JOBS AND INNOVATION ACCELERATOR CHALLENGE

TECHNICAL PROPOSAL

a. Integrated Cluster and Region

i. Identification of Region

The southern New Jersey region is as unique as it is diverse. Although its location is adjacent to the most populated metropolitan corridor in the country, extending from Boston to Washington DC, open space and rich agricultural land still abound. The rural nature of southern New Jersey is portrayed by a population of some 589,000 people living in an area of some 1,678 square miles.

While the region is much less densely populated than the remainder of New Jersey and the surrounding states, it sustains substantial economic activity. The economic base of the region was conceived from its physical and natural resources, those being the vast waterfront access, rich agricultural land and extensive mineral deposits.

The tourism industry in the state of New Jersey is its largest industry and is focused generally in the southern part of the state along the coastal region of the Atlantic Ocean. In Atlantic City, the advent of casino gaming has been a major tourism drawing card, attracting in excess of 32 million visitors per year. Cape May County boasts a wide array of water related and resort recreational activities as attractions that lure tourists from as far as Canada.

Agriculture continues to play a key role in the regional economy. The magnitude of this industry is demonstrated by the Vineland Produce Auction, which records an annual sales volume in excess of $50 million.

The glass industry is an example of industry drawn to the region by one of its natural resources, sand. As the region grew and prospered, a host of new primary and support industries appeared. The region now also enjoys some degree of diversification of the service sector, including technology based businesses.

From an environmental standpoint, the region enjoys extensive open space and ecologically sensitive areas. The Pinelands National Reserve, in particular, hosts some of the country's most valuable environmental resources. Along with the Pinelands reserve area, the region has two potential wild and scenic river candidates, which have been proceeding through the process of congressional designation.

There are four member counties in the South Jersey Economic Development District. Each county has its own unique character, both economically and physically.

In Atlantic County the economic development activity of the region is established in harmony with the environment. This harmony was accomplished through a major planning effort to achieve compliance with the Pinelands Comprehensive Management Plan. Atlantic County has the largest portion of Pinelands growth area within the entire 100,000 square mile reserve. The growth area is centered in the three Townships of Galloway, Hamilton and Egg Harbor Township. These Townships contain the necessary land masses to support economic growth for the Pinelands region and have been so designated.

The eastern portion of the region is comprised of the Barrier Islands which are subject to the development regulations of the Coastal Area Facilities Review Act (CAFRA). The entire coastal region, east of the Garden State Parkway, from the northern tip of Atlantic County to the southern peninsula of Cape May, are governed by CAFRA rules and regulations. The ocean resources accommodate significant commercial fishing activity, particularly in Cape May County. Cape May is, in fact, the second largest commercial fishing port on the east coast. Tourism and the fishing industry comprise the majority of the economic development activity in Cape May.

To the west, in Cumberland County, large sand and gravel deposits can be found. The deposits attracted the industries utilizing these minerals for production purposes, those being both the construction and glass industries. In addition, the commercial fishing industry is active, particularly in the lower Delaware Bay area of Port Norris and Bivalve.

Further west in Salem County, the rich and abundant farmlands have led to a primarily agrarian oriented economy, with the exception of the petroleum, chemical and electrical production industries. In addition, access to the Delaware Bay has provided the opportunity to develop a commercial port.

Although southern New Jersey is adjacent to the country's largest metropolitan corridor, economic growth has always been hindered by the lack of extensive transportation linkages. A key element of the economic development agenda in the region is pursuing improvements to the transportation system. Facilities such as airports, roads, bridges, and rail are critical to the continued viability of the economy in

southern New Jersey. Efforts thus far have translated into many success stories, including resumption of rail passenger service between Atlantic City and Philadelphia and the expansion of the Atlantic City International Airport, completion of Route 55, development of Salem Port and resumption of freight rail by short haulers.

Since the economy of southern New Jersey has historically been overly dependent on tourism and agriculture, the need for diversification has been underscored. Thus, industry targeting efforts with an eye toward diversification by individual counties over the past ten years and for the foreseeable future is a high priority. The overall economic development picture for the region can be characterized as promising if the necessary infrastructure is put into place.

The demographics of the region are presented in the supplemental section of the technical proposal along with the annual municipal unemployment rates to accurately portray the characteristic of the region and more graphically depict the underrepresented local areas.

Current Conditions:

Southern New Jersey continues to experience significant economic headwinds as business activity remains at greatly reduced levels. A lackluster national economy and a constrained consumer have contributed to the malaise. Moreover, competition with out of state gaming venues over the past two years has taken its toll on gaming and tourism related jobs, particularly in Atlantic City. Hot and humid weather conditions, during the recent peak summer season have brought more visitors to the beaches, signaling a more prosperous year for industry outside of gaming.

A bright spot in the economy included the success stories achieved in the aviation regional industry cluster. In the past year, Cumberland County received statewide attention when Boeing moved its Chinook Helicopter facility to the Millville Airport. An estimated 125 highly skilled technical jobs are expected to be created as it ramps up its operation. In addition, the Next Generation Aviation Initiative gained traction when the new 58-acre Technology Park, located on the campus of the William J. Hughes Technical Center, started construction in December 2009. In the summer of 2010, the FAA awarded nearly $5 billion in new contracts to private industry to create the new satellite based air traffic management system.

As the nation and the state emerge from what has been considered the harshest economic downturn since the "Great Depression," coupled with a financial meltdown, new industries will emerge and existing ones will transition to a more competitive and sustainable model. The southern New Jersey region appears to be poised to move toward a new vision, which will yield a more stable and sustainable economic environment.

Unemployment:

Unemployment rates throughout the region once again escalated from 2009 to 2010. All four counties that comprise the region have seen rates in the double digits. These rates have also remained high going into 2011, but may moderate as weather conditions appear more conducive to a stronger tourism season.

Across the region, the labor force has grown. In order to achieve a stable, albeit elevated, unemployment rate, the region would need to create an estimated 245 new

jobs per year to accommodate the growth of the labor force. More importantly, in order to reduce the unemployment rate by 1 percentage point would require the creation of 3,000 jobs.

