

A DIALOGUE WITH THE  
JOHN ADAMS INNOVATION INSTITUTE GOVERNING BOARD



# CONVERGENCE

IDEAS ■ MARKETS ■ SECTORS ■ RESOURCES



Bill Roy of Peerless Precision setting up a Haas VF3 CNC Milling machine.



**Patricia M. Flynn**, Trustee  
Professor of  
Economics and  
Management,  
*Bentley College*

**“The Index isn’t a marketing document; it is an analytical tool to help assess where Massachusetts is, and what we must do to remain competitive. We aren’t hiding anything.”**

**Creating the Right Tool for the Job**

*The Index of the Massachusetts Innovation Economy turns ten this year, and it remains one of the best analytical tools for measuring the innovation process in the*



Gov. Mitt Romney at April 24th event (State House Photos/Abby Brack)

## Putting Nano To Work

NSF awards \$16 million to UMass Amherst to support the Center for Hierarchical Manufacturing

**AMHERST** – Massachusetts is now poised to lead the nation in integrating innovative nanotechnology processes into manufacturing techniques and platform technologies, and then placing them into manufacturing test beds.

On April 24, the University of Massachusetts Amherst received a \$16 million award from the National Science Foundation to support the Center for Hierarchical Manufacturing under the Nanoscale Science and Engineering Center (NSEC) program. At a State House ceremony, Gov. Mitt Romney hailed the award, joined by University of Massachusetts President Jack Wilson and other dignitaries.

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*“Of critical importance to the success of the proposal was \$2 million in state matching funds provided by the John Adams Innovation Institute.”*  
Jack Wilson



UMass President Jack Wilson

## The Big Picture on Nano

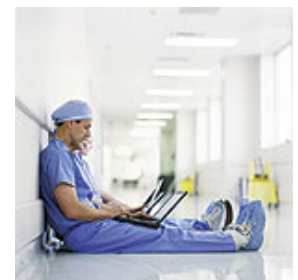
## WANTED: Skilled machinists

*Investing to build a sustainable pipeline of workers in Western Massachusetts to keep the precision machining sector from grinding to a halt*

**WESTFIELD** – When Berkshire Industries recently advertised for an experienced operator of coordinate measuring machines, computerized equipment used to measure exactly machined parts after fabrication, they received applications from a worker from a local steakhouse, a worker with food service industry experience, and a former Yankee Candle Co. worker. “We got the butcher, the baker, and the candle-stick maker, but no one we could hire,” Al Nickerson, Vice President at Berkshire Industries, told *The Springfield Republican*.

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## To Your e-Health!

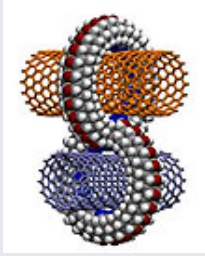


**WESTBOROUGH** – Landmark legislation creating universal health insurance coverage in Massachusetts was signed into law on April 12 and contained a

*New survey of cluster puts the focus on how best to shape the future of one of Massachusetts fastest emerging technology-based industries*

**WALTHAM** - Patricia M. Flynn, Trustee Professor of Economics and Management at Bentley College in Waltham, has chaired the Advisory Committee of The Index of the Massachusetts Innovation Economy since its inception 10 years ago. In an interview with **Convergence**, Flynn shares her insights into how the Index has evolved into one of the best analytic tools for measuring the innovation process—and some ideas for improvement looking at the next ten years.

[More >>](#)



**CAMBRIDGE** -- Many of the movers and shakers within the Massachusetts nanotechnology cluster — academic researchers, small firm entrepreneurs, venture capitalists, research center directors and policy makers—met recently at the MIT Faculty Club to discuss and explore ways that the rapidly growing cluster could better organize itself. [More >>](#)

### Innovation Institute Investments

**DARTMOUTH** – To help create a **Massachusetts Ocean Observation System Center** at the University of Massachusetts in Dartmouth, the John Adams Innovation institute has invested \$150,000 from its Collaborative R&D Partnership Development Grant Program. [More >>](#)

**WORCESTER** – To help establish a **Collaborative Imaging Biomarker Center**, the University of Massachusetts Medical School in Worcester was awarded \$50,000 by the John Adams Innovation Institute. [More >>](#)

**SALEM** – On May 3, the Hawthorne Hotel and the Peabody Essex Museum in Salem will host a one-day conference exploring the intersection of the innovation and creative economies, entitled: **The Innovation Agenda – Growing the Creative Economy**. [More >>](#)

provision for \$5 million to spur the implementation of Computer Physician Order Entry (CPOE) at community hospitals.

[More >>](#)

### Making the Move to Ubiquitous Broadband Access



**BOSTON** – At the heart of the upcoming May 1st meeting of the Governing Board of John Adams Innovation Institute is a vital dialogue that will inform the Commonwealth's role in shaping our broadband infrastructure for a generation to come.

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## Putting Nano To Work

*(Continued from front page)*



*Sen. Kennedy and UMass President Wilson*

“We are thrilled that the National Science Foundation has recognized the scientific excellence at the University of Massachusetts Amherst,” said Jack Wilson, president, University of Massachusetts. “This is the second major award of federal research dollars for nanotechnology that the University of Massachusetts system has received

during the last two years. Of critical importance to the success of the proposal was \$2 million in state matching funds provided by the John Adams Innovation Institute.”

The Innovation Institute provided critical support for the new center by pledging a matching investment of \$2 million, with the goal of placing emphasis on the adoption and deployment of innovations in nano-electronics and bio-nanotechnology by Massachusetts companies.

“This generous grant will help the University of Massachusetts to advance its deserved reputation as a nanotech leader and center of excellence,” said Gov. Romney. “Nanotechnology is an important part of our state’s economic future, and this center will show graduates and businesses that we are committed to this promising new field.”

