the survey respondents are selected for the sample is referred to as "the sample selection bias."

invited to include cluster service providers and partners in both annual and intermediary interviews. The annual interviews were conducted in a semi-structured fashion, which allowed for follow-up questions to be dynamically added during the interviews. The intermediary interviews followed a more structured approach, although they also allowed for follow-up questions. While the core themes that were investigated remained the same across annual cluster interviews, questions were customized for each cluster to elicit the maximum amount of information within the limited interview duration. The annual interviews included questions on each cluster's configuration, business model, targets, and strategies. They lasted approximately an hour for each cluster.

A.1.4. Cluster Proposals and Quarterly Reports

Cluster proposals for SBA's Cluster Initiative and the clusters' quarterly reports provided another source of qualitative data for the evaluation. They were used as sources of background information on clusters, including cluster configurations, their business models and strategies, their goals and challenges in implementing SBA's Cluster Initiative, and various other aspects of cluster governance, operations, and organizational capacity. In addition, these sources were used to gather detailed information on the clusters' activities, events, and services provided to small businesses as well as instances of small business collaboration and small businesses' grant and contract awards.

A.2. Categorization of Cluster Services

The services and activities that clusters provide to small businesses can be classified in one of six categories, which are used throughout this report as a basis for the categorization and measurement of cluster services and activities for small businesses:

- One-on-one counseling: The provision of one-on-one assistance and guidance to starting or growing a business, including but not limited to general business consulting, technical assistance, mentoring, business development, and guidance related to resolving specific business issues.
- Networking events: Events facilitated by the clusters, either alone or in collaboration with other organizations, whereby cluster members meet with program sponsors, large businesses, prime contractors, and other potential end users or providers to end users of the small businesses' products or services.
- Training events: Group sessions or workshops on one or more topics of interest to small businesses that are cluster participants.

- Matchmaking events: Events or activities facilitated by the clusters, either alone or in collaboration with other organizations; cluster participant(s) meet with large businesses, prime contractors, or among themselves to discuss contracting and award opportunities in a particular technology area selected by the clusters with the explicit intention of creating competitive teams able to respond to these opportunities. These events/activities can involve multiple small businesses or a single one. Examples include small business referral, teaming/matchmaking events, and teaming facilitation and support.
- Showcasing events: Events or activities facilitated by the clusters, individually or in collaboration with other organizations, whereby cluster participant(s) showcase (i.e., display, demonstrate, market) technology products or services to potential customers, including representatives of governmental agencies, as well as prime and subprime contractors. Examples of showcase opportunities include giving technology and prototype demonstrations to third parties individually or at events and trade exhibitions. These events/activities can involve multiple small businesses or a single one.
- Information dissemination: Dissemination of information relevant to cluster participants about such topics as the supply chain, industry-relevant reports and presentations, location of specialized resources (prototyping, legal assistance, etc.), and Small Business Innovation Research/Small Business Technology Transfer Research (SBIR/STTR) opportunities. The dissemination can be done through newsletters, databases accessible to cluster participants or to the wider public via clusters' websites, or the creation of virtual social platforms focused on collaboration.

The above six categories of services and activities are separated on the basis of the forms these services and activities take, as well as their stated goals. For an example of this distinction based on form alone, the difference between the training and workshop category and the one-on-one counseling category is the number of small businesses receiving assistance (several versus one, respectively), which is expected to translate into a different level of customization in the assistance provided. Yet the topic covered during these two services (e.g., commercialization, partnership development, intellectual property) can be the same. For example, a cluster can organize a training event focused on exporting goods and services to Canada, or it can provide one-on-one counseling to a small business particularly interested in exporting to Canada. In the second case, the assistance will likely be much more tailored to that particular small business's needs and strategy.

On the other hand, the distinction between a networking event and a matchmaking event revolves around each category of service's stated goal. Both take a similar form, where cluster small businesses are placed in an environment where they are encouraged to interact with each other and often, but not necessarily, with representatives of large organizations (e.g., large businesses, government agencies) both internal and external to the cluster. It should be noted that matchmaking is differentiated from networking because it is structured around contracting and award opportunities (e.g., a new release of SBIR/STTR solicitations, specific contracting opportunities) in a particular technology area selected by the cluster with the explicit intention of creating competitive teams able to respond to these opportunities. Networking is more of a free-form activity where interactions among attendees do not revolve around a predefined set of opportunities or awards selected by the cluster.