In Atlantic County, job losses in the casino industry were due to a difficult economic climate and an increasingly competitive marketplace. Surrounding states have embraced gaming to compensate for dwindling tax revenues and rising costs. In 2010, the Atlantic County unemployment rate stood at 12.4%. The State of New Jersey's recent plan to revive Atlantic City's competitive position and continued success in expanding the aviation and healthcare industries should help this county return to a more favorable labor market.

Cape May County's labor market felt the brunt of the national economic downturn, as it depends in large measure to the larger, albeit constrained, consumer market. While their "staycation" strategy was effective in capturing the market within a "tank of gas", the spending by tourists was far more modest. The jump in the unemployment rate was significant, growing from 11.4% to 11.9% but faired better than Atlantic County, as they did not have to contend with losses incurred by the gaming industry.

Cumberland County experienced the highest unemployment rate amongst its peers in the region. Historically, this trend emerges as Cumberland County has a significant proportion of its economy devoted to manufacturing. The recent emerging national trend of a growing manufacturing sector may contribute to an improved

economic trend line in the county. In addition, successes in renewable energy and aviation should accelerate the pace of recovery.

Traditionally, Salem County has maintained a relatively stable labor market as its job market is inextricably tied to larger industrial and energy producers. This was not the case in the recent year, as these industries experienced the brunt of the national and international economic downturn. While some of these jobs will return as the economy recovers, many will need to be replaced by other industries within the identified regional industry clusters as new market opportunities arise.

ii. Identification of the Cluster

This project will benefit the New Jersey and Pennsylvania aviation Regional Innovation Cluster (RIC). A review of aviation research reports indicate a concentration of aerospace businesses located in the New Jersey and Pennsylvania region. “Trade and Industry Development”, a site selection organization, industry profile shows New Jersey and Pennsylvania ranking ten (10) and eight (8) respectively for the size of the aerospace workforce in the country with a combined total of 57,700 employees or 5.4 percent of the aerospace workforce nationwide The Delaware Valley Regional Planning Commission documents reveal a strong presence of aerospace and defense manufacturers in Southeastern Pennsylvania. This blends well with the presence of firms more focused on aviation system technologies. In fact, this has a synergistic affect when approaching the acceleration of unmanned vehicle systems (UVS), the subject of this proposal.

To the north of the project are central New Jersey which hosts the Joint Base Maguire-Dix-Lakehurst that support Air mobility and Naval air functions. Warren Grove, a key segment, is located in the close proximity of Joint Base M-D-L. Warren Grove Range host military operations, specifically air and ground combat training mission. Here again a unique match for Unmanned Vehicle Research and Development.

Located within the project area, defined by the geographic boundaries of Atlantic, Cape May, Cumberland and Salem Counties, is the William J. Hughes FAA Technical Center (WJHTC). The WJHTC, which is centrally located in the region, is FAA's premier RDT&E facility. The SJEDD is close to completing a fifty-eight (58) acre Aviation Research and Technology Park on the campus of the WJHTC that will connect laboratories and real time data flows to tenants at the park to assist in the creation and deployment of Nextgen Air Traffic Management Technologies. Some 5,000 federal, civilian and military personnel work on the campus of the WJHTC. A heavy concentration of aviation oriented firms are located on or near the Tech Center and provide RDT&E service to the FAA on a contractual basis.

More than twenty (20) colleges and universities are located within the area of benefit described above including Rowan University, University of Pennsylvania and Drexel University all of which have nationally recognized engineering programs. Drexel has a direct link with the WJHTC and has well established internship programs as well. Other schools, including Rowan, Lehigh, Villanova and Penn State Universities are members of the Keystone Chapter of the Association of Unmanned Vehicle Systems International (AUVSI) and work collaboratively to advance the unmanned industry mission and growth potential.

iii. Assets and Competitive Advantage

Approximately five years ago, new economic opportunities in the aviation cluster emerged with Federal Aviation Administration being assigned the task of designing and implementing the vastly improved Air Traffic Management Technology, now known as Nextgen. This new satellite based technology is designed to replace the archaic radar based Air Traffic Control System. The Leaders in the community learned of the Nextgen effort and mounted a concerted effort to capture the economic benefits of the RDT&E work associated with Nextgen. Regional entities were convened to design a strategy to enhance the business climate to entice aviation oriented companies to locate and expand their operations in southern New Jersey in support of the "Nextgen" initiative. The centerpiece of the strategy was to develop a research park on the campus of the WJHTC to facilitate the design and implementation of the Nextgen systems. The WJHTC is a premier RDT&E facility in the nation for air traffic control and safety in Civil Aviation. The Center also houses the "Federal Laboratory devoted to the transfer of Aviation and Homeland Security Technology". The driving force behind the "Nextgen Aviation Research and Technology Park" was to create a collaborative environment for public and private entities and universities to meet the challenge of creating the necessary technology solutions that will allow for the successful deployment and achieve the benefits of Nextgen. The infrastructure of the Nextgen Aviation Research and Technology Park will be completed in the summer of 2011.

To encourage the collaboration, the Park was empowered with unique capabilities. As part of the infrastructure, a telecommunications line was constructed from the labs and system located within the WJHTC to the Park building sites. The

telecommunication line will allow tenants high speed access to RDT&E resources and real time streaming aviation data to supply modeling and simulation data. In addition, the FAA will establish a new 5,000 s.f. “Nextgen” laboratory within the park to provide access to essential tools for researchers to overcome obstacles encountered during the design phase. The overarching purpose of the park is to accelerate the R&D continuum that will achieve the desired goals in a timely and cost effective manner.

iv. Cluster Partnerships

It was determined early on that in order for the aviation cluster to be sustainable, a high skilled work force is critical. To this end, the SJEDD’s strategy was to closely delineate career pathways and design education and training programs to match job requirements at various milestones within the pathways. There are short term solutions to this need but a systemic improvement is necessary to assure a more sustainable model that addresses the economic needs of the region. To accomplish the task at hand, a unique multi organizational partnership was formed. The Atlantic Cape Community College (ACCC) established an Aviation Degree program that includes an air traffic management program. Air Traffic managers are a well paying, high demand career and the current workforce is approaching the mandatory retirement age of 56. ACCC investigated the supply and demand for the program and evaluated various options. College leadership determined that the demand for such programs existed and the skills could be employed in a wide array of aviation career pathways. However, the cost of introducing new degree programming was costly. The program was launched in January of 2011 where the College and the SJEDD shared the capital cost of the air traffic management equipment. The Atlantic City international Airport active and retired

air traffic controllers devoted their time and expertise to curriculum design and classroom instruction. WJHTC personnel and private aviation contractors volunteered to participate in an aviation advisory panel to guide the future of the program. The Director of the WJHTC contributed his support by teaching one of the first courses entitled “Contemporary Aviation Issues”. As a logical next step, the Atlantic Cape Community College is preparing to break ground on a new Science, Technology, Engineering and Mathematics (STEM) Building, that will host the Aviation Institute. In addition, Rutgers University in June, 2011 broke ground on a new undergraduate facility on the campus of ACCC enhancing undergraduate level educational opportunities within the cluster landscape.

