

# Maine

VISION

# Innovation

The State of Maine will develop a diversified, vibrant & resilient innovation economy to build prosperity and opportunity for its people.

# Economy

2017

# Actions

# Plan



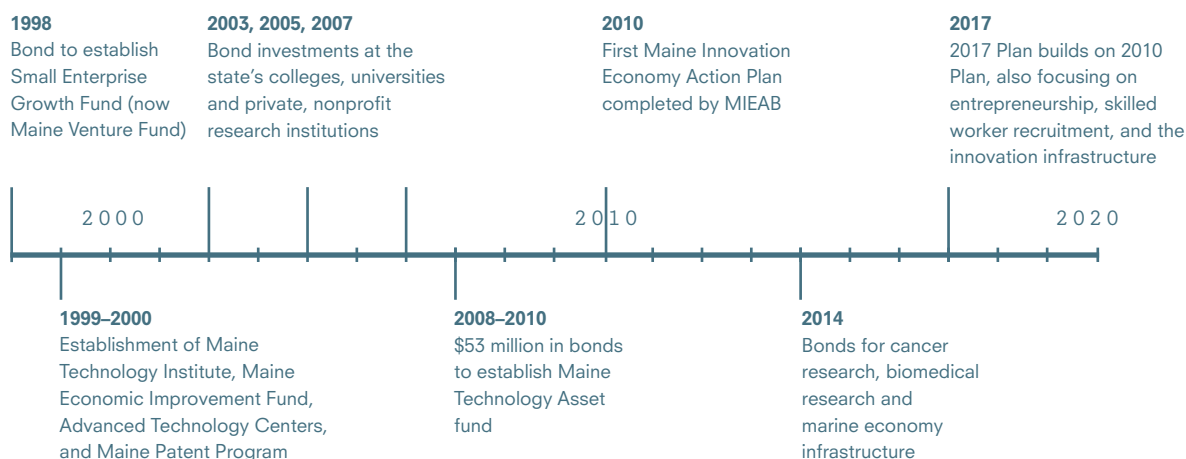
Since the mid-1990s when national rankings found Maine at the lowest level of research and development (R&D) investment in the country, Maine has acted to diversify its economy through broader encouragement of a knowledge-based innovation economy.

From 1998–2000, Maine established the original cornerstones of the State’s strategy to build an innovation economy, including the Small Enterprise Growth Fund (now known as Maine Venture Fund), Maine Technology Institute, Maine Economic Improvement Fund, Advanced Technology Centers, and the Maine Patent Program. Subsequent bonds approved by Maine voters in 2003, 2005, and 2007 lead to significant investments in facilities and equipment at the State’s colleges, universities and private, nonprofit research institutions.

In 2007, the Maine Innovation Economy Advisory Board (MIEAB) was established to coordinate the State’s research and development activities and to foster collaboration among higher education and nonprofit research institutions and the business community. The Board consists of thirty representatives from the industry and research communities, all appointed by the Governor, as well as two ex-officio seats for the President of the Maine Technology Institute (MTI), and the Director of the Office of Innovation.

MIEAB oversaw the 2010 Maine Innovation Economy Action Plan, which defined investments in Research Capacity, Innovation Capacity, and Entrepreneurship Capacity. The 2010 plan was the first to recognize the critical addition of entrepreneurship to the previous focus areas of R&D infrastructure and higher education goals.

This 2016 plan continues the work of the 2010 plan, while recognizing that some progress made since 2010 – particularly in the area of entrepreneurship – was by entities not envisioned in the 2010 plan. This 2016 plan acknowledges a shift from a centralized State-led strategy to one requiring connection and cohesion among diffuse networks and organizations within the State, as the underlying State-supported pillars of the past plans have either evolved or disappeared. The 2016 plan also broadens its focus from job creation to also include skilled worker recruitment, in recognition that Maine’s workforce must also evolve to compete in a technologically sophisticated and globally connected economy. And finally, the 2016 plan asserts that it is not enough to build capacity for innovation and entrepreneurship, Maine must also build culture and a supportive ecosystem for growth. The plan outlines tactics that do both.



## PLAN STRATEGY

The State of Maine will continue to diversify its economic strategy and strengthen its innovation-based economy. **The strategy is a “three-legged stool” approach of (A) growing R&D capacity, (B) increasing human capital, and (C) cultivating entrepreneurship and innovation within enterprises.** The State will encourage innovation based on technology, market, and/or business model, and also encourage enterprises to build on Maine’s unique competitive assets.

It is critical that Maine’s public and private sectors work hand in hand to build a vibrant innovation economy. Public investment, wisely channeled and multiplied through public-private partnerships, can be the kindling to build capacity, and demonstrate the value of innovation-led business strategies in the private sector.

### Maine’s Seven Targeted Technology Sectors (Appendix 1)

The State of Maine has previously identified seven technology sectors that represent its historical strengths and emerging opportunities, and focused investment on these sectors. Going forward it will continue to support these sectors, with a greater focus on intersections and on high-performance clusters within and between sectors – contexts that have proven fertile for innovation.

### Plan Organization

Within each of the three areas of this plan is a Venn diagram. The overlap is the active space where the Plan is most focused and anticipates the biggest return on efforts. However, for Maine to truly move its economy, the tactics must make a broader impact across the whole economic spectrum.

For each tactic, the plan identifies which organizations are primarily responsible, and which play a supporting role. Clarifying responsibility in this way will help publicly-supported efforts to be better aligned and coordinated.

- MIEAB LEADERSHIP
- ★ MIEAB MEMBER LEADERSHIP
- PUBLIC POLICY OR RESOURCE

### Implementation Principles

This plan is designed to be a strategic vision for the Maine economy, not a work plan. In moving toward implementation, the following principles are recommended:

- Build on existing networks such as MIEAB, Maine Accelerates Growth, Maine Science & Tech Alliance and the STEM Council to coordinate, align messaging and avoid duplication.
- Review progress toward goals annually, building on systems in place through the Maine Economic Growth Council’s (MEGC’s) Measures of Growth, Kauffman Foundation and Milken Institute.
- Review and update the plan on an annual basis based on progress against goals and changing external circumstances.
- Consider a centralized function within State’s structure to oversee the parts that have public policy and resource implications.
- Provide opportunities for further education about the tactics recommended in the Plan.

