Rhode Island State Science & Technology Plan

2014 Progress Report

Rhode Island Science & Technology

Advisory Council

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Executive Summary

Rhode Island adopted its first State Science and Technology Plan in 2009 with the aim of establishing jurisdiction-wide goals and objectives for building world class research and development competitiveness and providing a framework to guide the State's utilization of resources from NSF EPSCoR and other stakeholders**.**

In order to secure its economic future, Rhode Island determined that it must leverage its competitive advantages in the areas of marine sciences, life sciences and energy and environmental sciences. The State also identified its small size, stable population, history of manufacturing and design, and historically ocean-oriented economy as competitive advantages. To build world class research and development competitiveness in these identified areas, the Plan called for the development and implementation of strategic investments to 1) bring science and technology (S&T) professionals together; 2) improve the S&T infrastructure; 3) streamline the conversion of S&T ideas into marketable products and services; and 4) communicate the state's S&T accomplishments to the wider public.

Over the course of the past five years, the Rhode Island Science & Technology Advisory Council (STAC) has worked with partners in academe, government, non-profits and the private sector to advance the goals and objectives identified in the Plan. We have also worked with these partners to identify and monitor emerging areas of excellence and the intersections of existing areas that can further enhance our research, education and innovation activities and stimulate our economic development. In this past year, STAC has been engaged in multiple statewide planning activities and has supported 1) the Rhode Island Statewide Planning Office's *Rhode Map,* a federal Sustainable Communities grant project ; 2) the Rhode Island Commerce Corporation's development of its *Statewide Economic Development Plan* and its report *Understanding the Economic Development Opportunity & Impact of Climate Change* as presented to the Rhode Island Climate Change Commission and; 3) the Rhode Island Foundation's joint effort with the Rhode Island Commerce Corporation to produce the *Rhode Island Economic Intersections* report.

Through these endeavors, STAC has made measurable progress in building specific platforms to advance Rhode Island's research competitiveness while working seamlessly with local partners to ensure alignment with statewide jurisdictional priorities. These dedicated efforts have resulted in a seed grant

program that has yielded a four-fold return in the form of follow-on funding from federal agencies and private investors, a statewide Benchmarking study of 23 innovation economy indicators, a statewide program to increase the number and quality of SBIR/STTR applications and to provide a state match to successful Phase I recipients, a grant program for workforce development in the bioscience and engineering fields, enhanced communication and outreach strategies and recommendations for future initiatives to increase state supported S&T activity. This progress, detailed in the following pages, demonstrates Rhode Island's continuing commitment to leveraging state and federal funds to build world class R&D platforms that support education, innovation and economic development.

I. Introduction

Rhode Island adopted its first *State Science and Technology Plan* in 2009 with the aim of establishing jurisdiction wide goals and objectives and providing a framework to guide the State's utilization of resources from NSF EPSCoR and other stakeholders**.** In that report, Rhode Island pledged to leverage its position as the "Ocean State" with the goal to become an innovation ecosystem that could be home to knowledge workers as well as world-class researchers where a culture of creativity and entrepreneurship would drive the state's accomplishments and reputation.

That Plan put forward a series of coordinated activities to leverage Rhode Island's assets to maximize the economic impact of science and technology. A set of specific actions and outcomes was identified to increase connectivity and communication, improve infrastructure, and streamline commercialization and translation, charting a course for Rhode Island's future. In order to provide focus for the Plan, STAC performed an assessment of potential areas for research collaboration by interviewing leaders of Rhode Island-based research institutions including universities, hospitals, public agencies, industry associations, military and defense industries, and government agencies. The assessment found that Rhode Island is particularly well-equipped to pursue research in three interrelated areas: life sciences, marine sciences, and energy and environmental sciences. The assessment also found that in order for the State to create a vibrant and resilient place for itself in the world of science and technology, it would greatly benefit from developing the following research capacities and tools: information technology, technology transfer, translational research, and strategic thinking, including design thinking.

Four specific goals were put forward for the development of science and technology with the purpose of creating an "innovation ecosystem" that builds on Rhode Island's assets and enables the state to succeed as the global research, development, and economic landscapes change.