Moving forward, new partnerships are in the formulation phase. The Naval Air Station Wildwood, ACCC and a local aviation company are joining with the SJEDD to move toward a flight school for pilot and remote pilot training. The preliminary conclusions are that there is and will be significant demand for pilots in the next decade as commercial aviation fleets increase globally and the existing pool of pilots approach retirement age. The cost of securing a pilot’s license is substantial. The committee has proposed several creative strategies to bring those costs down thus lowering the barriers of entry into the field. Along with the pilot training the committee believes that training in unmanned vehicle operations is an essential component in a flight school. As the deployment of these vehicles accelerates over the next decade, the need for remote pilots will rise as well. This element will become a fundamental part of the unmanned vehicles strategy proposed herein.

The SJEDD will also be instituting the Innovation, Collaboration and Transformation Consortium (ICTC) in the next several months. The ICTC is envisioned to be a public, private and University partnership to facilitate technology innovation in the region by focusing attention on the drivers of an innovation based economy (i.e. access laboratories, venture capital as well as assistance in the commercialization process).

The Region also boasts a number of Universities with active research engagements in southern New Jersey. Currently, the District has research and development relationships with New Jersey Institute of Technology and Rowan University School of Engineering. Continued interaction with major universities, particularly on unmanned vehicles, occurs through the Keystone Chapter of the Association of Unmanned Vehicle Systems International (AUVSI). As the ICTC evolves, these Universities will engage in more extensive collaborative research activities. Currently, the following Universities contribute to this Chapter of the AUVSI: Lehigh University, Penn State University and Rowan University.

In addition, the Federal Laboratories and Universities provide the necessary research and technology transfer capabilities to fuel the commercialization process in the region.

To engage students at an early age, Technical High Schools across the region have established sophisticated programs on aviation, technology and even robotics. These educational institutions are attuned to the employment market and are fully engaged in the regions Workforce Investment Boards as are the Community Colleges.

These institutions work closely together to meet the workforce training requirements within the career pathways. They have also made great strides in addressing the needs of underrepresented populations so that they may participate in job opportunities and career pathways requiring higher skill levels and commanding higher wages.

Venture capital has been and continues to be difficult to obtain and will be a priority for the ICTC. The ICTC will focus on such resources as SBIR's venture and angel financing vehicles to move projects through the commercialization process. The SJEDD has recently modified its lending program to more adequately address entrepreneurs early stage product development.

Leveraging Federal Resources

The state and federal agencies have been particularly helpful in encouraging the growth of the aviation cluster in southern New Jersey. A brief synopsis of those public investments is presented below.

The Nextgen Aviation Research and Technology Park:

Federal EDA	$2,500,000
NJ DOT	$1,000,000
South Jersey Transportation Authority	$ 200,000
Atlantic County Government	$2,500,000
HUD	$ 240,500
Land - 58 Acres Donated by FAA	

Loan Guaranty - USDA $4,700,000

Research Building @ Research Park:

Casino Reinvestment Development Authority (CRDA) $3,000,000

Aviation Institute:

Air Traffic Management Program

HUD $ 187,000

USDA Rural Development (RBEG) $ 100,000

International Aviation Center of Excellence:

Feasibility Studies/UAV Technical Report:

HUD $ 20,000

South Jersey Metropolitan Planning Organization $ 100,000

Naval Air Station Wildwood Building Renovations $ 225,000

vi. Evidence of Effectiveness within Regional Communities

The South Jersey Economic Development has reached out to numerous communities including Egg Harbor, Galloway and Hamilton Townships and Egg Harbor City. These communities all surround the WJHTC and Atlantic City International Airport (ACY). This process involved briefings on the direction and content of the proposal and expected outcome. It should be noted that the SJEDD is in regular communication with these communities to engage them in the planning and implementation process. The

SJEDD Board of Directors has established a policy to work with communities to broaden the positive economic benefits of growth of the Regional Innovation Clusters.

SJEDD has also garnered support from the four (4) county government representatives and the surrounding communities to undertake this effort. To further the project planning and coordination, a team was assembled to design this strategy comprised of twenty-three (23) community leaders from the public and private sectors, and university, community college and technical high school representatives as well. Finally, the SJEDD has consulted with the military in charge of Warren Grove and FAA officials at the WJHTC.

This initiative continues to be a region wide effort to insure the long term involvement of the communities in the planning process and that all have an opportunity to share in the resultant positive benefits.

vii. Evidence that the Cluster has High Growth Potential

The growth of UAV over the past decade is nothing less than remarkable. Nearly ten (10) years ago the Pentagon had less than fifty (50) unmanned vehicles. Today that number now exceeds 7,000. The Air Force expects to quadruple the multi-functional UAVs like the Reaper. The Air Force is now training more remote pilots then fighter and bomber pilots. The Teal Group of Fairfax Virginia, in its March 2011 market analysis, projects that UAV procurement will exceed ninety-four ($94) billion dollars in the next decade. Currently, the US accounts for seventy (70%) percent of the purchases of UAV technology and RDT&E expenditures worldwide.

The market continues to grow with demands for smaller, more versatile UAVs with enhanced equipage. While the military continues to be a dominant consumer of these vehicles, law enforcement, Homeland Security, NAS and other commercial applications continue to broaden. As UAV integration into the National Air Space becomes less restrictive, the commercial segment should accelerate dramatically.