## IN PRACTICE

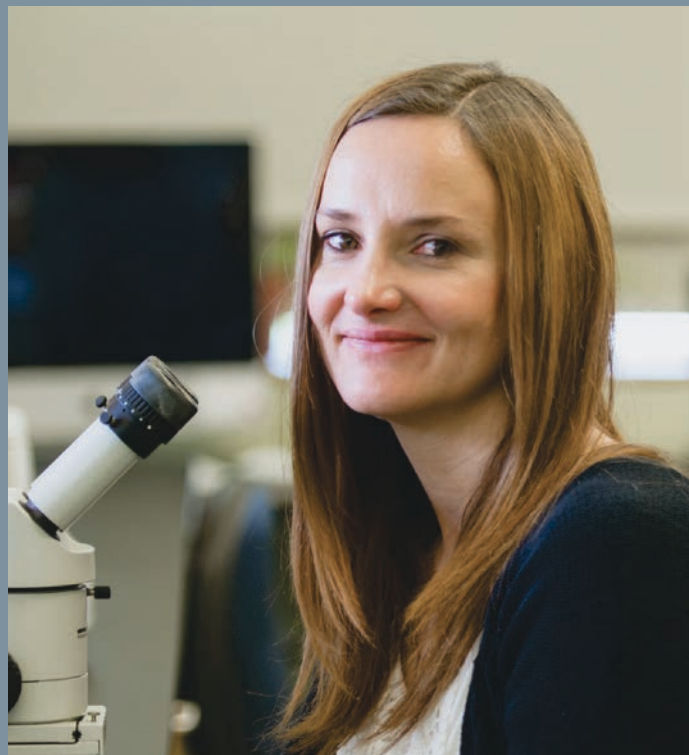


Photo credit: MDI Biological Laboratory

## Sandra Rieger, Ph.D.

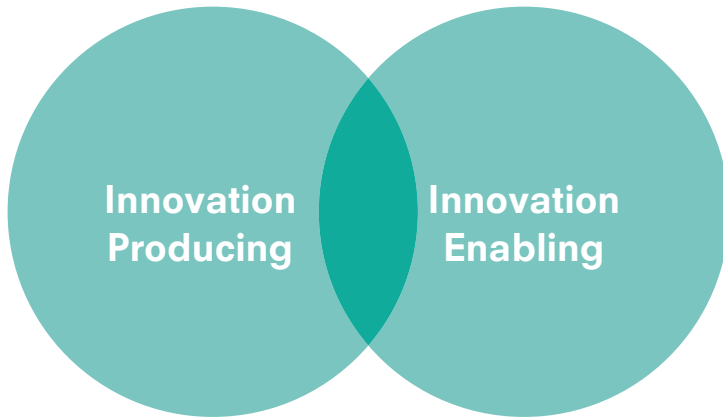
*Assistant Professor, MDI Biological Laboratory*

Sandra Rieger, Ph.D., studies the molecular mechanisms underlying chemotherapy-induced peripheral neuropathy in zebrafish. She has identified two compounds that can prevent, and somewhat reverse, the condition by suppressing these mechanisms. Peripheral neuropathy is a disabling condition that causes pain, tingling and numbness in the hands and feet, and affects approximately 20 million Americans.

**Her discovery raises the hope that these compounds can be used to treat peripheral neuropathy in humans.**

The compounds discovered by Dr. Rieger are the subject of a provisional patent filed by the MDI Biological Laboratory. The next step is to conduct studies in mammals. Dr. Rieger is also working on a potential collaboration with the Mayo Clinic in Rochester, Minn., to test the clinical relevance of these findings for humans.

# R&D Infrastructure, Capacities and Resources



**BENCHMARK**

**Maine will improve its score in the Research and Development Inputs Composite Index compiled by the Milken Institute biannually to move up by 3-5 places in state rankings.<sup>1</sup>**

*Research and development (R&D) infrastructure in Maine loosely falls into two categories: Innovation Producing – facilities and organizations whose primary mission is direct research and development, both basic and applied; and Innovation Enabling – facilities and organizations that function as Centers of Excellence, supporting partnerships or research that directly support private industry growth. Both types of assets are critical for the growth of the Maine Innovation Economy.*

*Maine will continue to grow and support both types of assets through this plan and also leverage needed expertise and assets not available within the State. Tactics will build the State’s capacity for R&D to translate into commercial and economic activity.*

**KEY:** ● MIEAB LEADERSHIP  
 ★ MIEAB MEMBER LEADERSHIP  
 ■ PUBLIC POLICY OR RESOURCE

**STRATEGY**

The State of Maine will increase its R&D activity through growth and maintenance of the State’s R&D infrastructure, capacities and resources, by:

- A1. Increasing R&D performed at the state’s academic and non-profit research institutions**
- A2. Increasing R&D performed in the private “for profit” sector**
- A3. Increasing cooperative research agreements with National Laboratories and between Maine R&D institutions and Maine companies**
- A4. Supporting efforts for a comprehensive approach to high speed internet connection to increase and improve access**

**TACTICS**

**A1. Increase research and development performed at the state’s academic and non-profit research institutions**

- Establish and grow the statewide capacity for intellectual property (IP) development, and processes to transform
- ★ discoveries into commercial successes
  - Establish and resource a central repository and system for IP protection, and a centralized data base of licensable IP
  - Establish and resource a mechanism for marketing this IP repository

*Maine currently does not have a centralized resource for improving the capacity to discover and commercialize new ideas in the State. Progress on this tactic is underway in response to evolving needs and the dissolution of the Maine Patent Program in 2014. In 2016, MTI undertook a discovery process to understand the state of IP protection and tech transfer across the State and will work with other MIEAB partners to establish a system to build capacity for commercializing results. This effort should be appropriately resourced for implementation.*

Primary Responsible Organization: **Maine Technology Institute**

Supporting Organizations: University of Maine System, The Jackson Laboratory, Maine Center for Entrepreneurial Development, University of New England, and other MIEAB represented organizations

- Ensure a steady and sustainable stream of public and private investment into R&D infrastructure and capacity
  - Develop a clear schedule and strategy for biennial R&D bonding and/or state appropriation for R&D infrastructure and facilities
  - Develop and resource a central repository of information about R&D assets available in the State and market these assets

- Develop a reporting mechanism to highlight and share stories of how R&D assets are used to improve Maine’s economy
- Revisit, clarify, and expand use of Maine Economic Improvement Fund appropriations to provide matching funds for Foundation, Federal or non-State funding for R&D projects won competitively by Maine academic and non-profit research institutions
- Continue to maximize Maine’s opportunities through participation in the National Experimental Program to Stimulate Competitive Research (EPSCOR) Coalition

*This area is both policy-focused input and implementation-focused output. The State needs to lead in devising and patiently implementing a long term strategy for steady and reliable investment in R&D assets, resources and infrastructure. In parallel, those who develop and use these publicly-funded resources must work together to develop and market them as not just properties of their institutions but also assets of the State of Maine.*

**Primary:** Maine Department of Economic and Community Development in consultation with Maine Innovation Economy Advisory Board

**Supporting:** Maine Technology Institute, University of Maine System, Legislature – particularly the Joint Standing Committees on Labor, Commerce, Research and Economic Development (LCRED) and Appropriations and Financial Affairs (AFA), and Governor’s office