- Bring together researchers across the state to encourage collaboration in marine sciences, life sciences, and energy and environmental sciences;
- Improve existing infrastructure for collaborative research, including Rhode Island's capacity for technology transfer within and across S&T sectors;
- Facilitate business innovation by streamlining the pipeline between research ideas and new venture creation; and
- Communicate research findings and initiatives to public officers and the wider community

Over the past five years, STAC has worked both alone and with community partners to develop and implement a variety of programs to achieve these goals. Following is a summary of each.

II. Strengthening the Collaborative Research Platform

To create stronger connections across the state's research organizations, STAC initiated the Rhode Island Research Alliance to serve as a platform for promoting collaboration, maximizing state and federal investment in research and enhancing the state's R&D-related economic development opportunities. By promoting collaboration among the state's research universities, research hospitals, business community and government agencies, the Alliance supports current research activities, strengthens Rhode Island's ability to attract federal and private research investment for new projects and spurs economic development and job growth.

A signature program of the Rhode Island Research Alliance is the annual Collaborative Research Grants. These grants are awarded to support a catalytic stage of inter-organizational, inter-disciplinary, collaborative research projects that are well positioned to attract substantial follow-on investment, have significant potential for technology development/commercialization, and/or advance bench-to-bedside

and bedside-to community translational efforts. The maximum amount of any given award is $200,000. Proposals must clearly show how the combined efforts of the investigators can lead to results that could not be achieved by either alone. Projects with strong translational components and projects that focus on infrastructure development that significantly advance the competitiveness of scientists in Rhode Island to secure additional funding awards are encouraged.

Funding for these grants is appropriated annually by the Rhode Island General Assembly. A minimum of $800,000 in funding serves as the mandated state match in collaboration with the RI NSF EPSCoR grant and is dedicated to projects that focus on the research themes of RI NSF EPSCoR. Since inception, STAC has distributed $9.8 million in awards to 65 teams representing 41 public and private institutions. These seed grants have resulted in over $36 million to the State in follow-on funding from federal, philanthropic and venture sources including over $4 million in SBIR/STTR awards. The external investment has supported additional research, new patents and products, infrastructure expansion and the formation of new companies. In addition, the work of one team developing a human artificial ovary was named by Time Magazine as one of the "Top 10 Innovations for 2010".

With the Collaborative Research Grant program firmly established, STAC expanded efforts to support large, inter-institutional collaborative research projects. This was accomplished through the launch of a number of initiatives aimed at expanded networking and communications including: 1) convening a statewide coalition of sponsored research and advancement professionals from academia and medicine; 2) co-sponsorship of two Matchmaking events to boost academic-industry collaborations; 3) coordination of two statewide research symposia; and 4) hosting a Grant Writing workshop for young investigators.

STAC has also brought a number of speakers to the State to discuss compelling topics and to share best practices. These speakers have included Robert Atkinson, Information Technology & Innovation Foundation; Michael Cassidy, Georgia Research Alliance; Richard Bendis, Innovation America; Jerry Melillo, Ecosystem Center at the Marine Biological Laboratory; Jean Slattery, Achieve, Inc.; Kei Koizumi, White House Office of Science and Technology Policy; Christina Gabriel, University Energy Partnership; James Hoehn, National EPSCoR/IDeA Foundation Office; Christopher Coburn, Cleveland Clinic Innovations; Richard Lunak, Innovation Works; Jeanne Mell, University City Science Center and Mark Skinner, State Science & Technology Institute.

III. Improving the Ecosystem for Entrepreneurship and New Venture Development

STAC developed the Rhode Island Innovation Tax Credit to meet two distinct policy goals: to provide capital to new, high potential ventures seeking to bring innovative products or processes to market and to reach into the community to tap local *mentor capitalists*, successful Rhode Islanders who are positioned to invest money and experience in Rhode Island companies. The program was targeted to industry sectors for which Rhode Island has a competitive advantage and was limited in scope, allowing only $1M be deployed in any two year budget period and capping credits at a maximum of $100K per company. To date, $1,105,000 has been distributed to 12 companies that have raised $3,150,000 from 83 investors. While this tax credit does not sunset until 2016, recent changes to the RI tax code do not allow the credits to be applied to personal income tax liability, thus making this tax credit no longer attractive to the targeted investor demographic. Because of the critical importance of capital to early stage ventures, STAC is working with Commerce RI to develop a revised initiative to support angel investment.