In addition to aerial vehicles, unmanned ground and maritime vehicles show market potential albeit at a far smaller scale at present. Ground vehicles procurement represents about $468 million per year. Little market data was available for maritime unmanned vehicles, but it is assumed to be nominal for the purposes of this analysis.

The economic projections presented below were published in a Report entitled "An Assessment of the Impact on Job Creation in the US Aerospace Industry" prepared by the Association of Unmanned Vehicles. This report concludes that some twenty-three thousand (23,000) jobs will be created as a result of UAVs being integrated into the National Air Space.

While the report didn't provide projection on individual job classifications, it did provide comments pertaining to various job categories that are expected to grow, as follows:

Direct Jobs: Many positions will be in the manufacturing sector; UAS pilots and operations; Data analysts; Maintenance Personnel; Consultants

Secondary Jobs: Sensor manufacturing; Avionics technology providers; Composite manufacturing; Engineers

Support Jobs: Accountants; Sales Associates; Managers

The positions would be in the highly skilled area similar to aerospace industrial/commercial and military aircraft production. The level of sophistication of these vehicles and their systems will bring a higher standard for job skills and correspondingly higher wage rates.

b. Cluster Needs and Opportunities

i. Economic, Business and Workforce Needs and Opportunities

Innovation and Commercialization:

Unmanned vehicles are a new and exciting innovation on manned aircraft and a unique version of Robotics. During the past eight years the military has been escalating its procurement of unmanned vehicles, particularly aerial vehicles. The technology is still in high demand and the US Department of Defense is expected to procure between $4-5 billion dollars of this technology each year for the next decade. It is clearly evident that this technology is evolving to a broader array of non military uses (i.e. Border Patrol, law enforcement, environmental investigations, emergency response and agri business). The trend for UAVs is moving to smaller more versatile systems with far greater capabilities. In addition, the military is seeking interoperability with other types of vehicles both manned and unmanned maritime and ground vehicles.

From a civil and commercial standpoint the aerial vehicles have technology challenges that must be overcome. The Federal Aviation Administration, the regulatory body governing access to the National Air Space, has yet to conduct sufficient tests and

evaluations to establish safety standards. Areas of concern are loss links communication from remote operators and sense and avoid technology to detect other vehicles in close proximity to avoid collision. Congress, within the FAA Reauthorization Bill, has established 2015 as the deadline to integrate UAVs into the National Air Space. Currently the WJHTC is testing the worthiness of the Scan Eagle unmanned aircraft produced by Insitu, a wholly owned subsidiary of Boeing. The RDT&E is being undertaken through a Cooperative Research and Development Agreement between the FAA and Boeing. With the restrictive FAA policies for assuring safety and the accelerating demand for this technology, RDT&E efforts must rise to a new level. However, the lack of restricted air space, particularly along the eastern seaboard, is a constraining factor. The SJEDD in July of 2010 commissioned an authoritative study of business opportunities for UAVs in southern New Jersey. The report issued in October 2010 clearly indicated that access to the Warren Grove Range would create a unique business opportunity to alleviate the time and expense that small businesses incur for RDT&E. AUVSI indicates that the lack of suitable air space is constraining RDT&E efforts for small businesses.

Small Businesses and Entrepreneurship:

The composition of the market for unmanned aerial, ground and maritime vehicles, particularly the smaller vehicles, is an excellent opportunity for small businesses to excel. Larger firms are focused on larger air craft more suitable for large scale military action. Market research from various authoritative sources (i.e. trade journals and government data) indicate a growing demand for smaller vehicles with broader capabilities.

The market shift is similar in many ways to the shift from laptops to notepads or cell phones to smart phones. Entrepreneurial talents will be instrumental in navigating through that market shift. However, small businesses must have certain access to certain resources that are addressed in this proposal. Typically, small business has limited resources to engage in certain activities that would accelerate their growth and prosperity. In the case of the aviation/unmanned vehicle cluster there are several key areas that must be addressed to achieve the growth potential of small businesses, including access to RDT&E resources. The intent of this proposal is to reduce or eliminate these barriers to growth particularly for SBA 7(j) qualified firms. As presented earlier, New Jersey and Pennsylvania have a large presence of aerospace businesses with the fourth largest workforce in the United States, yet lack an RDT&E test bed (restricted air space) to fly UAVs. While larger firms can absorb the cost of conducting flight operations in remote locations across the country, small businesses have a difficult time incorporating those costs within a smaller UAV product line. Access to RDT&E facilities such as Warren Grove Range will allow the small business community to compete more effectively in the market place.

Government Procurement:

Military and other agencies acquiring unmanned systems represent the major market segment of this industry. Participating in government contracting is time consuming and requires specialized expertise. The region needs an experienced government procurement specialist devoted to this innovation cluster. Once small businesses acquire the expertise in identifying and participating in government

contracting, sales should increase rapidly. The integrated work program for this proposal includes hiring a government procurement specialist.

Exporting:

Market data presented indicates projected global unmanned vehicle sales of about ten ($10) billion dollars per year over the next decade. Data further indicated that sixty-nine (69%) percent of those sales will emanate from the US. With over three ($3) billion in sales opportunities outside the United States, it is incumbent on United States small businesses to devote a portion of their marketing efforts to international sales opportunities. It appears that restrictions on UAV operations in airspace in Europe and other regions in the world are less cumbersome. However, it should be noted that US produced UAVs will fly under a somewhat different air traffic management system entitled “SESAR” Single European Sky. This has implications on small business export strategies as design may have to be modified for compatibility. Sales of unmanned systems must be of such magnitude to cover the costs of complying with foreign technologies. Small businesses must work together with the International Trade Administration to design collaborative strategies that will allow small businesses to enter these international markets while maintaining profit margins.

Planning, Promotion or Partner Integration:

Regional Innovation Clusters are dynamic and constantly evolving to compete in an ever changing market place. Physical and land use planning, workforce development, and RDT&E capabilities working in concert will enable small businesses to grow and prosper. There have been a number of assets that have been placed into

operation that contribute to the cluster development. The Nextgen Aviation Research and Technology Park, the Atlantic Cape Community College Aviation Institute and initial investments in Cape May County and Millville airport form a cohesive regional framework that enhance the aviation cluster's competitiveness. The SJEDD will garner all of its resources to assist small businesses by proceeding with implementing the Proof of Concept Strategy in Salem City, Millville Naval Air Station, Wildwood in Lower Township and Egg Harbor City. These centers will not only provide the resources, market research, technical assistance and technology transfer, but networking and collaboration opportunities as well. Each of these areas will be an element and will be discussed in the Integrated Project Concept section.