[Link to State House press release of the event on April 24](#)

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**The Innovation Institute’s Research Center Matching Fund** has made awards and commitments totaling more than \$11 million to date. These investments are expected to leverage more than \$45 million in federal and industrial research dollars over the next five years, creating 500 new, high-paying jobs, and seeding commercialization efforts in emerging technologies. All investments support technology-based economic development activities through partnerships involving Massachusetts academic institutions, affiliated teaching hospitals, and industry.

- Establishment of the Center of Excellence in Nanomanufacturing at UMass Lowell (and through it, the Center for High Rate Nanomanufacturing, a \$12.4 million partnership with Northeastern University and the University of New Hampshire, funded by NSF).
- Start-up funding for a Center of Excellence in Apoptosis Research at the Pioneer Valley Life Sciences Institute in Springfield (a joint venture of UMass Amherst and Bay State Medical Center).
- Matching grant for the Massachusetts Space Grant Consortium, a NASA-supported partnership between industry and 19 leading academic institutions



*Speaker DiMasi*

The Center for Hierarchical Manufacturing at the University of Massachusetts Amherst joins NSECs at Harvard and Northeastern, as well as MIT's Institute for Soldier Nanotechnology, as major federally sponsored nanotechnology centers located in Massachusetts. Coupled with the creation of the Innovation Institute-supported Center of Excellence in Nanomanufacturing at the University of Massachusetts Lowell, this award positions Massachusetts to be the leading U.S. center on design and manufacturing of nanoscale materials, devices and systems. The goal is to spur commercialization of nanoscale technologies, encouraging companies to locate their R&D and nanomanufacturing facilities in Massachusetts.

The new Center will have three major technical thrusts in developing products and markets:

- **Materials and processes.** Creation of the basic foundational technology for nanomaterials fabrication
- **Bio-nanotechnology.** Through the creation of intermediate products, such as protein assembly and separation and polymer-based drug delivery systems, the development of therapeutics, medical instruments, and dental equipment.
- **Nano-electronics.** Through the creation of intermediate products, such as nanoscale optical devices, hierarchical memory cells, and nano-patterned magnetic storage media, the development of memory chips, logic chips, and hard drives.

The new center includes two key industry partners — Lucent Technologies and TIAX LLC. Lucent will provide access to state-of-the-art facilities for nano-electronics, while TIAX will provide technology and market assessment and commercialization assistance related to technology transfer.

throughout Massachusetts, led by MIT.

- Framework for initiatives to enhance the mission of the Soldier Systems Center in Natick, one of two major Department of Defense research installations in Massachusetts.
- Development grant to support the establishment of the Center for Biomedical Innovation at MIT, in partnership with the Harvard-MIT Division of Health Sciences and the Harvard affiliated teaching hospitals.
- Development grant to support expansion of Center for Subsurface Sensing and Imaging Systems at Northeastern University, an NSF-supported Engineering Research Center. This grant has already lead to a major \$3.5 million contract selection by the Department of Homeland Security.
- Development grant to the University of Massachusetts Dartmouth, in partnership with the University of Massachusetts Boston, to create a framework for a Center of Excellence in Applied Ocean Observation Systems.
- Development grant to the University of Massachusetts Lowell, in partnership with the University of Massachusetts Dartmouth, Tufts University, and Worcester Polytechnic Institute, to support a pilot program at the Massachusetts Bio-Manufacturing Center.
- Development grant to the University of Massachusetts Medical School, in partnership with Harvard Medical School, to explore the feasibility of establishing a Collaboration Imaging Biomarker Center to support the Massachusetts bio-pharmaceutical and medical imaging clusters.

“Our partnership with industry is an important part of the equation,” explained Paul T. Kostecki, Vice Provost for Research University of Massachusetts at Amherst. “It will enable the new Center to provide levels of support beyond the efforts in traditional technology transfer settings, enhancing both the research agenda and commercialization efforts.”

In winning the award, the University of Massachusetts Amherst becomes the sole NSF-funded Center for Hierarchical Manufacturing in the nation under the NSEC program.

“Through this award, there is now growing national recognition of the University of Massachusetts Amherst as a prestigious academic research institution,” said State Senator Stanley Rosenberg.

**IN THE NEXT 10 YEARS**, according to a January 2005 study by Lux Research, more than 10 percent of products in three key sectors — manufacturing and materials, healthcare and life sciences, and IT and electronics — will utilize nanoscale processes in manufacturing. These products include everything from aircraft and sporting goods to medical instruments and orthopedic materials, from computer hard drives and logic chips to solar cells and embedded displays. Massachusetts is now positioned to capture a significant share of the new facilities and jobs that will be created.



Senate President  
Robert E. Travaglini



“To grow the Massachusetts Innovation economy, we must invest in success,” said Mitch Adams, Executive Director of the Massachusetts Technology Collaborative. “As Thomas Friedman so eloquently describes in his recent book, *The World Is Flat*, we face increasing competition from the global economy as technological and political forces converge, producing a level playing field

Newsletter from University of  
Massachusetts' President Jack Wilson  
reporting on Economic Development matters.

Mitchell Adams and Gov. Romney without regard to geography or distance. This award is proof positive of the value of making state investments in university matching grants to leverage federal research dollars – and enhancing the competitiveness of the Commonwealth's economy.”

Return to front page of **Convergence**.



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## **Machine tool shops face worker shortage**

Sunday, February 05, 2006

By WILLIAM FREEBAIRN

*Springfield Republican*

Executives at Berkshire Industries recently advertised for an experienced operator of coordinate measuring machines, the computerized equipment used to exactly measure machined parts after fabrication.

Vice President Al Nickerson said the position was important to the machine shop and would pay well.

In response to the advertisement, the firm received applications from a former Yankee Candle Co. worker, a worker from a local steakhouse, and someone with food service industry experience.

"We got the butcher, the baker and the candle-stick maker, but no one we could hire," Nickerson said.

The region has been battered by news that historic names in manufacturing have closed their doors or cut back their operations. Danaher Tool, a factory making wrenches for about 100 years, closed last fall and moved the work down South.

Ludlow Manufacturing is winding down its textile-making operations, which gave the town of Ludlow its name and most of its jobs for decades.