## A2. Increase R&D in the private “for profit” sector

### ★ Drive private sector funding for R&D by leveraging the State’s investments

- Increase state funding for early stage R&D activities through Maine Technology Institute
- Review, improve and promote state R&D tax credits and other incentives for companies to conduct R&D in Maine
- Expand seed/angel tax credits
- Increase level of matching grants and technical assistance for Maine companies applying for federal R&D grants and contracts, Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) opportunities
- Find ways to connect existing businesses to new R&D outlets and infrastructure

*The public sector has a critical role in incentivizing and encouraging private sector investment in R&D. Investments made by the State through MTI are made with a 1-to-1 leveraging effect and drive more R&D investments by private companies. Tax credits for R&D assets and innovation-based investing can incentivize further private investment, and are often the key factor in a company commercializing in Maine.*

**Primary:** Maine Legislature and Governor’s Office; recommendation support from DECD and MIEAB

**Supporting:** Finance Authority of Maine, Maine Technology Institute, Maine Venture Fund

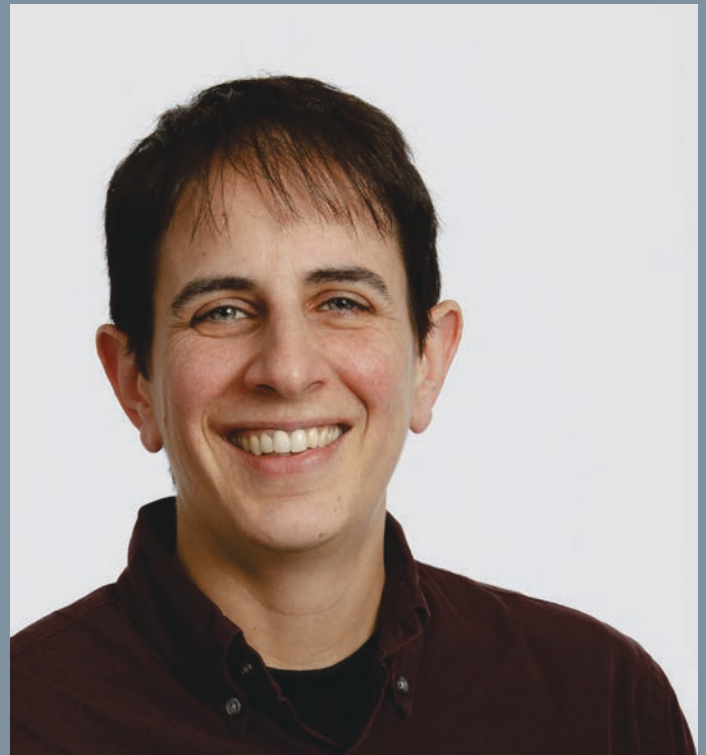


Photo credit: The Jackson Laboratory

## Elissa Chesler, Ph.D.

*The Jackson Laboratory*

The Jackson Laboratory (JAX), recipient of Maine’s 2014 bond investment in the JAX Center for Biometric Analysis, has won a five-year grant totaling \$11,714,623 from the National Institutes of Health (NIH) to create a new Center for Systems Neurogenetics of Addiction (CSNA) in Bar Harbor. Deploying state-of-the-art behavioral and diagnostic tools, including those in the future JAX Center for Biometric Analysis, the principal investigator Elissa Chesler, Ph.D. will evaluate advanced mouse populations in search of traits that predispose individuals to addiction. She and her colleagues will correlate traits like impulsivity, acute and sensitized drug responses and reward-seeking, with the genomes of the mice, building databases to help translate the findings from mouse to human.

**These data resources and sophisticated analysis tools will be made available to the global research community.**

★ Market Maine to existing and newly forming R&D entities from outside the State

- Provide Maine & Company with pertinent data
- Encourage public/private collaborative efforts to attract Centers of Excellence
- Work with nationally recognized innovation companies to bring “skunkworks” teams to Maine to work on innovation concepts

*This tactic acknowledges the benefit of bringing new R&D organizations into the State, whether they be the R&D arms of existing industries or companies or brand new R&D “shops” that can develop new technologies and also support startups and spin offs from these shops. It also celebrates the emergence of engineering and other scientific/technical services as a small but fast growing and well-performing cluster for the State that can be leveraged to attract R&D entities.*

Primary: Maine & Company, MTI, Maine International Trade Center (MITC)

Supporting: MIEAB members providing data

● Use networks and “Bully Pulpit” to encourage private sector to engage in innovation

- Collect data and tell stories each year of Maine-based innovation; train innovation-based enterprises how to tell stories around innovation

*The January 2016 state economic development evaluation recommends that the State use its “Bully Pulpit” to showcase and celebrate accomplishments across all of Maine’s regions, encouraging R&D, the growth of new enterprises, and continual innovation within existing companies.*

Primary and Supporting: MTI and Maine Accelerates Growth, with MIEAB organizational member support

**A3. Increase cooperative research agreements with National Laboratories and between Maine R&D institutions and Maine companies**

- ★ Promote awareness of federal Research Laboratories as a resource for Maine companies and researchers
- ★ Assist “matchmaking” between Maine companies and federal and Maine-based R&D facilities
- ★ Incentivize collaborative R&D using funding criteria in competitive funding Request for Proposals (RFPs); and by developing company-friendly tech-transfer policies at Maine-based R&D facilities

*Maine is not home to a National Laboratory and does not have many of the locational R&D assets of other states. Therefore Maine must optimize the use of the assets that do exist by lowering barriers to collaboration. Maine will work to better leverage*

*the Federal Laboratory Consortium for Technology Transfer, as well as Maine-based R&D assets to increase product innovation within established companies. This tactic will take patience and dedicated resources to understand and build on the Federal Laboratory system.*

Primary: Currently Maine does not have a lead institution in this area. MTI, the University of Maine System, and the Maine Center for Entrepreneurial Development are exploring how to lead this effort, building on UMaine EPSCoR efforts to promote and expand awareness of these opportunities

Supporting: MIEAB member organizations

**A4. Support efforts for a comprehensive approach to high speed internet connection to increase and improve access**

Support and resource networks of collaboration for improving Maine’s access to high speed internet needed for R&D, a digital economy and population retention and growth in rural areas

*High speed internet, bandwidth and connectivity is a crucial piece of the infrastructure needed to support Maine’s R&D, to support remote workers and connect with global markets. While Maine has built its “three-ring binder,” connection of communities, workers and infrastructure is inconsistent and incomplete. Multiple efforts are underway to extend high speed internet to individual rural areas, but Maine needs a comprehensive, statewide plan to innovate and coordinate high speed internet access.*