Skilled Workers in the Cluster

Workforce preparedness is an essential ingredient to the continued growth of the cluster. A qualified workforce well versed in the STEM disciplines will command higher wages. Regional educators are now collaborating on designing an integrated curriculum devoted to the aviation cluster. Rowan University, the nearest Engineering College in the region, has highly qualified faculty and has grown its enrollment by over forty (40%) percent, conferring over one hundred (100) engineering degrees each year. Rowan offers both undergraduate and graduate degrees in engineering disciplines needed for the cluster to grow including Electrical, Mechanical and Computer along with all engineering specialties. The graduate program also offers focus area of transportation and computational science. The Rowan University graduates are expected to secure higher level job positions in the career pathways. It also closely aligns with Top 2010 H-1B Visas in NAIOS categories of 54 and 51, thus lowering the demand for foreign

workers. Of critical importance to the region is the affordability of Rowan. While Rowan has maintained high levels of academic excellence particularly in its engineering school it offers enrollment at far more modest tuition costs. This will allow High School students in underrepresented areas in southern New Jersey greater opportunities to secure higher positions on the career pathways. To assure connectivity of High School students to the STEM disciplines and pursuit of engineering as a career goal, Rowan now sponsors the Rowan Introduction for Students in Engineering (RISE) Workshop. The three (3) day event will host fifty (50) area High School Students and expose them to the contributions engineers make from design of bridges to wind turbines. On the Pennsylvania side of the Delaware River, Drexel University offers a broad array of engineering degree programs. Along with its stature as an engineering school with tremendous research capability it now boasts the rank of number ten (10) nationally in awarding PhDs to domestic students, increasing opportunities for US citizens. Through its leadership roles in various organizations it enables dozens of students each in historically underrepresented groups to pursue graduate studies in STEM fields. The “Sensor” summer program is of particular interest to the UAV initiatives as this field will play an integral role in integrating UAVs into the National Air Space. Here again the “Sensor” program is only offered to domestic students further enhancing the domestic workforce opportunities.

Local community colleges throughout the region offer excellent two year programs and are very focused on providing both two year degree programs and skill training oriented to existing career pathways including, healthcare, aviation and hospitality. The two year degree programs have been the stepping stones students

need to move to obtain four (4) year degrees. Cumberland County College has some eight (8) different colleges and universities offering undergraduate and graduate degree programs. Atlantic Cape Community College (ACCC) has now established an Aviation Institute and is preparing to break ground on a new STEM building. In addition, Rutgers University is currently constructing an academic building on the ACCC campus, further enhancing student connections to four year degree programs.

Technical High Schools in the region are also devoting their efforts to career pathways in the STEM disciplines. A number of these schools have students participating in competition in areas such as robotics. While the education community has integrated STEM disciplines they have not established or integrated curriculum from K-12 through master's level engineering degrees. This is a critical element in accelerating the growth of the aviation cluster. The strategy moving forward is to create a multi-level academic team that will oversee curriculum and integration from high school to graduate level degree programs that closely aligns with career pathways within the aviation cluster. Pilot and remote pilot training will also be an essential part of this strategy.

ii. Inclusion Needs and Opportunities

Historically, southern New Jersey has experienced difficulties in participating in the economic growth and educational opportunities offered by the state as a whole. For instance, unemployment rates in the four counties in Southern New Jersey are typically two (2) points above the statewide average. In 2010 the unemployment rate in the region surpassed twelve (12%) percent. There are several underlying reasons for this

disparity. The southern New Jersey economy is largely dependent upon tourism and agriculture sectors. These industries are typically lower wage rate and are seasonal in nature. This generally lowers household income and the standards of living of households in the region. In addition, over the past twenty-five (25) years manufacturing job losses have mounted, particularly in glass and clothing. Most of the manufacturing plants have shuttered their doors and moved to countries in South America or the Pacific/Asia Rim. More recently, the gaming industry has fallen on difficult times. The great recession of the past several years and competitive forces in surrounding states has dramatically curtailed gaming revenues. The gaming industry, once the prime economic engine of the region, has been forced to reduce staffing levels driving unemployment levels higher. In the past five years the gaming workforce alone dropped from over 54,000 to 36,000.

The underrepresented population has been experiencing difficulties for an extended period of time. When the Baby Boomer Generation began its movement to the suburbs some forty years ago cities and urbanized areas suffered. Industries moved to suburban locations shortly thereafter to avoid an ever increasing tax burden and gain access to better transportation systems.

Efforts have continued to focus resources towards stabilizing the distressed communities. The court ruling that created the “Abbott School District” directed more financial resources to schools in these areas. The Abbott, coupled with the Urban Enterprise Zone which allowed these communities to capture a portion of state sales tax to invest in infrastructure and other services, have stabilized these areas for now. However, a sustainable strategy needs to be employed to revitalize these

underrepresented communities. Each component of the accelerator proposal is intended to directly engage these communities and their respective populations. That process is already underway (i.e. shuttle transit service that serves the William J. Hughes Technical Center, the Aviation Research and Technology Park ,and the Richard Stockton College of New Jersey, now serves the City of Egg Harbor). The SJEDD and Egg Harbor City recently completed the construction of a Transit Hub that connects Atlantic City/Philadelphia commuter rail service and New Jersey Transit Bus service. In addition the City has recently completed a new Middle School and in the past year the Regional School District opened the doors on Magnet High School with technology prominently featured in the curriculum. The SJEDD is also proposing to establish a Proof of Concept Center in the recently restored Lafayette Building located in the downtown area. All of these core capabilities working in unison will reduce or eliminate the barriers to sustainable growth and return economic prosperity to this community currently experiencing an 18.8% unemployment rate and a population that is comprised of fifty-three (53%) percent low and moderate income people.

The Proof of Concept Center (POC) that is intended to accelerate innovations through a region wide network of college/university private industry and public agencies, particularly those that sponsor Research and Development (R&D) will facilitate the R&D Continuum. The POC will have locations in Egg Harbor City, Lower Township (Cape May Airport), Millville and Salem City.