But all the bad news hides a seemingly contradictory fact: some types of manufacturing in the Pioneer Valley are not only going strong, they are having trouble finding enough workers.

Machine tool shops, which make parts on contract to major aerospace, medical and defense companies, have been complaining for more than a year about labor shortages. In particular, they are having trouble finding workers trained to operate computer-controlled machines that turn out complex parts to extremely precise tolerances.

"Manufacturing out here in Western Massachusetts is not dying. It may be killed off, but it's not dying," said Larry Maier, president of Peerless Precision, a machine shop in Westfield.

"We will get killed off, not by competition, but by lack of labor and lack of state support," he said.

Maier and a group of machine tool shop owners are pressing the state to help the industry out with worker training. Several grant proposals have been made and an allocation in the pending economic stimulus bill would provide \$150,000 for the Hampden County Regional Employment Board to begin a training program.

The machine shop owners have conducted internal studies showing just 22 area companies could hire 85 workers immediately if they could find qualified applicants. The machine shop owners' trade organization, the National Machine Tool Association, is struggling to make up ground since the training school it ran closed three years ago due to state budget cuts.

The group's new plan is to leave the running of schools to a network of area regional vocational high schools.

"We have a labor shortage that counters everything you read about layoffs," Maier said.

Unfortunately, it is not as simple as getting the machine shops to hire the workers let go from Danaher Tool, for example. Machine shop owners said privately that it's often difficult to get operators of less sophisticated tool machines to adapt to the highly computerized equipment on their shop floors.

Even those with exposure to computer-controlled equipment are not used to the complex three-dimensional parts required by aircraft engine manufacturers and medical device makers. In addition, the machine shops often run at full capacity and rush to complete orders for the contractors, requiring employees to work 10 to 20 hours of overtime on many weeks. The pay can sweeten that requirement, as trained workers can make \$15 an hour, and more for overtime.

There are an estimated 300 to 350 machine tool shops in Western Massachusetts, employing 10,000 workers, according to Buck Upson, president of Pioneer Tool Supply Inc.

His firm sells supplies to machine shops, but also makes some parts as well. Upson has been involved in efforts to promote manufacturing as a career.

"We have to change some of the views of our young people in the seventh and eighth grade who are unaware of the economic opportunities," he said.

A grant application is pending to hire a marketing and education coordinator who could become more aggressive about promoting manufacturing.

Upson said he would like to see an interactive DVD to show how modern most machine shops have become, to stress the pay of such jobs and encourage

students to consider it.

The machine shop owners believe that working through a network of area vocational high schools could help both the schools and their industry. The high schools could increase the number of students they train, and could begin to offer adult education at night, Upson said.

The machine shop group has historic ties to the Westfield Vocational High School machine shop program, one of very few in area high schools. The machine shop owners have contributed money towards the Westfield Vocational High School's purchase of new equipment in recent years.

However, the organization is also working with Dean Vocational in Holyoke and Chicopee Comprehensive High School. A new vocational high school in Springfield is on the drawing board, and it could include a machine tool program when built, officials said.

Westfield Vocational High School has seen rising interest from one group of students, instructors there said. Half of the students in one class there are of Ukrainian origin.

Some machine shop owners said they believe immigrant students have more appreciation for machining careers than their U.S.-born counterparts.

In addition to the students themselves, the machine tool owners said they struggle with guidance counselors and parents who can be resistant to the idea of children eschewing college to go directly to work in a shop.

Machine shop owners tell stories of students being advised not to enter manufacturing because it is a dying field.

"The guidance counselors and career specialists are not up to date," Upson said.

He and Maier preach a gospel that some parents will not want to hear.

"Half the kids in high school aren't college material," Upson said flatly.

Many students who are pressured to go to college by well-meaning teachers and parents end up dropping out, with only 30 percent of students in eighth-grade going on to complete a college degree, he said.

There are reasons for some wariness about the machine shop boom. Their business has tended to be cyclical, with booms followed by busts that end with the bankruptcy of many firms.

Such a cycle occurred in the 1980s and early 1990s, when a Cold War defense boom ended and dozens of machine shops went out of business. Maier said business cycles occur in all fields, and today's machine shops depend less on any one industry as clients.

There is support for the machine tool shops among legislators. Several attended a briefing by the machine tool association's Western Massachusetts branch last month in Southwick.

State Sen. Michael Knapik, R-Westfield, said the state's economic development efforts must recognize the importance that manufacturing can still have.

"It's not just about biotechnology, it's not just about emerging technologies. We have to focus on home-grown companies in Western Massachusetts," he told the machine tool meeting.

The high-end machine shops are not the only manufacturers struggling for employees.

Smith & Wesson Holding Corp., based in Springfield, has been hiring as demand for their handguns has grown in recent years. Company officials believe they could hire hundreds more workers as the company grows, but the average age of a worker there is over 50 today, and retirements are already a weekly occurrence.

The firm is having trouble hiring machinists to replace them, the company said.

At Springfield Technical Community College, a robotics program that trains students to work in advanced factories in the automotive, semiconductor and medical industries is struggling to attract and retain students.

"We cannot provide enough students for industry," said Doug M. Buckley, chairman of the electrical engineering technology department.

"It's not as attractive to students as it should be," Buckley said.

He said he believes regular news of layoffs at manufacturing companies has hurt his recruiting efforts.

"It's a public perception that's really killing us," he said.

The situation is so bad at some machine shops, they have had to turn away or subcontract work.

Nickerson, vice president of finance for Berkshire Industries Inc., said the larger shops have been trying to grow due to rising business from military and aerospace contractors. His company has gone from 125 workers two years ago to 165 today. It would hire more if it could, he said.

Local firms are stealing workers from one another in their desperation, he said.

One area where prospective employees lack is in math.

Math skills are a bigger and bigger part of the required background for workers

in the new manufacturing. Some companies require an associate's degree in a technical field, and all would like applicants to be proficient in geometry and algebra, which are required to program the computer-controlled equipment.