A.3. Secondary Data Sources Used in the Analysis

The evaluation of SBA's Cluster Initiative used secondary data sources to compute average statistics for three key outcomes: (1) revenue, (2) number of employees, and (3) total compensation. These average measures were then compared with the average outcomes experienced by the small businesses participating in the 10 clusters. The following secondary datasets were also used in the evaluation:

- The Quarterly Census of Employment and Wages (from the Bureau of Labor Statistics), which provides data on the number of employees
- The State Personal Income Accounts (from the Bureau of Economic Analysis), which provides data on compensation
- The Dun and Bradstreet (D&B) Business Database, which provides data on both revenue and number of employees

These data sources vary with respect to the frequency with which they are updated, the time periods covered, type of respondents, geographic and industrial granularity, and unit of observation. Exhibit A2 summarizes the various characteristics of the secondary data sources.

The Quarterly Census of Employment and Wages, as well as the State Personal Income Accounts data provide statistics for various industries at the county level, Metropolitan Statistical Area (MSA) level, or state level. In creating the benchmark from the Quarterly Census of Employment and Wages, the North American Industry Classification System (NAICS) codes and the county distribution of small businesses participating in the clusters were used for specifying the industrial categories and geographic scope of each cluster. The average of the county-level data was used as the benchmark statistic for the cluster. In creating the benchmark from the State Personal Income Accounts data, industry classifications

and the states of the 10 clusters' small businesses were used. For clusters that have small businesses from multiple states, a weighted average of the state-level statistics were calculated based on the number of firms that the cluster has in each state.

The D&B Database provided firm-level information on revenue and the number of employees; as such, it allowed for a more robust comparison group. Using the D&B Database, the comparison group for each cluster was created by selecting firms with fewer than 500 employees that were located in the counties of each cluster and that had the same six-digit NAICS codes reported by each cluster's small businesses. In addition, the comparison group was composed of three firm age categories for each cluster to better replicate each cluster's small business age structure. Due to cost considerations, a random sample of 1,000 firms that corresponded to these sample restrictions was selected from the D&B Database for each cluster.

Exhibit A2. Data sources for the creation of benchmarks

Data	Availability	Frequency	Respondent	NAICS code	Employment	Total compensation	Revenue	Number of establishments	Geographic granularity	Level
Quarterly Census of Employment and Wages	6-month[a] to 1-year lag	Monthly, quarterly, or yearly	Businesses covered by unemploy-ment insurance	6 digits	X	-	-	X[b]	By state or by county	Industry
D&B Business Database	3- to 12-month lag	Quarterly or yearly	Businesses registered	6 digits	X	-	X[c]	-	ZIP codes	Individual firms
State Personal Income Accounts	3-month to 1-year lag	Quarterly or yearly	Individuals	3 digits	-	X	-	-	By state or by county	Industry

BLS = Bureau of Labor Statistics, BEA = Bureau of Economic Analysis.
[a] The latest 3 months of data available are listed as preliminary but remain highly reliable because the Quarterly Census of Employment and Wages is not based on sampling but rather on a census of all establishments that report to unemployment insurance.
[b] Unlike monthly employment numbers, the number of establishments is provided quarterly when selecting a statewide or countywide scope.
[c] Available yearly, based on fiscal year reporting, which means a lag of 12 months based on the data-extraction schedule.