The training aspect of the proposal will address the educational and skill levels of the unemployed/dislocated workers and underrepresented populations.

Finally, the accelerator strategy provides for procurement services to underrepresented business owners to allow them to more effectively compete for government and military contracts. This is of critical importance as the government and military appetite for these unmanned robotic vehicle systems currently represents the largest market segment. Global trade opportunities are also a substantial segment of the market and will be another focal point of small business strategy.

The strategy proposed herein not only accelerates the pace of innovation in the aviation regional industry cluster, but presents new inclusion opportunities for underrepresented communities and populations.

c. Project Narrative

i. Integrated Project Concept

In order for the job accelerator program to achieve maximum performance and benefit, the approach must be comprehensive, strategic, collaborative and sustainable. The technical proposal herein captures the essence of those elements that should assure that the aviation industry cluster, particularly in the field of unmanned vehicle systems/robotics, is globally competitive in both innovation and production. Unmanned vehicles have proven to be an effective and reliable resource for contemporary warfare. While it appears that these vehicles are satisfying the existing demand for current application, the technology can be considered relatively new and its capabilities limited. Demand for greater capabilities and interoperability with other technologies is rising at unparalleled rates. Military users are seeking smaller UAVs with capabilities comparable to the larger ones. It is projected by the Teal Group that sales of UAVs over

the next decade will exceed Ninety-four ($94) billion dollars. This projection was revised upward from last year as the efficiency of these weapons platforms make them invaluable to the new war fighters. Ground and marine systems, at annual sales in excess of Four Hundred and Eighteen ($418) million dollars, provide versatility. However, since technologies and systems are common to all these unmanned platforms it is the intent of this proposal to incorporate all three platforms. The key to success in accelerating growth in the aviation cluster will be the integration and implementation of a comprehensive strategy where private industry, public sector agencies and the military work collaboratively towards common goals, specifically to enhance the capabilities of the aviation cluster to design, produce, maintenance repair and retrofitting and piloting unmanned vehicles to capture a global market.

The following elements of a comprehensive strategy builds current capabilities and addresses needs to successfully attain substantial job growth in well paying technical career pathways that support the Aviation Regional Innovation Cluster. These elements are specifically designed to support and complement each other to successfully accomplish the stated mission.

ii. Scopes of Work, by Funding Agency

EDA:

Prepare an Operations and Procedure manual to allow RDT&E of UAV activities at Warren Grove Range.

The Warren Grove Range is a military complex located in south central New Jersey. The facility is designated as restricted air space, an over arching consideration for the RDT&E of unmanned aerial vehicles, as this type of vehicle is not permitted to fly in the National Air Space without a Certification of Authorization (COA) issued by the FAA. The COAs are issued with significant limitations and can take six (6) to nine (9) months to obtain. These authorizations, while necessary to assure public safety, hamper technological advancement.

In July 2010 the SJEDD commissioned a study of economic opportunities presented in the RDT&E of unmanned aerial vehicles (UAV). The report prepared by King Aeronautics identified Warren Grove as a unique opportunity to fully engage the private sector in using this facility to advance their knowledge in product development of UAV systems. This effort would be mutually beneficial to all parties as the military would gain access to enhanced technologies sooner, while the private sector would gain convenient access to test facilities and work closely with their military customers to enhance UAV capabilities. Using Warren Grove for these purposes would also provide the FAA with UAV “Test” data on a wide array of vehicles to support the goal of integration. The current FAA Reauthorization Bill includes language that sets a deadline to integrate UAVs into the NAS by 2015. In order to accomplish this task, all cognizant parties must work as a team to use this facility to its maximum potential. Obviously, flight operations within restricted military air space will be governed by various rules and regulations. The purpose of this element of the job’s acceleration proposal is to streamline the access process to Warren Grove without disturbing its ongoing military mission. It is worth repeating the combined size of the aerospace industry in New

Jersey and Pennsylvania would rank them 4th in the nation. The RDT&E Accelerator Team comprised of military, cognizant Public Agencies, Private Industry and Associations, Colleges and Universities would require the engagement of a consultant to create an “Operations and Procedures Manual” that would govern UAV RDT&E activities at Warren Grove Range. At the conclusion of this process a memorandum of agreement would be executed governing the use of the facility. It should be noted that this manual could serve as a national model for other jurisdictions in RDT&E efforts specifically for collaborative R&D initiatives.

Strategic Evaluation of RDT&E assets.

A review of the “National Aeronautics Research, Development Test and Evaluation Plan” authorized by the White House National Science and Technology Council indicated several gaps RDT&E asset to advance new technology. It also determined at times that there are areas of duplication arising from agencies moving somewhat autonomously on carrying out their mission. In order to avoid these circumstances a strategic evaluation is necessary to identify existing asset and potential gaps in RDT&E complex. This will not only guide further investment in unmanned vehicles but allow agencies with somewhat different purposes to work collaboratively to achieve mutual goals. The military and the FAA have differing goals for unmanned vehicles however the technological advancement of unmanned vehicle capabilities will certainly be mutually beneficial. The collaboration with private sectors will also reduce time and expense in product delivery.

The RDT&E team will oversee the development of a scope of services and consultant selection process to establish an RDT&E investment Plan.

Pilot and Remote Pilot Training

The SJEDD established a committee in March of 2011 to evaluate the needs and opportunities of providing pilot and remote pilot training programs. Market research indicated that demand for pilots over the next decade is dramatic. Demand is driven by the aging of the existing workforce and expanding fleets of aircraft. Similarly, the number of unmanned vehicles is rapidly increasing, driving the need for skilled operators. The cost of securing a pilot's license is costly and a significant hurdle to meet demand. These costs may preclude underrepresented population from pursuing this career. Additionally, skills associated with remote vehicle piloting in many respect does not coincide with pilot skills. While there are overlapping areas which make a joint school logical and cost effective, programs for each category will be distinctive as will the selection process for potential candidates. There are several creative approaches to satisfying demand for pilots and remote pilots that can be employed to assure sufficient enrollment that achieves financially sound programs that can be offered at price points that will make it accessible to underrepresented population. The creative approach engages a partnership with aviation oriented small businesses.