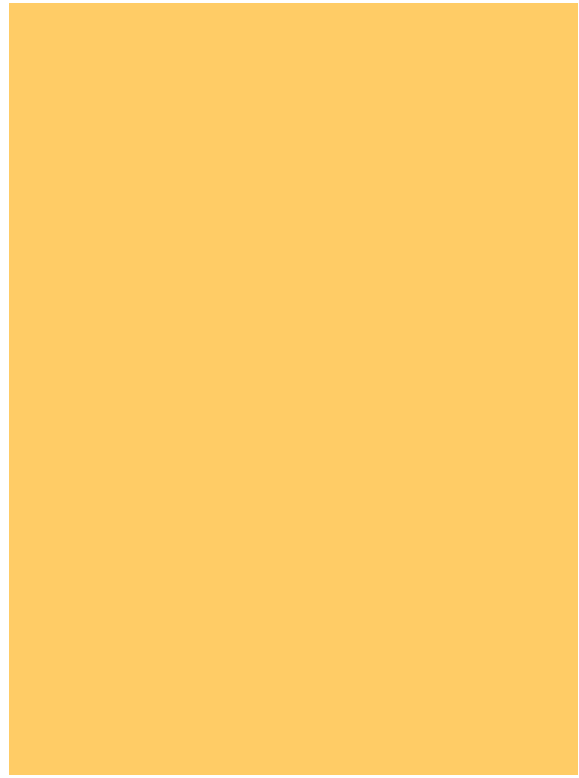
"It's not your grandfather's machine shop any more," Nickerson said.

The capacity problem is growing throughout the metal machining industry, the local group said. Large contractors are depending more on machine shops to solve the problem, but the threat that looms is that work could be sent to eastern Europe or Asia.

"If we don't figure out how to deal with the work here, the work's going to go somewhere else," Nickerson said.

"Right now these companies come to Western Massachusetts. We've got to keep that."

[Return to front page of \*Convergence\*.](#)



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## Wanted: Skilled machinists

***Investing to build a sustainable pipeline of workers in Western Massachusetts to keep the precision machining sector from grinding to a halt***

*(Continued from front page)*



The team of Industry Leaders and Politicians who worked together on this project: Rep. Don Humason - Westfield; Rep. Sean Curran - Springfield; Sen. Mike Knapik - Hampden County; Bill Ward - Regional Employment Board; Buck Upson - Pioneer Tool, West Springfield; Al Nickerson - Berkshire Industries, Westfield; Larry Maier - Peerless Precision, Inc. - Westfield; Jack Mitchell - Mitchell Machine, Springfield (not pictured); David Cruise - Regional Employment Board (not pictured)

million. Projected market growth in aerospace, defense and medical devices is very strong for the next five-seven years. Overall, the precision machine sector in the Pioneer Valley region of Western Massachusetts consists of more than 300 companies with about 7,500 skilled workers, according to a 2005 survey.

Workforce development is critical to the sector's continued growth, as many of the current employees are approaching retirement age. While a skilled worker in the precision machinery industry can earn excellent wages and benefits within the Pioneer Valley labor market, the industry suffers from a lack of trained workers at all levels in

The goal of the 18-month regional project, called RENEW, is to attract employees into the skilled positions that can sustain and grow the precision machining cluster in the lower Pioneer Valley, named the number-one traded cluster by the Pioneer Valley Regional Competitiveness Council.

The Western Massachusetts chapter of the National Tooling and Machine Association in Greater Springfield comprises more than 20 companies, employing about 900 skilled workers, with total gross sales in 2005 estimated to be about \$110

"State leaders have recognized the importance and the benefit of having a healthy tool and machining industry here in the Commonwealth," said



**State Senator Michael R. Knapik.** "I am confident these important funds for skilled workforce development will leverage continued growth on the side of industry in the area."

**[Read the Press Release](#)**

**New Investment To Help Grow the Greater Springfield Precision Machining Cluster**

this region

The program will also work to with schools to foster the necessary math, science, pre-engineering and machine tool education and training.

“We have to change some of the views of our young people in the seventh and eighth grade who are unaware of the economic opportunities,” said Buck Upson, President of the Pioneer Tool Supply Company, in a recent newspaper article.

[Return to front page of \*Convergence\*.](#)

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## Creating the right tool for the job

***The Index of the Massachusetts Innovation Economy turns ten this year, and it remains one of the best analytical tools for measuring the innovation process in the Commonwealth***

### How and why did the Index get started?

**Flynn:** There was a good deal of research in the 1980s and 1990s on high technology in Massachusetts and New England. It attempted to show how critical high tech was to Massachusetts. We're not a low-cost state, and we need to take advantage of our skilled workers and our universities.

Often, I would get very frustrated with the manner in which the data were collected. They were actually aggregated by industry—the computer industry, the chemical industry, etc. What the research 'showed' was that you couldn't measure innovation by measuring the industry group.

Massachusetts, as did other states, compiled lists of "high-tech" industries to focus on. Yet within the so-called 'high-tech' computer industry, for example, some companies were assembling circuit boards, and said they could really use workers with good needlepoint skills. In contrast, the textile industry in Massachusetts, which was often put on a 'low-tech' or 'no-tech' list, required workers with the ability to run very sophisticated, high-level electronic equipment.

The point was this: The existing data didn't help us when we were trying to make our case for the innovation economy. We needed a different kind of analytical research tool.

### When was this?

**Flynn:** It was early 1997, and Joe Alviani (the former executive director of MTC) and I had crossed paths several times, and we had discussed frustration with data availability, and its limitations in helping to promote strategies and investments in the innovation economy.

The next thing I know Joe suggests I join the board of MTC and suggests we create an analytical tool to help us better assess these issues.

And so the ***Index of the Massachusetts Innovation Economy*** was born.