Two principal limitations should be considered when samples from these secondary data sources are used as comparison samples for the 10 clusters' small businesses. First, both the Quarterly Census of Employment and Wages and the State Personal Income Accounts data provide statistics for all firms in a given industrial and geographic scope and do not provide statistics by firm size or age within industrial and geographic categories. As a result, part of the difference between the benchmark outcomes and outcomes of the clusters' small businesses may be due to the difference in firm size or age across the two groups. The comparison sample from the D&B data was restricted to those firms with fewer than 500 employees and was constructed to reflect a simplified age distribution of each cluster. Yet still, the distribution of the firm sizes in the D&B sample may be different than the distribution of firm sizes among the clusters' small businesses. Second, the small businesses participating in the 10 clusters may not be a representative sample of small businesses operating in the United States. It is plausible that these firms have certain characteristics that make them more likely to participate in the cluster. To the extent that these characteristics are correlated with the business performance outcomes, they may partially drive the differences between the outcomes of the benchmark samples and those of the clusters' small businesses.

An important limitation noted in last year's report—the mismatch in the time period during which the secondary data source benchmarks were calculated and the period of evaluation—has largely been mitigated in this evaluation. In this year's analysis, the Quarterly Census of Employment and Wages and the State Personal Income Accounts data correspond quite closely to the period of evaluation, while the D&B data is a significantly better match than previously. The timeframes for the comparison samples are September 2010 to June 2012 for the Quarterly Census of Employment and Wages, the third quarter of 2010 to the third quarter of 2012 for the State Personal Income Accounts, and December 2009 to December 2012 for the D&B sample. As discussed in the text (Section 4.3), given recent patterns in recent national economic growth (U.S. gross domestic product growth), to the extent that there are differences between the evaluation time frame and the time frame of calculated benchmarks, these differences should have little effect on the relevance of the comparisons at hand.

8. Data Appendix

This appendix contains tables complementary to the analysis in Section 3. These tables are organized based on the order in which the information they contain is discussed.

Exhibit B1. Number of various cluster stakeholders as of October 1 in the years 2010, 2011, and 2012

Cluster	Business associations			Universities and research institutions			Public-sector agencies			Foundations and nonprofit organizations		
	2010	2011	2012	2010	2011	2012	2010	2011	2012	2010	2011	2012
Project 17	1	2	3	2	5	5	0	6	6	1	4	0
Carolinas' Nuclear Cluster	6	6	1	9	11	13	4	4	2	1	1	3
Advanced Power Cluster	0	7	8	0	5	6	0	7	9	0	2	4
Geospatial Cluster	0	0	12	1	2	5	0	0	20	0	0	23
FlexMatters	0	0	3	0	5	7	0	0	5	0	1	3
Huntsville Defense Cluster	1	5	5	6	10	6	8	9	8	1	2	5
Smart Grid	20	33	6	2	5	29	1	2	18	0	1	20
Energy Storage Cluster	1	4	9	3	7	9	10	15	19	6	11	10
San Diego Defense Cluster	5	5	6	1	1	1	2	4	3	4	6	1
Green Aviation Cluster	0	1	1	7	9	3	7	9	8	5	7	0
All clusters	**34**	**63**	**54**	**31**	**60**	**84**	**32**	**56**	**98**	**18**	**35**	**69**

Source: Cluster Administrator Surveys 2011 and 2012

Exhibit B2. Number of small business participants in SBA's Cluster Initiative

Cluster	Small businesses				
	2010	2011	2012	Change between 2011 and 2012	Cumulative change since 2010
Project 17	4	32	52	20	48
Carolinas' Nuclear Cluster	8	11	13	2	5
Advanced Power Cluster	0	87	99	12	99
Geospatial Cluster	11	34	39	5	28
FlexMatters	0	24	39	13	37
Huntsville Defense Cluster	68	276	271	–5	203
Smart Grid	0	23	14	–11	12
Energy Storage Cluster	62	126	186	60	124
San Diego Defense Cluster	0	25	39	13	38
Green Aviation Cluster	26	34	112	78	86
All clusters	**179**	**672**	**859**	**187**	**680**