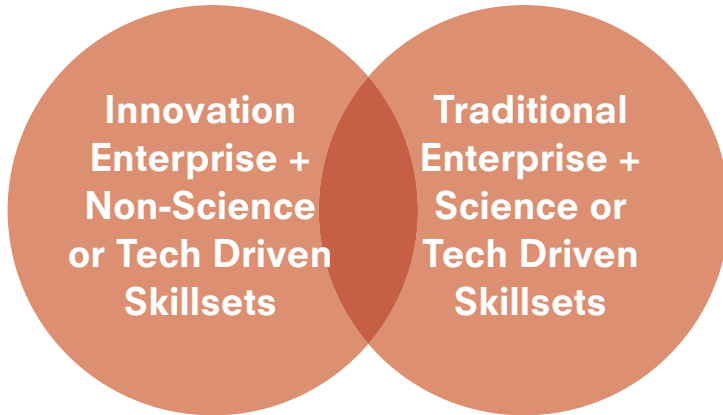
Primary: Connect Maine

Supporting: Multiple at the State and local levels

KEY: ● MIEAB LEADERSHIP  
★ MIEAB MEMBER LEADERSHIP  
■ PUBLIC POLICY OR RESOURCE



# Human Capital, Talent Creation and Retention



**BENCHMARK**

**Maine will improve its score in the Human Capital Investment Composite Index compiled by the Milken Institute biannually to move up by 3-5 places in state rankings.<sup>1</sup>**

**Maine will experience year-over-year increases in the percentage of innovation-focused companies and jobs with STEM-related requirements.**

*The goals for human capital recruitment, development and retention have changed since the 2010 plan, due to Maine’s demographic challenges and global technology trends.*

*Demographically, as the oldest State in the nation, the Maine Department of Labor’s focus has shifted from finding jobs for people to finding people for jobs. This holds true across all industries in Maine, from tourism to scientific and technical services.*

*Secondly, the increasingly ubiquitous nature of technology means that all businesses, including those in traditional industries, require a level of technical knowledge, and workers need to be agile and adapt to a changing and increasingly technical environment. Maine’s productivity, or value-added per work is well below the national average, and MIEAB contends that improvements in this focus area will lead to increased productivity and wages.*



Photo credit: College of the Atlantic

## Heath Fuqua

*Student, College of the Atlantic*

Only a year and a half ago, Heath Fuqua was living in a camper and trying to figure out what to do next, after spending eight years in the Army. Today, he’s on track to become a research physician specializing in the neuroscience of aging. He found his direction through a National Institutes of Health-funded program called INBRE (Idea Network of Biomedical Research Excellence). Maine’s INBRE program works to strengthen Maine’s capacity for competitive biomedical research by exposing and providing real-world training to undergraduates.

**“The program was totally instrumental in focusing my future on biomedical research.**

Without Maine INBRE, I never would have been doing what I’m doing,” says Fuqua. Today, he works part time as a research technician while continuing to pursue his undergraduate degree. He studies specialized particles called germ granules in the tiny roundworm, *C. elegans*, to learn more about how to treat cancer in human beings.

## STRATEGY

The State of Maine will develop or attract and retain a workforce with skills that match the needs of Maine's current and future employers, by:

### B1. Recruiting and retaining new skilled workers

### B2. Increasing skills of existing workforce pipeline

## TACTICS

### B1. Recruit and retain new skilled workers from all demographics

- ★ Leverage Maine's quality of life and place to increase in-migration of skilled workers
  - Support and resource national advertising and social media campaigns around living and working in Maine
  - Support and resource efforts to target Maine's former residents and workers and alumni networks to return to Maine

*Maine's beautiful natural environment and quality of life can be a powerful recruiting tool. There are a variety of organizations focused on this effort and MIEAB connection and awareness of these efforts allows a supporting or following role on this tactic. This effort must be a public/private partnership open to innovative approaches.*

Primary Responsible Organizations: This tactic currently has no one champion, although public-private efforts are coalescing. MIEAB supports a centralized, well-resourced strategy and policy gains in this area. The University of Maine System can bring its vast alumni network to bear on this issue.

Supporting Organizations: MIEAB member organizations are participants in these efforts as individual employers

- Proactively market and support opportunities at innovation-based employers
  - – Subsidize internships with tax credits
  - Recruit and retain resources for subsidized internships
  - Subsidize advertising in appropriate trade publications, online forums or at relevant trade shows

*This tactic focuses on incentives that either the State or innovation-based employers can provide, both individually and collaboratively.*

Primary: This tactic currently has no one champion, but would benefit from one that is economy-wide and part of the State's overall economic development plan; the Maine State Chamber platform could be augmented and the Innovate for Maine Fellows program could be scaled to fill this need. Regional trade organizations also have a role in supporting this effort.

Supporting: Many, including Maine's Career Centers to connect and market local opportunities

- ★ Cultivate a welcoming culture within Maine's communities and institutions

- Support recommendations from the "Maine's Labor Shortage: New Mainers and Diversity" report to ensure that attracting and helping new Mainers engage in the economy is woven into existing workforce development and community development efforts
- Actively catalogue skills of new Mainers from other countries and resource re-credentialing in US
- Actively welcome new Mainers

*Maine's future prosperity is directly tied to population growth, which is in turn tied to in-migration. Retention and full economic participation of new Mainers requires a welcoming culture.*

Primary: This tactic currently has no one champion, but would benefit from an umbrella body to bring efforts together for better alignment with the report recommendations

Supporting: Many Maine non-profit organizations are engaged around this issue, but better connections need to be made between these groups and tying in-migration to prosperity. Leading groups include Maine Development Foundation, Chambers of Commerce, Maine Department of Labor, Coastal Enterprises Inc., and School District Adult Education programs

### B2. Increase skills of existing workforce pipeline

- Increase the number of students retained, recruited and
- ★ graduating from Science, Technology, Engineering, Art/
- Design, and Mathematics (STEAM) disciplines through the education pipeline
  - Focus post baccalaureate courses where companies are resident
  - Expand remote learning in Science, Technology, Engineering and Mathematics (STEM) courses
  - Increase financial aid for post-secondary students in STEM disciplines
  - Attract high-quality faculty and graduate students in STEM disciplines through assistance with student loans
  - Expand paid internships to high school students and teachers
  - Expand "non-traditional" learning for students from different parts of the pipeline (eg. short courses, seminars, non-credit)

*This tactic builds on goals outlined in past Maine Innovation Economy Action Plans to continue to improve the STEM skills at all levels of the educational and workforce pipeline within the State. It also recognizes that STEM should be expanded to STEAM to include the arts, representing creative thinking and soft skills also needed by Maine's employers, current and future. The University of Maine System is focused on this priority with a system-wide approach.*



**Primary:** University of Maine System, Maine's private colleges and Universities, community colleges, Career and Technical Education Centers