**“The Index doesn't talk about policy implications, or make recommendations about how the money should be spent. It identifies and clarifies the key issues and economic trends.”**

**Patricia M. Flynn, Trustee  
Professor of Economics and  
Management at Bentley College**



Link to the pdf of **Index**



Link to the **Index** archive page

Developing the Index was particularly important for Massachusetts, because of our industry base, our high-tech types of activity, which were critically historically, and are key to the future of the state as well.

**It must have been a very daunting task.**

**What were the first steps you took in organizing the project?**

*Flynn:* It was challenging, but we had a lot of help. We first put together an advisory committee. We started out with 18 people. Remarkably, ten years later, ten of us are still serving on the advisory committee:

Along with myself, there's Alain J. Hanover, with Navigator Technology Ventures, Yolanda Kodrzycki, with the Federal Reserve Bank in Boston, Jim Utterback, a professor of Management and Innovation at MIT, David Fleming with Genzyme Corporation. Jeff Grogan a partner with Monitor Group, Aram Chobanian dean of the medical school at Boston University, Tom Chmura, vice president of economic development at the University of Massachusetts, and Bill Guenther, the president of Mass Insight. We subsequently added another twenty advisors from business, government and academia.

It's a very impressive group of people.

The first question we asked was: If we are going to try and measure innovation and its impact on the economy, what kinds of data do we need? Does it even exist?

We decided to mine a lot of existing data: venture capital investments, educational levels. We also made the decision to focus on three things:

- Results – not the dollar aspects. but the outcomes for people in business – jobs, wages exports
- The dynamics of the innovation process, including idea generation, and entrepreneurship
- Resources – defining the human technology and other resources Massachusetts had, defining what we have to work with

We also decided to compare Massachusetts with its competitors, with other leading technology states. That first year we had six other leading technology states, so we could look not just at what was happening here in the Commonwealth, but in states around the country.

**So, you were prepared to give the good news and the bad news?**

*Flynn:* Yes, we wanted to be fact-based, historical, and we wanted to provide both the good news and the bad news in terms of benchmarks, laying out the problems as well as the successes, to identify what we have to do better compared to our competitors. We wanted to track our progress —or lack thereof —against our competitors; we also wanted to learn from them.

The Index creates a set of facts in a quantitative fashion and identifies what the issues are. It looks at Massachusetts historically, looking at trends, examining years of data.

The Index doesn't focus on specific policy implications, or make specific recommendations about how state money should be spent. It identifies and clarifies the key issues and economic trends, laying the groundwork for development of policies in the public and private sectors.

**In 1997, this had never been done before and you were cutting from whole cloth. Is that correct?**

**Flynn:** Yes. We created the first Index of the Innovation Economy. Today, there are more than 20 states that are publishing a similar kind of document—they often call it a science and technology report, with a similar format. The UK did do an "Innovation Index," and they cited us as the model.

**How have things changed in 10 years of producing the Index?**

**Flynn:** The indicators we use are evolving, as the Massachusetts Innovation Economy evolves. As new data comes to our attention, we try to incorporate it. Our overall philosophy has remained the same—with the focus on results, the innovation process, and awareness about what our resources are.

The Index has never been a p.r. document. I once gave a presentation to a group of corporate executives who complained that they couldn't include the Index in their promotional materials because it laid out the problems as well as the good news.

That's exactly our goal: To identify the cracks in the system so that that people can react before they become fatal flaws. The Index isn't a marketing document; it is a analytic tool to help assess where Massachusetts is, and what we must do to remain competitive. We aren't hiding anything.

**Looking ahead to the next Index, what do you see?**

**Flynn:** I think what we'll see is that Massachusetts as a state is still very strong. We still do very well in several important areas associated with the Innovation Economy, such as in research and development and in venture capital. Yet, there are cracks in the system. The gaps between us and our competitors have been narrowing. The ten-year perspective should show where and how the other leading technology states are gaining on us.

There are also certain chronic issues in Massachusetts—housing costs, migration patterns, and the relatively low level of support for public higher education—that have emerged on a consistent basis over the last 10 years.

Regardless of who wins the election this year, the Index goes on. It is not about politics, it is about the underlying infrastructure and competitive advantage of the state. Massachusetts is never going to be a low-cost manufacturer. Its strengths are innovation and high-technology—where 'high-tech' is a stage of development, the creative, experimental, research oriented, front-end phase of the life cycle, not a particular industry or list of industries. The firms and industries in the state's high tech sector will change over time. What will NOT change is our dependence and need for a well-educated and

highly skilled workforce, and on R&D and venture capital.

The Index is a tool. It gives us benchmarks and guidelines to have the critical conversations about what Massachusetts should be doing with its scarce resources to support and foster its Innovation Economy.

[Return to front page of \*Convergence\*.](#)

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## The Big Picture on Nano

New survey of cluster puts the focus on how best to shape the future of one of Massachusetts fastest emerging technology-based industries

*(Continued from front page)*

The March 22 session, organized by the John Adams Innovation Institute and the Commonwealth's Executive Office of Economic Development, officially introduced a survey that is currently being conducted of more than 175 nanotech-related firms in Massachusetts.

The survey will develop a comprehensive profile of the sector, detailing the firms, the target markets, applications and products being developed, as well as facilities and services firms are likely to want, and also identifying barriers to the firms' potential growth. Key data points—such as an accurate number of people currently employed by the cluster—are expected to be part of the results.

The survey results will be presented at the **Bio Nano 2006** conference to be held in Boston in early May.

As an introduction to the discussion, Robert Kispert, director of Federal and University Programs at the Innovation Institute, provided an **overview** of the nanotech industry in Massachusetts, by the numbers.

- Massachusetts ranks nationally first in workforce, second in innovation, fourth in nanotech research, second in nanotech industry, and second in venture capital investment in nanotechnology. Venture capital investments in nanotechnology have doubled in the last year.
- The Commonwealth has developed a critical mass in research & development in nano – garnering \$26.04 per capita in federal awards. It is the home to three nanotech-focused national research centers at Harvard, Northeastern and the latest, announced April 10, at the University of Massachusetts Amherst.
- In addition, there are Department of Defense-funded Institute for Soldier Nanotechnologies, National Institute for Health-funded centers in nanomedicine at Harvard and MIT, and a nanotechnology in society research center at Harvard.