Source: Cluster Administrator Surveys 2011 and 2012

Exhibit B3. Reasons for small business participation in the clusters

Cluster	Number of small businesses that responded	Networking with other small and large businesses	Integration in the industry's supply chain	Access to cluster services (e.g., counseling and training)	Access to new domestic or international markets	Access to government procurement opportunities	Other
Project 17	22	64%	9%	59%	9%	0%	32%
Carolinas' Nuclear Cluster	7	100%	29%	14%	57%	43%	14%
Advanced Power Cluster	21	76%	24%	48%	48%	71%	19%
Geospatial Cluster	25	96%	28%	60%	36%	60%	8%
FlexMatters	18	89%	78%	83%	39%	22%	11%
Huntsville Defense Cluster	67	84%	25%	45%	34%	61%	9%
Smart Grid	11	64%	27%	73%	36%	45%	27%
Energy Storage Cluster	31	77%	39%	48%	29%	26%	10%
San Diego Defense Cluster	25	80%	16%	84%	32%	76%	8%
Green Aviation Cluster	12	67%	50%	33%	67%	50%	17%
All clusters	**239**	**80%**	**30%**	**55%**	**35%**	**49%**	**13%**

Source: Small Business Survey

Exhibit B4. Reasons for large organization participation in the clusters

Cluster	Number of large organizations that responded	Improve legislation and regulations	Help spur regional economic development	Improve supply chain	Gain access to new technologies with commercial potential	Find interested partners for technology transfer	Identify contractors or subcontractors	Find partners for funding collaboration	Other
Project 17	18	17%	67%	22%	39%	39%	6%	11%	11%
Carolinas' Nuclear Cluster	19	47%	79%	42%	32%	42%	32%	42%	5%
Advanced Power Cluster	3	67%	100%	0%	67%	33%	33%	67%	33%
Geospatial Cluster	13	8%	54%	15%	46%	62%	46%	46%	8%
FlexMatters	4	0%	100%	25%	75%	75%	0%	50%	0%
Huntsville Defense Cluster	10	20%	50%	10%	50%	50%	30%	40%	10%
Smart Grid	7	14%	57%	0%	57%	86%	0%	57%	29%
Energy Storage Cluster	4	50%	75%	25%	25%	25%	50%	50%	25%
San Diego Defense Cluster	5	20%	40%	40%	80%	40%	80%	40%	40%
Green Aviation Cluster	12	8%	83%	17%	17%	33%	8%	17%	0%
All clusters	**95**	**23%**	**68%**	**22%**	**42%**	**47%**	**25%**	**36%**	**12%**

Source: Small Business Survey

Exhibit B5. Estimated use of cluster time by activity type

Cluster	Counseling	Group events and activities:				Information dissemination	Cluster management	Other
		Training and workshops	Networking events	Matchmaking	Showcasing			
Project 17	25%	5%	5%	25%	25%	5%	10%	0%
Carolinas' Nuclear Cluster	5%	20%	0%	35%	10%	10%	20%	0%
Advanced Power Cluster	64%	5%	2%	2%	2%	15%	10%	0%
Geospatial Cluster	40%	10%	10%	15%	10%	3%	12%	0%
FlexMatters	51%	4%	15%	15%	0%	5%	10%	0%
Huntsville Defense Cluster	10%	10%	10%	10%	5%	15%	40%	0%
Smart Grid	29%	3%	3%	9%	2%	34%	20%	0%
Energy Storage	12%	29%	17%	3%	3%	3%	7%	26%
San Diego Defense	40%	14%	7%	5%	8%	11%	15%	0%
Green Aviation	20%	10%	10%	10%	10%	10%	30%	0%
Cluster average	**30%**	**11%**	**8%**	**13%**	**8%**	**11%**	**17%**	**3%**

Source: Small Business Survey.

Exhibit B6. Number of networking events held by clusters and average number of participants by type

Cluster	Networking events	Average number of small businesses	Average number of large businesses	Average number of universities and research institutions	Average number of public sector agencies
Project 17	4	11.25	0.5	0.75	0.25
Carolinas' Nuclear Cluster	1	N/A	N/A	N/A	N/A
Advanced Power Cluster	4	82.75	8.25	2.75	2.75
Geospatial Cluster	27	14.48	6.7	2.26	4.74
FlexMatters	1	15	2	4	0
Huntsville Defense Cluster	1	75	4	2	2
Smart Grid	0	0	0	0	0
Energy Storage Cluster	36	12.1	1.46	1	2.82
San Diego Defense Cluster	7	9	4.86	1.29	1.86
Green Aviation Cluster	5	27.8	5.4	3	4.2
All clusters	**86**	**19.87**	**4.98**	**1.93**	**3.45**

Source: Cluster Administrator Survey; "N/A" indicates that the cluster did not provide attendance information for this event by type and participant category.