STAC is also working closely with the newly-created Business Engagement Center at the University at Rhode Island to ensure the services it provides from technology or IP transfer assistance to licensing information are accessible to new ventures.

IV. Facilitating Business Innovation

In 2013, to foster job creation, facilitate small business development and enhance the workforce pipeline, the Rhode Island General Assembly created the Innovate Rhode Island Small Business Fund . Through Article 23 of the FY14 Rhode Island state budget, a special revenue account was created and STAC was directed to administer the account. Five hundred thousand dollars ($500,000) was appropriated for this account in FY14 and level funded in the current FY15 budget. In assigning the new Fund to STAC, the General Assembly recognized the special value of alliances that can increase linkages

between EPSCoR researchers and counterparts in private technology-based small businesses to increase the competitiveness for SBIR/STTR.

Through a variety of programming supported by the Fund, eligible Rhode Island small businesses may apply for grants and loans to defray the cost of applying for SBIR/STTR awards, match SBIR/STTR Phase I and Phase II awards and hire interns. The goals of the program are to:

- Leverage state funds to encourage and support Rhode Island entrepreneurial participation in the federal SBIR/STTR programs;
- Increase the amount of federal research dollars received by Rhode Island firms;
- Sustain companies through the early stages of product development;
- Encourage the establishment of high potential, high quality, high growth ventures in Rhode Island; and
- Enhance the talent pipeline in the life sciences and engineering fields.

By early 2014, all three programs were operational with $495,000 of the funding targeted to direct grant assistance to small business. The remaining $5,000 is dedicated to administrative costs including the attendance for the first time by a Rhode Island state representative to the national SBIR/STTR Conference.

In the first year of the program, all of the funding targeted to matching grants has been committed to eight Rhode Island small businesses, leveraging $1,424,592 in funding from three federal agencies (Department of Defense, National Institutes of Health and National Science Foundation). Two of the companies receiving federal awards received seed funding through the STAC collaborative research grant program and one of the two was also a participant in the NSF I-Corp program.

Twenty five grants of $3,000 each have been obligate to reimburse companies in the bioscience and engineering fields for the costs of hiring of interns. Twenty grants of $3,000 each have been set aside for companies that submitted SBIR/STTR applications in the first six months of 2014 are just now submitting applications for reimbursement of eligible direct costs associated with preparing an SBIR/STTR Phase I application.

V. Enhancing Communication and Public Awareness

Our Plan identified communicating the research findings of our investigators and our S&T initiatives to public officials and the public as a top priority. Communication not only facilitates the transfer of knowledge, but it also builds broad support and understanding for key initiatives. To better inform our community stakeholders, including our funders in state government, STAC dedicates a small part of its annual appropriation to enhancing its website (www.stac.ri.gov) and publishing stories on S&T activities in the Ocean State. The website is a central clearing house for information on the Collaborative Research Grant program, Innovation Data including the Innovation Index and the Innovate Rhode Inland Fund. It also provides transparency by posting information on STAC meeting agendas, Council profiles and the State Science & Technology Plan. A special feature for our users is an online funding portal and an on-line submission process for applications to all of STAC managed grants. In addition users can access information on NSF EPSCoR including links to its website, facilities database and editions of its publication *The Current*.

VI. Benchmarking

Innovation depends on an environment that links a pipeline of ideas and talent with the creativity that can transfer discoveries and knowledge into products with value in a marketplace. The Rhode Island Innovation Index is a joint project by the STAC and the Greater Providence Chamber of Commerce to benchmark and track Rhode Island's S&T enterprise and innovation capacity through 23 key indicators. The data from the Index provides a picture of our innovation capacity and allows us to strategically identify and better support initiatives that will insure Rhode Island continues to be a major hub of innovation. Published bi-annually, the report will provide an understanding of how Rhode Island is trending in major areas that define our capacity for creating prosperity and also compare our trends with those of states in our region, our EPSCoR peer cohort and nationally. Using the data in the report, we will be able to better identify and support initiatives that best leverage scarce financial resources, measure the impact of these investments, and pursue the promise of a strong Rhode Island in the years to come.