### John Adams Innovation Institute 2006 Survey of Nanotechnology- related Firms in Massachusetts



#### Overview of the Nanotech Industry



- The R&D capability has been bolstered by complementary state and institutional investments – more than \$8 million by the Innovation Institute in a Center of Excellence in Nanomanufacturing at the University of Massachusetts Lowell, a Center for High-Rate Manufacturing at Northeastern, and the Center for Hierarchical Manufacturing at the University of Massachusetts Amherst.
- Currently, the Innovation Institute has identified 175 companies, working in carbon nano-materials and applications, medical and industrial non-carbon nano-engineered material applications, devices for accelerated drug discovery, drug delivery technologies, renewable and portable energy technologies, lithography, microscopy, semiconductor capital equipment, and nano-enabled consumer products

Ranch Kimball, the Commonwealth's Secretary for Economic Development, then provided a detailed analysis of a new initiative, [Massachusetts Business Connect](#), as a way to engage with companies and connect with the resources and services Massachusetts has to offer.

Kimball used as an example the successful engagement with Proctor & Gamble, which recently purchased Gillette. After meeting with Proctor & Gamble executives, and getting a detailed list of research needs of the company, Kimball put together a two-day itinerary with research facilities and companies, many of which were focused on nanotechnology. The engagement led to 10 new agreements signed with Massachusetts' business and research entities.

Kimball praised Massachusetts nanotechnology cluster as one defined by its broad range of potential applications and products

A productive dialogue ensued, facilitated by Pat Larkin, Innovation Institute director, as the participants talked with each other about needs and issues confronting the cluster: recruiting top engineers, access to facilities, the transition of products to the marketplace, and resources.

"The meeting was a success," said Kispert. "It was a great starting point. Very few participants left after the meeting ended; instead, we all continued the conversation. Some of us stayed for more than 45 minutes."

[Return to front page of \*Convergence\*.](#)

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## Innovation Institute Investments

*(Continued from front page)*

**DARTMOUTH** – To help create a **Massachusetts Ocean Observation System Center** at the University of Massachusetts in Dartmouth, the John Adams Innovation Institute has invested \$150,000 from its Collaborative R&D Partnership Development Grant Program. This is the second of a series of complementary investments that the Innovation Institute anticipates making in the Marine S&T sector.

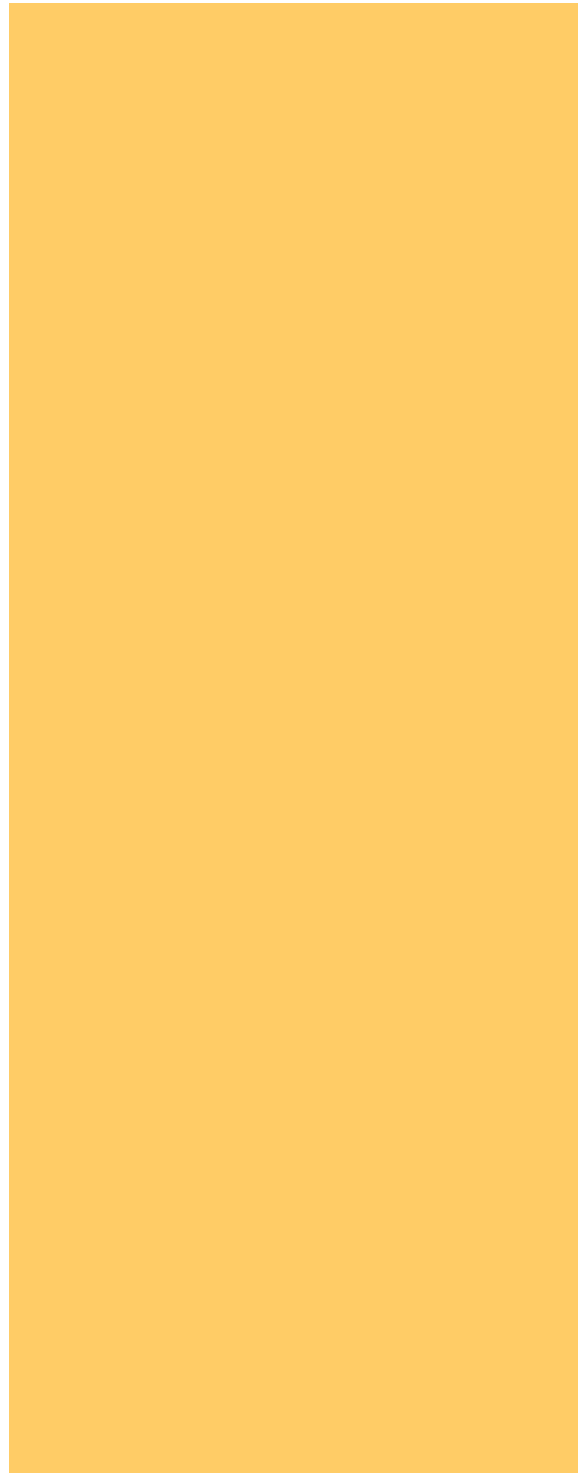
The new center will support the establishment of expanded major R&D partnerships and create the framework for a new Center of Excellence in Applied Ocean Systems.

The objective of the new center is to develop technology-based solutions that energize emerging markets in the marine science and technology sector. A recent report by the Donahue Institute at the University of Massachusetts documented that the marine science and technology sector is a major contributor to the state's economy, employing about 9,000 people and generating about \$1.5 billion in total sales a year. About half of the economic activity is concentrated in marine instrumentation and equipment.

The Dartmouth campus serves as the focal point for the multi-campus School for Marine Sciences and Technology (SMAST), with scientific expertise in ocean modeling and monitoring, fisheries science and management, coastal systems science, ocean acoustics, biogeochemistry, remote sensing and ocean engineering.