**Supporting:** MIEAB member organizations, Maine STEM Council

- Align and adequately resource education and workforce training with needs of knowledge-based employers
- ★
- - Align and adequately resource the implementation plan of the Maine STEM Council
  - Develop strategies to leverage retraining of new immigrants, older adults and displaced workers
  - Provide ongoing professional development for existing scientists and technical staff

*This tactic supports the efforts of the Maine STEM Council to analyze gaps in existing education and workforce training programs in STEM in meeting the needs of the State's employers. MIEAB supports the recommendations of the Council and plays a key supporting role in helping ensure individual efforts as employers align with the efforts of the Council. The member organizations of the Idea Network of Biomedical Research Program (INBRE) also play a role in this tactic to ensure continuing professional development of science and technical staff at member organizations.*

**Primary:** Maine STEM Council, Legislature, and Governor's Office, INBRE network members

**Supporting:** Career and Technical Education Centers

KEY: ● MIEAB LEADERSHIP  
★ MIEAB MEMBER LEADERSHIP  
■ PUBLIC POLICY OR RESOURCE

## IN PRACTICE



### Susan MacKay, Ph.D

CEO, Cerahelix

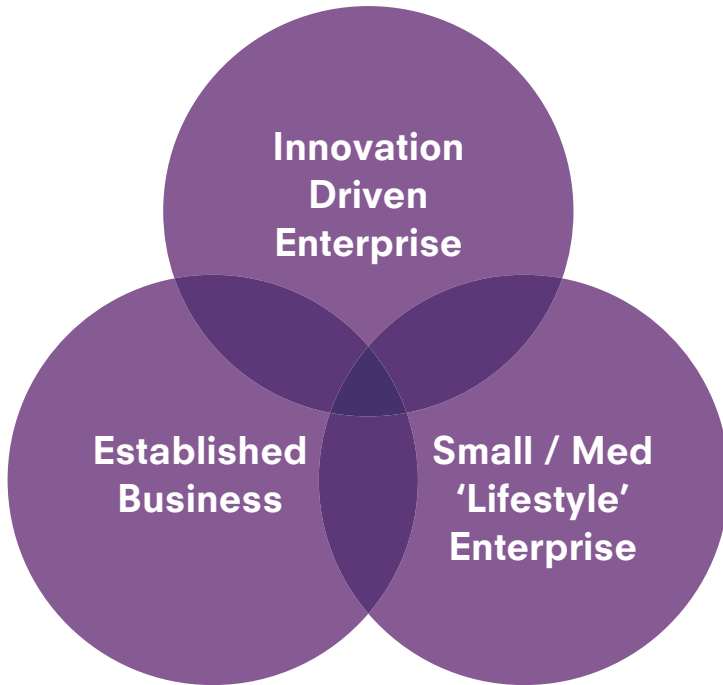
Cerahelix is a tenant in the Upstart Center for Entrepreneurship (formerly Target Technology Center) in Orono, one of the State's technology incubators. The company was founded in 2011 by Susan MacKay – who has 20 years experience in product development and materials R&D, and was named a Mass High Tech “Woman to Watch.”

Cerahelix develops technology to enable process manufacturers working in harsh environments to operate sustainably by providing high purity durable filtration, and thereby

**reducing both  
operational costs  
and environmental  
impact.**

Cerahelix was selected as a finalist in the MassChallenge accelerator in its first year. Since then, it has leveraged \$2.5 million in federal SBIR grants from the National Science Foundation and the Department of Energy to take its technology from proof of concept to working full scale prototype, and has also raised \$1.4 million in seed stage Angel investment from Maine-based investors – including Maine Technology Institute and Maine Venture Fund and – to support early sales.

# Entrepreneurial Capacity and Culture



## BENCHMARK

**Maine will improve its score in the Risk Capital and Entrepreneurial Infrastructure Composite Index compiled by the Milken Institute biannually to move up by 3-5 places in state rankings.<sup>1</sup>**

*Business starts and enterprise growth need different strategies and resources, depending on the type of enterprise. Strategies tailored to more predictable “lifestyle” enterprises are different than those needed by innovation-driven or disruptive companies. Likewise, the timeline to success may be longer or shorter, depending on the type of company or product. Innovators within established businesses also need to be nurtured if Maine companies are to remain competitive and to grow.*

*Furthermore, commitment and alignment of resources is critical but not sufficient. The system must also “innovate innovation,” which means it must be open to new people and new ideas. The strategies balance these needs to tailor services and systems, align players, and celebrate successes from wherever they come.*

**KEY:** ● MIEAB LEADERSHIP  
 ★ MIEAB MEMBER LEADERSHIP  
 ■ PUBLIC POLICY OR RESOURCE

## STRATEGY

The State of Maine will continue to develop and cultivate the education, mentoring, financial, and cultural supports for the successful emergence and growth of entrepreneurial and innovative enterprises, by:

- C1. Increasing the number of knowledgeable entrepreneurs**
- C2. Increasing the number of new business starts and businesses scaling across the state, and the number of innovators within existing businesses**
- C3. Celebrating the successes of Maine entrepreneurs**

## THE TACTICS

### C1. Increase the number of knowledgeable entrepreneurs

- ★ Further develop existing tools and metrics to understand
- Maine’s entrepreneurial capacity at any point in time
  - Identify gaps in entrepreneurial knowledge, and develop and continually adapt programs to help entrepreneurs remain relevant in the market
  - Support programming applicable to a wide variety of industries to address entrepreneurial capacity, while also enhancing our ability to support emerging clusters that require specific talent, resources and tools
- Ensure that those entities involved in training and developing
- ★ entrepreneurial talent are coordinating effectively
  - – Support network-building and coordination
  - Foster the development of entrepreneurial thinking and action through academic and experiential programming in Maine’s elementary, middle and high schools, Career Technical Education (CTE) centers, as well as at the undergraduate level
  - Encourage private philanthropy to support entrepreneurial service organizations and venture-development organizations

*A greater density of knowledgeable entrepreneurs in Maine is a critical ingredient for growth. While Maine does have strong publicly supported lead organizations providing services to entrepreneurs, this plan recognizes that Maine also needs strong participation from serial entrepreneurs and private sector actors. It also recognizes that private sector financing institutions are crucial to this effort and public sector efforts should encourage and lead to private sector support.*

Primary Responsible Organization: **MTI**, as backbone host organization and convener of networks like **Maine Accelerates Growth**, a network of entrepreneurial support organizations and champions, including **MIEAB member organizations**

Supporting Organizations: Educate Maine, Legislature’s Joint Standing Committee on Education & Cultural Affairs, Maine Philanthropy Center, private sector finance institutions.