Exhibit B7. Number of showcasing events held by clusters and average number of participants by type

Cluster	Showcasing events	Average number of small businesses	Average number of large businesses	Average number of universities and research institutions	Average number of public sector agencies
Project 17	5	6.2	7.8	2.2	3
Carolinas' Nuclear Cluster	0	N/A	N/A	N/A	N/A
Advanced Power Cluster	0	0	0	0	0
Geospatial Cluster	23	5.35	3.65	1.74	4.17
FlexMatters	5	N/A	N/A	N/A	N/A
Huntsville Defense Cluster	1	90	8	3	2
Smart Grid	1	5	N/A	N/A	N/A
Energy Storage Cluster	4	11	1.5	0	2
San Diego Defense Cluster	10	2.4	2	0.8	1
Green Aviation Cluster	3	2.67	0.33	1.33	2.33
All clusters	**52**	**6.06**	**3.16**	**1.35**	**2.73**

Source: Cluster Administrator Survey; "N/A" indicates that the cluster did not provide attendance information for this event by type and participant category.

Exhibit B8. Number of training and workshop events held by clusters and average number of participants by type

Cluster	Training/ workshop events	Average number of small businesses	Average number of large businesses	Average number of universities and research institutions	Average number of public sector agencies
Project 17	2	41.5	0	1	0
Carolinas' Nuclear Cluster	2	N/A	N/A	N/A	N/A
Advanced Power Cluster	4	29.75	1.75	1.5	1
Geospatial Cluster	19	13.68	3.47	1.79	3.26
FlexMatters	2	7.5	3	3.5	8.5
Huntsville Defense Cluster	14	14.31	0.21	0.71	0.21
Smart Grid	2	2.5	N/A	N/A	N/A
Energy Storage Cluster	19	31	11	5	5
San Diego Defense Cluster	3	14.67	5	1	2
Green Aviation Cluster	13	19.38	1.6	0.08	0.46
All clusters	**80**	**16.86**	**2.22**	**1.19**	**1.78**

Source: Cluster Administrator Survey; "N/A" indicates that the cluster did not provide attendance information for this event by type and participant category.

Exhibit B9. Number of matchmaking events held by clusters and average number of participants by type

Cluster	Matchmaking events	Average number of small businesses	Average number of large businesses	Average number of universities and research institutions	Average number of public sector agencies
Project 17	0	0	0	0	0
Carolinas' Nuclear Cluster	1	N/A	N/A	N/A	N/A
Advanced Power Cluster	1	20	0	0	0
Geospatial Cluster	20	4.3	1.85	0.7	1.15
FlexMatters	1	28	2	5	0
Huntsville Defense Cluster	2	73.5	5	3.5	3
Smart Grid	0	0	0	0	0
Energy Storage Cluster	2	72	2	3	7
San Diego Defense Cluster	19	1.21	0.21	0.21	0.79
Green Aviation Cluster	1	5	0	1	0
All clusters	**47**	**8.47**	**1.22**	**0.75**	**1.13**

Source: Cluster Administrator Survey; "N/A" indicates that the cluster did not provide attendance information for this event by type and participant category.

9. Clusters Supported by SBA

This appendix provides an overview of the various cluster initiatives supported by SBA as of March 2013.