The center will be a partnership between UMass Dartmouth and UMass Boston, with expected additional academic partnerships with MIT and the Woods Hole Oceanographic Institution. Lockheed-Martin Sippican, one of the largest marine science and technology companies in Massachusetts, is an initial industrial partner.

At its February 6 meeting, the Governing Board of the John Adams Innovation Institute, Robert Gagorian, the President of the Woods Hole Oceanographic Institution, and Chancellor Jean MacCormack of the University of Massachusetts Dartmouth shared their vision of the emerging sector.



According to Gagosian, the potential economic benefits from increasing the predictive capability as a result of ocean exploration were enormous – hundreds of millions each annually in the recreation, commercial, fishing, defense and homeland security sectors.

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**WORCESTER** – To help establish a Collaborative Imaging Biomarker Center, the University of Massachusetts Medical School in Worcester was awarded \$50,000 by the John Adams Innovation Institute. The investment will assess the feasibility of the new center, with an additional \$100,000 reserved to support business model development if the feasibility study demonstrates the center's viability.

The feasibility study will determine the extent that industry will provide financial support to the new center, the potential commercial value of intellectual property generated by pre-competitive research, and the likelihood that the center can attract the necessary capital and operating funds.

The goal of the center is to accelerate drug development through the application of biomarker imaging techniques at the cellular and molecular levels.

To date, the project has received contributions from the University of Massachusetts President's S&T Fund and from Merck. AstraZeneca, Wyeth and Bristol-Myers Squibb are considering proposals to provide additional funding. The project was originally organized by Mass Insight through its Drug Discovery Working Group, an outgrowth of its Technology Roadmap study.

Members of the working group have included: AstraZeneca, Wyeth, Biogen, Merck, Partners Health Care, Mass General Hospital, the University of Massachusetts, PAREXEL, Bristol-Meyers Squibb Imaging, PerkinElmer, and Novartis.

When the Collaborative Imaging Biomarker Center is fully operational, it is envisioned to employ about 125 people and have an annual operating budget of about \$25 million.

The targeted activities of the center are projected to:

- accelerate drug development at lower risks and costs for pharmaceutical companies and biotech firms;
- provide access to facilities such as test beds for start-up and emerging biotech firms, as well as opportunities for strategic alliances with biopharmaceutical companies;
- support the expanded development and use of imaging technologies by medical device companies in support of minimally invasive surgery;
- attract additional R&D and equipment investment from imaging equipment manufacturers; and
- drive demand for and investment in improved imaging agents and

related informatics technology.

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**SALEM** – On May 3, the Hawthorne Hotel and the Peabody Essex Museum in Salem will host a one-day conference exploring the intersection of the innovation and creative economies, entitled: **The Innovation Agenda – Growing the Creative Economy**. The conference is being supported by a \$20,000 award from the Innovation Institute’s Regional Priority Fund.

The conference will feature Professor Edward Glaeser from the Kennedy School of Government at Harvard as the keynote speaker.

The morning session will also feature a “perfect brainstorm,” moderated by Editor George Donnelly of the *Boston Business Journal*, with Michael Goodman, the director of economic and public policy research at the University of Massachusetts’ Donahue Institute, John Schneider, vice president of MassINC, **Beth Siegel, president and co-founder of Mt. Auburn Associates, and Dan L. Monroe, executive director and CEO at the Peabody Essex Museum.**

For more information, call 1-888-832-3857 or visit [www.creativeeconomy.us](http://www.creativeeconomy.us)

[Return to front page of \*Convergence\*.](#)

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## To your e-Health!

The new healthcare law funds an initiative to provide Massachusetts hospitals with the technology to save lives, reduce costs and improve the delivery of medication to patients.

*(Continued from front page)*

This e-health initiative, championed by MTC Executive Director Mitch Adams in partnership with the New England Healthcare Institute, has the potential to save 500 patient lives and reduce \$275 million in health care costs a year, due to reduced medication errors and adverse drug events, according to a recent study.

The overall goal is to introduce CPOE at every hospital in Massachusetts during the next four years. In addition, the initiative is working to develop a payment model for hospitals to receive reimbursement based on reduced costs to managed care providers created by the introduction of CPOE. An advisory panel has been assembled to study benefit payment and performance models and develop metrics for "pay for performance" incentives.

According to a 1999 publication from the Institute of Medicine, as many as 98,000 Americans die each year due to medical errors, and about 1 million patients are injured. A significant percentage of these were attributed to problems with the delivery of medications in hospitals – either the pharmacy didn't understand the doctor's handwriting, there were incorrect doses of the drug, or there were bad interactions with other medications.

The CPOE system creates a sophisticated clinical support network that guides physicians' decisions, which is programmed into the hospital's data system at the point of ordering medication, avoiding many of these mistakes. "This initiative will create a higher quality of care and introduce cost-saving technology that will improve the delivery of medication – throughout the Commonwealth," Adams said.

The first steps of the initiative will be to assess the readiness of hospitals to introduce CPOE into their system of delivery for health care.

The changes required to introduce CPOE into a hospital are both technological



"We are looking to break down barriers impeding widespread implementation of advanced technologies at hospitals in Massachusetts. Our goal is to improve patient safety and realize cost-savings that improve the delivery of health care in the Commonwealth," said **Wendy Everett**, President of the New England Healthcare Institute. "This initiative, with its collaborative approach, is a terrific start."

and cultural, and this initiative, by working in collaboration with healthcare institutions, hopes to ease transition and shorten the learning curve.

“Adopting CPOE requires hospitals to carefully plan and prepare for its implementation, because CPOE touches so many departments, processes and professionals within the hospital system,” said Bethany Gilboard, director of Health Technologies at MTC. “Working together with the hospitals, we are committed to improving patient safety and encouraging the deployment of technology that supports it.”