## C2. Increase the number of new business starts, business scaling, and innovators within existing businesses

- Improve supports for entrepreneurial business starts and growth
  - ★ – Differentiate the types of supports needed by type of company, and align tools appropriately
  - – Improve systems for leveraging discoveries developed within or recruited to the State (see R&D Tactic 1)
  - Improve systems for leveraging talent developed within or recruited to the State (See Human Capital Tactics 1 & 2)
- Ensure access to capital for entrepreneurs and innovators
  - ★ – Recruit and educate high net worth individuals across the State to invest in entrepreneurs and entrepreneurship
  - – Continue to support and resource programs that enhance the quality of investment opportunities
  - Continue to funnel investment through MTI into innovation and commercialization initiatives
  - Support and improve the Maine Seed Capital Tax Credit
  - Continue and resource the Maine Venture Fund
  - Leverage national trend towards impact investing through Coastal Enterprises Inc. and Maine Community Foundation

*R&D capacity, talent capacity and the establishment and growth of strong enterprises are fundamentally connected. Maine must continue to tailor resources to the varied needs of enterprises and not provide “one-size-fits-all” support. Private financing institutions are important players, and public sector efforts should work to encourage their participation.*

**Primary:** MTI, MVF, MCED, DECD and LCRED and Appropriations Committees of the Maine Legislature

**Supporting:** Other MIEAB members, other economic development agencies, private philanthropy, SCORE and Maine SBDC

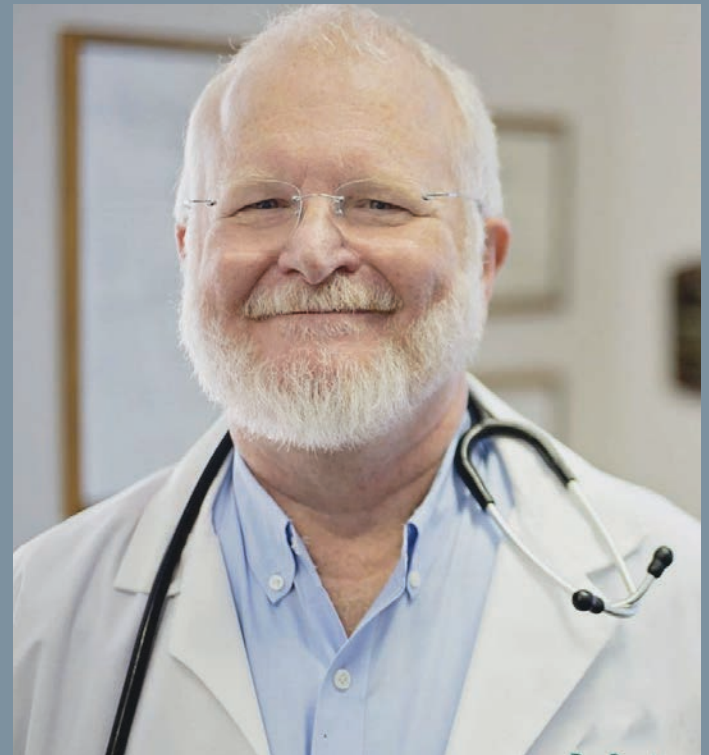
## ● C3. Deliberately cultivate a culture of innovation and connect entrepreneurs to each other and to resources

- Support events and programs celebrating risk-taking, entrepreneurial aspiration and design thinking
- Further invest in proven successful strategies and take risks on testing new ideas
- Provide deliberate opportunities for entrepreneurs and innovators to connect with existing and new networks
- Promote and resource initiatives within post start-up companies that support their scale-up and accelerated growth
- Encourage Small and Medium-Sized Businesses to innovate to accelerate growth and increase diversification

*A supportive environment and culture are needed for entrepreneurs and innovators to take risks, try innovations and aspire to growth and success.*

**Primary:** Maine Accelerates Growth network and partner organizations

**Supporting:** Traditional economic development professionals



## Dan Mingle

*Founder, Mingle Analytics, South Paris*

Dan Mingle was a doctor running a practice in Norway, Maine, who recognized a need for more efficiency in the healthcare system. Instead of complaining about it, he saw an opportunity to build the solutions he wished for. In 2012, he founded Mingle Analytics, focused on helping healthcare providers comply with Medicare reporting requirements.

Since opening his business, Mingle has been racing to keep up with demand, and now employs 63 people. He raised a \$900,000 seed round in early 2016 from investors including Maine Venture Fund, Coastal Ventures, Boston Millenia Partners, and angel investors from both the Maine Angels and angels in Bangor. The opportunity is so great that Mingle reinvests all profits back into the company to grow as quickly as possible, and plans to raise a Series A sometime later in 2017. He notes proudly,

**“We are the second largest company of our kind in the nation—run out of South Paris, Maine.”**

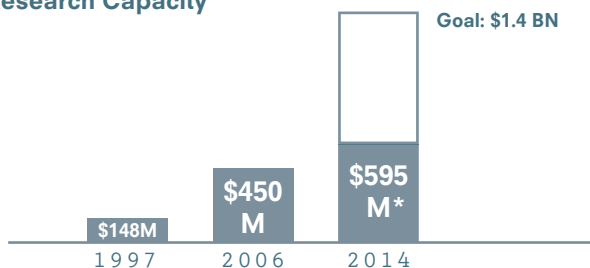
Source: Maine Startup Insider

# Progress & Work to Do

## PROGRESS AGAINST 2010 PLAN

The 2010 plan focused on three benchmarks.

### 1. Research Capacity

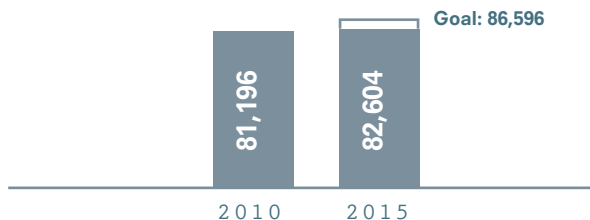


Benchmark: R&D activity will reach \$1.4 billion (3% of gross state product) by 2015

Progress: Progress was made but benchmark was not met.

\*1.1% of gross state product. 2014 data from the Maine Economic Growth Council's upcoming 2017 Measures of Growth report.

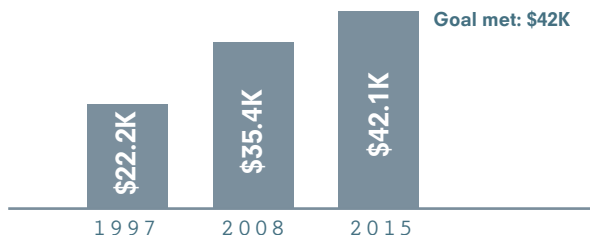
### 2. Innovation Employment



Benchmark: Increase innovation sector jobs by 5,400 by 2015

Progress: Aggregate employment in the innovative intensive sectors identified by NAICS codes in 2010 declined by 2015. However, new NAICS codes have been included in innovative intensive sectors as innovation and technology becomes more ubiquitous. Aggregate employment in those sectors grew slightly from 2010 to 2015. Slight progress made but benchmark not met.