IX. Alignment with Statewide Planning Initiatives

Over the past eighteen months, the Rhode Island state Departments of Administration (Planning), Commerce and Environmental Management have been involved in statewide planning projects and have published the following reports:

- An Equity Profile of Rhode Island (Department of Administration/February 2013)
- Economy RI: Economic Data Analysis and Assessment (Department of Administration /February 2013)
- Economic Intersections of Rhode Island (Department of Commerce/February 2014)
- Understanding the Opportunity and Impact of Climate Variability (Department of Commerce/April 2014)
- Actions for Economic Development in the Ocean State (Department of Commerce/May 2014)
- A Resilient Rhode Island: Actions for Climate Change (Department of Environmental Management/May 2014)
- Rhode Map (Department of Administration /anticipated Fall 2014)

The findings throughout these reports underscore the strong connection and interdependence of Rhode Island's economic success to its coastal geography and density of institutions of higher education. Many of the recommendations are directed towards boosting our science and technology ecosystem, demonstrating both strong state fidelity and a coordinated approach for the prioritized goals and objectives outlined in the State Science and Technology Plan. In fact, Directors of two of the Departments issuing reports are STAC members (Commerce/Valois and Environmental Management /Coit). This demonstrates a strong continuity and seamlessness shared by state leadership across state priorities and investments.

In the report "Actions for Economic Development in Rhode Island," water-related activities and our eleven colleges and universities are identified as two of four primary competitive advantages. Rhode Island is also identified as a test-bed for developing and then exporting new technologies related to

adapting to a changing climate or recovering from disaster. Within this report, the *Innovation* section specifically calls for an expanded role for STAC and includes a specific directive to leverage NSF EPSCoR funding to strategically invest in areas of economic opportunity and to continue activities to benchmark key technology measures. The section also calls for support for collaboration between the state's research enterprises in order to accelerate the level of research funding coming into the state, increased seed funding for projects, and revision of angel tax incentives. Finally, within the report's *Resilient Economy* section, our water based economy is referenced as a strategic asset and suggestions are made to create test sites for both land and water piloting of resiliency-related products and create a Proof of Concept Fund to be administered by STAC to support the commercialization of research around climate variability.

The second report issued by Commerce RI, *Understanding the Economic Development Opportunity & Impact of Climate Change*, names innovation as one of nine areas for economic focus and directly references the need to build upon NSF EPSCoR investments:

> Rhode Island's ability to harness the vast amount of climate change research being conducted by Rhode Island colleges and universities, and develop that research into new products to help our economy mitigate and/or adapt to climate change, is something that goes beyond just one type of business or industry. Under the NSF EPSCoR grant, nearly $40 million dollars of combined state and federal funds will have been invested by 2015 with an additional $20 million requested for 2016-2021 around climate variability in Narragansett Bay (NB). NB is a watershed of national significance and uniquely positioned at the convergence of two climatic zones making it one of the best places in the world to demonstrate how the effects of climate change are intense and detectable. Building on our "Ocean State" assets that include deep expertise in the natural sciences, engineering and art/design, we enjoy a broad range of possibilities for development of new products and services for both private and public sector use. Examples include: communication tools/data narratives to explain climate variability, autonomous coastal monitoring devices, sculptural forms/new materials for coastal habitat restoration, marine disease management (vaccines, natural products), and nanotechnology products to detect and monitor chemical changes in coastal and marine waters.

This report also reiterates the call for a new Proof-of-Concept fund administered by STAC to support the commercialization of research around climate change.

VII. Closing

The Rhode Island State Science and Technology Plan was designed to be a living document, to be updated as new expertise and resources develop. We are grateful to those who participated in originally helping to inform and shape this plan, and to those who continue to work with us to develop initiatives in order to position Rhode Island as a leader in collaborative research and innovation. STAC will continue to recommend, launch and manage new programs to support a world class R&D infrastructure in our state and to work with leadership in state government to ensure state fidelity to federal investments in our economy.