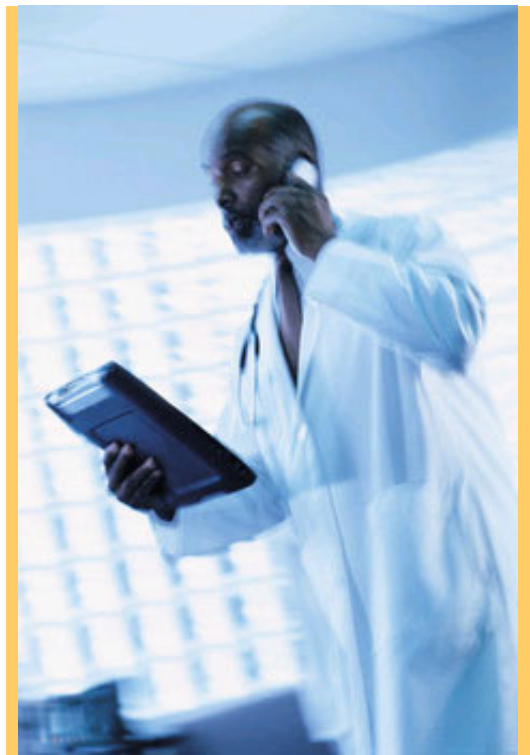
Part of the work will be making the business case for the real savings that can accrue by implementing CPOE at all Massachusetts hospitals. These savings accrue not just to hospitals, but to the insurance companies – or, in the vernacular, the payer market.

Using the findings of a study conducted at Brigham and Women’s, based on the introduction of CPOE in the obstetrics department, the initiative plans to build metrics that can be applied to community hospitals to demonstrate the savings achieved. The effort is being assisted by Dr. David Bates, M.D., Dr. Rainu Kashal, M.D., and Dr. Cal Franz, PH.D, the lead authors of the Brigham and Women’s study.

In addition, the initiative will be looking at the different accounting models to document and measure the cost-savings from the introduction of CPOE at a hospital, with an eye to creating performance metrics that all of the major managed care plans will agree to accept in principal.

“We are looking to break down barriers impeding widespread implementation of advanced technologies at hospitals in Massachusetts. Our goal is to improve patient safety and realize cost-savings that improve the delivery of health care in the Commonwealth,” said Wendy Everett, president of the New England Healthcare Institute. “This initiative, with its collaborative approach, is a terrific start.”

[Return to front page of \*Convergence\*.](#)



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## Making the Move to Ubiquitous Broadband Access

As the cost of wireless broadband technologies plummets the opportunity for Massachusetts exists to shape ubiquitous access for today's needs and scalable to mesh with the needs of tomorrow

*(Continued from front page)*

The first phase of Boston's efforts to build and deploy a citywide wireless network is now underway. The work is being directed by a 23-member task force, which is chaired by Joyce Plotkin, president of the Massachusetts Technology Leadership Council, Rick Burnes, co-founder and director of Charles River Ventures, and Jim Cash, retired professor, Harvard Business School. Mitch Adams, MTC's executive director, is a member of the task force.

Mayor Menino's Task Force has six working groups addressing everything from community outreach to ownership models. The successful deployment of ubiquitous broadband access in Boston, as in other major metropolitan areas, hinges less on the technical design and more on the ability to create a convergence between the requirements of wholesale and retail markets. The work is moving rapidly with expectations that the final recommendations will be published in July. All of this must be accomplished with an eye towards developing infrastructure, networks and business models predicated on the open standards that are capable of enabling access speeds at ten times current offerings across our economic landscape. WiFi technology is an affordable means to ensuring truly affordable broadband access.

Towards that end, a \$150,000 award from the Innovation Institute, leveraging a \$50,000 award from the Boston Foundation, will create the opportunity to spread the experience of the Boston Task Force throughout our Massachusetts communities.

At the meeting, members of the Governing Board will engage with the co-chairs of the task force in examining key questions – for Boston and the Commonwealth:

- What are the implications for existing telephony and broadband offerings now that municipal broadband efforts are catching fire across the nation?
- Will the City of Boston be able to synchronize its own marketplace

"The success factors for the Boston initiative include that there is access for everyone, it is affordable and sustainable, it provides a sound technological foundation, it has a carrier neutral transport, it is future-proof, and that there are no incremental costs to the city to build or manage the network," said Steve Gag, who is coordinating work on the wireless network for Boston Mayor Thomas Menino.

demand for infrastructure, network and access with broadband suppliers and other major market makers?

- What are the advantages and disadvantages of organizing around a municipal model?
- Will the Boston experience be transferable to other Massachusetts communities?
- Can we devise ownership and operational models that simultaneously guarantee access for all and trigger market rate offerings of higher speed access?

“The success factors for the Boston initiative include that there is access for everyone, it is affordable and sustainable, it provides a sound technological foundation, it has a carrier neutral transport, it is future-proof, and that there are no incremental costs to the city to build or manage the network,” said Steve Gag, who is coordinating work on the wireless network for Boston Mayor Thomas Menino. The Task Force Leaders will be with us on May 1st to help us imagine how the Commonwealth accelerates the shift into ubiquitous broadband for the Commonwealth.

[Return to front page of \*Convergence\*.](#)

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**Convergence: an e-publication of the John Adams Innovation Institute**

The John Adams Innovation Institute, the economic development division of the Massachusetts Technology Collaborative, is working to strengthen the state's knowledge- and technology-based economy. **Convergence** is a new electronic communication from the Innovation Institute that profiles emerging issues and activities within the Commonwealth's Innovation Economy.

In a manner similar to how our Governing Board has chosen to engage, **Convergence** intends to set out the issues, challenges and choices confronting practitioners and policymakers as they address the economic and social conditions necessary for vibrant growth in the Innovation Economy. This communication is an invitation to join in a broader dialogue about important issues facing Massachusetts.

The name **Convergence** was chosen to underscore the fact that no single individual or institution can guarantee the Commonwealth's future growth; rather, it is the "convergence" of our collective wisdom and capabilities, at every level and in every discipline, that will provide for our common future.

[Return to front page of \*\*Convergence\*\*.](#)



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