### 3. Per Capita Income



Benchmark: Increase per capita income to \$42,000 by 2015.

Progress: This benchmark was met.

*Maine still has work to do to fully realize its potential as an innovation economy and to meet the benchmarks set in the 2010 Maine Innovation Economy Action Plan, but it has made some progress. Here are a few highlights:*

### State Investment in R&D Infrastructure

The State of Maine has invested \$53 million of bond funds in R&D assets through the Maine Technology Asset Fund (MTAF), administered by Maine Technology Institute. In 2016, a \$50 million R&D bond was enacted and signed by the Governor. That bond will appear on the June 2017 ballot seeking voter approval. Through January 2017, the MTAF investment results\* are:

**795** jobs created (salary ranges from \$20-150K)

**1068** jobs retained (salary ranges from \$20-130K)

**58** new joint ventures and strategic partnerships

**14** workforce training programs

**100%** of award recipients have secured new grants or contracts as a result of MTAF-supported infrastructure; 413 new grants or contracts totaling \$293,591,315

**79%** of award recipients have developed new products or services

**72%** of award recipients currently have contracts or research agreements with Maine companies using the MTAF funded infrastructure

**52%** of award recipients' cluster or industry sector have also developed new products or services with shared infrastructure

**61** IP protections filed

**\$196,407,214** in sales revenue based on use of MTAF supported infrastructure

**\$130,000** in licensing revenue

**\$37,316,864** in additional debt or equity raised by recipients

\*Cumulative results from economic impact surveys (63.8% return rate) as of 12/29/16

### Educational Opportunity Tax Credit

On July 1, 2016, the Educational Opportunity Maine Tax Credit (known as "Opportunity Maine") was greatly expanded: Eligibility was expanded to any United States college graduate with student loan debt who lives and works in Maine and expanded to include graduate degrees. Prior to this change, only those who graduated from Maine colleges as undergraduates and lived in Maine could take advantage of the credit. The credit was expanded to include an employer program, encouraging Maine employers to make payment of an employee's student loans part of a benefit package. The tax credit then accrues to the employer, rather than the employee. Finally, with a degree in a STEM related field the tax credit becomes a fully-refundable income tax credit (meaning graduates are eligible to receive the full benefit of the tax credit even if it exceeds their Maine income tax liability).

This powerful recruitment and retention tool is now being actively marketed both within and outside the State by a



partnership between the Opportunity Maine coalition, Educate Maine and a privately supported effort, Live + Work in Maine (liveandworkinmaine.com), a web presence geared towards young professionals with an affinity for life in Maine.

### **Innovate for Maine Fellows**

The University of Maine established the Innovate for Maine (IMF) Fellows program as part of a collaborative initiative known as “Blackstone Accelerates Growth.” The IMF program connects the best and brightest Maine college students with Maine’s most exciting, growing companies as a way to change attitudes about opportunities in Maine and to encourage talent through innovation and entrepreneurship. College and graduate students with a Maine affinity (from Maine or attending college in Maine) are eligible to apply. Students and companies come together to collaborate on innovative projects that will accelerate company growth and give students a paid, meaningful, hands-on internship experience.

All fellows participate in a one-week innovation boot camp that allows them to bond with each other, network with business leaders, and learn everything they need to know to be successful in their fellowship. The boot camp brings together students from all majors and backgrounds to form a close-knit cohort. This cohort is an important part of their support system for the duration of the internship.

From coffee and chocolate to wind turbines and tropical fish, Innovate for Maine Fellows have the opportunity to work on a number of projects over the course of their fellowship. With each new project, they are able to gain valuable, real-world experience in a variety of industries.

“The Innovate for Maine internship was the greatest experience of my college career so far. It didn’t only change my life for the time that I was in it. It has continued to change my life decisions and thought process well after completing it. I would not simply recommend this internship, I would urge any college student to take this opportunity! Trust me, it will change your life!”

### **CONCLUSION**

When the people and institutions of our State are creating new knowledge and technology, innovators and entrepreneurs are building startups and growing their businesses, and the workforce is educated and trained in the skills to utilize the latest advances, then all Mainers will benefit from increases in growth and prosperity. This plan, with significant public sector support and public-private partnership, can help demonstrate the value of innovation economy activities to the private market. As the private sector realizes the opportunity, it can assume a greater responsibility for the innovation economy, leading to efficiency that drives growth and prosperity for Maine.

## IN PRACTICE

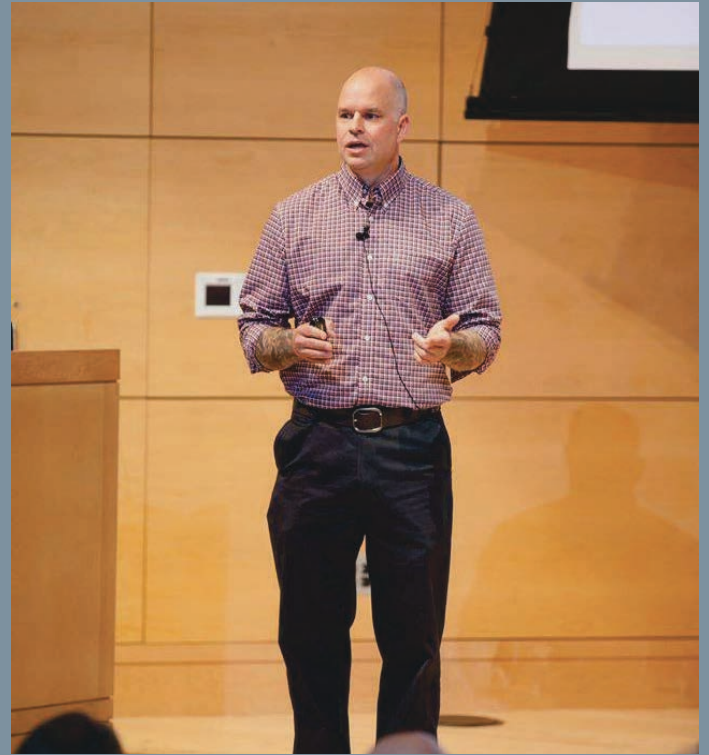


Photo credit: Maine Center for Entrepreneurial Development

## **John Rooks**

*Co-founder, Rapport*

**Rapport is a Portland-based software company on a mission to democratize sustainability – and a great example of how Maine’s interconnected entrepreneurial ecosystem can help a new business.**

**Rapport was first invited to pitch at House of Genius in 2015. It went well, and they decided to join TopGun 2015, run by Maine Center for Entrepreneurial Development. They proceeded to win the 2015 TopGun Showcase, which led to attention from the Environment and Energy Technology Council of Maine, and participation in intentional clean-tech accelerator, CleanTech Open.**