K-12 through Graduate level studies in STEM Disciplines.

In order to satisfy the workforce demands of the unmanned vehicle industry, there is a need to coordinate curriculums at the Technical High School, Community Colleges, and Universities/Engineering schools levels. The curriculums must build a

ladder within the educational system that coincide with the career pathways associated with unmanned vehicle design, repair, maintenance and retrofitting, Maintenance Repair and Overhaul (MRO) is well within the capabilities of the education community located in southern New Jersey and the Delaware Valley regions. However, the program alignment should facilitate the progressive transition to the next level. Furthermore, industry representatives should participate to identify levels of education and workforce competency at various points along the career pathways. Curriculum alignment will allow accelerated job and small business growth success to be sustainable over time.

ETA:

Basic Skill on the Job Training

Presently the Technical High School and Community Colleges in Southern New Jersey and the Delaware Valley provide an excellent pool of technically skilled candidates to satisfy the immediate workforce needs of the industry. These schools boast award winning teams of students who regularly participate in state and national competition for design in aviation and robotics. The Cape May County Technical High School Team recently received top honors in the state of New Jersey for its innovative design of an aircraft wing. Atlantic Cape Community College with its new Aviation Institute was launched in January of 2011 with a class of some seventy (70) students that will participate in air traffic management systems, skill and course training using the latest modeling and simulation equipment on the market. These schools are ready, willing and able to provide candidates to meet the needs of the unmanned vehicle industry. They can offer a combination of tailored course work and on the job training

programs to not only meet industry needs, but incentivize job creation. The unmanned vehicle MRO operation could represent a significant segment of the market considering the number of vehicles currently engaged in military operations.

A team compromised of Workforce Invest Board, Technical High School and community college representatives will work with industry representatives to devise the most effective program to achieve these objectives.

SBA:

Government Procurement

At present the primary market for unmanned vehicles are in the military. As stated previously the military has submitted a capital plan that shows expenditures between $4.0-5.0 billion annually for the next decade. The ability of small businesses to participate in this market are looking more favorable. The trends in the unmanned, particularly aerial vehicles is growing towards smaller vehicles with greater capabilities as the market broadens to commercial applications, small businesses again will have competitive advantages as they can quickly shift resource to capture immediate opportunities. However, in many circumstances small businesses do not have the expertise to identify and participate in government contracting opportunities. Since the industry is heavily dependent on public procurement small businesses specifically SBA70 qualified small businesses owners must be vigilant and proficient in pursuing these contracts.

To accomplish this task a government procurement specialist must be engaged to support this activity. Additionally, this function cannot be considered either part time or ad hoc. The specialist will deliver services at a sub regional primarily at Proof of Concept Centers in Egg Harbor City, Cape May County Airport (Lower Twp), Millville and Salem City. It should be noted that a portion of Galloway Township is in close proximity to the Egg Harbor City POC and is a designated HUB Zone.

As stated previously in the Technical proposal, while the US is the dominant market of unmanned vehicles sales, approximately thirty (30%) percent of the projected ninety-four ($94) billion dollars of sales for this industry will emanate from outside of US borders. Here again proficiency in international sales is typically beyond the capabilities of small businesses. The SJEDD has participated in International Trade Administration reverse trade missions which is a cost effective means of participating in global market opportunities. The Innovation, Collaboration and Transformation Consortium, under the auspices of the SJEDD, will provide the support for this component that will be funded through the SBA segment of the application.

SJEDD/SBDC Contributions:

Financial Resources

Entrepreneurs in unmanned vehicles will require financial resources to “ramp up” their business to a sustainable level. Bridge or venture capital will allow these smaller businesses to participate in government contracting and international trade opportunities. These areas can generate substantial sales but require significant time and energy to achieve success. Businesses may experience protracted time frames

from submission of proposals to contract fulfillment. Financial resources must be sufficient to sustain itself during those extended periods of time. Also businesses may engage in proof of concept competition. Here again, the cost of prototype may have to be carried by the business until sales emerge. SJEDD has modified its EDA Revolving Loan Fund recently to accommodate businesses needs in this area. Under the new plan Seed loans can be offered in such situations to accommodate small business needs. The SJEDD also has an existing relationship with the Small Business Development Center located at Stockton College to support business development through a broad array of technical assistance services. Finally the SJEDD is establishing the Innovation, Collaboration and Transformation Consortium to better organize the networking system. This network will provide the necessary resources to improve both capabilities of the businesses and present new opportunities for partnering and strategic alliances.

Project Element Synergies

The SJEDD has been building a framework to support the aviation cluster to assure its long term success. This project is built upon accelerating the innovation process that spurs sustainable job creation. The project strategies address the immediate and long term market opportunities and positions the region to compete on a global scale. The region has and continues to add to RDT&E research assets to support the R&D continuum process. The resources devoted to workforce development programs are targeted to immediate and long term needs of the cluster. Technical assistance and loan resources are also shaped to facilitate small business formation and expansion.

As evidenced in the support letter from the AUVSI contained in the application the lack of convenient access to a compatible airspace for UAV's testing and training is adding time delays and expense to the research and development of activities of small businesses. Unfettered access to RDT&E facilities yield accelerated pace of product delivery and higher degree of quality and customer satisfaction, resulting in expanded sales opportunities. This project unifies Innovation, Labor and Capital resources and establishes an effective and efficient delivery method that allows small businesses to be far more competitive in the introduction of new and innovative products and services for unmanned vehicles.

iii. Inclusion:

The SJEDD has devoted significant resource over its history to undertake projects in economically distressed/underrepresented areas. In recent years this District has stepped up these efforts as it executes its economic diversification through innovation policy. The SJEDD has devised and is now implementing a satellite Proof of Concept Center Strategy in the region in four (4) historically underrepresented areas, Egg Harbor City, Lower Township, Millville and Salem City. Each of these communities, which have been plagued by prolonged economic distress have unique innovation features and or assets. The District is introducing the Proof of Concept Centers in those communities to drive jobs and innovation. The ground work in these communities has taken place over the past several years in preparation for the transformation. A quick snapshot of these communities is provided below.