Represented in Exhibit C1 are the 10 clusters in the Regional Clusters Initiative (number 1 through 10), the 20 clusters involved in the innovation and high-technology component of the Jobs and Innovation Accelerator Challenge (number 21 to 40), the 10 clusters involved in the advanced manufacturing component of the Jobs and Innovation Accelerator Challenge (number 11 to 20), as well as clusters supported through other initiatives.[56]

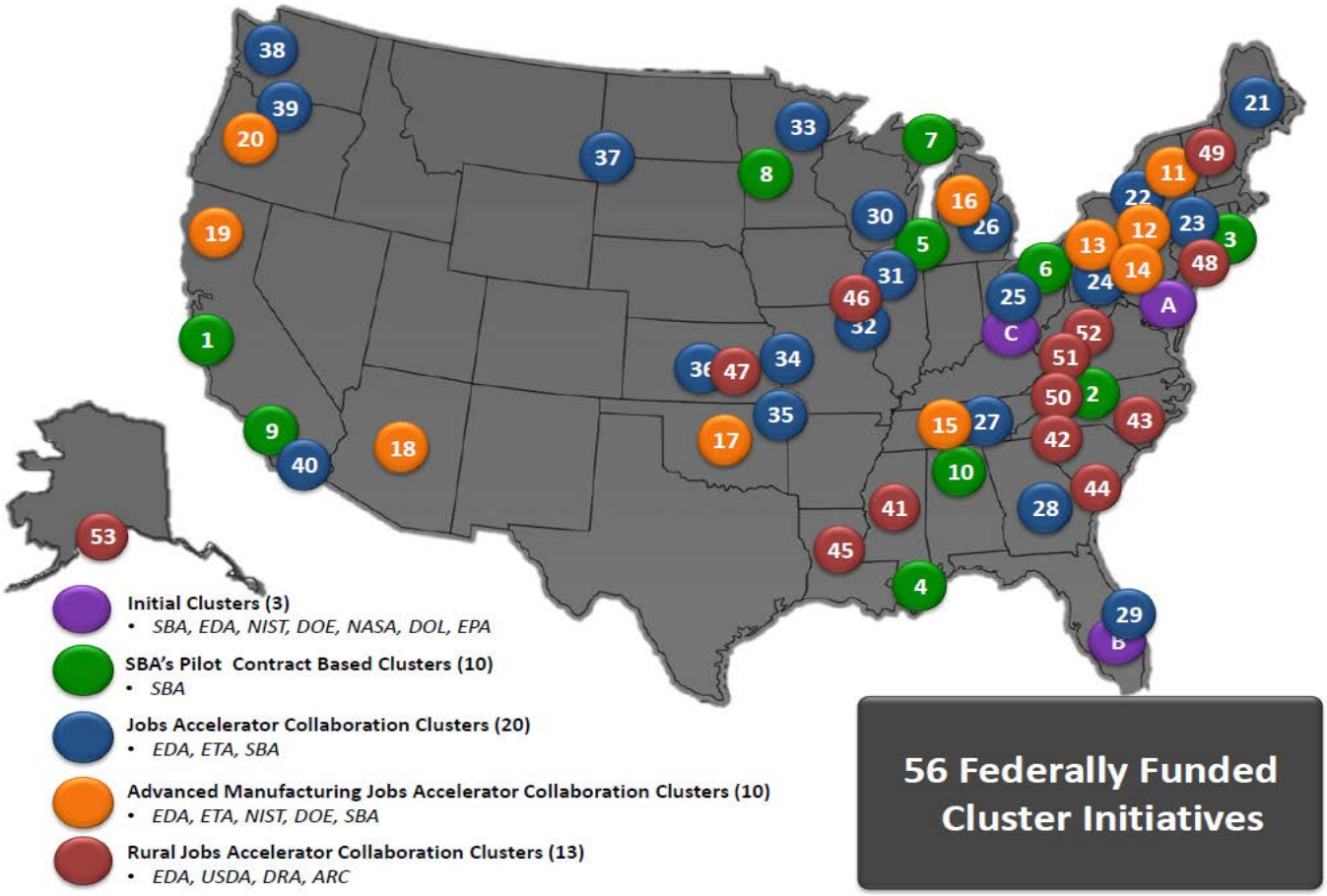


Exhibit C1. Map of the clusters supported by SBA around the United States as of March 2013

[56] An interactive, up-to-date map of all the clusters supported by SBA as well as the hyperlink for each cluster's website can be found at http://www.sba.gov/sba-clusters.