**At the same time, the 2015 Maine Startup and Create Week attracted the attention of Steve Case, who brought his Rise of the Rest to Portland in 2016. At that event,**

## **Rapport pitches to Steve Case and a panel judges... and wins.**

**The Case investment brought local investors off the sideline to also invest. Rapport was able to match these with a Maine Technology Institute Development Loan... and now they are off running to the next milestone.**

## NOTES & APPENDICES

### ENDNOTE

1. The Center for Jobs and Human Capital of the Milken Institute analyzes multiple data sets to provide a composite State Science & Technology Index every two years. The benchmarks proposed in this 2017 Innovation Economy Action Plan are from three of the five composite indices that make up the overall Index. Information about what data goes into each component index is found at: <http://statetechandscience.org/statetech.taf?page=state&state=ME>

### APPENDIX 1

#### Maine's Seven Targeted Technology Sectors

##### Biotechnology

Maine has developed distinct knowledge and skills in genetics and genomics as well as commercially successful products in the diagnostics markets based on knowledge of antibodies and related biochemistry and biology fields. The large and growing volume of research indicates potential clusters that may emerge in the future, while the diagnostics/antibodies industry represents a current emerging cluster. There are overlaps with the information technology and precision manufacturing sectors via bioinformatics and bio-manufacturing.

##### Composites & Advanced Materials

Composites and advanced materials is the technology sector which, as a whole, best approximates a sustainable cluster in Maine today. The sector and its industries are grounded in a clearly defined set of knowledge and skills that are strongly identified with Maine. Both formal and informal networks have arisen to develop and widely diffuse the key knowledge and skills. There is a long track record of entrepreneurship in the historic boat building industry, which has adapted to new market conditions, and in new companies looking to develop new products made from composite materials for the industrial and renewable energy markets. Finally, there is a substantial critical mass of commercially successful firms selling their products in global markets based on the knowledge and skills centered in Maine.

##### Environmental Technologies

The Environmental Technologies sector represents a highly diverse sector from which has emerged a clear set of directions in the fields of environmental services and engineering. Maine has a definable advantage in the knowledge and skills in this area, with a diversifying set of activities to meet growing markets. Maine's own commitment to a high quality environment serves as a spur to innovation in this field, which may permit national and global markets to be served. The environmental services subsector is the one part of this diverse sector that has the characteristics of a sustainable cluster.

Technology development and application has been growing in Maine over the years, with the convergence of market demand, innovation in composite materials, leadership from the University of Maine and industry players such as Cianbro and Reed & Reed, and Maine's natural tidal and wind assets. The worldwide demand for certified "green" products is also growing, presenting a ripe opportunity for Maine.

##### Forest Products & Agriculture

Forest products and agriculture are both grounded in a very solid base of knowledge and skills backed by extensive research facilities centered at the University of Maine. Since these sectors have been embedded in the Maine economy for so long and have achieved significant scale of operations, both forest products and agriculture contain a number of clusters that have shown they are sustainable over time.

Though still facing mature and highly competitive markets, there are opportunities for innovation in each subsector that may provide new chances for growth. Some of these opportunities are variations on traditional product lines, such as the increasing market for specialty and locally produced foods and beverages for niche markets. Others are at the cutting edge of biotechnology as in biofuels and bioplastics, which will require significant growth in Maine's research capacities.

##### Information Technology

Information technologies and the knowledge and skills associated with them are so widely diffused throughout the economy that one must look for more defined areas of specialization to identify potential clusters of competitive advantage. Maine has developed a specialization in geospatial technologies, which is an emerging cluster. In addition, new media, bioinformatics and the application of IT to measure and control technologies are all potential clusters.

##### Marine Technology & Aquaculture

Aquaculture exhibits the characteristics of a sustainable cluster. The markers for its products are strong and could grow significantly, given the world's demand for seafood and the severe pressures on capture fisheries. It is a technically complex industry that still faces a number of challenges in mimicking the functions of natural ecosystems to grow and sustain organisms, but a robust research and skills base exists in Maine to meet these challenges. The strength of the research foundation in Maine, together with growth in demand for technologies related to ocean observing and measurement over the next decades means that new clusters may yet emerge from this sector.

##### Precision Manufacturing

The precision manufacturing sector includes two distinct sub sectors: metal products and electronics. Each has a small number of very large world-scale firms and a much larger number of smaller companies serving a variety of customers, primarily outside Maine. The electronics sector shows high rates of innovation as measured by patents. Innovation capacity rests primarily within the private sector, though higher education institutions provide some support. New areas of activity include network development, training and certification in aviation manufacturing as well as an emerging group advancing biomanufacturing in Maine.



## APPENDIX 2

### Maine Innovation Economy Advisory Board Members

#### Current Board Members

Andrew Anderson, PhD UNIVERSITY OF SOUTHERN MAINE  
Brian Whitney MAINE TECHNOLOGY INSTITUTE  
Christopher Davis MAINE AQUACULTURE INNOVATION CENTER  
Dale Syphers, PhD BOWDOIN COLLEGE  
Donald Perkins GULF OF MAINE RESEARCH INSTITUTE  
Donald St. Germain, MD MAINE MEDICAL CENTER RESEARCH INSTITUTE  
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AND COMPOSITES CENTER  
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John Burns SMALL ENTERPRISE GROWTH FUND, DBA MAINE VENTURE FUND  
John Ferland OCEAN RENEWABLE POWER COMPANY  
Karin Gregory, Esq FURMAN GREGORY DEPTULA, CTM VENTURES AND  
BLUE HIGHWAY CAPITAL  
LuAnn Ballesteros, designee for THE JACKSON LABORATORY\*  
Patricia Hand, PhD MOUNT DESERT ISLAND BIOLOGICAL LABORATORY  
Peter Merrill DEARBORN PRECISION  
Peter Murray  
Rita Heimes, Esq  
Robert Peacock  
Steve Von Vogt MAINE COMPOSITES ALLIANCE  
Terry Shehata, PhD, designee for UNIVERSITY OF SOUTHERN MAINE\*  
Whitney King, COLBY COLLEGE  
Vacancy, UNIVERSITY OF NEW ENGLAND\*

\*institutional position by statute, currently vacant

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#### Other Stakeholder Groups

MAINE DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT  
MAINE STEM COUNCIL  
SCORE  
MAINE MANUFACTURER'S EXTENSION PARTNERSHIP  
COASTAL ENTERPRISES INC.  
FINANCE AUTHORITY OF MAINE  
MAINE DEVELOPMENT FOUNDATION/MAINE ECONOMIC GROWTH COUNCIL  
MAINE & CO  
MAINE ANGELS  
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Produced by Maine Innovation Economy Advisory Board  
with support from Maine Technology Institute