City of Millville:

This community is characterized by a 13.6 percent unemployment rate, and a dramatic loss in manufacturing jobs. Millville was at one time a dominant force in the glass manufacturing industry. The vast supply of silicon sand made Millville a logical choice for glass production. Unfortunately, these glass manufacturers fell prey to low cost foreign competitors such as China.

Millville's unique feature/asset is its airport and motor sports park. The airport has been a key factor in attracting the aviation industry to the region. Recently Boeing opened its Chinook Helicopter Maintenance Repair and Overhaul, (MRO) operation to the airport which has provided 120 jobs for highly skilled workers. The New Jersey Motor Sports Park boasts a grand prix style racecourse and plans for a motor cross course that provide testbed platforms and MRO capabilities for unmanned air and ground vehicles RDT&E and MRO operations. Federal EDA provided two ($2.0) million grant for infrastructure to support the recently completed Airport Industrial Park. A Proof of Concept Center will advance Millville's efforts to attract small business enterprises.

Salem City:

This community is one of the oldest and most historic towns in New Jersey. Unfortunately the City has experienced severe economic distress and urban decay that occurred over a long period of time. Employment at the electric utilities has remained steady, but workforce levels of DuPont, the dominant employer, has dwindled over the years.

The unique innovation feature/asset is the location of a shipping port and the Salem nuclear plant close by. Both of these assets represent RDT&E test bed opportunities in unmanned underwater UUVs and ground vehicles. It has become apparent during the earthquake that rattled the Daiichi and Daini Nuclear Reactors that unmanned vehicles can play a critical role in the emergency response to these events. In addition, with Homeland Security interests in port security, the active albeit small port operations provide RDT&E capabilities.

Egg Harbor City:

This community has worked diligently to reverse the economic distress experienced since the 1970s. While the unemployment remains high at 18.8 percent several milestones have been achieved. Egg Harbor City is now home to a Technology Magnet High School and a new transit hub that links Atlantic City/Philadelphia commuter rail service with New Jersey Transit bus and local shuttle service that ties this community to Richard Stockton College and the William J. Hughes Technical Center. The city also owns the closest industrial park to the Warren Grove Range. These assets provide convenient access to RDT&E facilities for UAVs and provide the transit hub to attract student and skilled workforce alike from the South Jersey and Pennsylvania region.

Lower Township/Cape May Airport:

This community is located at the southern most location in the state of New Jersey. Tourism and fishing is the economic mainstay which unfortunately presents limited full time employment opportunities at higher wage rates. The key Innovation

feature/asset is the Cape May County Airport. This underutilized airport has several aviation oriented businesses including a fixed base operator. The SJEDD recently secured funds to renovate the Historic Naval Air Station in Wildwood at the airport. This existing Hanger facility is located adjacent to the Airport runways. Renovation will open class room space at this renowned Aviation Museum complex that would accommodate a pilot/remote pilot training facility. A creative plan has already moved forward to lower the cost of obtaining a pilot's license, the major impediment to satisfying the future demand for pilots and remote vehicle operations.

The Satellite Proof of Concept Center (POC) combined with their unique assets establishes platforms to launch new product innovation for unmanned vehicles, and will also provide these underrepresented communities with the catalyst to revive their local economies while contributing to the growth of the Regional Aviation Innovation Cluster.

iv. Project Sustainability

The intent of this initiative is to set forth a comprehensive approach to ignite the small business innovation process to capture a major emerging global technology market. The Teal Group from Fairfax, Virginia, in their 2011 market analysis estimated that unmanned vehicle market will exceed ninety-four ($94) billion dollars over the next decade. It was further postulated in a Washington Post article dated July 4, 2011 that global sales of unmanned vehicles and corresponding global competition will escalate dramatically based on the initial success by the United States in deploying these systems and their relatively inexpensive price tag. While countries across the globe are

putting forth austerity measures, the cost of these systems compared to manned systems and defense platforms are allowing them to survive defense cutbacks.

The sheer size of the unmanned vehicle/robotics market compared to the cost of a strategic public investment in supplementing the existing RDT&E assets yield overwhelming positive results. Moreover future public investment requirements in the aviation cluster should diminish as critical mass of businesses is achieved that will assume the cost of R&D.

d. Impact and Measurable Outcomes, by Funding Agency

EDA:

- Two Hundred (200) new jobs created in Cluster Small Businesses Technical Certification Level, twenty-four (24) months
- One Thousand (1,000) new jobs created in Cluster Large Business Technical Certification Level, twenty-four (24) months
- Public Private Partnership minimum One ($1.0) million RDT&E project, twenty-four (24) months
- Private Investment in RDT&E Five ($5.0) million, twenty-four (24) months
- Four (400) hundred new jobs in RDT&E undergraduate STEM, twenty-four (24) months

- Fill Fifty (50) percent open cluster positions with PA/NJ residents/US citizens
- Note: Outcomes dependent on access to Warren Grove Range

SBA:

- Increase enrollment in College Level STEM Disciplines
- Ten (10) Licensed Pilot/Remote Pilots
- Twenty (20) New Jobs in Small Businesses, twenty-four (24) months
- Five ($500,000.00) International Sales, twenty-four (24) months
- Five ($5.0) Million Federal Procurement contract for Small Businesses, twenty-four (24) months

ETA:

- Eighty (80) job placements for training participants, twenty-four (24) months
- Twenty (20) OJT placements resulting in permanent employment, twelve (12) months
- Priority Status will be given to military veterans

e. Qualifications, Project Management and Project Feasibility

i. Competency of Management and Communications

Efforts in the unmanned vehicle segment of the Aviation Cluster have been underway for some eighteen (18) months. The FAA is already engaged in Research & Development/Test & Evaluation Project with larger firms fully engaged in the Global UAV market. There is significant expertise at the William J. Hughes Technical Center to pursue this aviation technology. There is abundant organizational capabilities in the Bi-State area in Aerospace and Defense contracting as well as the Joint Base Maguire-Dix-Lakehurst interest and capabilities. Collectively the Bi-State region has the expertise and desire to assure success.

ii. Inclusive Leadership and Participation

The Proof of Concept Strategy at the sub regional level provides a best practice model of inclusive leadership and participation. The businesses, universities and support structures are all engaged in the innovation process, and Research and Development Continuum. This organizational approach allows the free flow of information and resources with distributive decision making capabilities.